

Relationship Quality Performance, Rework And Worker Productivity With Customer Satisfaction On Housing Development Project

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Abstract : At recent time, with increasing levels of competition and greater demands for efficiency, construction service operators must be able to control or increase the productivity of construction projects. Based on these problems and challenges, the purpose of the research is to measure and know the behavior of various variables that influence the level of productivity, rework, and customer satisfaction on housing development projects. The results of the study can provide benefits for project implementers to control the level of tested variables more directed and systematic. To find out the effect of variables in the system can be done with a SEM PLS approach. Field survey method of solving complex problems that arise due to a causal tendency of various variables in the system. The model approach is needed because of the interaction between elements in the model need to be known. SEM PLS model can also provide recommendations for policy development related to quality management system and customer satisfaction.

Key Words: Quality Performance, Rework, Productivity, Customer Satisfaction, Housing Development Project

1. INTRODUCTION

At the project level, quality performance, rework and the level of productivity can influence customer satisfaction [1] [2]. Project quality is determined by the type of complexity of the project, labor, equipment, and project management. Quality performance, the level of productivity and customer satisfaction has a significant variation in the difference between a project and another project development [3], [4]. Quality performance and customer satisfaction at the housing project level, in general, measure the ability in producing of housing products with quality assurance, compare with customer satisfaction. Housing customer demand and product quality in supply factors, related one to another [5], [6]. In this relationship, ideal condition is housing product with quality assurance will took the balancing demand and supply. Several factors can be used to describe the situation, quality performance factors, rework factors, labor productivity and customer satisfaction factors [7]–[9]. A number of factors can be used to develop a quality management system model. The model based on SEM PLS to analysis relationship among the factors [10], [11].

2. LITERATURE REVIEW

2.1 Quality Concept

Many interpretations can be found related to quality definition since it was based on personal perspective [12]. Some may say “zero defect”, “meeting customer expectation”, “fitness for use”, etc. However, a detailed definition has been provided by the ISO 9000 :2015 i.e. “the degree to which a set of inherent characteristics of

(2019) gave a concise definition as compliance with requirements or specification. Juran then explained 2(two) important understanding in managing the quality. Firstly, high quality is viewed required extra cost. This concept is likely for investment purpose. once company able to fulfil customer’s needs then customer satisfaction automatically improved and more income can be expected later on. Secondly, high quality is viewed required low cost. This concept is likely for preventive purpose from rework possibilities. Quality is viewed free from defects, failures, customer dissatisfaction, disputes, or other things that required rework processed, etc. In this context, high quality is viewed required low cost since rework activities due to defects, failures can be avoided during the process [10] Furthermore, Juran provided extensive thinking and concept on how to manage quality accordingly by implementing 3(three) managerial approach, namely quality planning, quality control, and quality improvement known as “Juran’s trilogy” [10].

2.2 Rework

Over the past few decades, construction projects have been haunted by the problem of quality failure. It can be said, none of construction projects are free from rework due to defects or failures. Rework has brought adverse implication in terms of cost, schedule and customer satisfaction [5]. Previous literature has viewed rework as unnecessary effort of re-doing process or activity that was not done correctly at the first chance [13].

2.3 Customer Satisfaction

Customer satisfaction is the customer's perception of the extent to which customer expectations have been met [9]. Generally, there are 2(two) type of customers, i.e. internal and external customer. All personnel within the organization plays 3(three) important roles, i.e. supplier, processor, and customer [10]. Customer satisfaction has been realized as the important purpose in the development of construction project. In this context, construction team should view customer as a party that can assist them in completing the project within planned budget and quality [7]. Generally, there are several methods in measuring customer satisfaction, i.e. complaint and suggestion system, ghost

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an object to fulfils requirements” [9]. Meanwhile, Juran et al

shopping, lost customer analysis, and through customer satisfaction survey [8].

3. PROJECT QUALITY PERFORMANCE AND CUSTOMER SATISFACTION MODEL

Proposed model is built to prove the relationship between project quality performance factors and customer satisfaction factors in the residential development project. The model can be used for approach to strategic development for developers, contractors or. relevant stakeholders. Controlling in quality performance and customer satisfaction can improve value of product in the residential development project. Relationship between variables in the proposed model is shown in Figure 1.

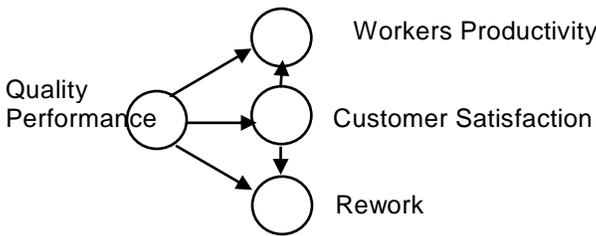


Figure 1. Relationship Between Variables in The Proposed Model

4. RESEARCH METHOD

The object or sample of the study is a housing construction project with the following criteria, (a) The type of construction is a residential building; (b) Location of the study in the South Tangerang City; and (c) Factors affected quality performance, rework and productivity from Contractors, (d) Customer satisfaction factors from residential buyers. Data compiling from field survey residential project and analysis as follows. The level of housing needs is shown by the statistical data, the data shows that the building needed is in accordance with population growth. The ability to meet needs will show a strong level of needs, this is influenced by purchasing power reflected by the level of income per capita. The housing construction is shown by data on housing construction by housing developers. Furthermore, quality performance, rework and productivity of project housing data supply by contractors. Customer satisfaction data from developer residential buyers. The relationship between the variables is compared with the data from the construction industry, housing sales, index of labor productivity for interpretation. The model between several data, analysis with SEM PLS.

5. DATA ANALYSIS

Making this path diagram is in accordance with the hypothesis and research model. This path diagram consists of 4 latent variables. Latent variables are divided into 2 types, namely endogenous and exogenous variables. Endogenous variables are variables whose values are influenced by other variables, while exogenous variables are variables whose values are not influenced by other variables. Therefore, exogenous variables are also called independent variables. Endogenous variables are Labor Productivity (LP), Rework (RW) and Customer Satisfaction (CS), while the exogenous variables are Quality

Performance (QP). The structural equation model can be seen in Table 1.

Table 1. Model Structural Equations

Variable Endogen	Equations
Labor Productivity	$\gamma_{1.1} QP + \zeta_1$
Rework	$\gamma_{2.1} QP + \zeta_2$
Customer Satisfaction	$\gamma_{3.1} QP + \beta_{3.1} LP + \beta_{3.2} RW + \zeta_3$

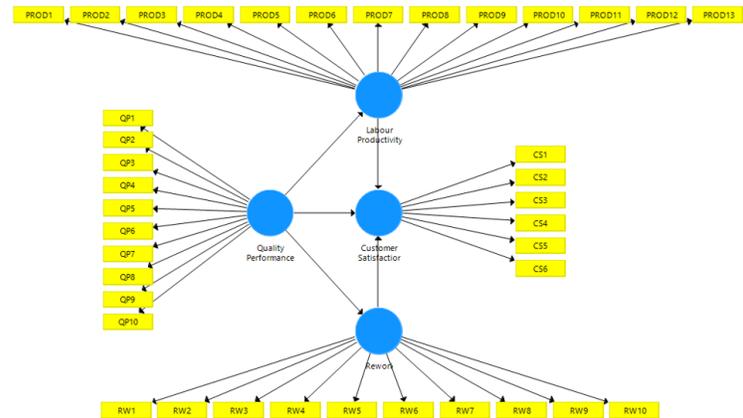


Figure 2. Path Model

Data analysis was performed by simulating the relationship between several factors, names as quality performance variable, and customer satisfaction variable. Certain types of data are used as indicators of certain variables. Then the data compilation is analyzed using the Partial Least Square (PLS) method. The relationship model between variables is shown in Figure 1. That model is develop based on literature review [14]–[16] Data entry on Path Model with validity and reliability test as follows [17]–[19]. The assessment of the measurement model (outer model) was carried out in three stages, namely the convergent validity test, the discriminant validity test and the reliability test. The loading factor value that must be achieved to be able to express the reliability of an indicator with its construct must have a value greater than 0.7. After all indicators in the proposed model already have a loading factor above 0.7, the next step is to evaluate the AVE value for each construct. Acceptable AVE values are > 0.5. Construct level is called internal consistency or also known as composite reliability (pc). The way to see internal consistency is to look at the Cronbach alpha value whose value is at least 0.7. Furthermore, the cross-loading value is tested to determine whether each indicator is sufficient to represent the latent variable. The cross-loading value of each indicator described must be greater than the cross-loading value of the indicator in other constructs. In this research model, the Labor Productivity and Rework variables are moderate because they are below 0.50, while the Customer Satisfaction variable is classified as substantial because it is below 0.75. The purpose of this value is the exogenous variables that affect Labor Productivity in the model tested, representing 24.6% of the likelihood of labor productivity, the exogenous variables that affect the rework on the model being tested, represent 31.1% of the probability of rework, while the exogenous variables that affect customer

satisfaction in the model tested, representing a 61.5% probability of Customer Satisfaction. The results of the calculation of the path coefficient in the research model in Table 2 show that all latent variables have coefficient values in the range of -0.558 - 0.496. According to Sarstedt et al., (2014), the value of the path coefficient (β) is standardized in the range of values -1 to +1. A coefficient closer to +1 indicates a strong positive relationship. While the coefficient is close to -1, indicating a strong negative relationship. The model after validity and reliability as shown in Figure 2. Path coefficient value describes in Table 2.

Table 3. Equation calculation structural model

Variable Endogen	Equations
Labor productivity	$0.496*QP + \zeta_1$
Rework	$-0.558*QP + \zeta_2$
Customer satisfaction	$0.325*QP + 0.357*LP - 0.276*RW + \zeta_3$

6. DISCUSSION

Housing projects are sector with high rating of growth in Indonesia. However, this sector is vulnerable facing the quality failure problem that bring adverse consequence on overall project performance. Considering, housing projects were generally constructed by housing contractors with small to medium qualification which has not implemented thorough quality management system on its construction process. This research aims to examine the relationship of quality performance against labor productivity, rework and customer satisfaction on housing project by taking a case study on the Nava park housing project which is located on prestigious commercial area of Bumi Serpong Damai, South Tangerang City, Banten province, Indonesia. Based on model analysis using SmartPLS 3.3.2 software, it was found that quality performance has strong relationship towards overall tested variables. For instance, labor productivity has path coefficient value (β) = 0.496. This value indicates that the better-quality performance will improve labor productivity. Quality performance has significant relationship against rework and customer satisfaction as well with path coefficient value -0.558 and 0.325 respectively. It clearly indicates, the better-quality performance will reduce rework opportunity and improve more on customer satisfaction. Besides assessing the relationships of the three above variables, this study also assessed the relationship among endogenous variables, namely labor productivity and rework against customer satisfaction. From the data analysis, labor productivity has strong effect on customer satisfaction with β value is 0.357. In line with productivity, rework has strong negative relationship with customer satisfaction with β value is -0.276. It clearly proves that the higher rework, will impact to customer dissatisfaction. This fact is in line with previous research which revealed that poor project quality which required rework process is the main cause of customer dissatisfaction in the construction project sector [7]. Furthermore, the data analysis also assessed the accuracy of the model's prediction by referring to the R^2 value. In the analysis of the model, labor productivity is considered weak since its value below 0.25 and rework is considered moderate since its value below 0.50, while customer satisfaction variable is viewed substantial because its value below 0.75. The meaning of the value is that 24.6% variance in labor productivity improvement is explained by the quality performance. 31.1% variance in rework reduction is explained by the quality performance. And finally, 61.5% variance in customer satisfaction is explained by the quality performance as well. Based on the R^2 value on final model, it is then realized that there are still more opportunities to add another moderation variable in the research model in order to improve the level of predictive accuracy that can be suggested for future study. The findings were then presented and discussed along with 3 (three) construction

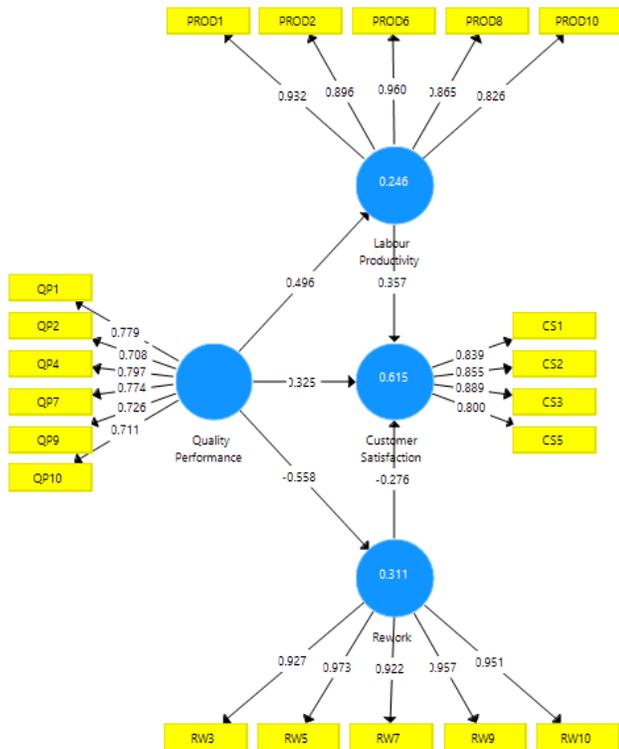


Figure 3. PLS Algorithm in Path Model

Table 2 Path Coefficient Values

Path	Path Coefficient
QP → LP	0.496
QP → CS	0.325
QP → RW	-0.558
LP → CS	0.357
RW → CS	-0.276

Variables ζ_1 , ζ_2 , and ζ_3 represent variables that are not included in the research. In addition to knowing what variables affect the dependent variable, differences in the path coefficient can be used to sort the variables based on their strongest influence. it can be seen that the variable QP (Quality Performance) has the most influence on the RW (Rework) variable compared to other variables, and CS (Customer Satisfaction) is the most influenced by LP (Labor Productivity) compared to other variables. Equation calculation structural model as shown in Table 3.

experts who had long professional track record in managing luxurious housing projects for 15 – 36 years to confirm the effectiveness and validate the results of this study. During the discussion session, all the experts shared their thought and opinions on how the reality of quality management were implemented in all housing projects they have managed. All the experts viewed the findings of this research is useful and able to assist the Project Manager in establishing an effective and efficient quality program in housing project in order to improve customer satisfaction and labor productivity as well as reduce the possibility of the rework drastically

7. CONCLUSIONS

Following are the conclusions from result of research:

- 1) Based on the results of the analysis, the exogenous variable (Quality Performance) has a significant influence on the endogenous variable (Labor Productivity) with a path coefficient value (β) of 0.496. That is, the better the quality performance, the better the labor productivity.
- 2) Exogenous variables (Quality Performance) also have a great influence on endogenous variables (Customer Satisfaction) with a path coefficient value (β) of 0.325. Thus, the better the Quality Performance, the better Customer Satisfaction will be.
- 3) The exogenous variable (Quality Performance) has a significant influence on the endogenous variable (Rework), with a path coefficient (β) of -0.558. So, the better the Quality Performance, the less Rework will be.
- 4) Endogenous variables Labor Productivity has an effect on endogenous variables Customer satisfaction (CS) with a path coefficient value of 0.357. So, the better the Labor Productivity, the better customer satisfaction.
- 5) Endogenous variable Rework has an influence on customer satisfaction with a path coefficient of -0.276. So, the bigger Rework, the less Customer Satisfaction.

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