

The Influence of E-Procurement System to the Quality of Construction Work in Indonesia

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Abstract

E-Procurement on an agency or company is a routine activity that is always done. E-Procurement intended to meet the needs of goods and services required for operational continuity agency or company. Procurement of goods / services electronically has principles: efficient, effectiveness, accountability, transparency, fair and non-discriminatory, open and fair competition, interoperability, security of the data, which of course has a meaning that is wide enough to hope that will be achieved in providing the goods / these services are getting the winner of the auction that has the quality and experience of work in completing the work with the right quality, timely and effective cost. In fact there are many the work is far from perfect, giving rise to a new problem for officials implementing techniques in managing the activities during the planning period. Supervision and construction, it is not uncommon consultants and contractors make conditions can not meet contractual clause which result in the conditions should be fined and blacklisted. Variables that affect the quality of the construction work proceeds through the process of procurement on e-procurement is the cost bidding, procurement of materials, labor procurement, procurement of equipment and methods of implementation of the work. Steps taken to obtain the quality of construction work proceeds through the process of e-procurement by taking into account cost of supply, supply of materials, labor supply, supply of equipment, methods of implementation.

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1. Introduction

LPSE or Electronic Procurement Service is organizing an electronic system of procurement of the government, operates its own LPSE e-procurement system called SPSE (Electronic Procurement System) developed by LKPP. Implementation of e-procurement in Indonesia were assigned to the Policy Institute for Procurement of Goods / Services (LKPP, <http://www.lkpp.go.id/>). LKPP develop Electronic Procurement System (SPSE) -based free license to apply to all government agencies in Indonesia. Were adopted in 2008 by 11 institutions and in 2013 it had 573 K / L / D / I (ministries / institutions / regions / agencies) that have LPSE. Procurement on an agency or company is a routine activity that is always done. Procurement intended to meet the needs of goods and services required for operational continuity agency or company. The procurement process is mostly done in the institution generally still conventional start of the procurement process up to the report. This raises problems in the procurement such as the length of the procurement process, a huge cost, lack of transparency in the procurement process, the coordination between the parts are not well established, and the many documents (papers) are involved, to the process of reporting inaccurate and slow. In the e-procurement system of the whole process starting from the announcement of the auction, bidding, selection, until the announcement of the winner will be done online via the internet site. Indonesian government today is trying to realize a clean government and implement good governance. To support this objective the government issued Presidential Regulation No. 4 Year 2015 on guidelines for the procurement, and a change 4 times of the president Regulation No. 54 of 2010. The principles of procurement

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electronically are: efficient, effectiveness, accountability, transparency, fair and non-discriminatory, open and fair competition, interoperability, data security guarantee. With these principles certainly has a meaning that is wide enough to hope that will be achieved in providing the goods / services. One of the objectives to be realized is to get the winner of the auction that has the quality and experience of work in completing the work with good quality. But in fact there are many significant work is far from perfect and many contractors and consultants winner procurement can not complete the work on quality, timely and cost effective, giving rise to new problems for the officials implementing the techniques and activities to manage during the planning, supervision and construction, sometimes consultants and contractors make conditions can not meet contractual clause which result in the conditions should be fined and blacklisted.

2. Purpose Of Study

The objective of this study is to identify the variables that affect the quality of the construction project proceeds through the process of e-procurement, specify the variables that affect the quality of the construction project proceeds through the process of e-procurement, and get action taken against the problem of the quality of construction work proceeds through the process of e-procurement.

3. Hypothesis Study

Results of this study was to determine the variables that affect the quality of the construction project proceeds through the process of procurement and get the steps taken to solve problems of quality of construction project proceeds through the process of e-procurement..

4. Literature Review

4.1. Definition of Procurement

Definition of Procurement According to the Basic Concepts and Procedures for Procurement explained that the procurement starting from the market, when people can buy or sell goods. The market is the scene of the bargaining process between the buyer or the user with the seller. The next process is the process of buying and selling. After the price agreement between the two parties, which ensues is a bargaining process and the process of buying and selling is done directly without the support with the purchase document or the document of payment and receipt of goods. If the goods to be purchased, the amount and type a lot, and every type of goods carried bargaining, it will take some time. To save time, the goods / services prepare in writing the type and quantity of goods to be purchased, is given to suppliers to submit a bid in writing anyway. This is the origin of the appearance of the document of purchase. While the price offers made in writing is the origin of the bidding documents (Wibowo: 2002)

The next development was the user submits a list of items to be purchased not only to one but to several suppliers. Users can choose the cheapest offer price of each type of goods to be purchased by requesting an offer to several suppliers. The way would that be the forerunner of the procurement of goods by way of auction.

The series of activities to obtain the desired goods and services carried out by using certain methods and processes, in order to achieve a deal price, time, and quality. Attempts to get the desired goods and services on the basis of logical thinking and systematic (the system of thought), following the norms and ethics, based on methods and standardized procurement processes.

4.2 E-Procurement

E-procurement is a procurement process that refers to the use of the Internet as a means of information and communication (Croom and Jones, 2007). In addition Tatsis et al., (2006) also defines EPROCUREMENT as merging management, automation, and optimization of an organization's procurement processes by using a web-based electronic systems. Davila et al.,

(2003) adds a definition of e-procurement is a technology. E-procurement is the procurement of goods / services which are carried out electronically (web based / internet). E-Procurement is motivated by weakness procurement of conventional systems is done by directly bring together the parties related procurement. E-procurement is present in order to utilize information technology development in the process of procurement of goods / services as well as to realize the procurement of goods / services that are efficient, effective, fair and transparent. The procurement of goods and services with e-procurement systems utilizing the facilities of communication and information technology used to support the public tender process electronically (LKPP, 2009).

4.3 LPSE (Lembaga Pengadaan Secara Elektronik)

According to the official website LKPP (lpse.lkpp.go.id) Electronic Procurement Service (LPSE) is a unit which serves the procurement of government goods / services are conducted electronically. LPSE is one of the applications of e-procurement is a government-owned applications managed by LKPP (Institute for Procurement Policy and Government Services). LPSE aimed to build a system of procurement of goods / services that is transparent and accountable government. In terms of the development of all from the central government which then disseminated every related mainly to local government agencies.

4.4 LPSE (Electronic Procurement System)

LPSE are units serving government procurement of goods / services conducted electronically which has a goal to build a system of procurement of goods / services that is transparent and accountable government. This application was developed in the spirit of national efficiency so that it does not require a license fee, whether the license SPSE itself and its supporting software. SPSE developed by LKPP in collaboration with State Code Institution (Lemsaneg) for document encryption function and the Financial and Development Supervisory Agency (BPKP) to sub-system audit.

4.5 Quality management

The level of understanding of the quality varies depending on the background as well as their point of view. Manufacturers are looking at the quality of customer satisfaction (Customer Satisfaction), while for consumers is a product that can meet the desires and expectations.

Some opinions and theories about the quality of management delivered some experts in the field of management, which are as follows: W.Edwards Deming expressed that quality means solving to achieve continuous improvement. All the components are visible in the achievement of the quality of a community of mutual support or Bottom-Up (Rudi Suardi: 2003), the process is often called the Deming cycle, namely Plan (Plan), Do (Implementation), Check (Inspection) and the Action (action).

Philip B. Crosby emphasizes that the quality is in accordance with the requirements or standardized. If a product has quality in accordance with the specified quality standards. Quality standards include materiality, production processes and finished production (Nasution 2005: 2). Crosby also looked at the quality problem by dividing the 4 steps that fulfillment of the requirements (Conformance), Prevention of disability (Prevention of Defects), free of defects (Zero Defects), and benchmark quality (Performance Measurement). The four steps proposed by Philip B. Crosby is a series of Top-Down (Rudi Suardi: 2003) to achieve the expected quality of consumers. The needs and desires of consumers should be recognized before the production process, in the process must avoid mistakes that would increase costs and time. Achievement of defect-free is essential for any defects that occur means the cost. This process requires benchmarks that are used to guide and continuously measure the quality will increase. Joseph M. Juran pointed out that quality means compatibility / suitability of use of products to meet customer needs and satisfaction. Juran concept affects the quality of travel is used as a benchmark in the industry.

Conscious company management will provide the best service quality will continue to seek the form of improved quality. Here Juran give a description of the trilogy process as shown below:

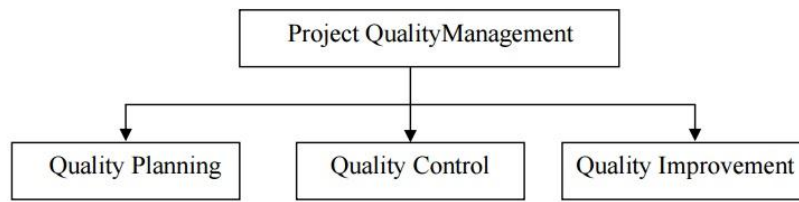


Fig. 1. Organizational Structure

This concept is commonly used in the construction industry which has a unique and different processes to the manufacturing industry. Construction industry prefers human resource skills while prioritizing tool manufacturing process / machine in achieving the final result. So it is often termed "handmade" because nearly 70% still rely on human skills. Juran theory is very relevant to the implementation of the project because it emphasizes on three very important element and one with interrelated.

4.6 Delphi Method

Delphi method is one of several analytical techniques used to obtain the opinion of an expert / specialist with not directly bring together in one place and one time. Basic Delphi method begins with a series of questions in the first round were asked individually to the experts challenged a problem. The experts collect their assessment. The first round of assessment results were then compiled into tables and the results are sent back to the experts to be modified. In essence, in the second round of experts asked to reassess their initial assessment based on an assessment of their average in the first round. Reassessment procedure followed for several rounds until a high enough level of agreement can be reached, or until the experts no longer change their previous assessment.

4.7 Structural Equation Modeling Based Component / Variance

Component-based Structural Equation Modeling / variance test oriented causality models / theories into component-based predictive models, the goal is the prediction Partial Least Square. Latent variables are defined as the sum of the indicator. Encryption Partial Least Square is getting the best weight estimate for each block of each latent variable indicator. Results component scores for each latent variable based on the estimated weight indicator that maximizes the variance explained in the dependent variable (latent, observed or both). As stated by Wold (1985), Partial Least Square is a method of analysis that is empowering because it is not based on many assumptions, data should not normally distributed multivariate (indicator with scale category up ratio, can be used on the same model), the sample does not have to be big and residual ditribusion. Although the Partial Least Square can be used to confirm the theory but can also be used to explain the relationship between the presence or absence of latent variables, and therefore more focused on the data and the estimation procedures are limited, so misspesification models are not so influential on the parameter estimates. Compared with CBSEM, component-based SEM Partial Least Square avoids two serious problems that inadmissible solutions and factor indeterminacy. Partial Least Square can be analyzed simultaneously construct formed by the indicator reflexive and formative indicators, and this is not possible due to run in CBSEM will happen unidentified models. Therefore, the Partial Least Square algorithm using ordinary least squares analisis series, the identification of the model is not a problem in recursive models and also not assume the form of a certain distribution of the measurement variable. Further efficiency calculation algorithm is able to estimate the model large and complex with hundreds of thousands of latent variables and indicators.

4.8 System Dynamics

System Dynamics is a methodology for studying and managing complex systems by building and applying simulation models. System Dynamics is able to create a learning environment - a laboratory that acts like a miniature of the system.

Simulation is defined as an imitation of the behavior of a phenomenon or process. Simulations aimed at understanding the phenomenon or process, making analysis and forecasting of the behavior of the symptoms or the process in the future. The simulation model is a technique in which a causal relationship from a captured system (capture) in a computer model, to produce some behavior in accordance with the real system. Simulation models are built to be credible. Implementation of simulation through four stages: the first stage is the preparation of the concept of simulation. Symptoms or processes to be simulated must be understood, among others, by determining the elements that play a role in the symptoms or the process, the second stage is the manufacture and formulation of the model. Concept at an early stage formulated as a model in the form of a picture or a description of the formula. The third stage, the simulation can be done using a model that has been made.

In quantitative models, simulations carried out by entering the data into the model, where the calculation is performed to determine the behavior of the symptoms or processes. In a qualitative model, a simulation done by tracking and holding analyzes causal relationship between these elements to enter data or information gathered to determine the behavior of the symptoms or processes, the last stage, performed the validation to determine the fit between the simulation results with symptoms or processes are simulated. The model can be expressed either if the error or deviation of the results of a simulation of the symptoms or simulated process has minor differences. The simulation results are then used to understand the behavior of the symptoms or processes and identify trends in the future.

5. Methodology

Research conducted divided into several stages, where each stage has different methods and ways are as follows:

Phase I:

Early stage performed a literature study to obtain findings about the variables that affect the quality of construction work through the process of procurement of goods / services of a full e-procurement systems. These findings resulted in 6 variables with 27 indicators that affect the goods / services of a full e-procurement system, and will be confirmed to the experts who are experienced in the quality of construction work. Test experts to determine the variables that affect the quality of construction work through the process of procurement of goods / services of a full e-procurement systems using the Delphi method.

Phase II:

The answer from the results of the expert analysis of the quality of construction work will be a reference for making the instrument to the second questionnaire, in which the questionnaires were made in the second phase with the answer choices shaped linkert scale ranging from 1 to 5. Samples are required at this stage a minimum amount to 30 samples, which will be tested item, test and test validity reliabilitas.

Phase III:

Data collection the opinion of the respondents expert consultants, implementers contractor, committee procurement of goods / services and the owner of the work to determine the effect of

each variable on the model and the level of influence on the quality of construction project and validated the results of a causal relationship is to the team of professionals / experts.

Stage IV:

The conclusion of the third phase will be the underlying of the preparation of modeling System Dynamics, together with the problems that occurred in the quality of construction project through the procurement of goods / services of a full system of e-procurement obtained from the respondents expert consultants, implementers contractors, procurement committee / services and the owner of the work, the patterns of simulation obtained a reference to determine recommendations for action and solutions to overcome the problems occurred.

Phase V:

The final results of research in the form of a model that has been good, validation is done to the team of professionals / experts. Validation by the Delphi method. In this study used several methods, which begins with the Delphi method, wherein the method is used to determine the variables that affect the quality of the design dokumend. The next method is a method eksplanatif. This stage will use analysis tools that program SEM (structural equation modeling) based variance with Smart program Partial Least Square (PLS). The latter method is a method of System Dynamics that will be used to simulate a model that is based on the model of causality and problems in the design process. System Dynamics Model chosen because it can be used to build and simulate large and complex systems and can incorporate quantitative data and qualitative data, (Sterman 2000).

6. Results And Discussion

The early stages of this research by conducting elections in the journal / research and construction service provider to get the variables that affect the quality of the construction project proceeds through the process of procurement of goods / services in full e-procurement. The findings of the variables that have an influence on the construction quality of the results of the procurement of goods / services on a full e-procurement are: The dependent variable quality of the construction project (Y) with indicators of quality, expressive, functional, appropriate standardization, life cycle cost, timeliness, energy-efficient, environmentally sound, independent variable supply (X1) with indicators offer Cost, offers Technical, Supply Administration, independent variable material (X2) with indicators of price, quality, support supplier, delivery time, quantity, independent variables Equipment (X3) with indicator, quantity, quality, specifications, ownership, capacity, independent variable method of implementation (X4) with indicators of compliance with type of work, compliance with the difficulty of work, sequence of work and innovation, the independent variable labor / HR (X5) with indicator, level of education, experience, skill. Based on the results of expert opinion on the variables which affect the quality of the construction project process results through the procurement of goods / services in full e-procurement by using Delphi was found that all of the variables and indicators that affect the quality of the construction project process results through the procurement of goods / services full e-procurement is appropriate.

A good questionnaire is a questionnaire that can be understood by the respondent and provide the appropriate answers respondents' perceptions of the indicator, with results accurate answers according to respondents. This item test performed on each item item statement / question with the aim that every statement / question did not give rise to misperceptions understanding of the meaning of the statement / question and each item statement / question is used able to differentiate towards attributes measured. Method used is descriptive for scale if item deleted, the item-total correlation values corrected ≥ 0.3 .

A good questionnaire is a questionnaire that has the consistency of the answers given by the respondents with consistent results, if the instruments used repeatedly will produce consistent value, therefore it is necessary to test reliability. The method used is the method of Cronbach's Alpha, Cronbach Alpha value of ≥ 0.6 . Recapitulation of the test results showed that all indicators

point has a value of item-total correlations corrected ≥ 0.3 , and all indicators have Cronbach Alpha value ≥ 0.6 , then all the indicators meet the test items and test reliability.

To make sure that the questionnaires are made will measure the same attributes, then tested the validity, All item statement / question on each attribute / variable corresponding extracted into 1 (one) factor with unexplained variance values $\geq 60\%$. The method used is the method of factor analysis.

From the above analysis results obtained all the indicators extracted into one, and all the unexplained variance factor values $\geq 60\%$, then all the indicators meet the validity test, questionnaire used, eligible to be used as a measuring tool in this study.

Testing causal models using Smartpls, where testing with the Smart PLS will generate and display the value of the standardized regression weight for each of the variables that exist in the research model. Model analysis of all the variables in PLS path consists of three sets of relationships, namely:

Inner model that specifies the relationship between variables, outer a model that specifies the relationship between the indicator variables, and weight relations are variables that influence the degree of influence can be estimated.

Hypothesis testing is done by comparing the value of t-statistic of each relationship between variables with the t-table (value = 1.96), which is said to be significant if the t-statistic relationship between variables is greater than 1.96.

Table 1. Results of Testing Value Line Variable Coefficient t Statistics

Latent variables	coefficient Line	t-Statistic	Description
X1 → Y	0.772	18.543	Significant
X2 → Y	0.199	5.858	Significant
X3 → Y	0.046	1.993	Significant
X4 → Y	0.019	1.987	Significant
X5 → Y	0.123	2.764	significant

Analysis of the effect of variable contribution or analysis of the percentage of variance between variables. The results can be seen in Table 2.

Table 2. The coefficient of determination (R2)

Latent variables	The coefficient of determination (R2)	Description
The quality of construction work (Y)	0.935	The influence of variables X1, X2, X3, X4, X5 to variable Y is at 93.5%

From the results in Table 2 show:

93.5% variations in the quality of construction work, can be explained by the variable supply (X1), material (X2), equipment (X3), the method of implementation (X4), labor (X5).

Follow-up of this study was to conduct interviews with the actors construction services related to the issues raised on the quality of construction work proceeds through the process of procurement of goods / services in full e-procurement.

Problems that occur in the process of procurement of goods / services on a full e-procurement are: Offer price below the fair price is causing constraints on implementation, offers reasonable prices resulted in a conviction under construction will adjust the price of the offer, so the potential for loss of quality by pressing the procurement costs of materials, labor costs and cost of equipment used.

On the procurement problems faced are material prices fluctuate, causing the perpetrator construction services have tendency to choose the most inexpensive price, quality of the material is different, supplier support, delivery Time lengthy and uncertain, as well as a limited quantity of goods that field is available.

In the equipment procurement problems faced is the quantity of tools, quality tools, equipment specifications, ownership and capacity tools. In the implementation of the employment problems faced is Compliance with the type of work, compliance with the difficulty of work, sequence of work, and innovation. In the procurement of labor / human resources are the problems faced by levels of education, experience and skill level.

Dynamic system modeling for the problems that occurred in the quality of construction work proceeds through the process of procurement of goods / services on a full e-procurement is based on the influence of variables that affect the quality of the construction project proceeds through the process of procurement of goods / services on a full e-procurement obtained from causality and problems that occur.

Flow diagram models of dynamic systems on the quality of construction project process results through the procurement of goods / services in full e-procurement begins with a decrease in the bid fee to the cost of the fair, which affect the supply costs that will be implemented in the construction process, while the cost bidding will affect the procurement of materials amounting to 45 per cent of the total cost of supply, procurement of equipment amounting to 35 per cent of the total cost of supply, procurement of equipment amounting to 20 per cent of the total cost of supply. Method of implementation is affected by three components, namely the procurement of materials, procurement of equipment and procurement of labor.

The magnitude of the effect of each variable that affects the quality of the construction project through the provision of full e-procurement system is taken from the relationship model of causality that has been obtained previously. Figure 1 below illustrates a flowchart model of dynamic system construction project quality through the provision of full e-procurement system. The simulation results obtained from the model variables that have an influence on the quality of construction project through the provision of full e-procurement systems are cost bidding, procurement of materials, labor procurement, procurement of equipment and methods of implementation of the work.

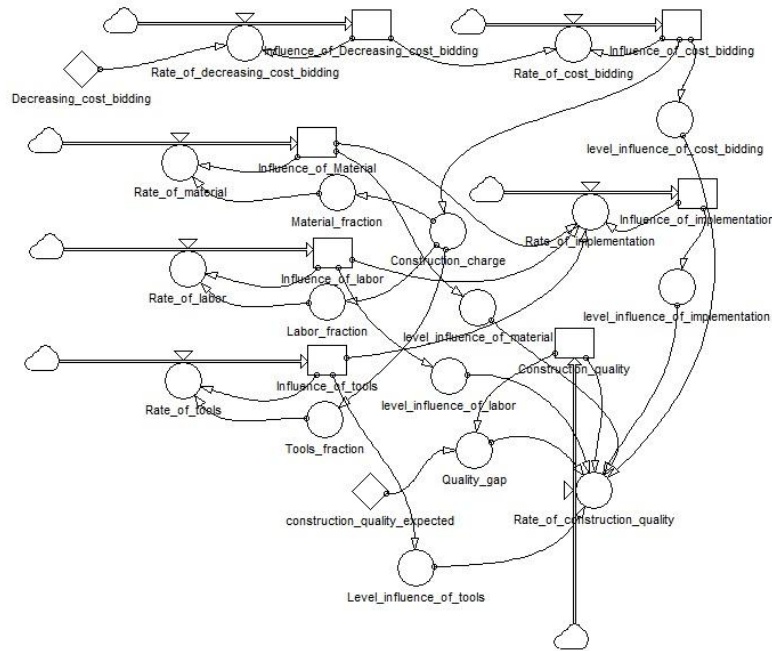


Fig. 2. Flowchart of quality model construction project proceeds through the process of procurement of goods / services in full e-procurement.

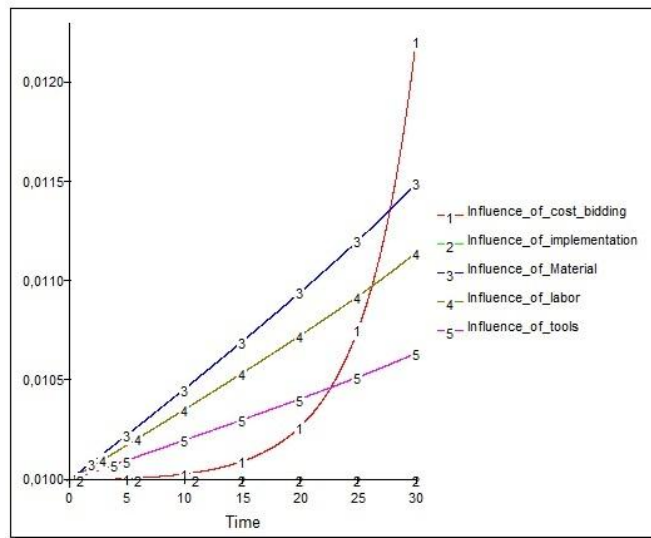


Fig. 3. Graph the results of the simulation model of the quality of construction work proceeds through the process of procurement of goods / services in full e-procurement

Action taken to obtain the quality of construction work proceeds through the process of procurement of goods / services in full e-procurement of quality are:

- The cost of the winning candidates offers the procurement of goods / services in full e-procurement must be above a reasonable threshold value;
- Committee for the procurement of goods / services in full e-procurement must be careful and take the right decision for the winner of the procurement of goods / services in full e-procurement;
- In conducting material offers service providers should consider implementing construction material price fluctuations, material quality, supplier support, delivery time, and the quantity of material available;
- In the procurement of construction materials service provider implementers should follow the technical specifications of the material that has been determined;
- In conducting labor supply construction service providers should consider implementing appropriate levels of education, experience and skills are adequate;
- In the procurement of construction service provider labor implementers should follow labor qualification has been determined;
- In bidding construction service provider equipment implementers should pay attention to the quantity, quality, equipment specifications, ownership and capacity tools;
- In the procurement of construction equipment service provider implementers must follow the prescribed qualifications and specifications;
- In a bid construction method of implementation of the implementing service providers should pay attention to the type of job suitability, compliance with the difficulty of work, sequence of work, and innovation;
- In the implementation of the construction service provider implementers must follow the procedures and work sequences that have been agreed;

7. Conclusion and Suggestion

In accordance with the analysis that has been performed, the variables that have an influence on the quality of construction work proceeds through the process of procurement of goods / services in full e-procurement qualified as follows:

- The variables which have an influence on the quality of construction project through the provision of full e-procurement systems are cost bidding, procurement of materials, labor procurement, procurement of equipment and methods of implementation of the work.

Action taken to obtain the quality of construction work proceeds through the process of procurement of goods / services in full e-procurement quality is

- The cost of the winning candidates offers the procurement of goods / services in full e-procurement must be above a reasonable threshold value;
- Committee for the procurement of goods / services in full e-procurement must be careful and take the right decision for the winner of the procurement of goods / services in full e-procurement;
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- In bidding construction service provider equipment implementers should pay attention to the quantity, quality, equipment specifications, ownership and capacity tools;
- In the procurement of construction equipment service provider implementers must follow the prescribed qualifications and specifications;
- In a bid construction method of implementation of the implementing service providers should pay attention to the type of job suitability, compliance with the difficulty of work, sequence of work, and innovation;
- In the implementation of the construction service provider implementers must follow procedure and sequence of work that has been agreed upon.

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