Development of Quality Management System for Construction Services Procurement to Improve the Quality of Contractor Performance in Universitas Indonesia

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Abstract. Purpose: Construction work was one of Key Performance Indicators (KPI) that stated in Universitas Indonesia (UI) Strategic Plan. Therefore, the success in the implementation of construction work had quite an influence in overall UI performance achievement, both the activities performance and financial performance. However, in the practice, the construction work implementation in UI was not always in line with the plan/expectation. The construction work was often delayed until the termination of contract that resulted in the obstruction of operational activities. This research had a purpose to develop the Quality Management System (QMS) for the Construction Services Procurement Process to Improve the Quality of Contractor Performance in Universitas Indonesia. Methodology: Research methods used were literature study, survey, and statistical analysis. Results: The development of Quality Management System (QMS) for the construction services procurement process in Universitas Indonesia. Applications/Originality/Value: With the development of this QMS, it is expected that the construction services procurement process could improve the quality of contractor performance and reduce the stoppage rate of projects.

1. Introduction
One of the important aspects in the implementation of financial governance of Universitas Indonesia (UI) was the procurement of goods and services. This goods/services procurement was done to support the operational activities and performance indicators’ target achievement that contained in UI Strategic Plan. The goods/services procurement that came from the state budget (APBN) refers to provisions of Presidential Decree Number 16 Year 2018 about State’s Procurement of Goods/Services, whereas the provisions about the procurement of goods/services that was not from state budget (non APBN) were regulated by Chancellors’ Regulation Number 2 Year 2019 about the Procurement of Goods/Services.

Construction work was one of Key Performance Indicators (KPI) that stated in Universitas Indonesia (UI) Strategic Plan. Therefore, the success in the implementation of construction work had quite an influence in overall UI performance achievement, both the activities performance and financial performance. However, in the practice, the construction work implementation in UI was not always in line with the plan/expectation. The construction work was often delayed until the termination of contract that resulted in the obstruction of operational activities. Here
Table 1: Construction failure events

| No | Work Package Title                                      | Year | Work Value  | Status  | Issues                                                                                                                                 |
|----|---------------------------------------------------------|------|-------------|---------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1  | The Renovation Work of PAU Building 3rd Floor          | 2018 | Rp 402,406,000 | Slacklisted | - The Work did not match the condition  
- The supplier accompanied with interior work, so that the work result quality was not in line with the requirements  
- Withdrawal of the provider because of unwillingness to finish the job  |
| 2  | Procurement of Campus Road Kantoran                    | 2018 | Rp 337,298,700 | Slacklisted | The provider withdrew with reason of the budget stated in the contract did not match with the goods price in the field, the provider was considered unable to finish the job as stated in the procurement contract  |
| 3  | Procurement Road Overlay Ruk (BNG Security Post) − Road towards Pharmacy Faculty and Road beside FKH Hall | 2018 | Rp 574,924,000 | Slacklisted | The provider was unable to show the work progress after giving the opportunity  |
| 4  | ULT Interior & Built in Furniture Work                 | 2018 | Rp 1,094,385,382 | Slacklisted | - The provider unable to finish the job after given the opportunity  
- The work that has been done was not based on the agreement and approval from the user, planning consultant, supervision consultant so that it was unacceptable and cause problems  |
| 5  | Pedestrian Crossing Track Repair from Psychology Faculty to SC PTU | 2018 | Rp 96,257,80 | Slacklisted | The provider unable to complete the work up to the end of contract period and no good intention to finish it  |
| 6  | Construction Procurement of Silemba Student’s Canteen   | 2018 | Rp 554,000,000 | Slacklisted | - The provider did the work in given opportunity period but the repair work result did not done well so that it was still unacceptable for the user  
- Request for work improvement was not completed by the provider so that demand unable to finish the job as per contract  |
| 7  | Standardization of FISM Classroom and Pilar 1 RUK       | 2019 | Rp 1,881,000,000 | Slacklisted | The provider unable to finish the job after given the opportunity  |

(Source: UI Logistic Directorate Document)

are some of the contract termination event that were documented in the past 5 years:

Discrepancy of contractor work result related to specification also became a spotlight in UI surroundings. The problem that occurred in that construction work resulted in the low work quality and result, such as delay in finishing, over-budget, and work result that were not in accordance with the plan/poor. The low work quality in construction project caused by several factors like contractor’s failure, change in project design, or bad weather [1]. Factors like project design change and bad weather could be overcome if the contractor applied the good quality management service as well. Therefore, the good contractor selection became crucial in starting a construction project. The success in good contractor selection was determined by how tender was done and pre-qualification process implemented [2].

Construction project was a project that needed calculation accuracy in every aspect in order to create the good quality of work result. Inaccuracy calculation and decision making in a construction project will resulted in low work quality, like delay in finishing, over-budget, and work result that were not in accordance with the plan/poor. The low work quality in construction project caused by several factors like contractor’s failure, change in project design, or bad weather [3]. Factors like project design change and bad weather could be overcome if the contractor applied the good quality management service as well. Therefore, the good contractor selection became crucial in starting a construction project. The success in good contractor selection was determined by how tender was done and pre-qualification process implemented [2].

The contractor selection was a decisive activity in the success of overall construction project [4]. In the contractor selection process, there was a pre-qualification process that plays an important role. The pre-qualification process in the contractor selection was done with the purpose to get a competent contractor [4]. The purpose of this research was to determine the appropriate pre-qualification process that would be able to choose contractors with good competencies.
1.1. Research objective
The objectives of this study are as follows:
1. Identify process and activity, organization, quality objective, SOP of procurement construction services
2. Identify risk factor that affects the quality of contractor performance
3. Developing a quality management system procurement process of construction services that can increase the quality of contractor performance

2. Literature Review
This section will be discussed about the literature review which is used as a basis for the theory used in this research.

2.1. Theoretical Review
In this research, the writer did literature study from earlier researches, according [5], Management capability is an important criterion in the critical prequalification process of contractor selection [11–21]. In developing the model that could evaluate the contractor management ability based on management practice was to fix the lack of previous work in the evaluation of contractor management ability. Mentioned in the research, that the various problems experienced in construction procurement system practice could be summarised in 4 (four) strategic issues: 1) weak knowledge management to push innovative construction procurement system practice; 2) inadequate manual construction procurement system especially integrated procurement system; 3) lack of construction service provider availability and capacity, especially for integrated procurement system, both in terms of funding support, experts, and equipment; and 4) construction service law enforcement perspective to protect legal certainty for all parties in the construction procurement.

The potential risk that the contractor could not fulfil the requirements from the authorized party was a result of insufficient information in a specification and in many cases could cause big failure. Selecting the right supplier for an assignment, as well as evaluating this supplier’s performance while the contract is being implemented, plays an important role in ensuring a good project outcome. The low work quality, the progress delay of work in the allotted time, or contractor decision to leave the work site, all could appear as the cause of wrong tender evaluation and wrong contractor appointment [5].

Selecting the most suitable contractor in a public procurement process plays crucial role in further project realization and may have an impact on its success. Lowered quality of delivered works, delays in delivering works within set time, or the decision of a contractor to walk off site may all emerge as a result of an incorrect evaluation of the tenders and wrong appointment of a contractor [6]. The decision on qualification of auction committee played an important role especially in large scale project. If the proper technical requirement implemented, the registered company became more selective. Small contractors could not fulfil the requirement without going through the selection. This interaction explained why the prospective contractor often reduce their offer dramatically in public infrastructure procurement [7].

Hence, the necessity of the development of quality management system for construction services procurement process that able to improve the contractor performance quality. Implementation of the quality management system (QMS) will help bring the company to a new level, because the QMS is designed to continually improve the activities of companies [4] [8].

Based on literature studies from the research of Sabariyah Din, Zahidy Abd-Hamid, David James Bryde (2011) ISO 9000 certified company had improved the performance level in the project environment compared with the uncertified companies. Therefore, it became important to implement a quality management system to improve performance. Then according to Husen A. (2009), there are 4 targets in the project objectives: economical budget, fulfil quality, deadline
Figure 1: Organization in Procurement Process

not exceeded, and work safety fulfilled. If one of the project objectives unfulfilled, then it could be interpreted that the project experienced failure. The construction failure and building failure were caused by the unfulfilled project performance indicators.

The appropriate construction procurement implementation in accordance with value structure framework should resulted in a lot of on-time-projects, desired budget and quality and able to do expected special function. It was an important thing to make sure that the construction procurement work was well-planned as well as run with the set objection and target. Because if that procurement activity was well-planned, then it would be easy to identify the problem in every procurement and repair recommendation step so that the benefit value for the community from procurement value implemented would be fulfilled.

This research was a development of Quality Management System for risk-based procurement process from every steps of construction services procurement in Universitas Indonesia to improve the contractor performance quality. The object was chosen because the construction service procurement in Universitas Indonesia were one of the activities with large budget, that the process became crucial and had an impact on operational activities.

2.2. Procurement

Government goods/services procurement is an activity of procuring goods/services by the Ministries/Institutions/ Regional Apparatuses financed by State Budget/Regional Budget which processes have since identify the needs up to the work handover. Construction work is a whole or part of an activity that include construction, operation, maintenance, demolition and rebuilding a building. The construction service procurement process according to Presidential Decree No. 16 Year 2018 (Indonesia, 2018) covering planning, preparation and implementation process.

Organization in procurement process according to Presidential Decree No. 16 Year 2018 can be described as below:

2.3. Quality Objectives

Performance is about doing a job and result achieved from that job. Performance is a work result that according to Armstrong and Baron has strong relation with the organization strategic objective, consumer satisfaction, and contribution to the economy. While according to Widodo (2006:78) said that performance is doing an activity and completing it according to its responsibilities with the expected result. The performance is a picture of level of achievement of the implementation of an activity/ programme/ policy in actualizing the organization’s target, objective, mission and vision that contained in the organization’s strategic planning. There are indicators that affect contractor performance assessment, such as work quality, budgets, human resources, environment and project implementation time (Adriuli, 2017). In the research, according to Anggraini et al. (2017), the main factor that affecting the contractor work quality include in the human resource factor and contractor capital [9].
Quality Objective is a goal or target from an organization in doing a process to be achieved in a certain period. Quality Objective is a method that used by companies to stay focus in pursuing target that come from the Quality Guidelines up to the plan for its achievement (ISO 9001:2015).

2.4. Risk
Risk management in a project is not limited to only recording all the pros and contras or put a ‘negative risk’ label to every disruption. Management is a complex process, continuing and long term that started long before the investment and sometimes take place even after the project. Managing risk wisely do not mean to avoid it but to correctly identify and determine all related opportunities and dangers [10]. In 6th Edition of PMBOK, project risk management includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project. The objectives of project risk management are to increase the probably and/or impact of positive risks and to decrease the probability and/or impact of negative risk, in order to optimize the chance of project success.

2.5. Quality Management System
Quality Management System according to Gaspersz (2008:268) is a set of documented procedures and standard practices for management system which aim to guarantee the compatibility of a process and product (goods or services) toward certain requirement needs that determined by customers and organization. Gaspersz (2008:273) divided the Quality Management System to 2 types; Informal Quality Management System and Formal Quality Management System. Quality Management System according to 6th Edition of PMBOK, project quality management include the processes to combine the organization quality policy that include quality management plan, quality management maintenance, and quality management control. Project quality management also support the improvement activities process that sustainable as the organization that carried it.

3. Methodology
In answering the formulation problem, the writer did research flow as below:

3.1. Research Variable
Research variable basically is everything that appointed by the researcher to be studied in order to get information about the matter, then the conclusion was drawn from it.

Phase 1 to phase 4 data collection was done with expert validation, where the experts were asked for their opinion regarding the business and activity process, organization form and the task of every position, quality target, and SOP toward the existing data. The objective of this data collection was to get the response of source whether the four variables had been according to the applicable regulation and whether it was appropriate with the construction service procurement process or not. Then the early stage of expert validation was done in phase 5.

The risk factor was validated to expert to identify whether that risk factor had influence toward the quality of contractor performance. The purpose of data collection phase was so that the less-relevant variables could be reduced and that missing variable could be added. Basically, the expert would look at the questionnaire’s construct and content so that the respondents could understand the questionnaire. In phase 6 was Pilot Survey data collection phase to identify whether the prepared questionnaire was easily comprehended by the respondents. This Pilot Survey would be spread to 5 respondents. After that in phase 7 it was done to get the highest risk factor that has influenced toward contractor performance. The respondents would
determine a probability and impact scale from every risk factor. The questionnaire would be spread to respondents who had experience in procurement sector in Universitas Indonesia with minimum 3 years of experience. After getting the highest risk factor, it will be validated to the expert to identify the correspondence of the result and existing condition with deep discussion regarding the cause, preventive action, impact, and corrective action to get recommendation to Quality Management System for Procurement Process. The expert condition in this phase has to have experience in procurement sector in minimum of 10 years with highest education in minimum of S1 and has good reputation. After getting the development action toward Quality Management System for Construction Service Procurement Process it has to be validated to the expert to identify whether the result is a match and applicable. The expert condition must have in minimum 10 years of experience in procurement sector with highest education in minimum of S1 and has good reputation.

The research variables were formed from the archive analysis for business procurement process and activities based on the provision of Presidential Decree No. 16 Year 2018 consists of 6 events and 28 activities and based on expert validation from the risk that affect the contractor performance by 17 risk variables. Those variables were defined in Table 2 as per below:

Risk analysis was done to the questionnaire that was given to respondents by using Likert scale. Probability score of the occurrence of risk and impact caused were multiplied, thus produce numbers that could later be ranked from risk factor. Based Table 3, the score range to determine risk rank as below:

- Low risk: \(0.01 - 0.05\)
- Medium risk: \(0.06 - 0.14\)
- High risk: \(0.18 - 0.72\)
| No | Process                                      | Event                                                                 | Risk Variable that Affect the Contractor Performance |
|----|----------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|
| 1  | Procurement Planning                         | Procurement General Plan (RUP) Arrangement                           | X1 Procurement plans did not base on needs          |
|    |                                              |                                                                      | X2 Procurement plans did not systematically assigned for the specification and quality       |
|    |                                              |                                                                      | X3 Procurement plans did not systematically arranged for the schedule, hand-over time, source, and system |
|    |                                              |                                                                      | X4 Procurement plans did not systematically assigned for quantity and budget               |
|    |                                              |                                                                      | X5 Procurement plans did not openly announced at the beginning of budget year         |
| 2  | Procurement Preparation                      | RUP Re-assessment                                                    | X6 Re-assessment result had a list of change including budget-related                    |
|    |                                              |                                                                      | X7 Did not complete the technical specification (RUP) arrangement                         |
|    |                                              |                                                                      | X8 Did not specify unsuitable in the market                                                   |
|    |                                              |                                                                      | X9 Leasing toward a certain product                                                          |
|    |                                              |                                                                      | X10 Over specification                                                                       |
|    |                                              | Determine the HPS                                                    | X11 Incomplete market survey result                                                           |
|    |                                              |                                                                      | X12 Insufficient price reference                                                              |
|    |                                              |                                                                      | X13 No accountable supporting data                                                             |
|    |                                              |                                                                      | X14 Did not calculate overhead budget                                                          |
|    |                                              |                                                                      | X15 Delayed HPS arrangement time                                                               |
|    |                                              | Determine contract design                                            | X16 Incompletely define the type of contract                                                  |
|    |                                              |                                                                      | X17 Contract design has not been made at the tender                                          |
| 3  | Construction Service Selection Preparation   | Determine the down payment, procurement guarantee, and price adjustment | X18 Incompletely determine selection method                                                   |
|    |                                              | Determine the selection method                                        | X19 Incompletely determine qualification method                                               |
|    |                                              | Determine qualification requirement                                   | X20 Qualification requirement did not completed completely                                    |
|    |                                              | Determine offering evaluation method                                  | X21 Unlikely supplier criteria                                                                |
|    |                                              | Determine method to distribute offering documents                    | X22 Incompletely determine offering valuation method                                          |
|    |                                              | Arranging selection schedule                                          | X23 Incorrect selection process schedule plan (for example, too short or too long)         |
| 4  | Construction Service Selection Implementation| Procurement package announcement                                     | X24 Incorrect announcement date (not on schedule)                                            |
|    |                                              | Enroll and download selection document                                | X25 Announcement context was not complete                                                     |
|    |                                              |                                                                      | X26 Short announcement time                                                                    |
|    |                                              |                                                                      | X27 Announcement notice                                                                       |
|    |                                              | Explanation Giving                                                    | X28 Unlikely explanation                                                                     |
|    |                                              | Offering document presentation                                        | X29 No participant present offering document                                                   |
|    |                                              |                                                                      | X30 Incorrect offering input method                                                           |
|    |                                              | Offering document opening                                             | X31 Unqualified offering document                                                             |
|    |                                              |                                                                      | X32 Price offering above the HPS                                                              |
|    |                                              | Offering document evaluation method                                   | X33 Price offering 50% from HPS                                                                |
|    |                                              | Determine the winner-to-be classification and negotiation of technical/budget  | X34 Candidate did not come in tech and budget negotiation and negotiation                      |
|    |                                              |                                                                      | X35 Did not reach an agreement in negotiation                                                  |
|    |                                              | Determine the winner                                                  | X36 Unmatched winner’s name with tender work                                                   |
|    |                                              |                                                                      | X37 Winner announcement did not match requirement                                             |
| 5  | Contract Implementation                      | Determine SPPC                                                       | X38 Late in producing SPPC and signing the contract                                           |
|    |                                              | Contract signing                                                      | X39 Contract signing did not match the contract content                                        |
|    |                                              |                                                                      | X40 Incompletely contract plan                                                                |
|    |                                              | Disagreeing contract content from both parties                        | X41 Unlikely format for contract implementation reports                                        |
|    |                                              |                                                                      | X42 Diversity or diversification forms of volume achieving process documentation             |
|    |                                              | Accepting and confirming guarantee                                    | X43 Supplier late in submitting guarantee                                                      |
|    |                                              | Pay the down payment                                                  | X44 Down payment paid but supplier did not give down payment guarantee                       |
|    |                                              |                                                                      | X45 Down payment liquidation not on time                                                       |
|    |                                              | Contract control                                                     | X46 Work accomplishment payment not on time                                                     |
|    |                                              |                                                                      | X47 Did not reach the agreed accomplishment                                                    |
|    |                                              | Volume realization time or date unmatched the contract schedule       | X48 Changes emerge that obstruct work progress                                                 |
|    |                                              |                                                                      | X49 Unmatched work with contract                                                              |
|    |                                              | Hard to coordinate with the supplier                                  | X50 Changes in work items that required extra time and unreasonable budget                   |
|    |                                              |                                                                      | X51 Work performance unmatched the requirement                                                |
|    |                                              |                                                                      | X52 Did not do good human resource management                                                   |
|    |                                              |                                                                      | X53 Did not do good time management                                                           |
|    |                                              |                                                                      | X54 No quality control from every work step                                                   |
|    |                                              |                                                                      | X55 On-duty personnel unmatched the contract                                                   |
|    |                                              |                                                                      | X56 No-quality control for the required specification                                         |
| 6  | Receiving and Checking the Work Result       | Work result report                                                    | X57 Mistakes in reporting format                                                               |
|    |                                              |                                                                      | X58 Work process documentation did not include in work result report                          |
|    |                                              | Work result checking                                                  | X59 No SOP for work result checking                                                            |
|    |                                              |                                                                      | X60 Checking time unmatched contract schedule                                                 |
|    |                                              |                                                                      | X61 Work still need repair                                                                     |
|    |                                              |                                                                      | X62 Physical work not 100% finished                                                            |
### Table 3: Score range of risk rank

| Threats | 0.05 | 0.10 | 0.20 | 0.40 | 0.80 |
|---------|------|------|------|------|------|
| Probability | Very Low | Low | Moderate | High | Very High |
| 0.1      | 0.01 | 0.01 | 0.02 | 0.04 | 0.08 |
| 0.3      | 0.02 | 0.03 | 0.06 | 0.12 | 0.24 |
| 0.5      | 0.03 | 0.05 | 0.10 | 0.20 | 0.40 |
| 0.7      | 0.04 | 0.07 | 0.14 | 0.28 | 0.56 |
| 0.9      | 0.05 | 0.09 | 0.18 | 0.36 | 0.72 |

### 4. Result and Discussion

The results of this study are as follows:

1. For RQ1 (business process and activities, organizations, quality target and SOP) was done by literature study and expert validation to validate the existing condition, whether it was in accordance with the applied regulation and the need of construction service procurement process.

2. To answer RQ2 (risk factor) was done by expert validation to identify what are the risk factors that affecting the contractor performance quality based in the activities and by scoring the risk level.

   Risk factor that went into high risk category, validated to the expert to know the correspondence of the result and existing condition with deep discussion regarding the cause, preventive action, impact, and corrective action to get recommendation for Quality Management System Process.

3. To answer RQ3 (development QMS) was done by deep interview from risk factor result that were identified having biggest score and deep discussion on how the development of QMS would be done (there is work instruction and activities checklist). After getting the development action toward the Quality Management System for Construction Service Procurement Process, it validated to the expert to know whether the result is appropriate and applicable.

### 5. Conclusion

Some policies and regulations relating to government buildings, especially those relating to maintenance, are sufficient to be used as a basis. In preventive maintenance, there are 4 (four) policies and regulations that apply as a reference. The identification of electrical components obtained from the policies and regulations can be compiled using WBS so that all electrical components in buildings can be identified completely, thoroughly and well-structured. From the results of the validation, there are 22 (twenty-two) work packages and 45 (forty-five) alternative designs for electrical components in buildings that need preventive maintenance with each activity, procedure and preventive action and time intervals.

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