Critical factors that influence the success of construction projects procurement in Surabaya

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Abstract. Construction procurement for public infrastructure projects is important with regard to the national development to fulfill infrastructure needs. As public construction works uses the public budget, its procurement process should be conducted appropriately. Proper procurement process will result the best contractors and consultants. This paper aims to analyze the factors that influence the procurement success of the public construction project in Surabaya. The right procurement process will produce good service providers. There has been a lot of research related to procurement, but only a few have focused on the determinants of construction procurement. Therefore, research is needed related to the critical success factors of construction procurement by reviewing presidential regulation number 16 of 2018. This study attempts to identify factors determining the success of construction procurement based on a literature review and applicable presidential regulations. The preliminary survey was carried out by involving several experts who assessed the variables obtained from the results of related literature studies.

1. Introduction

Construction procurement for public infrastructure projects is a very important thing because the process of public procurement in order to meet development needs is determined through the procurement process. The procurement process is carried out competitively and taking into account the principles of fair business competition can also improve the welfare of the community because most government projects aim to spur government activities and economic growth.

One type of procurement that has been the government's priority for some time is the construction sector. The construction sector includes road projects, school buildings, drainage projects, and many others. Construction services have an important role in producing facilities and infrastructure that support growth and development in all fields, especially in national development [1].

Based on the description above, it is necessary to develop a proactive policy to develop Indonesian construction so that it can play a positive role in reducing the risk of failure of construction projects [2]. One of the things that can be done is to implement good public procurement [3]. Information technology systems that are often referred to as electronic procurement (E-procurement) in recent years have been used in the procurement process in Indonesia. This system is expected to be a means to increase cost efficiency and productivity in product revenue and customer satisfaction [4]

However, even though E-procurement has been implemented, there is no guarantee that the existing procurement process and system has no shortcomings at all. The Corruption Eradication
Commission (KPK) noted that in 2019, corruption in Indonesia was dominated by procurement by 80% [5]. Public procurement systems are considered to be the main source of the budget, where the combination of conventional and collusive intervention systems that use a major decline in public services [6]. Considering the importance of the construction sector, it is very important that procurement implementation in this field can be carried out cleanly and efficiently for the success of national development.

Surabaya City has been one of the pioneers in implementing E-procurement in Indonesia since 2004. In general, the Surabaya City Government is considered successful in implementing e-procurement systems in the public sector and has made the implementation of e-procurement systems in preventing Corruption Collusion and Nepotism (KKN) [7]. The implementation of this policy has a positive impact on the achievement of the City of Surabaya so that it has managed to get several awards related to procurement, one of which is the 2013 E-procurement award. Some of the advantages of E-procurement are that it is more transparent so that it can be monitored by the public, more efficiently because it facilitates the document research process, and in terms of bidding competition, it can save 20-30% of the budget from auction efficiency [8].

However, the achievement of the procurement success of the Surabaya City government does not automatically guarantee the success of all its construction projects. However, achieving the success of the Surabaya City government procurement does not automatically guarantee the success of all construction projects. The impact of less successful construction projects will be detrimental to the parties involved in the project, the community and the surrounding environment [7]. Several previous studies related to procurement have been conducted. However, not much research has focused on finding the critical success factors for procurement and its development strategies [9].

Based on the description above, it is necessary to conduct the research to find out what factors determine the success of construction procurement for public infrastructure projects in the City Government of Surabaya. By identifying the critical success factors, efforts or strategies can be formulated to increase procurement success in the city of Surabaya. The purpose of this research is to find out what factors influence the success of construction procurement for public infrastructure projects in the city of Surabaya through a preliminary survey.

2. Literature review

2.1. Public procurement

Public procurement is an activity to obtain goods or services by ministries, institutions, regional apparatuses, or other institutions whose processes start from the planning of needs until the completion of all activities whose budgets are financed by the state/region [10]. The purpose of procurement is to produce the right goods/services measured in terms of quality, time, cost, location of the right service provider of every money spent [10]. Public procurement is the essence of the duties of public sector organizations. The main proportion in public expenditure at every level of public sector organizations is the public procurement and construction activities.

2.2. E-procurement

Use of integrated communication systems that are usually web-based to carry out part or all of the purchasing process. The process combines the activities of early identification of needs by users, search, sourcing, negotiation, ordering, acceptance, and review after purchase [11]. In the process e-procurement reduces things that are not needed in a business process. In addition, in practice, e-procurement reduces paper usage, saves time and reduces labor usage[12]. The purpose of e-procurement is to realize the effective, efficient, transparent, fair, non-discriminatory and accountable public procurement in accordance with the principles of procurement [13]. Therefore, the Corruption Eradication Commission (KPK) encourages all government agencies to implement e-procurement in public procurement [14]. The implementation of e-procurement is considered to be able to save budget, time and increase transparency in the implementation of public procurement[15].
2.3. Success factors
The success factor is a matter or condition that can lead to the achievement of a desired goal. The success factor is used as a planning tool to reach an ideal condition or success [16]. The success factor is the term for an element that is needed for an organization or project to achieve its mission. With the approval of a previous study [9] what was agreed in this case was the best procurement, the efficient, fair and transparent procurement process.

2.4. Review of public procurement from the concept of critical success factors
The success factor as a limited area of all the results obtained, if satisfactory, can certainly lead to success towards the goal[17]. In this context it is assumed that the existence of critical factors related to the public procurement ensures that their implementation will be successful. There are several factors that influence the success or failure of a public procurement. Success factors related to the construction procurement for public infrastructure projects must consider all aspects involved [9]. Some researchers [9,18,19,20,21,22] found that the influence of e-procurement implementation at the local level, particularly leadership, human resources, planning and management, policies and regulations, system integration, infrastructure and standardization, and the dependent variable of the efficiency and effectiveness of e-procurement.

Of the eleven factors that were modeled [19], the most influential factors were top management support and performance measurement. The six factors formulated [9] produce that human resources most influence the success of the occupation. In addition to this, training and education in the new procurement process and technology are very important to ensure the successful adoption of e-procurement. This is evidenced by the research produced [20] in identifying the determinants of procurement success. Based on the results of the identification of literature found 10 variables that can be seen in table 1.

3. Research methodology
The methodology used in this study started from the identification of variables obtained from several previous studies. Then a preliminary survey involving several experts was appropriate in their field [23]. The number of experts involved in this matter was 4 experts and it had been considered sufficient to measure the relevance of the variable i.e. at least three to five experts [24]. Another special requirement was that the experts involved in the preliminary survey were those who had at least 5 years experiences in this field.

The purpose of the preliminary survey was to validate the variables obtained from studies of research literature related to actual conditions in the field [25]. At this stage the practitioner could judge whether the chosen variable actually happened or not by assessing the relevance level of one to five using a Likert scale[26]. The variables to be measured were translated into indicator variables. Then the indicator was used as a starting point for compiling instrument items which could be statements or questions[27, 28, 29, 30]. Scale 1 representing variables was highly irrelevant and scale 5 representing variables that were highly relevant[26]. In addition, if there were other variables not listed in the preliminary questionnaire, practitioners could add new variables.

Then a preliminary survey was conducted. Resource persons from this survey were experts to assess the relevance of variables obtained from literature studies. Variables were developed with several measurement indicators which would then be given a rating scale. After the data were obtained, the next step was data analysis. Check the completeness of the answers carried out to ensure no data were lost in distributing the questionnaire. In addition, researchers might also ensure that the answers given by experts were complete and clear. This was done in order to get accurate results.

Then the data obtained would be transferred to Excel for analysis. The average test was carried out on the answers obtained from the questionnaire. In order to make it easier to see the relevance of the most relevant assessment indicators, the average test results were sorted by rank.
4. Result and analysis
This paper presents preliminary results of research to investigate the critical success factors for the procurement of goods and services in Indonesia. It covers the preliminary survey result based on the experts’ survey which is presented with regard to the attributes relevancy and their rankings.

| Variable ranking | Variable | Indicator | Source | Mean | SD  | Rank | Average | Conclusion |
|------------------|----------|-----------|--------|------|-----|------|---------|------------|
| 1                | Procurement Success (PS) | Efficient procurement process | [9], [19], [20] | 5.00 | 0.00 | 1    | 4.50    | Relevant   |
|                  |          | Punctuality |        | 5.00 | 0.00 | 2    | Relevant |
|                  |          | Fair procurement process |        | 4.75 | 0.71 | 3    | Relevant |
|                  |          | Transparent procurement process |        | 5.00 | 0.00 | 4    | 4.57     | Relevant   |
|                  |          | Guaranteeing the selection of the best providers |        | 4.25 | 0.71 | 5    | Relevant |
|                  |          | Quality accuracy |        | 4.00 | 0.71 | 6    | Relevant |
|                  |          | Cost accuracy |        | 4.00 | 0.71 | 7    | Relevant |
| 2                | Security and Authenticitation (SA) | The system guarantees the privacy of data privacy | [9], [18], [19] | 4.50 | 0.71 | 1    | Relevant |
|                  |          | The system is equipped with multi-factor authentication to secure access |        | 4.50 | 0.71 | 2    | 4.50     | Relevant   |
|                  |          | The system is equipped with cryptography to secure network communications |        | 4.50 | 0.71 | 3    | Relevant |
| 3                | Technology Standards (TS) | Software availability | [9], [18], [19], [20], [21] | 4.75 | 0.71 | 1    | Relevant |
|                  |          | Availability of adequate internet access |        | 4.75 | 0.71 | 2    | Relevant |
|                  |          | Relevant content or information |        | 4.75 | 0.71 | 3    | Relevant |
|                  |          | Accurate content or information |        | 4.75 | 0.71 | 4    | 4.45     | Relevant   |
|                  |          | Up to date (updated) content or information |        | 4.75 | 0.71 | 5    | Relevant |
|                  |          | Fast system response time |        | 4.75 | 0.71 | 6    | Relevant |
|                  |          | Guidelines and regulations can be accessed online |        | 4.50 | 0.71 | 7    | Relevant |
There are a number of features to the procurement implementation that can be accessed online. There are features in the form of standard operational procurement procedures that can be accessed online. Relevant

| Feature                                      | Score | Weight | Outcome |
|----------------------------------------------|-------|--------|---------|
| Hardware availability                        | 4.25  | 0.96   | 10      |
| Hardware reliability                         | 4.25  | 0.71   | 11      |
| Software reliability                         | 4.25  | 2.12   | 12      |
| Providing bidding room services              | 3.75  | 0.71   | 13      |
| Large bandwidth capacity                     | 3.75  | 1.41   | 14      |

There are features in the form of standard operational procurement procedures that can be accessed online. Relevant

| Feature                                      | Score | Weight | Outcome |
|----------------------------------------------|-------|--------|---------|
| Evaluate achievement targets                 | 4.75  | 0.71   | 1       |
| Own a clear SOP                              | 4.75  | 0.71   | 2       |
| Setting success targets related to procurement| 4.75  | 0.71   | 3       |

There are features in the form of standard operational procurement procedures that can be accessed online. Relevant

| Feature                                      | Score | Weight | Outcome |
|----------------------------------------------|-------|--------|---------|
| Follow international e-procurement standards | 4.75  | 0.71   | 4       |
| Appropriate procurement implementation schedule | 4.50  | 0.71   | 5       |
| Procurement officers carry out daily monitoring | 3.25  | 1.41   | 6       |

There are features in the form of standard operational procurement procedures that can be accessed online. Relevant

| Feature                                      | Score | Weight | Outcome |
|----------------------------------------------|-------|--------|---------|
| Own a coherent policy                        | 4.75  | 0.71   | 1       |
| Own a policy related to accountability        | 4.75  | 0.71   | 2       |
| There are strict legal sanctions related to fraud | 4.75  | 0.71   | 3       |
| The procurement process is carried out in accordance with applicable regulations | 4.75  | 0.71   | 4       |

There are features in the form of standard operational procurement procedures that can be accessed online. Relevant

| Feature                                      | Score | Weight | Outcome |
|----------------------------------------------|-------|--------|---------|
| Conformity of laws / regulations regarding policies with technological | 3.75  | 2.12   | 5       |
|   | Reengineering Process (RP) | System Integration (SI) | User Willingness (UW) |
|---|---------------------------|-------------------------|-----------------------|
| 6 | Conformity of laws / regulations regarding policies with environmental changes | There is no conspiracy between providers of goods and services | Evaluation of things that can be reengineered |
|   | 3.75 2.12 6 Relevant | It is not possible for cooperation between procurement officers and providers | System stability [9], [18], [19] |
|   | 4.75 0.71 1 Relevant | Compliance with Standard Operating Procedures (SOP) | Ease of electronic transactions [9], [18], [20], [19], [21], [22] |
|   | 4.75 0.71 2 Relevant | The procurement master plan is clearly and systematically structured | Accessibility of service users / suppliers |
|   | 4.50 0.71 4 Relevant | | Easy data exchange between providers and service users |
|   | | | Share clear experiences of goals and objectives |
|   | 3.25 1.41 5 Relevant | | Establishing an appropriate work culture |
|   | | | Having expertise / competency certification according to their fields |
|   | | | Identify measurable performance indicators |
|   | | | Conduct education and training related to public procurement |
|   | | | | 3.75 2.12 3 Relevant |
|   | | | | 3.75 0.71 4 Relevant |
|   | | | | 2.50 2.12 5 Irrelevant |
### Provider Involvement (PI)

| Attribute                                                                 | Mean | SD  | Value | Relevance |
|---------------------------------------------------------------------------|------|-----|-------|-----------|
| Having expertise / competency certification according to their fields    | 4.75 | 0.71| 1     | Relevant  |
| Having the ability to use technology                                       | 4.00 | 0.71| 2     | Relevant  |
| Actively participating in education and training related to public procurement | 3.00 | 2.12| 3     | Relevant  |
| Develop independent training                                               | 2.50 | 0.71| 4     | Irrelevant|

### Leadership (L)

| Attribute                                                                 | Mean | SD  | Value | Relevance |
|---------------------------------------------------------------------------|------|-----|-------|-----------|
| Establishment of Goods and Services Procurement Work Unit                  | 4.75 | 0.71| 1     | Relevant  |
| Own a good vision and procurement goals                                    | 4.50 | 0.71| 2     | Relevant  |
| Top management support                                                     | 4.25 | 1.41| 3     | Relevant  |
| Appropriate allocation of resources                                        | 4.00 | 2.12| 4     | Relevant  |
| Publish the vision and objectives of procurement                           | 3.75 | 0.71| 5     | Relevant  |
| Integration between top management and procurement audits                   | 3.50 | 1.41| 6     | Relevant  |
| Involvement of top management                                              | 2.75 | 1.41| 7     | Irrelevant|
| There is a mechanism for vision consultation with stakeholders             | 2.75 | 1.41| 8     | Irrelevant|
| Involving the private sector related to public procurement                 | 2.25 | 2.12| 9     | Irrelevant|
| Involving the community related to public procurement                      | 2.25 | 2.12| 10    | Irrelevant|

Data analysis from the experts' opinion can be represented in the attributes mean and standard deviation (SD) as can be seen in Table 2. In this study, 3.00 (three) score was used as the cut-off to determine the attribute relevance as this value is the middle score between 1 to 5. It means that the attributes are considered relevant if their means are larger than three (≥ 3) as the middle value. As the means of the overall attributes were greater than three, all attributes were considered relevant to be used for the main survey through the questionnaire distribution. Based on the results of this
preliminary survey, there are several variables that are omitted because they are considered irrelevant by showing mean values smaller than 3 (three).

There are 6 critical success factors that are not relevant according to procurement experts in Surabaya, so 58 others are considered relevant. Following some opinions from experts in Indonesia during the preliminary survey show that top management involvement, consultation mechanism, involving other parties, evaluations in the reengineering process, education and training for users are considered insignificant as determining factors for successful procurement in Surabaya.

While experts agree that the benchmark for the success of procurement of goods and services is to produce the right goods and services related to quality, quantity, time, and cost, and to ensure the selection of the best providers, and an efficient, fair and transparent procurement process.

5. Discussion

Data analysis from the experts’ opinion can be represented in the attributes mean and standard deviation (SD) as can be seen in Table 1. In addition to the attributes relevancy, it is also important to find the attributes ranking based on experts’ opinion. The highest ranking is the success of the procurement itself (average 4.57). Experts agree that the success of procurement is the most important thing. All indicators in this variable are relevant with the highest average value being 5.00 and the lowest being 4.00. Efficient, timely and transparent procurement processes are indicators that have very high relevance values. This is in line with previous research [9]. The most relevant measurement indicators of this attribute are the efficient procurement process, timeliness, and transparent procurement processes.

While security and authentication (average 4.50) is the second most dominant critical success factor in procurement according to experts. Electronic procurement requires good safety standards to achieve successful procurement. Access management and identity protection and required to avoid system threats from outside interference. All indicators in this attribute are relevant to the average value of all the indicators being 4.50.

The next attribute of success determination is the technology standard (average 4.45). Experts agree that this element of technical standards is a basic need that encourages successful procurement. By increasing the role of technology standards, the higher the chances of successful procurement. This is in line with previous research that good technology standards will influence procurement success. All indicators in the technology standard are relevant with the highest average being 4.75 and the lowest being 3.75.

The fourth variable is planning and management (average 4.46). All indicators in this measurement are relevant to the highest mean of 4.75 and 3.32. The experts agree that before the procurement process is carried out, procurement actors must carry out good planning and management of all activities carefully. Evaluation of activities and disciplined SOPs are important points.

The fifth variable is policy and regulation (average 4.42). All indicators in this measurement are relevant to the highest mean of 4.75 and lowest of 3.75. Experts agree that the provision of good construction is also determined by the policies and regulations adopted by the government. Procurement must be in line with regulations that become the legal umbrella and regulate all procurement activities. So that procurement can be carried out according to procurement objectives.

The rating attribute that determines the success of procurement is the reengineering process (average 4.40). All measurement indicators in this variable are considered relevant to the highest mean of 4.75 and lowest of 3.25. Experts agree that reviewing failed bidding or improper planning is a success for procurement.

The seventh variable is system integration (average 4.19) All measurement indicators in this variable are relevant to the highest mean 4.5 and the lowest mean 4.00. Experts agree that system integration is a success. In this case, reviewing the ease of transaction and the convenience of access are important points.

While the attribute with the lowest average according to experts in determining the success of procurement is leadership (an average of 3.48). Within this attribute, there are four indicators deemed
irrelevant, including top management involvement (average 2.75), there is a vision consultation mechanism with stakeholders (average 2.75), involving the private sector and other parties (community) in procurement (average 2.25).

The involvement of top management is not necessary because in this case top management is only authorized to delegate part of the budget execution tasks. Top management is expected to support the procurement process well, without having to be directly involved in each process. The vision consultation mechanism with stakeholders is also not considered relevant by experts in determining procurement success. This is because the procurement vision and mission must be clearly defined in the procurement plan so that it can run efficiently. In addition, the involvement of the private sector and the community is also considered less relevant by experts. Procurement will be held transparently and openly so that all parties involved are able to know the planning to the results.

Another irrelevant indicator is developing your own training at home (average 2.50). This indicator is contained in the provider involvement attribute. This also relates to other indicators deemed relevant by experts to provide education and training related to procurement (average 2.50). This indicator is contained in the user's willingness attribute. Experts agree that providers must be professional in using technology systems and keep abreast of the latest developments in information technology. In addition this may also be possible if there are additional human resources or new policies.

6. Conclusion and recommendation
According to the preliminary survey, 58 out of 64 relevant factors were found to be important for the successful procurement of construction for public infrastructure projects. The most dominant determinants of procurement success are security and authentication, technology standards, and planning and management. 6 other factors are considered irrelevant in influencing the success of construction procurement. The next research step will be carried out to conduct the main survey and analysis using multiple regression to study the effect of these factors on the performance of construction procurement.

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