

Analysis of Choosing A Tools Supplier for Project Procurement Process with Analytical Hierarchy Process (AHP) Method

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Abstract

At the process of procurement construction project, to choose a qualified tools supplier will help the work on project to run without any obstacles and right on schedule. In the choose a tools supplier without any specific policy, will causing the contractor disadvantages in time, cost and quality because the lack of professionalism from the supplier. As a solutive act, a contractor must made a choice based on some of positive aspect that owned by the supplier. The purpose of this research is for analyze the factors that influenced contractors policies to choose tools supplier and also determine application of the procedure in process of the choice supplier for procurement of tools by online. The analysis starts with validating the variables from literatures in general to some of respondents, and then analysing the result questioners with a method that similar to analytical hierarchy process. With these methods of research, it will show the main factors that influenced contractors for choice of tools supplier. Based on statistical analysis it is known that main factors that influenced the policies for choosing of tools supplier at the process of purchase project are the quality of tools, price of tools, conformity to spesificantions, collateral provided supplier, easiness in payment condition and method, speed and timelines of delivery tools. While for application of grooves according to procedure based on data flow diagram (DFD) that required the application of grooves with supplier choice system on procurement of tools by online.

Keywords

Construction Project, Projects Procurement, Questionnaire, Tools Supplier

1. Introduction

Construction project consists of some activites and use resources who consist of manpower or worker, and tool for support on the job a construction project. Construction equipment is one of limited resources on the construction project with limited cost from total of project cost. Procurement of tools as one of the main from activity of construction who have value very large from project cost, so already is natural of the project executor very needed for purchase in every construction activity (Fitriana & Santosa, 2020).

Tools supplier who will be follow of process the construction and must be can support of construction project by fully.

Tools supplier is people of business who sales equipment for requirement a job of construction project. When price become factor is the most important in decide of choosing supplier in the evaluation choosing supplier, but had been accepted when process of evaluation requires another factor important who also need quality, delivery, and flexibility.

Process of choosing supplier is the part of procurement process, where the another part also need the procedure (Giantoro, 2018).

Consideration on doing the choice supplier of thools who good will be create cooperative relationship between contractor and supplier who give opportunity for become single purchase tools of single with value and deal price. So, cooperative relationship who created will be more tightly, avoid from element of fraud and come good negotiations for reach of price will be benefits to both parties. The price who gives with discount compatible from result of negotiation and smooth of purchase products from process until delivery from supplier is a expertise of supplier to the job of project, so, occurs comfort contractors of professionalism the suppliers (Fitriana & Santosa, 2020).

The contractor problems on the choosing of tools supplier is very selective, there are cases found that when the contractor have requirement or demand for purchase a construction project to tools supplier and has

been holding negotiations to finally get the best price. But, tools supplier unprofessional with it's agreement who deal 14 work days will be delivered, in fact the funds of down payment had already been received and the supplier of tools not also delivery request from contractor, who makes contractor lost money and also make work being backward. Hence, needed a system or purchase tools who doing by modern with online, to make transparent in know price and professional. After that, with existst the problems, the lack of choosing criteria on the get tools supplier who have integrity and professional.

The choosing supplier of tools really needed by a contractor in both auctions or survey by direct to location of tools supplier. But, with step of autions or survey who doing by this conventional needs very long time, so in the things make contractor will be subjected to the influence of performance in the field in the purchase tools at the project location. After that, constructors difficult in the apply a groove of purchase tools by quick, easy and efficient.

An author doing research with the purpose is to know main factors who impact of contractor in choosing of tools supplier by online, and to know a groove of system for contractor in choosing the supplier of tools by online.

2. Methodology

The problem was in accordance with the topic of discussion, where implementation has been delayed needs to purchase of tools and not in accordance his criteria in the determination of the supplier of tools in providing a construction project.

The problem was happened at the company of contractors PT. Prasadha Dipantyasa, then in careful more deeper using analyticaly hierarchy process (AHP) method with do the determination of the factors thath influence with criteria and process of variable's who had been previously decided.

An author doing some literature review before doing research more deeper. Literature review was doing with collecting some research data. Collecting of data based on 2 kinds are primary data and secondary data (reference).

The following a diagram of groove a research on the image below :

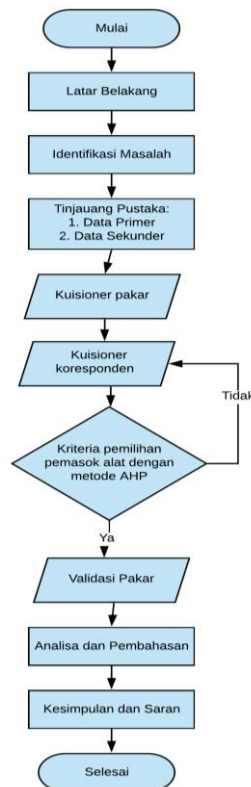


Figure 1. Diagram A Groove Research Method
(Source: Author Processed, 2020)

2.1. Population

The population is an area generalization which consist of object or subject with the quality and specific characteristics set by researcher's to be studied and then pulled in conclusion (Prof. Dr. Sugiono, 2019).

Based on the sense, so experts who will be used in this research has the following condisitons :

1. Working on the sector construction at least 4 years.
2. Minimum education is bachelor
3. Experience in the sector construction both professional or academics
4. Understand standard operating prochedures (SOP) to purchase of tools
5. Understand of problems who happens on the purchase of equipment
6. Understand about criteria of choosing tools supplier

While for respondents questionnaire, respondents who will be involved in this research own reservations as follows :

1. Working on the sector construction
2. Minimum education is associate degree
3. Experience on the sector construction at least 1 years
4. Understand the problems and criteria of choosing tools supplier

And the population would be used as respondents in this study of criteria choosing tools supplier. So, this study is doing about 35 respondents.

2.2. Data Collection Techniques and The Development Instruments

Data collection based on 2 kinds are primary data and secondary data (reference). The collection of primary data is the data collected doing with step of interview and questionnaire to respondents. This interview doing fot to know by deeper the problems who often occurs, what the cases, and how to prevent who doing in the criteria choosing, so can solve the problem.

The collecting of secondary data in the form of obtained from a specific reference or literatures who relating to the project performance. The collecting of secondary data aims to get information and data on theories related to the main issues obtained form various related research, directly concerned whether it's the final task, thesis, or joernal and literature lecture of the university who related with the subjects.

To develop instrument there was a dissemination of questionnaire to experts. After experts, is also the spread of respondents questionnaire, where is doing the criteria with analytical hierarchy process (AHP) method.

2.3. Data Analysis

In data analysis, was conducted using the mathematical modelling resembling analytical hierarchy process (AHP). From each sample when have been filled by respondents, out of that comes an order of each variables. Of this order afterward to be exerted weighting value through a descriptive statistical method with weighting used to know priority choosing variables based on all consideration. This method developed of a descriptive statistical method used to sort the percentage based on frequency. This method can be used for determining sequence of priority given to the statistic in each sample by appending weight ranked that apperars different in each sample.

Then, the order on each sample have it's own weight. A sum of the weightings is 100%. As on the table 3.2, many variable is 5, so that maximum weight for the first is $5/15$ or 33.33%. While for the second order is $4/15$ or 26.66%. For every the next sequence, given the weight of declined.

This could clearly seen in columns sequence on a sample 1 weighting and on the right those columns. The formula used to determine the value of weighting is the value of weights based on sequence or number of weight values.

Based on the number of the value of the weighting each are sample, so it's got the scale of priority based on the average value of weights. A varible that has the sum of the values largest weight will occupy the position of greatest main, then declined by the lowest.

3. Result and Analysis

Based on analysis of questionnaire above, then performed validation results to the 3 experts of construction project. As for table under this which is conducted, resume of validation like below :

Table 1. Research Variable

No.	Kode	Variabel	Kisaran Bobot	Validasi (Ya/Tidak)	Komentar
1	X22	Kualitas alat	25%-30%	Ya	Pemasok yang menawarkan kualitas alat yang terbaik, terutama bila didukung hasil uji tes alat yang akan diutamakan
2	X24	Harga alat	20%-25%	Ya	Semakin murah harga yang ditawarkan, maka pemasok akan lebih didahulukan dibandingkan dengan pesaingnya. Dengan syarat, kualitas lebih baik.
3	X23	Kesesuaian dengan spesifikasi	20%-25%	Ya	Kontraktor akan mencari pemasok yang menjual alat sesuai dengan spesifikasinya dan kebutuhan alat yang akan digunakan dalam proyek.
4	X26	Jaminan yang diberikan pemasok	15%-20%	Ya	Kontraktor memerlukan jaminan yang diberikan oleh pemasok, agar saat digunakan di lokasi proyek berjalan dengan sesuai spesifikasi dan kebutuhan.
5	X21	Kemudahan dalam cara dan syarat pembayaran	15%-20%	Ya	Kemudahan dalam pembayaran ini akan menjadikan kontraktor lebih efisien saat bertransaksi khususnya melalui online.
6	X9	Kecepatan dan ketepatan waktu penyerahan alat	10%-15%	Ya	Pengiriman alat ke lokasi tujuan proyek perlu mempertimbangkan keterbatasan waktu pelaksanaan proyek.
7	X15	Kondisi alat pada saat kedatangan	10%-15%	Ya	Tidak bisa meramalkan kondisi alat pada saat kedatangan nantinya, karena itu pada pelaksanaan penerimaan barang dibutuhkan qualitycontrol dari pihak kontraktor.
8	X2	Kapasitas produksi pemasok	5%-10%	Ya	Kemampuan produksi akan menambah produktivitas sebuah perusahaan pemasok.
9	X1	Citra dan nama perusahaan pemasok	5%-10%	Ya	Nama baik perusahaan pemasok, terutama yang sudah bekerja sama dengan baik pada proyek-proyek sebelumnya.

(Source : Author Processed, 2020)

In the validation experts can be drawn that 6 major aspects of the potential impact the choosing tools supplier is the quality of tools, price of tools, conformity to specifications, guarantee who given to supplier, easy in the way and requirement of payment, speed in the material the hand out.

After that, based on from validation of experts that can be drawn conclusion to the apply a groove system of choosing tools supplier needs by online for development, for suppor good performances, quick and accurate.

After that, based on analysis of questionnaire to the apply a groove of choosing tools supplier conducted validation results 3 experts people. As for data flow diagram (DFD) by conventional who refer to PMBOK, 2013.

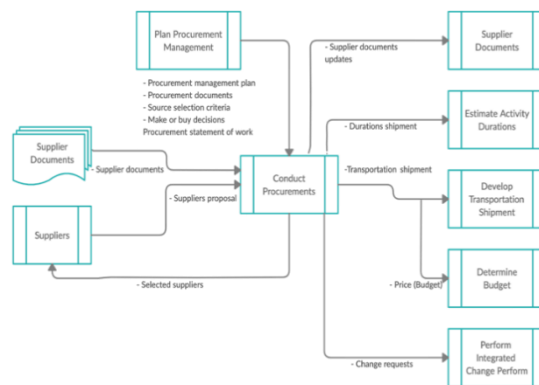


Figure 2. DFD Plan Procurement Of Conventional
(Source : Author Processed, 2020)

According from picture 2 is apply a groove system of choosing tools supplier by conventional, which by apply a groove still used with manual system. After that, in the choosing tools supplier with conventional system need long time for checking and needs doing check before.

This is validation for 3 the experts people on this under table, which are resume of result validation who done, as follow :

Table 2. Validation Experts Of Application A Groove Of Tools Supplier

No.	Pakar	Indikator	Validasi (Ya/Tidak)	Komentar
1	Pakar 1	Penerapan alur sistem pemilihan pemasok alat secara online.	Ya	Penerapan SOP atau alur dalam pemilihan pemasok, agar lebih prima dan efisien diperlukan secara online untuk menghindari data yang duplikat
2	Pakar 2	Penerapan alur sistem pemilihan pemasok alat secara online.	Ya	Penggunaan secara konvensional perlu dirubah menjadu secara online, sehingga dalam menentukan pemilihan pemasok dapat lebih cepat dan pengecekan data yang lebih efisien serta terukur.
3	Pakar 3	Penerapan alur sistem pemilihan pemasok alat secara online.	Ya	Pemilihan pemasok alat diperlukan sebuah database untuk menampung data, sehingga tidak terjadi kesalahan data dan dapat mengukur bahwa layak atau tidaknya, ketika mengambil suatu keputusan.

(Source : Author Processed, 2020)

In the results validation experts in table 2, a conclusion can be drawn that the application a groove system of choosing tools supplier by online very needed in the implementation. When the system done by online, so contractor will be easy in the doing of choosing supplier by quich, easy and efficient. After that, data who saved not will be occurs duplicate and contractor can takes decided who accurate and measurable.

4. Closing

4.1. Conclusion

Based on result of analysis and discussion to the data who collect from result of answer respondents in this research, so can give conclusion that :

1. Main factors who impact of contractor in the choosing tools supplier by online between :
 - a. Generality of suppliers.
Image and name of supplier company, and capacity of supplier production.
 - b. The state of service suppliers
Speed and timeliness of delivery tools, condition tools at the arrived, easy in the step and terms of payment.
 - c. Condition of tools from suppliers

- Quality of tools, compatible with specification, price of tools, and warranty who gives by supplier.
- Application a groove system for contractor in the choosing tools supplier by online, between :

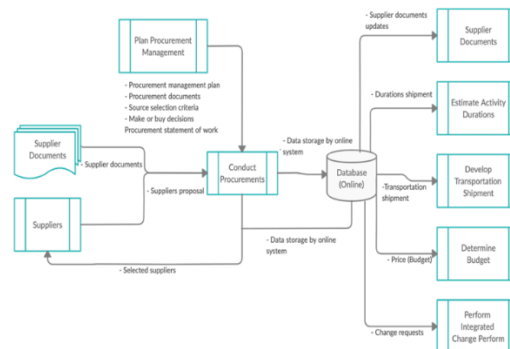


Figure 3. DFD Of Plan Procurement Proposed By Online
(Source: Author Processed, 2020)

Application a groove system at the picture 3, for easier contractor in the choosing of tools supplier by online. When supplier of tools want to do register with send document, don't need to use hardcopy document who tired of contractor in decided of supplier who have integrity and professional. Only by system based on online, supplier only upload by system, and side of contractor only check with easy don't must long wait. Therefore, with exist of application the grooves, can increase of system contractor on the choosing criteria of tools supplier with easy and efficient.

4.2. Suggestion

From result of this research and conclusion who can takes, so can suggestion that :

- Contractor can give information about requirements and consideration about runway of choosing tools supplier by clear and adequate.
- Choosing tools supplier in Indonesia, where price of equipment still become main consideration, should be start follow of choosing tools supplier in the advanced country who already concerned another factors besides price, quality, easily on the project implementation and etc.
- On the process of purchase tools need by transparent and more increase from procurement based on online, so contractor don't difficult in the choosing of purchase tools.
- Provides next research special about primarily quantitative policies contractor in Indonesia in choosing tools supplier.

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