Strategies to Increase Procurement Maturity Level using Procurement Maturity Model to Improve Procurement Performance

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Abstract- Procurement performance improvement needs to be carried out continuously so that the efficiency and effectiveness of the procurement process can increase. Based on literature studies, one method to improve procurement performance is to measure the procurement maturity level so that it can be identified which procurement components need to be improved. This research aims to produce improvement strategies based on a gap analysis of the existing procurement maturity level using the Procurement Maturity Model (Guth, 2010) to improve procurement performance. This research uses a literature study method and a survey conducted by distributing questionnaires to respondents. Subsequently, a literature study was conducted to formulate conceptual improvement strategies to produce strategies to increase the procurement maturity level of the procurement process. These strategies were then analyzed so that a recommendation was generated in the form of strategies to increase the procurement maturity level that could improve the performance of the procurement process.

Index Terms- Procurement, Procurement Performance, Procurement Maturity, Efficiency, Effectiveness

I. Introduction

According to the Presidential Regulation Number 12 of 2021 concerning the Procurement of Government Goods and Services, it is necessary to regulate the procurement of goods / services that can provide value for money, contribution in increasing the use of domestic products, increasing the role of Micro, Small and Medium Enterprises and sustainable development to improve public services and develop the national economy [1]. This regulation requires all government agencies to carry out a procurement process with efficiency, effectiveness, transparency, open, competitive, fair, and accountable.

Based on audits by Audit Board of the Republic of Indonesia in 2013, there were 1,853 cases of government loss, 717 cases of potential loss, 545 cases of revenue shortage, 121 cases of administration findings, 55 cases of inefficiency and 53 cases of ineffective process of the procurement in Indonesia [2]. In addition to those findings, according to the national news portal, many failed procurements in various government agencies in Indonesia were occurred due to a variety of factors, including procurement participants failing to meet requirements in 69 packages of road infrastructure projects in South Lampung as well as no participants qualifying the bid evaluations for the Jatigede reservoir project. As a result of these particular circumstances, it is certain that the procurement process in Indonesian government agencies appears to require improved performance.

According to Guth (2010), one way to improve procurement performance is to determine the maturity level of the procurement process [3]. Based on previous research, it is known that there is a positive relationship between the level of maturity and the performance of the procurement process. Rozemeijer et al. (2003) found a significant positive relationship between the procurement process and the maturity of corporate strategies in procurement planning [4]. The higher level of maturity, the better strategic activities, which leads to an increased performance (Ubeda et al., 2014) [5]. Moreover, a positive relationship can be identified between maturity and the performance of the procurement process (Batenburg & Versendaal, 2008) [6]. Schiele (2007) concluded that a positive relationship between procurement maturity and procurement performance provides benefits to the company [7].

Statement of the Problem

The procurement maturity level and its relation to procurement performance will be studied more deeply and become the focus of this research. The aims of this research are to produce strategies to increase the procurement maturity level based on a gap analysis of the existing conditions using the Procurement Maturity Model to improve procurement performance. The results expected in this study are recommended procurement indicators that should be improved by government agencies in Indonesia.

The research result in the form of a strategy that is applicable and relevant to varied procurement agencies in Indonesia differentiates this apart from the prior studies. There has yet any research that has produced a strategy for increasing procurement maturity based on assessment results of the procurement maturity model. The maturity model only uses as assessment tools.

This research is limited to the object of research which is the procurement department in a non-ministerial government institution/agency in Indonesia which one of its main tasks is maintaining monetary stability in Indonesia. The mapping of the existing procurement maturity level conditions using the Procurement Maturity Model (Stephen Guth, 2010). The research is approached by questionnaire surveys, descriptive analysis, and literature study. The research results are limited to strategies to

improve procurement maturity indicators from literature studies and correlation analysis.

II. Theoritical Study

1. Procurement Process

All acts required for the competitive bidding acquisition of products, services, works, or real property are referred to as procurement. The acquisition process encompasses all the activities involved in acquiring products and services, including identifying and developing requirements, planning, budgeting, conducting solicitations, gaining permissions, and engaging in contract negotiations (United Nations, 2020) [8].

In Indonesia, procurement is defined by Presidential Regulation No. 12 of 2021, which is the activity of procuring goods and services by ministries, institutions, and regional apparatus, which is funded by the State Revenue and Expenditure Budget (APBN) / Regional Revenue and Expenditure Budget (APBD), and has been in progress from the identification of needs to the handover of work results. The procurement principle refers to Presidential Regulation No. 12 of 2021 on Government Procurement of Goods and Services, which stipulates that procurement should be effective, efficient, transparent, accountable, open, competitive, and fair / non-discriminatory [1].

In Indonesia, according to the National Public Procurement Agency (LKPP) Regulation No.9 of 2018 on Implementing rules and Regulations of the Procurement of Goods / Services through Suppliers, notably planning, preparation, tender preparation, the selection process, implementation contract, and handover, primarily in government-owned ministries, institutions, and regional apparatus [9].

2. Procurement Performance

The procurement performance, which includes procurement efficiency and effectiveness, is the dependent variable in this study. According to Knudsen (1999), procurement performance begins with identifying the procurement function's effectiveness and efficiency with the objective of transforming the procurement process from reactive to proactive [10]. Scheper (2002) found that synchronizing information technology with strategy and policy, monitoring and control, organization and processes, people and culture will greatly enhance the performance of a firm [11]. Measurement of procurement performance is based on efficiency and effectiveness as in broader context of the cost / value equation (Axelsson et al., 2005) [12].

The more integrative, value-oriented, strategic, proactive, and center-led procurement becomes, the more successful it will be. Considering the five elements mentioned above are so interconnected, improving procurement maturity is one method of achieving excellent procurement performance (Andreasen, 2012) [13]. Van Weele (1984) correlates the varying levels of maturity to the aspects of performance measurements we would expect to see at each level. In comparison to organizations where procurement is a low-level function, we would expect incredibly advanced measures if procurement is represented in upper management [14]. According to Schiele (2007), there is a link between a high maturity level and procurement innovation introduction success. The more sophisticated procurement procedures are, the more center-led the procurement organization becomes [7]. Using reliable and up-to-date information and communication technologies is one technique for enhancing procurement performance. Technology in procurement, such as e-procurement, will improve procurement efficiency, decrease unnecessary costs, speed up the procurement process, and provide an improved inventory system (Kalaskar et al, 2016) [15].

3. Procurement Maturity

According to Guth (2010), procurement maturity is measured against the best practice benchmark. Among various examples, a baseline of 63 best practices has been discovered. All of them are referred to as the upper limit of procurement service levels, or benchmark level, and a test case is evaluated by comparing the best case's limits to the test case's status level. Guth also observed that there are a number of factors that have a direct impact on organizational performance, including the organization, policies, processes, people, tools, values, and vendors [3].

Guth developed a set of characteristics as variables in PMM to determine the procurement maturity level. The PMM variable is used as a independent research variable. The PMM is an acronym for Procurement Maturity Model. Guth (2010) proposed a list of determinants for calculating procurement maturity, as well as a maturity determination scale, which comprises of six different levels of maturity: inhibiting & performing, enabling & optimizing, best in class & world class [3].

Table 1. Procurement Maturity Level of Procurement Maturity Model (Guth, 2010)

Score	Maturity Level	Conditions
0 - 0,5	Inhibiting	Users view the procurement process as a barrier, therefore they avoid purchasing through and do not really pay close attention to staff feedback
0,5 - 1,0	Performing	
1,0 - 1,5	Enabling	In general, procurement may add value, invest in system improvement, and users and vendors are satisfied. Procurement also gives attention to employee feedback and is oriented on improvement to adopt Best Practices
1,5 - 2,0	Optimizing	
2,0 - 2,5	Best in Class	Strategic procurement that uses a procurement automation system, has a high degree of user and vendor satisfaction, employs highly qualified professionals, and is focused on improving performance
2,5 - 3,0	World Class	

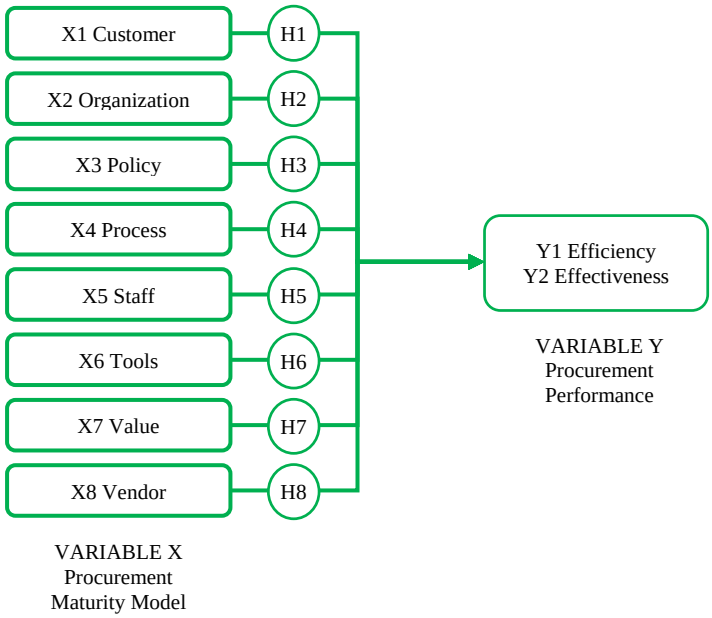
All indicators each had their own weights, which are then summed up to get the overall value of PMM, which has a range of 0 to 3, with 0 being the smallest and 3 being the highest. PMM provides four alternatives for existing procurement process conditions, namely 0, 1, 2, and 3, which can subsequently be used to identify gaps with procurement best practices. The results of the assessment can be used by the government agencies as a reference in implementing best procurement practices to improve procurement performance.

III. METHOD

1. Research Strategy

The selection of a research approach is based on a preconceived statement of the problems. According to Robert K. Yin (2014), there are five research methodologies that can be used: experiments, surveys, archival analysis, history, and case studies [16]. The survey and archival analysis were employed to collect data. The types of data acquired in the field, which included both qualitative and quantitative information. Because the results are credible, standardized questionnaires were used to collect primary data. Secondary data was collected from a variety of sources, including books, journal articles, research reports, and proceedings.

Fig. 1. Conceptual Framework



2. Research Stages

The research began with a literature review, followed by problem identification, problem formulation, and the selection of research techniques and variables. The initial stage of the research is the creation of a questionnaire based on the Procurement Maturity Model (Guth, 2010), which will be validated by experts and a pilot survey. The second part of the research involves analyzing the procurement maturity level using a validated questionnaire. The acquired data will be tested using SPSS software and represented in a spider web for each variable. The third stage of the research involves examining the relation between procurement maturity and procurement performance indicators. The research's final stage is to provide strategies to enhance procurement maturity in order to improve procurement performance.

3. Research Variables

According to the literature study and expert validation, there are eight factors for the dimensions of Procurement Maturity Level that may be used to measure the procurement process in Indonesian government agencies. The independent and dependent variables and indicators (sub-variables) determined based on the sources are listed below.

Table 2. Procurement Maturity Variables and Indicators (Independent Variables)

No.	Variable	Indicator
X1	Customers	Engagement, Procurement Instructions, Relationship Management, Satisfaction, Status Reporting
X2	Organization	Best Practices, Business Plan, Executive Support, Mission Statement, Strategic Plan, Structure, Vision Statement
X3	Policy	Approval Authority Levels, Business Continuity Plan, Delegation of Spend, Procurement Authority, Procurement Policy, Procurement Standards, Record Retention
X4	Processes	Audit, Competitive Bidding Plan, Cost Reduction Plans, Forecast, Negotiation Planning, Purchase Order Generation, Spend Profile
X5	Staff	Certification, Commodity Training, Customer Engagement, Employee Engagement, General Training, Job Qualifications, Performance Management, Performance Objectives, Procurement Training, Training Plan
X6	Tools	Contract Approval Workflow Automation, Contract Labor Sourcing System, Contract Management System, Contract Templates, eRFx, External Website, Internal Website, P-Cards, Procure-to-Pay Process, Requisition / Purchase Order System, Reverse Auctions, RFx Templates, Third-party Research, Vendor Profile System / Vendor Portal, Vendor Relationship Management System
X7	Value	Contract Disputes, Contract Risk Level, Contract Template Ratio, Contract Turn-around Time, Cost Avoidance / Cost Savings, RFx Turn-around Time
X8	Vendor	Approved Vendor List, Measurements and Metrics, Vendor Categorization, Vendor Qualification, Vendor Rationalization, Vendor Recognition

Source : Procurement Maturity Model, Stephen Guth (2010)

Table 3. Procurement Performance Variables (Dependent Variables)

No.	Variable	Description
Y1	Procurement Efficiency	Procurement processes, policies, and procedures are executed in accordance with plans and objectives
Y2	Procurement Effectiveness	The goods or services are obtained in accordance with user-defined objectives and targets, with high quality, reasonable pricing, and dependable vendors

Source : Weele (2006) [17]

4. Research Instrument

After validating the content and constructs of expert-validated research instruments, a pilot survey of potential respondents is done to see whether the questionnaire use is easily understood. To establish the current level of procurement maturity, 8 variables, containing 63 indications, have been validated as procurement maturity assessment indicators.

Table 4. Procurement Maturity Model Sample Questions

Indicator	Current Practice
Engagement	0. Customers avoid use of procurement department. 1. Procurement department reactive and demand driven; very few RFx projects 2. Tendency for procurement department to be reactive; some pro-active involvement with customers; few RFx projects. 3. Significant pro-active involvement with customers early in their project cycle; frequent RFx projects

Source : Procurement Maturity Model, Stephen Guth (2010)

This research used the Procurement Maturity Model (Guth, 2010) scale, with the lowest value of 0 and the highest value of 3. The questionnaire scale is based on the PMM scale, which is a 4-point Likert Ordinal scale with values ranging from 0 to 3. There are eight variables and a total of 63 indicators to assess, and each indicator has a choice with an interval value of one that can be selected based on the conditions that best represent the current situation. All indicators have weights that are combined together to generate the PMM value for a procurement organization. Guth (2010) divides the scale of each interval in half to include extra values such as 0.5, 1.5, and 2.5 in order to increase accuracy and precision in terms of total PMM values. The PMM maturity level is divided into six stages with 0.5 intervals.

Table 5. Procurement Maturity Model Score Scale

Maturity Level	PMM Score
Inhibiting	0 - 0,5
Performing	0,5 - 1,0
Enabling	1,0 - 1,5
Optimizing	1,5 - 2,0
Best In Class	2,0 - 2,5
World Class	2,5 - 3,0

Source : Procurement Maturity Model, Stephen Guth (2010)

5. Research Data Collection

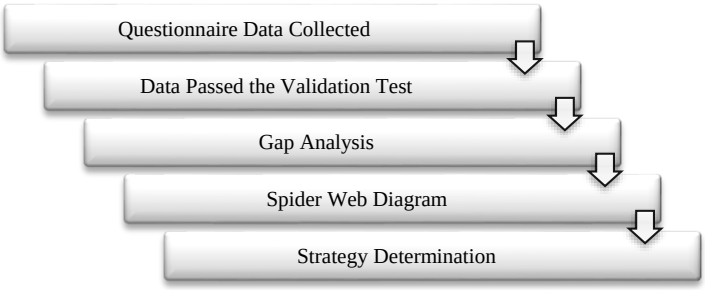
The draft questionnaire was developed using variables and indicators from the PMM, as well as the scores from the PMM. The questionnaire then validated by four experts in the field of goods and services procurement. Validation is done to establish whether the indicators used can measure the maturity level of the procurement process and improve procurement performance. The validation question is whether the indicators can evaluate procurement maturity and how much influence the indicators have on procurement performance and if the answer choices for each indicator are relevant to assessing the procurement process's maturity. Afterward, a pilot survey was done to determine whether the questionnaire was easy to understand and fit with the study's objectives.

After validating the content and constructs as well as the pilot survey, the questionnaire was prepared in good and correct Indonesian so that it could be understood by respondents using a scale using the PMM scale, namely 0, 1, 2, and 3. Calculation of research sample needs using a regression approach according to Cohen (in Hair et al., 2013) were determined based on the level of significance, statistical power, minimum coefficient of determination (R2), and the number of arrows pointing to the dependent variable [18]. This study is assumed to have a significant value of 5% with a statistical power of 80% and an R2 value of 0.25 (5% error probability). Then based on the number of arrows, namely 8 variables X that lead to variable Y, the minimum number of samples is 54 respondents. The research population included procurement practitioners in Indonesian government agencies, and the data obtained from 58 procurement department staff. After obtaining the components of the procurement process that need to be improved, data collection is carried out using literature studies in previous studies to develop strategies to improve the performance of the goods and services procurement process.

6. Research Data Analisys

The results of data collection on existing conditions and procurement maturity level are first tested with SPSS software using Data Adequacy Test (KMO & Bartlett), Comparative Homogeneity Test (Kruskal Wallis Test), Validation Test (Pearson Product-Moment Correlation Test), and Reliability Test (Cronbach's Alpha). After the data was tested and passed the requirements, the authors conducted an analysis of the respondent's data. The analysis carried out is to find the mean score, correlation analysis of X (Procurement Maturity Level) to Y (Procurement Performance).

Fig. 2. Data Analysis Framework



This research's output is the present state of procurement maturity at the object of the research. A spider web diagram will be used to portray the findings of data analysis. With this, a gap analysis can be conducted under optimized conditions in order to improve the procurement performance of Indonesian government agencies. After determining the condition of the maturity level of the present procurement process, literature review is performed using secondary data, primarily prior research, journals, books, and other research, to determine the best strategy for increasing the maturity of each indicator.

IV. Results & Discussion

1. Assessment of the Procurement Maturity Level

The above-mentioned 8 variables and 63 indicators (sub-variables) provide as a starting point for assessing the Procurement Maturity Level. The maturity aspects are derived from the preceding list of variables and indicators. Further, in the expert validation process, the expert-validated identification of maturity conditions at each level of indicator is as follows.

a. Assessment on the Expected & Existing Conditions of Procurement Maturity Level in Indonesia

The questionnaire data collection regarding the conditions of procurement maturity level was delivered to 58 respondents. Furthermore, the SPSS software was used to perform the data sufficiency test, the validity test homogeneity, and the reliability test on the results of the main questionnaire data. After the data has been confirmed to be sufficient, homogeneous, accurate, and reliable, it is processed and analyzed. Data processing is carried out in order to get a comparison of current and predicted maturity level quality culture conditions based on data from respondents.

The procurement maturity level in the object of the research is displayed in Table 4, along with the discrepancy from expected circumstances and the correlation between the Procurement Maturity Level and Procurement Performance.

Table 6. Results of Procurement Maturity Level

Code	Indicator	Existing Procurement Maturity Level Condition	Gap
X1.1	Engagement	2	-1
X1.2	Procurement Instructions	3	0
X1.3	Relationship Management	3	0
X1.4	Satisfaction	3	0
X1.5	Status Reporting	2	-1
X2.1	Best Practices	3	0
X2.2	Business Plan	3	0
X2.3	Executive Support	3	0
X2.4	Mission Statement	3	0
X2.5	Strategic Plan	3	0
X2.6	Structure	3	0
X2.7	Vision Statement	3	0
X3.1	Approval Authority Levels	3	0
X3.2	Business Continuity Plan	2	-1
X3.3	Delegation of Spend	3	0
X3.4	Procurement Authority	3	0
X3.5	Procurement Policy	3	0
X3.6	Procurement Standards	2	-1
X3.7	Record Retention	3	0
X4.1	Audit	3	0
X4.2	Competitive Bidding Plan	3	0
X4.3	Cost Reduction Plans	3	0
X4.4	Forecast	3	0
X4.5	Negotiation Planning	3	0
X4.6	Purchase Order Generation	3	0
X4.7	Spend Profile	2	-1
X5.1	Certification	3	0
X5.2	Commodity Training	2	-1
X5.3	Customer Engagement	2	-1
X5.4	Employee Engagement	2	-1
X5.5	General Training	3	0
X5.6	Job Qualifications	3	0
X5.7	Performance Management	3	0
X5.8	Performance Objectives	3	0
X5.9	Procurement Training	3	0
X5.10	Training Plan	3	0
X6.1	Contract Approval Workflow Automation	3	0
X6.2	Contract Labor Sourcing System	1	-2
X6.3	Contract Management System	3	0
X6.4	Contract Templates	3	0
X6.5	eRFx	1	-2
X6.6	External Website	3	0
X6.7	Internal Website	3	0
X6.8	P-Cards	1	-2
X6.9	Procure-to-Pay Process	2	-1
X6.10	Requisition / Purchase Order System	3	0
X6.11	Reverse Auctions	2	-1
X6.12	RFx Templates	3	0
X6.13	Third-party Research	2	-1
X6.14	Vendor Profile System / Vendor Portal	3	0
X6.15	Vendor Relationship Management System	1	-2
X7.1	Contract Disputes	2	-1
X7.2	Contract Risk Level	1	-2
X7.3	Contract Template Ratio	2	-1
X7.4	Contract Turn-around Time	3	0
X7.5	Cost Avoidance / Cost Savings	3	0
X7.6	RFx Turn-around Time	2	-1
X8.1	Approved Vendor List	3	0
X8.2	Measurements and Metrics	3	0
X8.3	Vendor Categorization	2	-1
X8.4	Vendor Qualification	2	-1
X8.5	Vendor Rationalization	2	-1
X8.6	Vendor Recognition	2	-1

PMM Score	Procurement Maturity Level
Mean Score	2,49

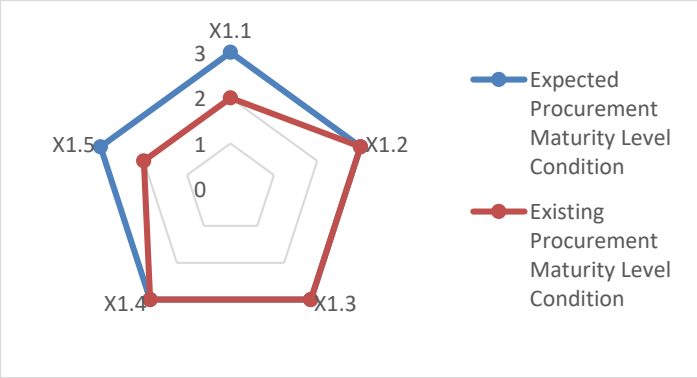
The organizational procurement maturity level is 2.49 based on an assessment adopting the Procurement Maturity Model (Guth, 2010), according on data acquired from questionnaire filled by 58 respondents. According to the PMM maturity level, a score of 2.49 is considered Best in Class and could be raised to a number between 2.5 and 3.0 to achieve World Class level. Table 6 shows the components that need to be improved, which have a 1 to 2 point gap to the best practice circumstances according to PMM. There are 18 indications with a one-point gap and 5 indicators with a two-number gap.

b. Gap Analysis Between Existing and Expected Condition of Procurement Maturity Level

The analysis is interpreted based on the gap between the expected and existing conditions in Table 4, which shows the value of the expected and existing conditions.

X1 Customer

Fig. 3. Spider Web Diagram for the Customer Variable

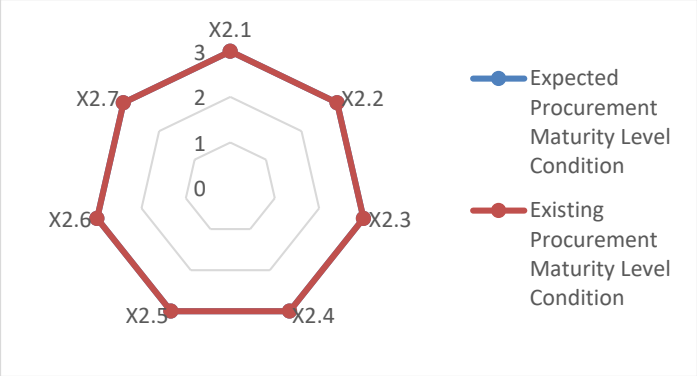


Based on Figure 3 above, there are 2 indicators of the existing procurement maturity level that are lower than the ideal level according to the PMM. The indicators are X1.1 Engagement and X1.5 Status Reporting with 1 levels of gap in the maturity level. In order to improve procurement performance, both indicator gaps need to be closed. For X1.1 Engagement, the best practice according to PMM is formal process exists which facilitates the

involvement of staff early in the customers' project cycle such that an effective competitive bidding process can be conducted [3]. For X1.5 Status Reporting, According to Salcedo (2017), the key to achieving positive customer service perception is to ensure that all purchasing requests are treated equally and that consumers are kept informed of the progress of their buy requests [19].

X2 Organization

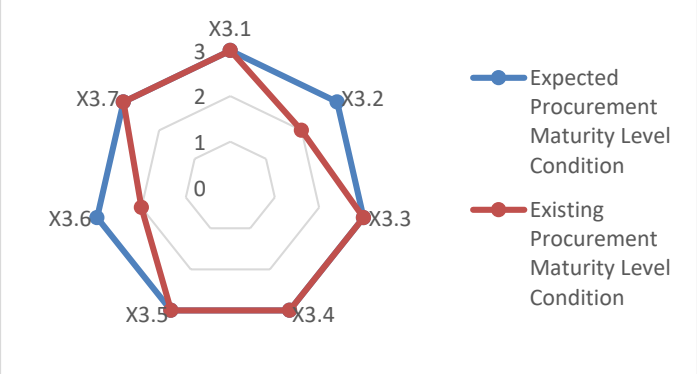
Fig. 4. Spider Web Diagram for the Organization Variable



Based on Figure 4 above, all indicators of the existing procurement maturity level that are at the same level with the ideal level according to the PMM.

X3 Policy

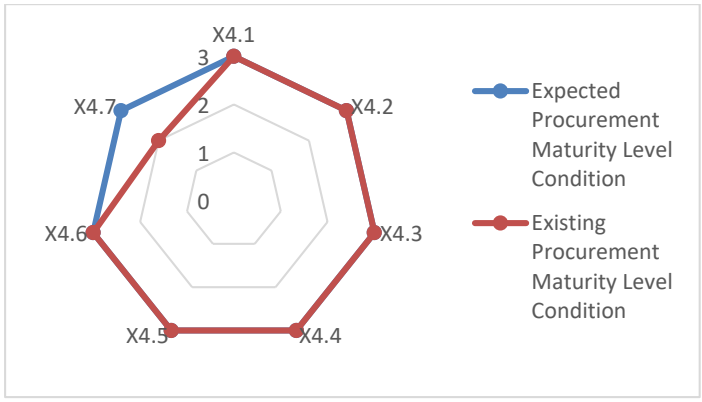
Fig. 5. Spider Web Diagram for the Policy Variable



According to the PMM, there are two indicators of present procurement maturity level that are lower than the optimal levels shown in Figure 5. The indicators are X3.2 Business Continuity Plan and X3.6 Procurement Standards, with a maturity level gap of one level. For X3.2 Business Continuity Plan, an effective business continuity plan, according to Zsidisin et al. (2003), is an organized and formal approach that identifies, manages, and eliminates all forms and types of procurement risks [20]. For X3.6 Procurement Standards, According to the United Nations Procurement Manual (2020), professional approaches, demonstrating integrity, and mitigating risks are techniques to improve customer knowledge of procurement standards [8].

X4 Process

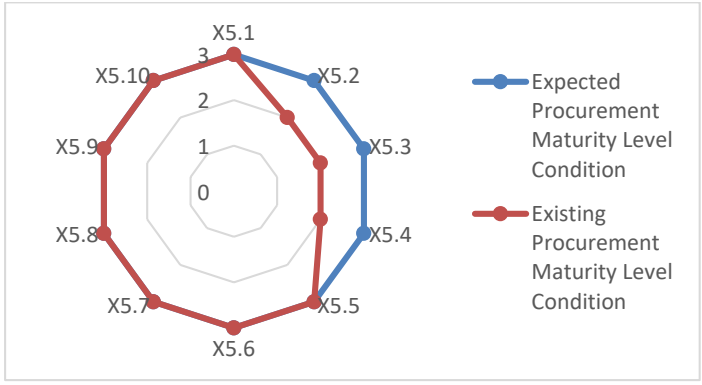
Fig. 6. Spider Web Diagram for the Process Variable



According to Figure 6, there is 1 indicator of existing procurement maturity level that is lower than the optimum level according to the PMM, such as X4.7 Spend Profile with 1 level of maturity gap. The indicator gap must be closed in order to increase procurement performance. For X4.7 Spend Profile, Morsinkhof (2018) described ideal expenditure analysis as when e-Procurement software does expenditure analysis autonomously, which is monitored on a regular basis in an organized manner by employees who can make manual decisions based on the data [21].

X5 Staff

Fig. 7. Spider Web Diagram for the Staff Variable

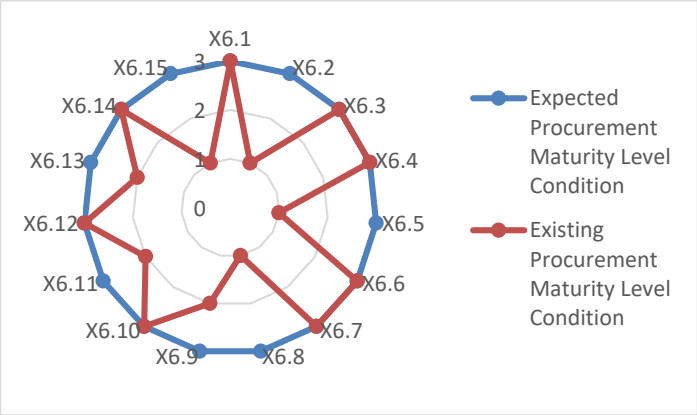


According to the PMM, three indicators of current procurement maturity level are lower than the optimal level, as shown in Figure 7. The indicators include X5.2 Commodity Training, X5.3 Customer Engagement, and X5.4 Employee Engagement, with a maturity level gap of one level. For X5.2 Commodity Training, the best practice according to PMM is Procurement department staff received twenty-four or more hours of commodity training annually [3]. For X5.3 Customer Engagement, the best practice according to PMM is Customers view procurement department staff as virtual extensions of their own staff, engaging procurement department staff in customer-specific processes, such as customer staff meetings [3]. For X5.4

Employee Engagement, the best practice according to PMM is Third-party surveys conducted annually to determine level of procurement department staff employee engagement; results are benchmarked against other organizations and are acted upon to improve survey results [3].

X6 Tools

Fig. 8. Spider Web Diagram for the Tools Variable



Based on Figure 8 above, there are 7 indicators of the existing procurement maturity level that are lower than the ideal level according to the PMM. Indicators X6.2 Contract Labor Sourcing System, X6.5 eRFX, X6.8 P-Cards, and X6.15 Vendor Relationship Management System have 2 levels of gap while indicators X6.9 Procure-to-Pay Process, X6.11 Reverse Auction, and X6.13 Third Party Research have 1 levels of gap in the maturity level.

For X6.2 Contract Labor Sourcing, the best practice according to PMM is automated third-party system exists to intake contract labor needs from the end customer based on labor profile templates, routes the need to approved vendors [3]. For X6.5 eRFX, Smart (2010) described firms who used eRFx as instruments to analyze supplier offers more systematically as having benefits such as improved supplier search [22].

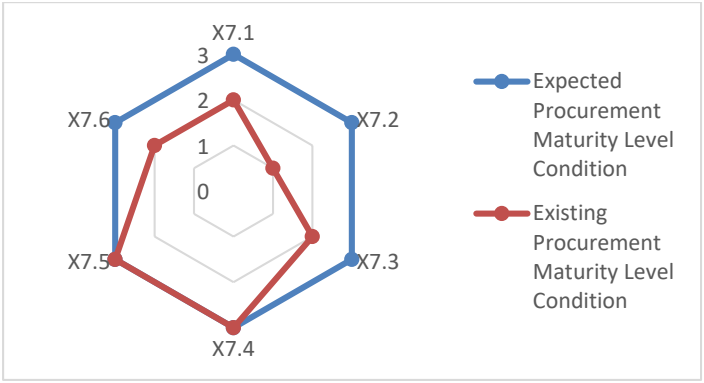
For X6.8 P-Cards, Buehner & Daly (2003) found that the implementation of P-Cards in the company delivers benefits such as increased flexibility in use and the elimination of routine purchase processes [23]. For X6.9 Procure-to-Pay Process, the best practice according to PMM is Fully automated procure-to-pay processes, through which a significant portion (50% or greater) of procurement spend flows [3].

For X6.11 Reverse Auction, the best practice according to PMM is reverse auctioning frequently used for commodity purchases, and guidelines established for use of the tool [3]. For X6.13 Third Party Research, the best practice according to PMM is For commodities requiring research, procurement department staff have required access to third-party research [3].

For X6.15 Vendor Relationship Management System, according to (Batran et al. 2017) that by utilizing smart apps, the system's degree of automation should be maximized, and manual work—such as market research activities or gathering and manually entering input in supplier ratings—should be minimized [24].

X7 Value

Fig. 9. Spider Web Diagram for the Value Variable

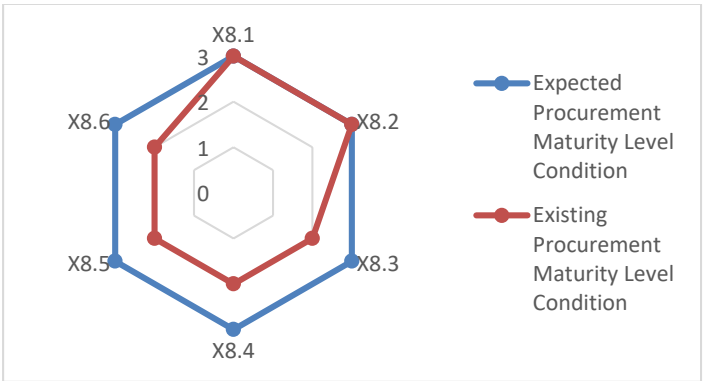


According to the PMM, four indications of current procurement maturity level are lower than the optimal level, as shown in Figure 9 above. Indicators X7.2 Contract Risk Level have a two-level gap in maturity, while indicators X7.1 Contract Disputes, X7.3 Contract Template Ratio, and X7.6 RFx Turn-around Time have a one-level gap. In order to improve procurement performance, those indicator gaps need to be closed.

For X7.1 Contract Disputes, Hinchey (2012) found that the selection of procurement strategies has an effect on dispute resolution [25]. For X7.2 Contract Risk Level, according to Siedel and Haapio (2013), in order to prevent and regulate disagreements, risk must be sensibly allocated by assigning each potential threat to the party best able to control it [26]. For X7.3 Contract Template Ratio, the best in class achieve when 80% or more of all contracts executed using procurement department contract templates [27]. For X7.6 RFx Turn-around Time, the best practice according to PMM is 80% or more of all RFx projects completed and contracted within 60 calendar days, with 95% or more of all RFx projects completed and contracted within 90 calendar days [3].

X8 Vendor

Fig. 10. Spider Web Diagram for the Vendor Variable



Based on Figure 10 above, there are 4 indicators of the existing procurement maturity level that are lower than the ideal level according to the PMM. The indicators are X8.3 Vendor Categorization, X8.4 Vendor Qualification X8.5 Vendor

Rationalization and X8.6 Vendor Recognition with 1 levels of gap in the maturity level. In order to improve procurement performance, both indicator gaps need to be closed.

For X8.3 Vendor Categorization, the best practice according to PMM is Formal hierarchy of vendor categories exist, with vendors assigned (via a system or documentation) to the categories [3]. Customers understand the process, and use the process for decision-making purposes. For X8.4 Vendor Qualification, the when the prospective vendors are qualified using a formal, automated process, best practice achieved [3]. For X8.5 Vendor Rationalization, according to Croom & Brandon-Jones (2007) the reduced search costs using web technology may lead to increased competitiveness in supply marketplaces, giving buyers more control on supplier numbers [28]. For X8.6 Vendor Recognition, the best practice according to PMM is Vendor recognition program exists where vendors are selected (based on quantitative and qualitative criteria) and recognized for their performance [3].

This research is only limited to the case study of procurement department in the object of the research which represent the government agencies in Indonesia, therefore further research can be developed for larger data samples. The limitation of this research is to analyse the gap between the existing and the expected conditions on the procurement maturity level. However, further research can be conducted to develop technical strategies or systems with the aim of increasing the procurement maturity level in order to improve procurement performance in Indonesia.

2. Correlation Analysis of PMM Indicators and Procurement Performance

The Pearson Product-Moment correlation validity test is conducted as in external test to get a correlation coefficient using SPSS software. The coefficient determines the link between the independent variable (from each indicator) and the dependent variable. The Pearson correlation value (r) for each indicator is the test result to be assessed, and r is deemed to be legitimate and significant if it is more than the r table, which is 0.2586. The Pearson Product-Moment Correlation Test results for each indicator on the Y variable are as follows.

Table 7. Correlation of PMM Indicators and Procurement Performance

Code	Indicator	Correlation of X	
		Y1 Efficiency	Y2 Effectiveness
X1.1	Engagement	0,111	-0,005
X1.2	Procurement Instructions	0,409**	0,056
X1.3	Relationship Management	0,324*	0,244
X1.4	Satisfaction	0,898**	0,470**
X1.5	Status Reporting	0,529**	0,218
X2.1	Best Practices	0,390**	0,761**
X2.2	Business Plan	0,075	00,151
X2.3	Executive Support	0,201	0,262*
X2.4	Mission Statement	0,140	0,325*
X2.5	Strategic Plan	0,068	0,157
X2.6	Structure	0,158	0,192
X2.7	Vision Statement	0,215	0,301*
X3.1	Approval Authority Levels	0,395**	0,222
X3.2	Business Continuity Plan	0,527**	0,328*
X3.3	Delegation of Spend	0,389**	0,580**
X3.4	Procurement Authority	0,858**	0,420**
X3.5	Procurement Policy	0,084	0,262*
X3.6	Procurement Standards	0,440**	0,528**
X3.7	Record Retention	0,431**	0,625**
X4.1	Audit	0,347**	0,533**
X4.2	Competitive Bidding Plan	0,116	0,155
X4.3	Cost Reduction Plans	0,736**	0,393**
X4.4	Forecast	0,488**	0,202
X4.5	Negotiation Planning	0,099	0,164
X4.6	Purchase Order Generation	0,390**	0,577**
X4.7	Spend Profile	-0,106	0,096
X5.1	Certification	0,091	0,176
X5.2	Commodity Training	0,125	0,114
X5.3	Customer Engagement	0,206	0,026
X5.4	Employee Engagement	0,202	0,125
X5.5	General Training	0,512**	0,164
X5.6	Job Qualifications	0,350**	0,540**
X5.7	Performance Management	0,087	0,115
X5.8	Performance Objectives	0,707**	0,369**
X5.9	Procurement Training	0,068	0,112
X5.10	Training Plan	0,156	0,124
X6.1	Contract Approval Workflow Automation	0,736**	0,393**
X6.2	Contract Labor Sourcing System	0,131	0,149
X6.3	Contract Management System	0,084	0,081
X6.4	Contract Templates	-0,012	0,006
X6.5	eRFx	-0,027	0,126
X6.6	External Website	0,100	0,224
X6.7	Internal Website	0,007	0,046
X6.8	P-Cards	0,131	0,149
X6.9	Procure-to-Pay Process	0,312*	0,074
X6.10	Requisition / Purchase Order System	0,347**	0,533**
X6.11	Reverse Auctions	-0,001	0,097
X6.12	RFx Templates	-0,098	0,162
X6.13	Third-party Research	0,296*	0,072
X6.14	Vendor Profile System / Vendor Portal	0,273*	0,152
X6.15	Vendor Relationship Management System	0,155	-0,026
X7.1	Contract Disputes	0,274*	0,053
X7.2	Contract Risk Level	0,345**	0,084
X7.3	Contract Template Ratio	0,194	0,020
X7.4	Contract Turn-around Time	0,140	-0,073
X7.5	Cost Avoidance / Cost Savings	-0,098	0,162
X7.6	RFx Turn-around Time	0,208	0,122
X8.1	Approved Vendor List	0,163	0,119
X8.2	Measurements and Metrics	0,154	0,170
X8.3	Vendor Categorization	0,019	0,088
X8.4	Vendor Qualification	-0,060	0,125
X8.5	Vendor Rationalization	0,041	0,141
X8.6	Vendor Recognition	0,130	0,200

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Based on the results of the correlation test of the PMM variable on the procurement performance variable using the Pearson Product-Moment Correlation Test, it can be categorized as the Procurement Maturity indicator which has a very significant relationship (strong correlation) and significant (medium

correlation) to the Procurement Performance variable. This category is identified based on the correlation value generated.

Table 8. Indicators with High and Medium Correlation

Indicators with High Correlation to Procurement Performance		Indicators with Medium Correlation to Procurement Performance	
X1.4	Satisfaction	X3.1	Approval Authority Levels
X3.4	Procurement Authority	X7.2	Contract Risk Level
X2.1	Best Practices	X2.4	Mission Statement
X4.3	Cost Reduction Plans	X1.3	Relationship Management
X6.1	Contract Approval Workflow Automation	X6.14	Vendor Profile System / Vendor Portal
X5.8	Performance Objectives	X2.7	Vision Statement
X3.7	Record Retention	X6.13	Third-party Research
X3.3	Delegation of Spend	X7.1	Contract Disputes
X4.6	Purchase Order Generation	X6.9	Procure-to-Pay Process
X5.6	Job Qualifications	X2.3	Executive Support
X4.1	Audit	X3.5	Procurement Policy
X6.10	Requisition / Purchase Order System		
X1.5	Status Reporting		
X3.6	Procurement Standards		
X3.2	Business Continuity Plan		
X5.5	General Training		
X4.4	Forecast		
X1.2	Procurement Instructions		

3. The Connection between Procurement Maturity Assessment Result and Procurement Performance

Reviewing the literature, the conceptual framework of this study hypothesizes that procurement maturity level influences procurement performance. According to Schiele (2007), there is a connection between a high maturity level and procurement innovation success, also according to Batenburg & Versendaal (2008), a significant link between maturity and procurement process performance can be identified, and according to Ubeda et al. (2014), the higher the level of maturity leads to an increased performance [5] [6] [7].

Based on the Pearson Correlation Test results, 18 indicators with high significance on procurement performance were identified in this study. The theory of Schiele (2007), Batenburg & Versendaal (2008), and Ubeda et al. (2014) can be proven: there is a strong correlation between procurement maturity and procurement performance. In order to increase procurement performance, indicators of procurement maturity that have gaps with ideal conditions must be improved.

4. Recommended Strategies to Increase Procurement Maturity Level using Procurement Maturity Model Best Practice

According to the assessment of procurement maturity levels, there are 23 maturity indicators that need to be improved. Five indications have two level gaps, while the remaining 18 indications have one level gap. This study will give 10 strategies for 5 indicators with the most significance for procurement performance based on the Pearson Product-Moment Correlation Test and 5 indicators with two level gaps. The five significant indicators are X1.5 Status Reporting, X3.2 Business Continuity Plan, X3.6 Procurement Standards, X6.9 Procure-to-Pay Process, and X7.1 Contract Disputes. The five indicators with two level gaps are X6.2 Contract Labor Sourcing System, X6.5 eRFX, X6.8 P-Cards, X6.15 Vendor Relationship Management, and X7.2 Contract Risk Level.

a. Status Reporting

The present maturity level for variable X1.5 Status Reporting indicates that the reporting has been conducted and scheduled, but the information given is incomplete and out of date. The necessary strategy for increasing maturity is to ensure that the data submitted to customers is complete and real-time (Guth, 2010) [3]. According to Salcedo (2017), the key to ensuring positive customer service perception is to assure the treatment of all purchasing requests and inform consumers of the status of their purchase requests [19]. The relevant data in this case is provided below:

- Lead time / expected delivery dates
  To maintain or improve customer service, lead time and projected delivery time frame information must be determined and communicated to customers on a timely basis.
- Purchase Request Information
  The status of the requisitions, such as RFQ created, procurement initiated, suppliers awarded, and processed by suppliers, required to be sent to customers through email notifying them of the current state of the requisitions.
- Purchase Order Information
  After the issue of the Purchase Order the system should notify clients via email with all essential information about the purchase order, including the projected delivery date.

Procurement management is advised to report complete and up-to-date data with pleasant service, prompt treatment, and conformance to lead time and projected delivery dates.

b. Business Continuity Plan

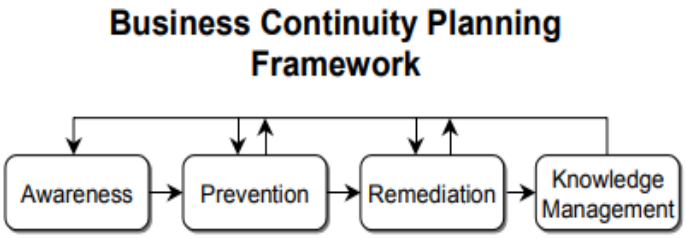
The current situation is there is a business continuity plan that is understood by procurement personnel, but the plan has not been assessed against specific scenarios, and the staff has not been trained to anticipate them. According to PMM, the ideal situation is when this business continuity plan includes procedures for continuing to operate the procurement process in the occurrence of a business disruption with qualified and trained personnel. According to Zsidisin et al. (2003), an effective business continuity plan is an organized and formal procedure that identifies, manages, and eliminates all forms and types of procurement risks [20]. There are 4 steps that can be taken to compile a good business continuity plan:

- Awareness
  The organization recognizes that it is exposed to supply chain interruptions and recognises the potentially significant effects of such interruptions. To control the risk, resources can be allocated, and appropriate processes and technologies can be established and deployed.
- Prevention
  Through risk identification, risk assessment, risk treatment, and risk monitoring, the organization is trying to limit the likelihood and/or effect of supply chain interruptions.
- Remediation
  When a disruption occurs, the organization establishes a plan of action to recover from it. The plan is capable of reducing the duration of the disruption, minimizing its impact on the

business, and identifying the resources that will be required to execute the plan in advance.

- Knowledge Management
  The plan also includes a post-incident audit that outlines key lessons learned and the outcomes of the recovery process.

Fig. 12. Business Continuity Planning Framework (Salcedo, 2017)



Management must analyze what occurred and conduct what amounts to a debriefing. Based on the analysis, the existing BCP must be altered in order to solve the flaws while maintaining the strengths of the existing plans and strategies

c. Procurement Standards

The parties, including procurement staff and customers, must understand the Procurement Standard. The present level of the PMM evaluation results indicates that the procurement staff has implemented a complete and up-to-date procurement standard document, but the customer does not fully comprehend the document. By these conditions, the approach that can be performed is to educate customers on the procurement standards that are used (Guth, 2010) [3]. The following are the methods that can be used, according to the United Nations Procurement Manual (2020) [8]:

- Professional Approach
  All procurement transactions must be performed with professionalism and in conformity with the highest ethical standards.
- Demonstrate Integrity
  Staff must ensure that all customers follow the procurement criteria with ethics, propriety, neutrality, fairness, honesty, and openness.
- Mitigate the risks
  Implement systems to detect conflicts of interest, fraudulent and unethical activities, and to respond appropriately to these improprieties.

When procurement standards are not followed, the damage extends far beyond economic consequences, posing major dangers to the Organization's reputation and capacity to achieve its operational and programmatic objectives.

d. Procure-to-Pay Process

According to the questionnaire, the procure-to-pay procedure or purchasing through the procurement process has occurred, however the amount is less than 50% of the entire budget. When more than 50% of expenditure is done through an automated procure-to-pay procedure, the situation is optimal (Guth, 2010) [3]. The approach that government agencies in Indonesia can apply is to prioritize the procure-to-pay process for spending in order to establish a better procurement function, particularly paperless procurement environments, decreasing time required for each step of the procurement cycle, increasing the number of transactions received or delivered electronically, strengthening information visibility and eliminating manual processes (Rosenberg, 2009) [29].

According to Batenburg and Versendaal (2008), the procurement spending process should be expanded in order to gain benefits such as cost reduction, higher profitability, assured supply, quality improvements, and competitive advantage [6]. Based on this literature review, the strategy for the X6.9 Procure-to-Pay Process indicator can be developed, in which organizations are urged to devote more than 50% of their spend through automated procure-to-pay procedures by investing in tools and training employees.

e. Contract Disputes

Contract disputes may arise during the procurement process; based on current conditions, it is approximately more than 1% of overall contracts encounter contract disputes within 12 months following contract execution. When the amount of contract disputes is less than 1% of the overall contract, the optimum condition for X7.1 is met [3]. The strategy required is to avoid contract conflicts, which can be accomplished in the following ways:

- Collaboration that improves cooperation in contract administration in order to reduce litigation. Collaboration improves communication and allows for the sharing of goals and interests. The drivers of its dispute resolution method are trust and good faith in collaborating partnerships (Morledge et al. 2006) [30].
- The selection of procurement strategies do have an impact on dispute resolution. Procurement should connect key stakeholders' objectives and interests in an enforceable contractual agreement that results in the project owner carrying practically all risks on the project (Hinchey, 2012) [25].

The ideal strategy to improve the maturity level for contract disputes indicator is to avoid contract disputes below 1% of overall projects by enhancing partnership with vendors and implement the proper procurement procedures.

f. Contract Labor Sourcing System

The contract labor sourcing system is a system that receives contract labor requirements from customers, sends these requirements to approved vendors, and receives vendor proposals. Morsinkhof (2018) describes the optimum level of system maturity as when the contracting phase is totally autonomous and arranged in fully networked systems, and human engagement is minimal to develop a solely monitoring function [21]. According to the PMM assessment, the system exists but is not frequently used. The approach that must be implemented is for the organization to establish automated systems based on labor profile requirements using third-party applications.

g. eRFX

There are automated eRFx systems, but they are not widely used. To achieve a higher level of maturity, third-party systems need to be implemented and used in all procurement activities in

accordance with the PMM. eRFX is made up of three parts: an electronic request for information (RFI), a request for proposal (RFP), and a request for quotation (RFQ). The recommended strategies based on the literature review as follows.

Guth (2010) described the ideal condition wherein the eRFX system is automated, developed by a third party, and used for 80% of competitive bids [3]. There is a difference between self-developed systems and third-party developed systems in terms of success rate, quality and speed. The third-party developed system has a greater success rate due to the deployment of a highly expert team on projects that would otherwise be unavailable in-house. This will result in a high-quality software project. (Haider et al. 2016) [31]. Outsourcing allows firms to execute their software projects on time (Grossman & Helpman, 2005) [32].

Morsinkhof (2018) characterized a successful procurement organization as one in which the eRFX processes are highly autonomous and integrated both internally and externally via the extensive usage of e-Procurement software. Only orders with a significant value require human input and authorization in e-Procurement software. The condition improves when human involvement is minimized in order to develop a solely authorising and monitoring role. Many factors are measured autonomously in the system, with an emphasis not only on pricing but also on quality factors [21].

Smart (2010) reviewed the usage of eRFX as tools to analyze supplier bids more systematically, allowing for more structured sourcing decision-making. Within the sourcing cycle, the eRFX technologies were also utilized to automate supplier responses to RFPs and analyze supplier proposals. The outcome of the eRFX analysis was specifically used for improved analysis of supplier bids, which contributed in spend reduction. Most organizations had used e-RFX software, which were evaluated to provide benefits such as improved supplier search, tender response analysis, supplier rating and ranking, and metrics for controlling both suppliers and spend categories [22].

h. P-Cards

P-Cards are Procurement Cards, which are electronic transaction cards issued by banks for minor value transactions, non-inventory / stock, and non-capital purchases. Employees can use the P-Card to obtain products and services without having to go through the typical document permission procedure (Boulianne, 2005) [33]. Palmer et al. (2002) analyzed P-Card usage in 150 US state and local governments and discovered that P-Card usage generates around $ 8.2 million in cost savings per state agency each year [34].

According to the PMM assessment, the score for X6.8 is 1, indicating a two-point gap toward optimum conditions, which will be achieved when P-Cards are adopted and used throughout the organization. According to Presidential Regulation No. 12 of 2021, procurement processes with a value of up to Rp200 million can be carried out in Indonesia by purchasing directly from the provider, supported by proof of purchase whose offer has been cleared and negotiated [1]. Since the regulation does not include P-Cards, the best strategy for government organizations in Indonesia is to use the P-Card as a payment mechanism for the purchase of low-value items.

P-Card feature enables each card to be formatted with checks such as monetary amount limit per transaction (for example, to Rp1 Million), transaction limit per day and month (for example, maximum three transactions per day or 40 transactions per month), and monetary amount limit for specific periods (Boulianne, 2005) [33]. P-card use gives other benefits in addition to operational cost reductions, increased acquisition flexibility, and faster purchase reaction times. The use of P-cards provides additional benefits such as flexibility in use and the ability to compare competing prices prior to purchase. The use of P-cards allows procurement systems to eliminate routine purchasing processes (Buehner & Daly, 2003) [23].

i. Vendor Relationship Management

Contract There is currently a vendor relationship management system in place, but it is not being used. To close the two-level gaps under ideal conditions, a vendor relationship management system designed by a third party needs to be implemented in the procurement process. The following is the recommended strategy for adopting vendor relationship management.

- Excellent e-procurement system
  Increased e-procurement utilization results in more successful buyer-supplier relations (Croom, 2001) [35]. E-procurement is more likely to strengthen rather than harm supplier relationships since it encourages hierarchical rather than market-based interactions (Croom & Brandon-Jones, 2007) [28]. The use of online marketplaces results in deeper connections with fewer suppliers (White et al, 2004) [36].
- Vendor Classification
  Supplier management action takes into account the time invested as well as the potential business impact. Only strategic and innovative partners are treated intensively with tailored measures and activities, while all other suppliers are examined through a conventional process that is kept to a minimum. Supplier management should be uncomplicated and straightforward (Batran et al. 2017) [24].
- Vendor Satisfaction
  Improved supplier relationship is dependent on supplier satisfaction. They provide innovation, capacity during bottlenecks, and even lower prices. If clients were awarded preferred customer status and achieved supplier satisfaction, suppliers would offer better prices. System interfaces assist in the development of relationships and trust. (Batran et al. 2017) [24].
- Data Update Automation
  The system's degree of automation should be maximized, and manual work market research activities or collecting and manually entering input in supplier ratings—should be minimized by employing smart applications. Supplier management upgraded with direct data flows, allowing buyers to focus on value creation activities by evaluating the available data (Batran et al. 2017) [24]. Increased levels of information exchange can lead to increased supplier integration (Garcia-Dastugue & Lambert, 2003) [37].

j. Contract Risk Level

Contract risks are viewed as part of legal or liability concerns, such as the inability or unwillingness of the party to execute its

obligations. Legal risk management is seen as a subset of contractual risk management (Mahler, 2010) [38]. According to the PMM assessment, the contract risk level is measured anecdotally and not recorded. To narrow the two-level gap with the mature condition the contract risk level must be objectively determined using pre-defined criteria and recorded in a contract management system.

According to Siedel and Haapio (2013), there are three risk levels: the first level is the threat that can be prevented, the second level is the risk that cannot be prevented but may still be prevent doing harm, and the third level is when the harm happens and thus the damage must be contained [26]. The precautions for those risk levels are as follows:

1. Create methods and tools to reduce friction and prevent risk and problem-causing factors from developing.
2. Seek early intervention to avoid risk factors from causing harm and problems from escalating into disputes.
3. Limit losses and costs by mitigating risk and resolving disputes.

The most effective strategy to prevent and control disputes is to rationally allocate risks by allocating each possible threat to the party best able to handle, control, or insure against it [26].

Morsinkhof (2018) described a successful procurement organization as one that manages risk through the use of e-Procurement software. It is feasible to detect hazards and disruptions from suppliers autonomously in the early stages, after which human input decides on further steps based on these signals [21].

V. Conclusion

Based on the current findings of the research and analysis, in order to achieve a better procurement process, Indonesian government agencies are advised to increase procurement maturity, particularly in variables that have a significant correlation to procurement performance and a considerable gap to the ideal condition.

There is a set of recommendation that may be provided to the procurement department in government agencies in Indonesia based on the discrepancy value between the present and expected condition of the procurement maturity level of government agencies in Indonesia and the link to procurement performance, namely ten priority indicators that must be reviewed and improved in order to attain higher procurement maturity levels and better procurement performance.

However, all indicators of the procurement maturity model must be analyzed and enhanced in order to achieve the best outcomes for improving the procurement performance of Indonesian government agencies. The following are the recommended strategies for increasing procurement maturity of government agencies in Indonesia:

1. Procurement management should deliver complete and up-to-date data with providing good professional service, efficient treatment, and complying to lead times and expected delivery dates. This is done to ensure that customers have a positive view of the service they get.
2. Management is encouraged to assess the business continuity plan and test it against specific conditions, while also ensuring that employees are prepared to anticipate any disruptions to the procurement process.
3. It is recommended that the procurement department enlighten customers about the procurement standard being used. To respond correctly to irregularities, the procured goods and services must be processed with a professional attitude, integrity, and risk response strategy.
4. The organization recommended increasing the use of the procure-to-pay procedure to more than 50% of the budget. By investing in tools and training staff, a more automated procurement process will eventually lead to a more governed process.
5. Procurement management is advised to keep contract disputes to less than 1% of total projects by strengthening partnerships with vendors and implementing correct procurement procedures.
6. To reduce time spent, it is advised that the procurement department develop an automated labor procurement system that can collect contract labor requirements from clients, send these requirements to approved vendors, and automatically receive vendor quotes.
7. The procurement department should implement the automated eRFX system for up to 80% of competitive bids. The benefit of this strategy is improved analysis of supplier bids, which contributed to spend reduction.
8. It is recommended that the procurement department introduced P-Cards (Procurement Cards) for minor value transactions, non-inventory, non-capital items. The advantages include lower operational costs, greater purchasing flexibility, and faster buy reaction times.
9. Management is advised to use smart applications that automate vendor relationship management systems to analyze vendor classification. Increased information interchange can lead to greater supplier integration and improve vendor satisfaction.
10. It is recommended that the organization pre-define the contract risk level in order to prevent and control disputes by sensibly transferring risks by allocating each potential threat to the party best suited to handle it.

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