# Risk Management of Goods and Services Procurement at PT XYZ

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**Abstract:** PT. XYZ is a foreign investment company engaged in the manufacturing industry of building materials. The products produced by PT. XYZ are concrete wall bricks that adhere to Japanese Industrial Standards (JIS), and have also received SNI product testing certification. In its business processes, PT. XYZ requires supplies of goods and services. The procurement implementation at PT. XYZ applies a "procurement by user" model. Risks may occur in this process, such as a lack of transparency in the supplier selection process, procurement cost constraints, and insufficient professionalism in the receipt of goods or services. ISO 31000 can serve as a guideline for implementing risk management, and the method used in this research is the House of Risk (HOR). HOR Phase 1 will produce an output in the form of Aggregate Risk Potential (ARP), which determines the priority of risk agents that will undergo further action, along with an analysis using a Pareto diagram. Followed by HOR Phase 2, which will produce outputs in the form of the difficulty level of mitigation processes (Dk) and Total Effectiveness of Difficulty Level (ETDk), determining the effectiveness ratio of each mitigation action. In this research, 18 risk events and 17 risk agents were identified, with 2 priority risk agents that will receive mitigation actions. Through HOR Phase 2, five recommendations for mitigation actions were obtained, with the top-ranking recommendation being the establishment of Standard Operating Procedures (SOP) for the procurement process.

**Keywords:** Mitigation Action, House of Risk, Risk Events, Procurement

## INTRODUCTION

Procurement is a crucial activity that aims to obtain goods or services from outside the company by covering the costs through various means, such as purchasing, leasing, outsourcing, and other means. The procurement process must involve mutual agreement regarding price, time, and other aspects. others to ensure the continuity of company operations.

Ideally, procurement management is run by a work unit such as *purchasing* or *procurement,* which has full responsibility to meet the company's operational needs. However,

variations in procurement strategies occur, including the *procurement by user model,* where each part can initiate and manage the procurement process. The following is the procurement process flow at PT. XYZ which applies the *procurement by user model*.
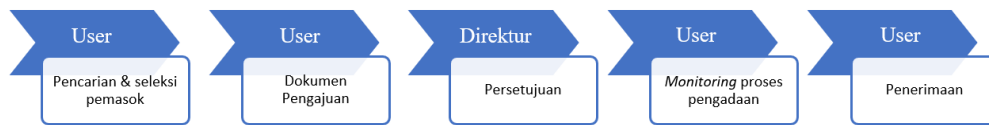


**Figure 1PT. XYZ Procurement Process Flow**

PT. XYZ is a foreign capital company engaged in the building materials manufacturing industry. The products produced by PT. XYZ are concrete wall bricks that use Japanese industrial standards or commonly called JIS and have also received SNI product testing certification. In its business process, PT. XYZ requires a supply of goods and services. The procurement implementation at PT. XYZ is with *the procurement by user model* which refers to the company's regulations, namely regarding administrative procurement (*Administrative Provisions for Procurement*). The process is also not free from risks that can occur, for example the lack of transparency in the supplier selection process, procurement cost constraints, and lack of professionalism in receiving goods or services are concerns and operational risks that can cause complaints from customers.
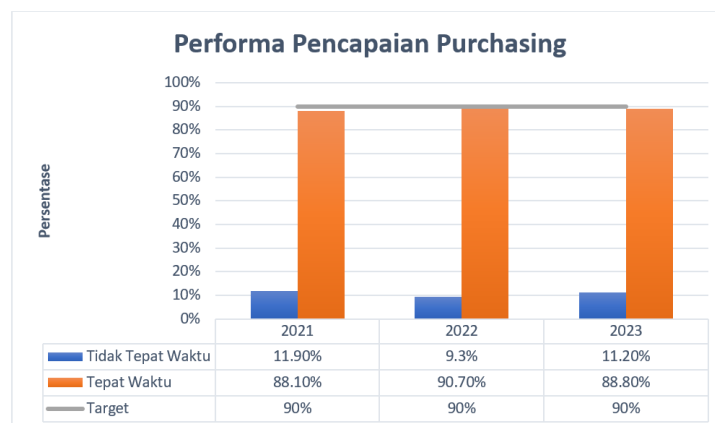


**Figure 2Purchasing Achievement Performance Graph 2021-2023**

Based on Figure 2 above, the performance achievement of the procurement process is still low and has not been able to achieve the targets set by the company. In the period from 2021 to 2023, there were several problematic conditions related to the supplier selection process, both from internal (company) and external (supplier) factors. This condition also has an impact on the late fulfillment of previously set targets. Of course, this can be detrimental to the company both financially and non-financially. SNI ISO 31000 can be a guide for implementing risk management. There are several tools that can be used in implementing risk management such as the *House of Risk* (HOR) method which is an integrated approach that combines the *Failure Mode and Effect Analysis* (FMEA) model with *the House of Quality* (HOQ). This method is designed to measure the level of risk, prioritize risk agents, and determine the most effective actions.

The focus of this research will be set on risk analysis in the procurement process of goods at PT. XYZ. The scope of this research includes further investigation of various types of risks that may arise in procurement of goods, including risks associated with the implementation of the *procurement by user model*.

## METHOD

The research was conducted at the operational unit of PT. XYZ in February - March 2023. The research was conducted using *desk research methods* and direct observation and coordination with internal *stakeholders*. The data collection techniques used in this study were 1) literature study by studying the concept of procurement management of goods/services, the concept of identification and assessment of procurement risks, risk mitigation steps, and company regulations related to procurement; 2) direct observation of the procurement process at PT. XYZ; and 3) interviews with five *key informants* related to the procurement process.

### *House of Risk* Phase 1

In HOR phase 1, risks will be identified first, then the second stage is HOR phase 2. In HOR phase 2, the identified risks will be handled by taking appropriate preventive measures. HOR phase 1 is used to determine the risk agents that must be prioritized so that preventive measures can be taken. The stages carried out are as follows:

a.  Identify risk events *that* occur such as *plan*, *source*, *make*, *deliver* and *return*.
b.  Provides an assessment to determine how big the impact or *severity* (S) and probability of the risk agent is if the risk occurs. The assessment scale used is 1 - 10.
c.  Identify risk sources and provide an assessment of the likelihood of each risk source using a scale of 1 – 10.
d.  Determine the correlation between *risk agent* and *risk event* using a scale of 0, 1, 3, 9.
e.  Calculate the *Aggregate Risk Potential* (ARP) value to determine the priority of risk agents for further action, using the following formula.

$$ARP_j = O_j \sum S_i R_{ij}$$

Information:
ARPj    : *Aggregate Risk Potential*
Oj      : Measurement of the probability value of a risk agent occurring
Si      : Measurement of the level of risk impact
Rij     : Measurement of the correlation value of risk events

f.  Creates the order of ARP values from the largest value to the lowest value.

**Tabel 1. House of Risk Fase 1**

| Business Processes | Risk Event (Ei) | Risk Agents (Aj) | | | | | | | Severity of Risk Event i (Si) |
|---|---|---|---|---|---|---|---|---|---|
| | | A1 | A2 | A3 | A4 | A5 | A6 | A7 | |
| Plan | E1 | R11 | R12 | R13 | | | | | S1 |
| | E2 | R21 | R22 | | | | | | S2 |
| Source | E3 | R31 | | | | | | | S3 |
| | E4 | R41 | | | | | | | S4 |
| Make | E5 | | | | | | | | S5 |
| | E6 | | | | | | | | S6 |
| Deliver | E7 | | | | | | | | S7 |
| | E8 | | | | | | | | S8 |
| Return | E9 | | | | | | | Rij | S9 |
| Occurrence of agent j | | O1 | O2 | O3 | O4 | O5 | O6 | O7 | |
| Aggregate risk potential j | | ARP1 | ARP2 | ARP3 | ARP4 | ARP5 | ARP6 | ARP7 | |
| Priority rank of agent j | | | | | | | | | |

**House of Risk Phase 2**

*House of Risk* (HOR) phase 2 is used to determine the priority of the first action by considering the effectiveness of the action, which can be seen from the side of resources or finances owned. The stages carried out are as follows:

a. Conduct selection of risk agents in the highest positions using Pareto diagram analysis.

b. Identifying appropriate actions to minimize risk agents or risk causes. One risk cause can be minimized by more than one action.

c. Determine the correlation of each preventive action and risk source using a scale of 0, 1, 3, 9.

d. Calculate the number of effectiveness using the formula:

$$TEk = \sum ARPj . Ejk$$

Information:

TEk      : The sum of the effectiveness of each action

$ARP\ j$     : *Aggregate Risk Potential*

$E\ jk$          : Correlation between each preventive action and each risk agent

e. Calculate the level of difficulty (Dk) in implementing each action using a scale of 3, 4, 5.

f. Perform a total calculation of the effectiveness ratio for each mitigation action to be carried out.

$$ETDk = TEk/Dk$$

Information:

ETDk    : Total effectiveness of difficulty level

TEk       : Number of effectiveness

Dk                : Difficulty level

g. Sort each action based on the ETDk value from highest to lowest.

**Risk Mapping Matrix**

The risk mapping matrix commonly called *heat map*, comes from the assessment of a risk which is basically calculating or assessing the impact of the identified risk, categorizing the magnitude of the impact of the risk, grouping risks with the main level (*major risk*), which has a large and broad impact that requires management, or which does not require special handling because the impact of the risk is within acceptable limits (*minor risk*). Risk is formulated as a function of occurrence (*likelihood*) and negative impact (*severity*).

Risk Value = Probability × Impact

The following is the risk rating and matrix according to AS/NZS 4360 Standard.

| | | |
|---|---|---|
| E | *Extreme Risk* | Very High Risk |
| H | *High Risk* | High Risk |
| M | *Moderate Risk* | Medium Risk |
| L | *Low Risk* | Low Risk |

**Table 2. Head Map**

| Severity / Likelihood | | 1 Insignificant | 2 Minor | 3 Moderate | 4 Major | 5 Catastrophic |
|---|---|---|---|---|---|---|
| 5 | Almost Certain | M (5) | H (10) | E (15) | E (20) | E (25) |
| 4 | Likely | M (4) | H (8) | H (12) | E (16) | E (20) |
| 3 | Possible | L (3) | M (6) | H (9) | H (12) | E (15) |
| 2 | Unlikely | L (2) | M (4) | M (6) | H (8) | H (10) |
| 1 | Rare | L (1) | L (2) | L (3) | M (4) | M (5) |

## RESULTS AND DISCUSSION

### Corporate Procurement System

Based on the existing organizational structure, there is no special procurement department (*Purchasing*) or appointment of special officers. The procurement system run by PT. XYZ is "*procurement by user*", so that each department head is responsible for the procurement needed for his/her section.
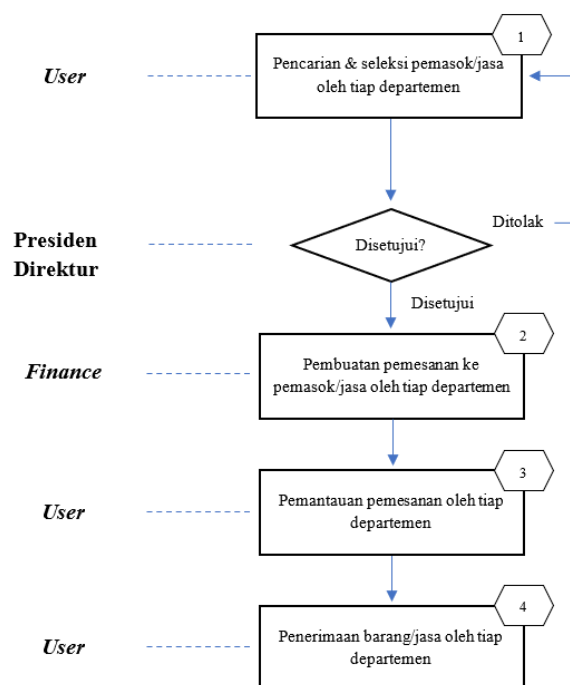


Procurement activities at PT. XYZ can be seen in Tables 3 and 4.

**Table 1Procurement Activities of Goods and Services of PT. XYZ**

| Proses | Aktivitas | PIC | Kode |
|--------|-----------|-----|------|
| Plan | Pencarian pemasok | User | C1 |
| | Negosiasi dengan pemasok | User | C2 |
| Source | Proses penunjukkan dan pemilihan pemasok | User | C3 |
| | Persetujuan pengadaan ke Presiden Direktur | User | C4 |
| Make | Penjadwalan pengiriman atau pengadaan | User | C5 |
| | Penerbitan Surat Perintah Kerja (SPK) atau *Purchase Order* (PO) | Finance | C6 |
| Delivery | Monitoring SPK/PO yang berjalan | User | C7 |
| | Pengiriman barang/jasa | User | C8 |
| | Penerimaan kondisi barang/jasa | User | C9 |
| Return | Pengembalian barang yang tidak sesuai PO | User | C10 |
| | Perbaikan atau penghentian pengerjaan jasa yang tidak sesuai | User | C11 |

RACI matrix of PT. XYZ procurement process with procurement system *by user*, which involves *user, Finance* Department, and *President Director* can be seen in Table 8. This RACI matrix shows that *user has the most* responsibility for the work.

**Table 2RACI Matrix of PT. XYZ**

| Activity | User | Finance | President Director |
|----------|------|---------|--------------------|
| Supplier search | A | I | I |
| Negotiations with suppliers | A | I | C |
| Supplier appointment and selection process | R | I | A |
| Procurement approval to the President Director | R | I | A |
| Scheduling of delivery or procurement | R | I | I |
| Issuance of Work Order (SPK) or *Purchase Order* (PO) | I | R | A |
| Monitoring of ongoing SPK/PO | R | C | I |
| Delivery of goods/services | R | I | I |
| Acceptance of goods/services condition | R | I | I |
| Return of goods that do not match the PO | R | I | C |
| Correction or termination of non-conforming service work | R | I | A |

Information:

| | | |
|---|---|---|
| | R | *Responsible* |
| | A | *Accountable* |
| | C | *Consulted* |
| | I | *Informed* |

**Initial Risk Mapping**

Based on the procurement process flow table above, the initial step in this study is to conduct initial risk mapping based on the impact (*severity*) and likelihood risks *known* through direct observation and interviews with sources to determine the risk value in each part of the procurement process.

**Table 3Initial Risk Mapping**

| Proses | Aktivitas | PIC | Kode | Kemungkinan | Dampak | Nilai Risiko |
|---|---|---|---|---|---|---|
| Plan | Pencarian pemasok | User | C1 | 4 | 5 | 20 |
| | Negosiasi dengan pemasok | User | C2 | 2 | 5 | 10 |
| Source | Proses penunjukkan dan pemilihan pemasok | User | C3 | 3 | 5 | 15 |
| | Persetujuan pengadaan ke Presiden Direktur | User | C4 | 2 | 3 | 6 |
| Make | Penjadwalan pengiriman atau pengadaan | User | C5 | 1 | 5 | 5 |
| | Penerbitan Surat Perintah Kerja (SPK) atau Purchase Order (PO) | Finance | C6 | 3 | 4 | 12 |
| Delivery | Monitoring SPK/PO yang berjalan | User | C7 | 4 | 5 | 20 |
| | Pengiriman barang/jasa | User | C8 | 2 | 2 | 4 |
| | Penerimaan kondisi barang/jasa | User | C9 | 1 | 4 | 4 |
| Return | Pengembalian barang yang tidak sesuai PO | User | C10 | 1 | 3 | 3 |
| | Perbaikan atau penghentian pengerjaan jasa yang tidak sesuai | User | C11 | 1 | 5 | 5 |

**Table 4Initial Risk Heat Map**

| Severity / Likelihood | 1 Insignificant | 2 Minor | 3 Moderate | 4 Major | 5 Catastrophic |
|---|---|---|---|---|---|
| 5 Almost Certain | | | | | |
| 4 Likely | | | | | C1, C7 |
| 3 Possible | | | | C6 | C3 |
| 2 Unlikely | | C8 | C4 | | C2 |
| 1 Rare | | | C10 | C9 | C5, C11 |

Information:

| | | | |
|---|---|---|---|
| ▇ | E | Extreme Risk | Very High Risk |
| ▇ | H | High Risk | High Risk |
| ▇ | M | Moderate Risk | Medium Risk |
| ▇ | L | Low Risk | Low Risk |

*The heat map* above shows that the very high-risk value is in processes C1 and C7 with a risk value of 20 and process C3 with a risk value of 15. Furthermore, the high-risk value is in process C6 with a risk value of 12 and process C2 with a risk value of 10. Meanwhile, the medium risk value is in process C4 with a risk value of 6, processes C5 and C11 with a risk value of 5 and process C8 with a risk value of 4. Finally, the low-risk value is in process C10 with a risk value of 3.

**Risk Identification**

*Risk Event Identification Results*

Based on the distribution of questionnaires conducted to respondents, eighteen risk events were obtained from eleven risk activities that occurred at PT. XYZ. Risk events will be assessed with an occurrence scale that represents the probability of occurrence, risk events with high *severity* and *occurrence values* must receive more attention than other risk events (Zsidisin

& Ritchie, 2009). Below are the results of interviews and filling out questionnaires related to *risk events* at PT. XYZ.

**Tabel 5. Identifikasi Kejadian Risiko dan Tingkat Keparahan**

| Proses | Aktivitas | Kejadian Risiko (*Risk Event*) | Kode | Severity (1-10) |
|---|---|---|---|---|
| Plan | Pencarian pemasok | Kesulitan mencari pemasok yang sesuai kebutuhan | E1 | 7 |
| | | Pemasok tidak dapat memenuhi kebutuhan pesanan | E2 | 3 |
| | | Pencarian pemasok terburu-buru | E3 | 3 |
| | Negosiasi dengan Pemasok | Negosiasi terhambat karena masalah teknis | E4 | 2 |
| | | Negosiasi berjalan terlalu lama | E5 | 3 |
| | | Kegagalan dalam negosiasi | E6 | 6 |
| Source | Penunjukan dan pemilihan pemasok | Proses seleksi tidak konsisten dilakukan | E7 | 8 |
| | Persetujuan pengadaan ke presiden direktur | Keterlambatan persetujuan | E8 | 4 |
| | | Perbaikan dokumen persetujuan | E9 | 6 |
| | | Dokumen persetujuan ditolak | E10 | 4 |
| Make | Penjadwalan pengiriman atau pengadaan | Kesalahan dalam menentukan jadwal pengiriman | E11 | 2 |
| | Kerja (SPK)/*Purchase Order* (PO) | Keterlambatan dalam pembuatan SPK/PO | E12 | 2 |
| Delivery | Monitoring SPK/PO yang berjalan | Pengawasan pemesanan tidak rutin | E13 | 6 |
| | Pengiriman barang/jasa | Keterlambatan dalam pengiriman | E14 | 5 |
| | Penerimaan barang/jasa | Barang tidak sesuai dengan PO | E15 | 7 |
| Return | Pengembalian barang yang tidak sesuai PO | Tidak dapat menukar barang | E16 | 6 |
| | Perbaikan/penghentian jasa yang tidak sesuai | Penukaran tidak bisa segera | E17 | 4 |
| | | Perbaikan tidak dilakukan segera | E18 | 4 |

*Risk Source Identification Results (Risk Agent)*

Identification of risk sources is analyzed based on previously identified risk events for each business process. Each risk event can occur due to intervention from one or more risk sources, and each risk source can cause one or more risk events (Pujawan and Geraldine 2009). The results of the identification of risk sources (*risk agent* t) obtained seventeen risk sources that caused eighteen risk events with the frequency of possible occurrence of risk sources (*occurrence*) as presented in Table 8.

**Table 6Frequency of Possible Occurrence of Risk Sources**

| Sumber Risiko (*Risk Agent*) | Kode | Occurrence (1-10) |
|---|---|---|
| Keterbatasan waktu untuk mencari pemasok | A1 | 7 |
| Ketentuan minimal pemesanan dari pemasok | A2 | 4 |
| Pengadaan tidak terencana atau mendadak | A3 | 6 |
| *User* tidak mepersiapkan dokumen teknis pendukung | A4 | 4 |
| Belum banyak alternatif membuka kemungkinan pemasok lain | A5 | 4 |
| Pemasok memiliki posisi yang lebih kuat | A6 | 2 |
| Tidak ada sistem yang mengatur proses seleksi | A7 | 6 |
| Proses persetujuan seminggu sekali | A8 | 4 |
| Keterangan dan isi dokumen persetujuan tidak jelas | A9 | 3 |
| Tidak ada SOP yang ditetapkan untuk pengadaan | A10 | 8 |
| Proses pengadaan tidak satu pintu | A11 | 7 |
| Penerbitan PO bergantung pada bagian keuangan | A12 | 9 |
| Tidak ada sistem *monitoring* | A13 | 7 |
| Tidak tersedianya barang di pemasok | A14 | 3 |
| Kesalahan pengiriman barang oleh pemasok | A15 | 2 |
| Tidak adanya kontrak yang terbentuk dengan pemasok | A16 | 5 |
| Tanggapan terhadap ketidaksesuaian lambat | A17 | 3 |

*Correlation of Risk Events with Risk Sources*

The relationship between risk events *and* risk sources (*risk agents*) is processed using values 0, 1, 3, and 9. The relationship between a risk event and a risk source is interpreted as one or many risk events can occur due to risk sources that can have a weak, medium, or high correlation. If a risk source can be controlled, the emergence of various risk events can be reduced or eliminated. The relationship between risk events and risk sources (risk agents) can be seen in Table 9.

***Table 7HOR Phase 1***

| Kejadian Risiko (*Risk Event*) | Sumber Risiko (*Risk Agent*) | | | | | | | | | | | | | | | | | Severity (Si) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | A13 | A14 | A15 | A16 | A17 | |
| E1 | 9 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| E2 | 0 | 9 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| E3 | 3 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| E4 | 1 | 0 | 3 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| E5 | 1 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| E6 | 0 | 0 | 0 | 0 | 0 | 9 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| E7 | 0 | 0 | 1 | 0 | 0 | 0 | 9 | 0 | 0 | 9 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| E8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| E9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| E10 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| E11 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 0 | 3 | 0 | 0 | 0 | 0 | 2 |
| E12 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 9 | 3 | 9 | 3 | 9 | 0 | 0 | 0 | 0 | 3 | 2 |
| E13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 9 | 0 | 0 | 0 | 0 | 6 |
| E14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 9 | 0 | 1 | 3 | 5 |
| E15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 0 | 3 | 7 |
| E16 | 0 | 0 | 0 | 0 | 0 | 9 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 9 | 0 | 6 |
| E17 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 3 | 9 | 4 |
| E18 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 4 |
| Occurrence (Oi) | 7 | 4 | 6 | 4 | 4 | 2 | 6 | 4 | 3 | 8 | 7 | 9 | 7 | 3 | 2 | 5 | 3 | |
| ARP | 539 | 120 | 498 | 72 | 120 | 234 | 666 | 336 | 252 | 1224 | 1106 | 162 | 455 | 210 | 134 | 400 | 342 | |
| *Priority* (Pj) | 4 | 15 | 5 | 17 | 16 | 11 | 3 | 9 | 10 | 1 | 2 | 13 | 6 | 12 | 14 | 7 | 8 | |

Based on HOR phase 1, it can be concluded that the risk source with the highest ARP is risk source A10 (1224), namely there is no SOP set for procurement. The risk source with the lowest ARP is risk source A4 (72), the user does not prepare supporting technical documents. The following is a table of risk source priority rankings.

**Table 8ARP Value Priority for Risk Sources**

| Peringkat | Sumber Risiko (*Risk Agent*) | Kode | Nilai ARP |
|---|---|---|---|
| 1 | Tidak ada SOP yang ditetapkan untuk pengadaan | A10 | 1224 |
| 2 | Proses pengadaan tidak satu pintu | A11 | 1106 |
| 3 | Tidak ada sistem yang mengatur proses seleksi | A7 | 666 |
| 4 | Keterbatasan waktu untuk mencari pemasok | A1 | 539 |
| 5 | Pengadaan tidak terencana atau mendadak | A3 | 498 |
| 6 | Tidak ada sistem *monitoring* | A13 | 455 |
| 7 | Tidak adanya kontrak yang terbentuk dengan pemasok | A16 | 400 |
| 8 | Tanggapan terhadap ketidaksesuaian lambat | A17 | 342 |
| 9 | Proses persetujuan seminggu sekali | A8 | 336 |
| 10 | Keterangan dan isi dokumen persetujuan tidak jelas | A9 | 252 |
| 11 | Pemasok memiliki posisi yang lebih kuat | A6 | 234 |
| 12 | Tidak tersedianya barang di pemasok | A14 | 210 |
| 13 | Penerbitan PO bergantung pada bagian keuangan | A12 | 162 |
| 14 | Kesalahan pengiriman barang oleh pemasok | A15 | 134 |
| 15 | Ketentuan minimal pemesanan dari pemasok | A2 | 120 |
| 16 | Belum banyak alternatif membuka kemungkinan pemasok lain | A5 | 120 |
| 17 | *User* tidak mempersiapkan dokumen teknis pendukung | A4 | 72 |

*Risk Evaluation*

This evaluation aims to obtain the dominant risk sources that will be handled based on the ARP value. The method used in this risk evaluation uses a Pareto diagram, where the concept of this method will determine the ARP which is the priority for improvement. As many as 20% of the dominant risk sources that appear will be the priority for improvement to minimize the other 80% of risk sources. The following is the processing of risk evaluation analysis using a Pareto diagram.

**Table 9 Pareto calculation**

| Risk Agent | Peringkat | ARP | Kumulatif ARP | Persen ARP | Kumulatif Persentase ARP | Kategori |
|---|---|---|---|---|---|---|
| A10 | 1 | 1224 | 1224 | 17,82% | 17,82% | Prioritas |
| A11 | 2 | 1106 | 2330 | 16,10% | 33,92% | |
| A7 | 3 | 666 | 2996 | 9,69% | 43,61% | Non Prioritas |
| A1 | 4 | 539 | 3535 | 7,85% | 51,46% | |
| A3 | 5 | 498 | 4033 | 7,25% | 58,70% | |
| A13 | 6 | 455 | 4488 | 6,62% | 65,33% | |
| A16 | 7 | 400 | 4888 | 5,82% | 71,15% | |
| A17 | 8 | 342 | 5230 | 4,98% | 76,13% | |
| A8 | 9 | 336 | 5566 | 4,89% | 81,02% | |
| A9 | 10 | 252 | 5818 | 3,67% | 84,69% | |
| A6 | 11 | 234 | 6052 | 3,41% | 88,09% | |
| A14 | 12 | 210 | 6262 | 3,06% | 91,15% | |
| A12 | 13 | 162 | 6424 | 2,36% | 93,51% | |
| A15 | 14 | 134 | 6558 | 1,95% | 95,46% | |
| A2 | 15 | 120 | 6678 | 1,75% | 97,21% | |
| A5 | 16 | 120 | 6798 | 1,75% | 98,95% | |
| A4 | 17 | 72 | 6870 | 1,05% | 100,00% | |
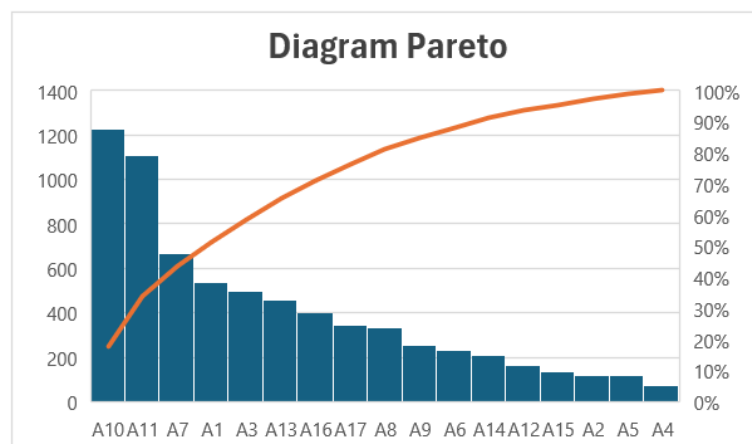


**Figure 3 Pareto diagram**

Based on the calculation results and analysis of the Pareto diagram above, it is known that there are two most dominant risk sources that can be a priority for improvement to carry out risk mitigation actions with a cumulative percentage of 33.92%. The first risk source with a percentage value of 17.82%, namely risk source A10, there is no SOP set for procurement (ARP: 1224) and the second with a percentage value of 16.10%, namely risk source A11, the procurement process is not one door (ARP: 1106).

*Risk Mitigation*

After knowing the priority risk agents from the results of the Pareto diagram analysis, the next step is to determine the most effective risk mitigation action to reduce the possibility of a risk event based on the dominant risk agent. Based on the Pareto diagram above, there are two dominant risk agents that must be mitigated. From the results of interviews and questionnaires to stakeholders, five mitigation actions that can be taken were identified. The following is Table 12 proposed risk mitigation action strategies along with the level of difficulty (Dk) in their implementation.

**Table 10Risk Mitigation Action Strategy**

| Agen Risiko | Aksi Mitigasi | Dk | Kode Mitigasi (PA) |
|---|---|---|---|
| A10 | Penetapan Standar Operasional Prosedur (SOP) proses pengadaan | 3 | PA1 |
| | Penyesuaian peraturan perusahaan terkait pengadaan | 4 | PA2 |
| | Sosialisasi peraturan atau alur proses pengadaan | 3 | PA3 |
| A11 | Membentuk Departemen Purchasing | 5 | PA4 |
| | Penunjukan *Person in Charge* (PIC) berkompeten khusus proses pengadaan | 3 | PA5 |

After knowing the risk mitigation actions and the degree of difficulty value, the next step is to weight the value of the correlation between the risk mitigation action strategy and the dominant risk agent. From the weighting of the correlation value, the effectiveness value of the mitigation action can be calculated. The following is the HOR 2 table which shows the effectiveness value of each mitigation action.

**Tabel 11 HOR Fase 2**

| Agen Risiko | Strategi Mitigasi (*Preventive Action*) | | | | | ARP |
|---|---|---|---|---|---|---|
| | PA1 | PA2 | PA3 | PA4 | PA5 | |
| A10 | 9 | 3 | 3 | 0 | 0 | 1224 |
| A11 | 1 | 3 | 0 | 9 | 9 | 1106 |
| *Total Effectiveness of Action (TEk)* | 12122 | 6990 | 3672 | 9954 | 9954 | |
| *Degree of Difficulty Performing Action (Dk)* | 3 | 4 | 3 | 5 | 3 | |
| *Effectiveness to Difficulty Ration (ETDk)* | 4041 | 1748 | 1224 | 1991 | 3318 | |
| *Rank Priority* | 1 | 4 | 5 | 3 | 2 | |

Based on Table 17 HOR Phase 2 above, the order of mitigation action strategies is obtained based on the highest ETDk value. The following is a table of risk mitigation action priorities from the results of the HOR phase 2 calculation.

**Table 12Priority Order of Risk Mitigation Actions**

| Kode | Aksi Mitigasi | Peringkat | TEk | Dk | ETDk |
|---|---|---|---|---|---|
| **PA1** | **Penetapan Standar Operasional Prosedur (SOP) Proses Pengadaan** | 1 | 12122 | 3 | 4041 |
| PA5 | Penunjukan *Person in Charge* (PIC) berkompeten khusus proses pengadaan | 2 | 9954 | 3 | 3318 |
| PA4 | Membentuk Departemen *Purchasing* | 3 | 9954 | 5 | 1991 |
| PA2 | Penyesuaian peraturan perusahaan terkait pengadaan | 4 | 6990 | 4 | 1748 |
| PA3 | Sosialisasi peraturan atau alur proses pengadaan | 5 | 3672 | 3 | 1224 |

Based on the priority level, PA1 – Establishment of Standard Operating Procedure (SOP) for Procurement Process which is ranked first is expected to be an appropriate recommendation for PT. XYZ. This mitigation action has the highest ETDk value of 4,041.

*Final Risk Mapping*

This final risk mapping is the last stage in the research, namely reviewing the risk potential map after the mitigation analysis process related to the procurement process at PT. XYZ.

**Table 13Procurement Activities of Goods and Services of PT. XYZ After Mitigation**

| Proses | Aktivitas | PIC | Kode |
|---|---|---|---|
| Plan | Pencarian pemasok | Purchasing | C1 |
| | Negosiasi dengan pemasok | Purchasing | C2 |
| Source | Proses penunjukkan dan pemilihan pemasok | Purchasing | C3 |
| | Persetujuan pengadaan ke Presiden Direktur | Purchasing/User | C4 |
| Make | Penjadwalan pengiriman atau pengadaan | Purchasing | C5 |
| | Penerbitan Surat Perintah Kerja (SPK) atau *Purchase Order* (PO) | Finance | C6 |
| Delivery | *Monitoring* SPK/PO yang berjalan | Purchasing | C7 |
| | Pengiriman barang/jasa | Purchasing | C8 |
| | Penerimaan kondisi barang/jasa | Purchasing/User | C9 |
| Return | Pengembalian barang yang tidak sesuai PO | Purchasing | C10 |
| | Perbaikan atau penghentian pengerjaan jasa yang tidak sesuai | Purchasing | C11 |

After risk mitigation was carried out, the RACI Matrix of PT. XYZ's procurement process also changed. Previously, almost all responsibility for the work (*responsible*) was borne by *the user*, but after risk mitigation was carried out, the *Purchasing Department* did more work. *The user* acts as *a consultant* in the process of appointing and selecting suppliers and accepting the condition of goods/services. In addition, *the user* is also responsible for making decisions (*accountable*) for returning goods and repairing or stopping work that is not in accordance with the PO.

*Tabel 14 Matriks RACI PT. XYZ Setelah Mitigasi*

| Aktivitas | User | Purchasing | Finance | President Director |
|---|---|---|---|---|
| Pencarian pemasok | I | R | I | I |
| Negosiasi dengan pemasok | I | R | I | C |
| Proses penunjukkan dan pemilihan pemasok | C | R | I | A |
| Persetujuan pengadaan ke Presiden Direktur | I | R | I | A |
| Penjadwalan pengiriman atau pengadaan | I | R | I | I |
| Penerbitan Surat Perintah Kerja (SPK) atau *Purchase Order* (PO) | I | A | R | I |
| Monitoring SPK/PO yang berjalan | I | R | I | I |
| Pengiriman barang/jasa | I | R | I | I |
| Penerimaan kondisi barang/jasa | C | R | I | I |
| Pengembalian barang yang tidak sesuai PO | A | R | I | I |
| Perbaikan atau penghentian pengerjaan jasa yang tidak sesuai | A | R | I | I |

Information:

| | | |
|---|---|---|
| 🟩 | R | *Responsible* |
| 🟧 | A | *Accountable* |
| 🟪 | C | *Consulted* |
| 🟦 | I | *Informed* |

**Tabel 15 Pemetaan Risiko Akhir**

| Proses | Aktivitas | PIC | Kode | Kemungkinan | Dampak | Nilai Risiko |
|---|---|---|---|---|---|---|
| Plan | Pencarian pemasok | *Purchasing* | C1 | 1 | 2 | 2 |
| | Negosiasi dengan pemasok | *Purchasing* | C2 | 2 | 2 | 4 |
| Source | Proses penunjukkan dan pemilihan pemasok | *Purchasing* | C3 | 2 | 2 | 4 |
| | Persetujuan pengadaan ke Presiden Direktur | *Purchasing & User* | C4 | 1 | 2 | 2 |
| Make | Penjadwalan pengiriman atau pengadaan | *User* | C5 | 1 | 5 | 5 |
| | Penerbitan Surat Perintah Kerja (SPK) atau *Purchase Order* (PO) | *Finance* | C6 | 3 | 3 | 9 |
| Delivery | *Monitoring* SPK/PO yang berjalan | *Purchasing* | C7 | 1 | 5 | 5 |
| | Pengiriman barang/jasa | *Purchasing* | C8 | 1 | 2 | 2 |
| | Penerimaan kondisi barang/jasa | *Purchasing & User* | C9 | 1 | 4 | 4 |
| Return | Pengembalian barang yang tidak sesuai PO | *Purchasing* | C10 | 1 | 3 | 3 |
| | Perbaikan atau penghentian pengerjaan jasa yang tidak sesuai | *Purchasing* | C11 | 1 | 5 | 5 |

The following is the final risk *heat map* in the procurement process at PT. XYZ based on the calculation of each risk value above.

**Tabel 16 Heat Map Risiko Akhir**

| Severity → Likelihood ↓ | 1 Insignificant | 2 Minor | 3 Moderate | 4 Major | 5 Catastrophic |
|---|---|---|---|---|---|
| 5 Almost Certain | | | | | |
| 4 Likely | | | | | |
| 3 Possible | | | C6 | | |
| 2 Unlikely | | C2, C3 | | | |
| 1 Rare | | C1, C4, C8 | C10 | C9 | C5, C7 C11 |

Information:

| | | | |
|---|---|---|---|
| 🟥 (dark red) | E | *Extreme Risk* | Very High Risk |
| 🟥 (red) | H | *High Risk* | High Risk |
| 🟨 | M | *Moderate Risk* | Medium Risk |
| 🟩 | L | *Low Risk* | Low Risk |

*Managerial Implications*

With the establishment of risk mitigation actions in the procurement process at PT. XYZ, the author recommends a Standard Operating Procedure (SOP) for the Procurement Process. This SOP for the Procurement Process is expected to have a positive impact on the company. The recommended SOP and procurement process flow are as follows.

**Gambar 6. Rekomendasi Alur Proses Pengadaan PT. XYZ**
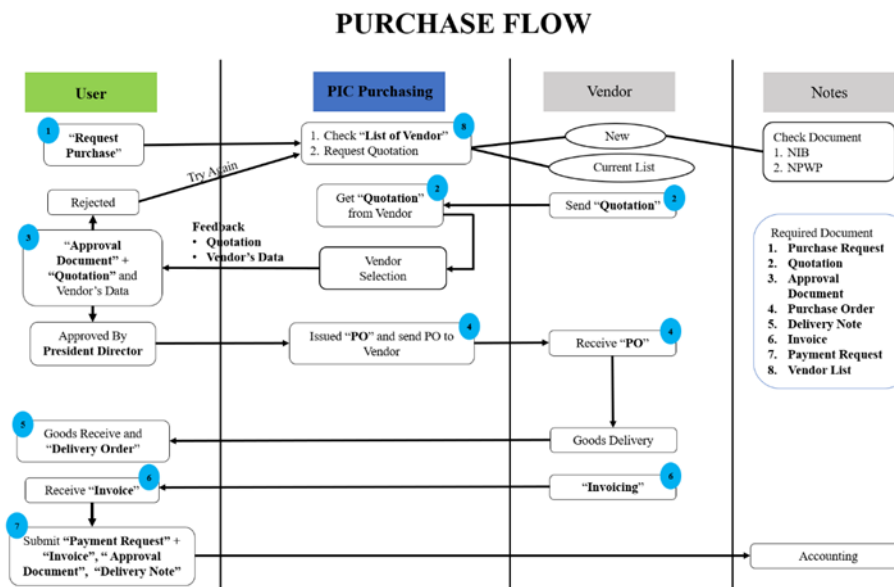


## CONCLUSION

The procurement process of goods and services at PT. XYZ is carried out through procurement by user. During the procurement by user, there were problems that occurred from the company's internal side and from the supplier side. Eighteen risk events and seventeen risk agents were identified that had the potential for risk. There are two priority risk agents in the procurement process at PT. XYZ, namely 1) there is no SOP set for procurement (A10), and 2) the procurement process is not one-stop (A11). The mitigation action recommendation given is the establishment of the Procurement Process Standard Operating Procedure (SOP).

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