

# Procurement Strategies Using Kraljic Portfolio Model And Supplier Relationship Matrix in a Biomanufacturing Company

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## ABSTRACT

*Uncertainty in the supply chain of Post-COVID-19 is a challenge for manufacturers. The risk of supply can be minimized if the company is able to implement a robust strategy and establish good relationships with suppliers. Kraljic's portfolio model is a popular approach for material classification. Research typically focuses on a case study and modification in the matrix attribute or dimension. Research that combines Kraljic's matrix and supplier relationship is still uncommon, especially research on Bio-Manufacturing companies which have a large and complex variety of materials. This research aims to formulate strategy and action plans in procurement. Data processing using the Multi-Dimensional Scaling approach. There are 19 types of materials researched, as well as 40 different suppliers. Kraljic matrix divides the material into four quadrants strategic, bottleneck, leverage, and noncritical quadrant. Procurement Strategies and Action plans developed from each materials quadrant. The Supplier relationship matrix divided the supplier of each material into four quadrants mutual attractiveness, supplier's attractiveness, buyer's attractiveness, and lack of attractiveness. By integrating Kraljic's matrix and supplier relationship matrix resulting 3 strategies are Strategic, Collaborative, and transactional relationships. From three strategies develop 16 action plans. Gap analysis is used to compare the action plans with the existing condition. According to the research result can be shown the strategy to manage material and suppliers related with the condition of organization.*

**KEYWORDS:** Strategy, Procurement, Kraljic, Supplier, Matrix

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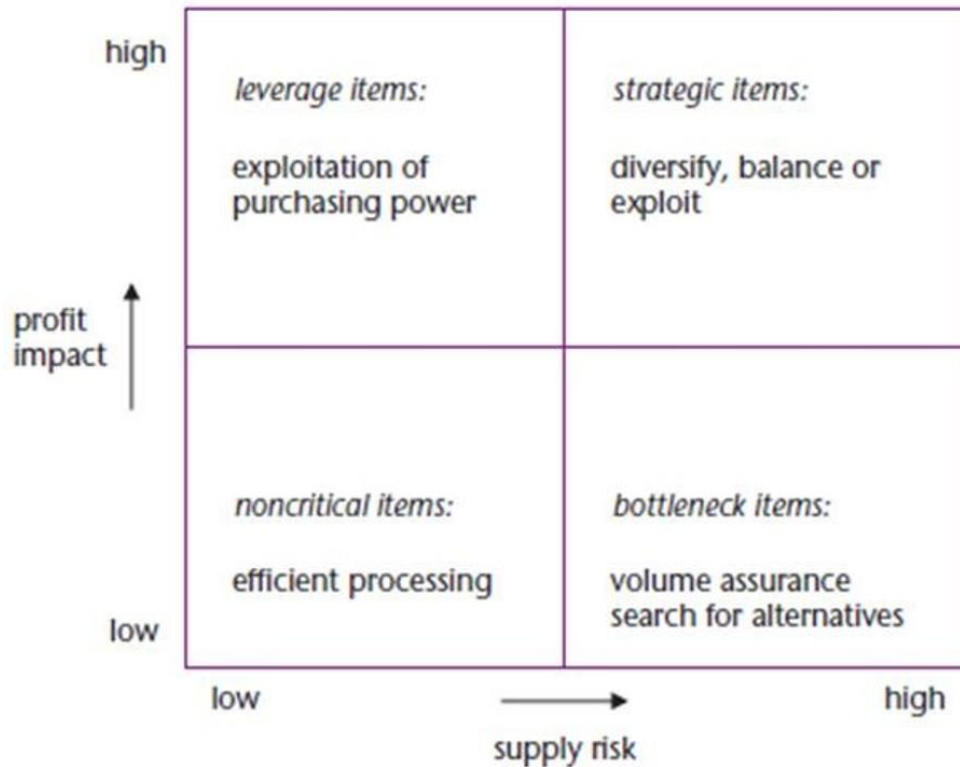
### 1. INTRODUCTION

In the massive industrial era and uncertainty in the supply chain, manufacturers are required to be able to produce as optimally as possible. The condition became more difficult after Covid-19 pandemic which began on 2020. The risk of supply can be minimized if the company is able to place a robust strategy and establish good relationships with suppliers. In the midst of high business competition, relationships with suppliers can support supply stability. If used correctly, supplier relationship development can be a strategic tool that can determine how efficiently a company uses its resources (Larsson, 2005) Connecting with reliable and trusted suppliers is a key factor for a successful organization (Pujawan & Mahendrawathi, 2017). Strong relationships between buyers and suppliers are known to contribute significantly to business by reducing risk in relationships (Roberts-Lombard et al., 2017).

Kraljic portfolio model is powerful to categorize the material and build strategy. In contrast to the Kraljic Portfolio model, supplier relationship portfolio framework is rarely conducted. Integration research between the Kraljic portfolio model for material mapping and the supplier relationships model has also been carried out before but is still limited. The previous research frameworks are from (Park et al., 2010) and Rezai et al (2018). From the development of previous research and problem faced by the organization PT. X as Bio Manufacture Company needs to develop integration research between material and supplier classification to formulate the optimal strategy in the procurement. The reference study still has not found research conducted in Bio Manufacture such as (Lee & Drake, 2010) in the elevator companies, (Padhi et al., 2012) in a construction company, (Kusumawati & Sari, 2018) Electricity Company, (Arantes & Alhais, 2021) at health institutions, (Perdana & Mulyono, 2021) at coal mining companies, This research aims to classify the material and supplier position then formulate the strategy and action plans in managing the procurement process and supplier relationship in order create savings opportunity and achieve the cost reduction target.

### 2. LITERATURE REVIEW

The purpose of procurement is to obtain surplus value from the supply chain (Pujawan & Mahendrawathi, 2017)). Kraljic (1983) establish the basis of material procurement classification. Kraljic portfolio model divides procurement strategies into four quadrants (Figure 1). The Kraljic matrix has evolved over the years and has been covered by many academics and researchers. (Kraljic, 1983) proposed a four-step approach to formulate a supply strategy for a product or group of products (Table 1).



Source: (Gelderman & Van Weele, 2002)

**FIGURE 1.** Kraljic Portfolio Model matrix quadrant

The ability of the organization to connect the two external relationships to be greater will determine the effectiveness of supply chain (Lambert et al., 1998). (Olsen & Ellram, 1997) develops a framework for supplier relationships by linking the supplier attractiveness and strength of relationships. (Olsen & Ellram, 1997) recommends a multi-step approach to analyze a company’s supplier relationship (Table.2). Supplier relationship frameworks were also developed by (Bensaou, 1999) to measure the strategic level of supplier relationship based on the investment amount from buyers and supplies. Suppliers are divided into four quadrants market exchange, captive buyer, captive supplier, and strategic partnership. (Johnson et al., 2011) develops a framework for supplier relationships by linking supplier satisfaction and buyer satisfaction.

**TABLE 1.** A four-step approach to formulating a supply strategy

Phase	Activity	Detail
Phase 1	Classification	The firm categorize all product on the matrix position, that are strategic, bottleneck, leverage and noncritical.
Phase 2	Market Analysis	The firm gives weight to the bargaining power of suppliers with the capability of the company itself.
Phase 3	Strategy	The firm identify areas of opportunity or vulnerability, assess supply risk and derive strategies into three risk category yaitu exploit, balance and diversity.
Phase 4	Action plan	Position in phase 3 has implications for purchasing action plan

Source:(Kraljic, 1983)

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**TABLE 2.** Company's supplier relationship step approach

Step	Activity	Detail
Step 1	Analysis of purchase	Classification the material using purchasing portfolio model.
Step 2	Analyze the supplier relationships	Supplier relationship analysis by developed second portfolio model use relative supplier attractiveness and strength of the relationship approach.
Step 3	Develop Action plan	Action plan developed by the position of suppliers.

Source: (Olsen & Ellram, 1997)

(Park et al., 2010) develop an integrative framework by combining Kraljic's matrix, supplier relationship matrix, supplier evaluation, and assessment. This framework classifies suppliers into four groups namely prime, collaboration, improvement, and maintenance. The framework consists of five phases and shows powerful tools in supplier relationship analysis due to able to develop a specific action plan for each supplier. To use the framework need collect and prepare complex data which takes more time. In the case study, (Park et al., 2010) only applied to five suppliers. In phase 1 (Park et al., 2010) use Kraljic's matrix and Olsen & Elram's matrix for shaping the strategies (Table 3). (Rezaei & Fallah Lajimi, 2019) develop an integrative framework that combines Kraljic's matrix and supplier potential matrix. The supplier potential matrix consists of two dimensions willingness and capabilities.

**TABLE 3.** Detail step of shaping the strategies developed

Step	Activity	Detail
Step 1	Classification of items based on portfolio model	Items classification use Kraljic portfolio model. When the supply risk is high uses cooperative strategy if the supply risk is low uses a competitive strategy.
Step 2	Analyze supplier relationships	The high risk items from step 1 are recategorized use supplier relation matrix (Olsen & Elram, 1997)
Step 3	Develop Action plan	Action plans are developed from their position wether low risk or high risk

Source: (Park et al., 2010)

Developments in Kraljic Portfolio Model and Supplier relationship focus on modifying the dimensions and attributes or case study companies. The studies discussed procurement strategies or supplier relationships in several different types of industries. (Lee & Drake, 2010) in elevator manufacture, (Padhi et al., 2012) in Construction Companies, (Arantes & Alhais, 2021) in health institution, Perdana & Mulyono (2021) in Coal mining company, (Zemmy & Setiyowati, 2021)) in Power plant company, Ahistasari (2021) in logistic company, Park et al (2010) in electronic semiconductor company, Rezaei & Lajimi (2018) in computer hardware. Case studies on Bio- manufacturing companies are still not developed. Bio manufacture has different characteristics where the materials used have many variations and high complexity. It's because the production of Bio-

manufacture uses a combination of biological and chemical processes. From these conditions, a case study on Bio manufacture companies is interesting study.

### 3. METHODS

Five steps are proposed to obtain procurement strategies in Bio-Manufacture Companies. The type of material studied is all materials purchased by PT. X. The material exception studied is raw material because the purchasing of these materials is not the responsibility of PT. X but the purchase is held directly by the Headquarter.

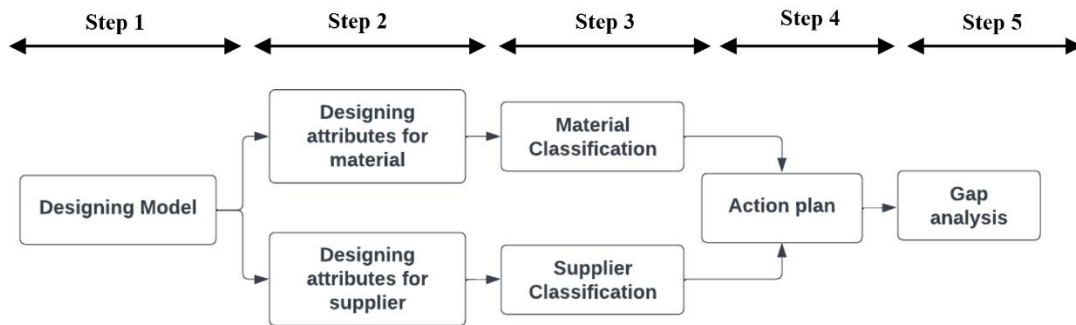


FIGURE 2. Research framework and methodologies

#### Step 1: Designing Model

The model in this study was designed by considering the literature and the need for organization. Popular dimension in the Kraljic matrix is supply risk and profit impact such as the research from (Gelderman & Van Weele, 2005), (Lee & Drake, 2010), (Padhi et al., 2012), (Arantes & Alhais, 2021), (Park et al., 2010), (Rezaei & Fallah Lajimi, 2019). For Material classification, the model used is Kraljic Portfolio with supply risk as the x-axis and profit impact as the y-axis. Kraljic model made a reasonable case for the usefulness of the portfolio approach by describing the experience of some large industry companies (Gelderman & Van Weele, 2002). Lamming & Harrison (2002) in (Gelderman & Van Weele, 2003) confirmed that Kraljic’s matrix remains the foundation of purchasing strategy for many organizations in various sectors. For supplier classification, the model used is (Olsen & Ellram, 1997) with the strength of the relationship as the x-axis and relative supplier attractiveness as the y-axis.

#### Step 2: Designing Attributes

From the results of the literature study (Table 4) a total of 10 attributes (6 attributes for supply risk and 4 attributes for profit impact. Supplier relationships also resulting 10 attributes, the strength of the relationship dimension consists of 4 attributes while the supplier attractiveness dimension consists of 6 attributes (Table 5). Attributes 9 out of 10 are references from (Olsen & Ellram, 1997). The remaining 1 attribute (Teamwork & communication) is a reference from (Morsy, 2017).

**TABLE 4.** Matrix Dimensions and Selected Attributes of Kraljic Portfolio Model

Dimension	Attribute	Reference
Supply risk	Risk of market	(Adi et al., 2017)), Seifbarghy (2010)
	Material availability	(Arantes & Alhais, 2021)), Seifbarghy (2010), Kraljic (1983), Ferreira et al (2015)
	Material substitution	
	Supplier availability	
	Delivery	Seifbarghy (2010), Fenson (2008), Sjöberg (2010), Zsidisin (2003)
	Risk of quality	Seifbarghy (2010)
Profit impact	Impact to company	(Padhi et al., 2012), Knight et al (2014)
	Quantity of purchase	Knight et al (2014), Kraljic (1983), Ferreira et al (2015), Olsen & Ellram (1997), Large & Thomsen (2011)
	Importance of purchase	(Padhi et al., 2012), (Arantes & Alhais, 2021)
	Price	Kraljic (1983), Sjöberg (2010), (Padhi et al., 2012), Grisi et al (2010)

### Material Classification

The research questionnaire was made based on the attributes. A total of 57 questionnaires were distributed for 19 types of materials. Each material consists of three respondents. One of the criticisms of Kraljic portfolio model is the classification is based on subjectivity. (Padhi et al., 2012) propose a method for matrix classification based on a statistical approach to address the problem. The method uses a fuzzy multy-attribute decision-making approach to assign the importance weight different supply risk and profit impact, and further, to incorporate a Multidimensional scaling (MDS) approach to objective position in a continuous scale of -1 to +1. The method consists of 6 steps (Table 6). The weighted assessment of each attribute is converted into a Triangular Fuzzy Number (TFN) consisting of variable values a, b, and c. The TFN is averaged and resulting three average importance according to the number of respondents. The next step is normalization by creating a Matrix  $AG = [M \times M]$ . From the matrix, the average vector weight is calculated. The final step is the defuzzification and normalization of each dimension.

**TABLE 5.** Matrix positioning method

Step	Detail
Step 1	Design a linguistic scale
Step 2	Collect scores of domain-expert on the attributes and convert into fuzzy number
Step 3	Compute the average of the attribute importance scores
Step 4	Obtain the normalized attributes importance by following step 4a through 4c 4a : Carry out a pair-wise comparison of the average importance score to construct a fuzzy matrix AG

Step	Detail
	4b : Determine the fuzzy attribute weights from the result of step 4a 4c : Defuzzify the fuzzy attribute weights and calculate normalized weight of the attribute
Step 5	Obtain performance scores and calculate the average performance scores
Step 6	Visually position using MDS

Source: (Padhi et al., 2012)

Defuzzification results from the questionnaire are multiplied by the weight of each attribute so the performance score is obtained. The supply risk dimension is weighted by 60% and 40% for the profit impact because of current issues and concerns of the organization on the supply risk. The MDS method is used to visualize data into a matrix. The Euclidean matrix shows the distance of the pairwise relationship between each material where the same material produces a value of zero (0).

### Supplier Classification

Selected suppliers are determined by discussion and interviews to represent suppliers of each type of material. Each type of material is selected by 2 or 3 suppliers the total selected suppliers are 40 suppliers. The processing method adopts the methods used in material classification. Each supplier has 3 respondents so the total questionnaires are 120 questionnaires. Supplier attractiveness dimension weighted by 60% and 40% for the strength of the relationship because related to supplier performance and supply flexibility.

### Designing Action plan

Procurement strategies are divided into 2 (two), strategies for material and strategy for supplier relationships. Strategy formulation is based on the company's conditions which are also reviewed from literature references. The determination of supplier relationship strategy is based on the integration of the supplier relationship matrix and Kraljic's matrix developed by (Park et al., 2010). The three main strategies are strategic, collaborative, and transactional relationship.

### Gap analysis

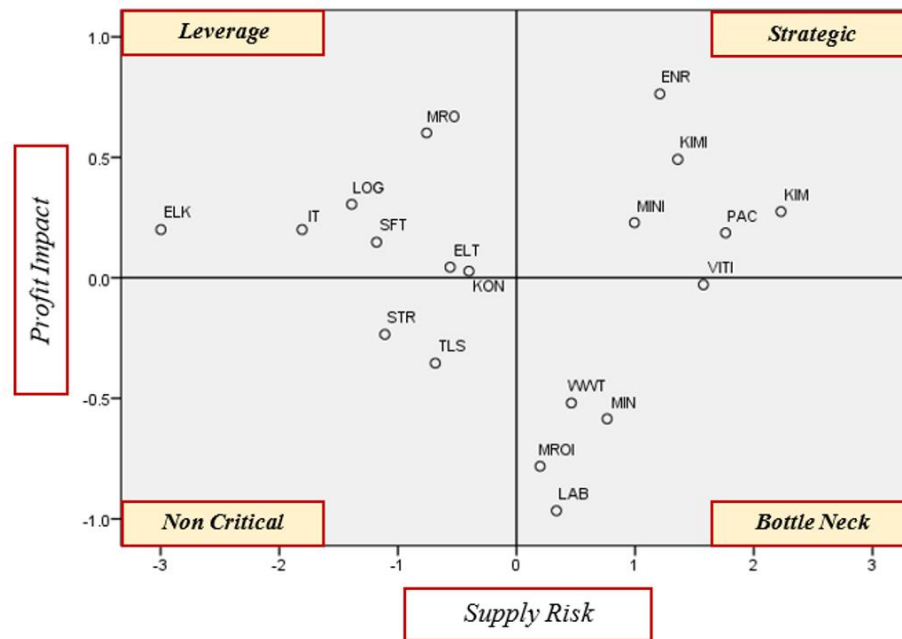
Gap analysis aims to compare the action plan that has been formulated with the actual condition. The gap analysis carried out is quite simple by comparing the condition of the organization whether it has implemented each action plan formulated. Information obtained from interviews with employees of the procurement department.

## 4. RESULTS

### Material Classification

The Material identity is encoded to simplify visualization (Figure 2). The same type of material but imported materials have a higher supply risk because the imported have a longer supply chain means more obstacles in supply for example regulation compliance or customs. Two imported materials have different quadrant positions with local material types local MRO (MRO) and imported MRO (MROI), then local minerals (MIN) and imported minerals (MINI).

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**FIGURE 3.** Material Position in Kraljic Portfolio Model

Strategic materials have the characteristics of high supply risk and provide a high-profit impact. Chemicals (KIM), imported chemicals (KIMI), packaging (PAC), energy (ENR), and imported minerals (MINI) are included in the strategic category. Local or imported chemicals are the main production materials of PT. X. The majority of mineral material manufacturing is from abroad (China) so compared to purchases from locals is greater. Packaging (PAC) is strategic because the packaging design is customized and the purchase value is high. Energy materials (ENR) are used to steam supply and the consumption also the highest. The bottleneck quadrant has the characteristics of high supply risk but low-profit impact. Bottleneck material is small in consumption but has specific specifications and is difficult to substitute. Imported MRO (MROI), Laboratory (LAB), Imported Vitamin (VITI), Mineral (MIN), and Water Treatment (WWT) are included in the bottleneck category. The amount of imported MRO purchases is not as large as local. Laboratory materials have high supply risk and are often found indent purchasing term or the goods will be available after a few months from PO. Leverage materials have the characteristics of low supply risk but can have a high-profit impact. Spare parts (MRO), Electronics (ELK), IT (IT), Logistics warehouse (LOG), Construction (KON), Electrical (ELT), and Safety (SFT) materials are included in the Leverage category. MRO spare parts has a lot of items and the purchase reaches thousands of items in one year. Materials in the Non-critical quadrant have the characteristics of low supply risk and low-profit impact. Of the total 19 types of materials studied, there are only 2 non-critical materials, Tools (TLS) and Stationary (STR) materials. Both materials have similarities in that the material is easily replaced and there are many supplier options available.

### Supplier Classification

The supplier relationship matrix classifies the supplier into four quadrants. The classification of the supplier depends on the position of the material in the Kraljic' matrix



(Figure 3). The most expected supplier position is mutual attractiveness where suppliers and buyers are attracted to each other beside that the strength of the relationship is well established. In this quadrant PT. X must focus on maintaining its position. Supplier of strategic material requires more effort and attention because it can create a large cost-saving impact. Supplier attractiveness is dominated by noncritical suppliers. The strength of the relationship is low due to the many supplier pools available so the relationship is not inclusive. The purchase volume of noncritical material is low due to the ranking system is based on the lowest price, not based on the accumulated total amount. High supplier attractiveness due to ease to meet the specification of material.

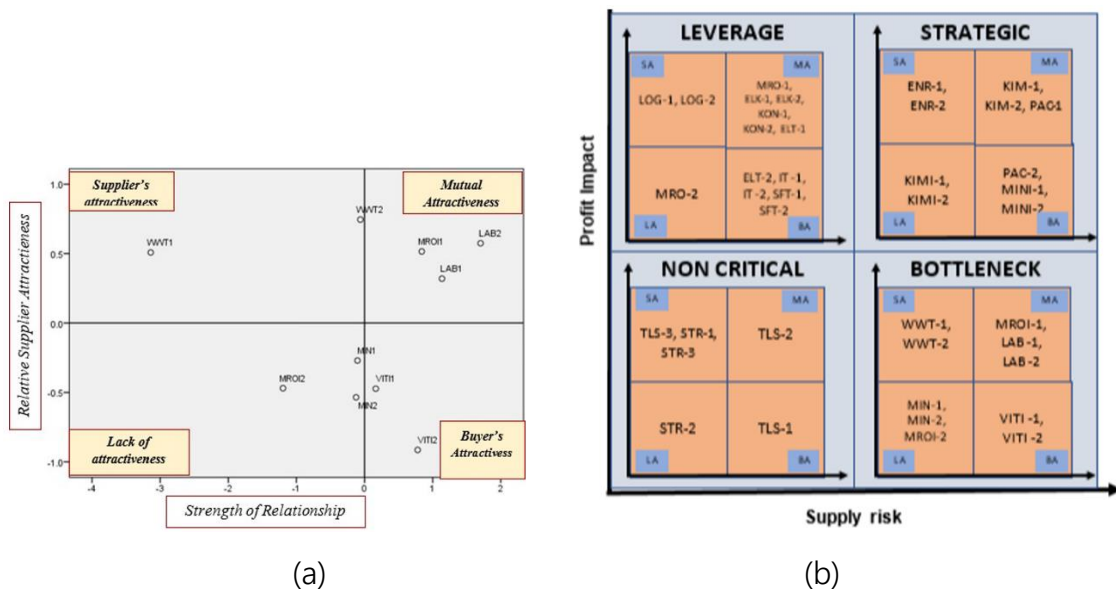


FIGURE 4. (a) Example result for Strategic Quadrant; (b) All Supplier Position Matrix.

The supplier of Strategic, leverage, and bottlenecks materials also exists in the supplier attractiveness quadrant because Loyalty has not been formed due to the order not meet with supplier expectations. Strength of relationships increased by building long-term relationships and loyalty. Loyalty can easily be built if transactions are in large volumes. For small volumes good communication is needed to build loyalty. The buyer attractiveness quadrant consists of 11 suppliers dominated by leverage material. The relationship is strong because has been established quite well, especially with authorized distributor suppliers. Electronics, electricity, construction and IT are dependent on brands because related to quality assurance and warranty. There are also suppliers of strategic, bottleneck, and noncritical material in buyer attractiveness because the supplier has low performance so under buyer expectations. The Action plans are supplier evaluation, building supplier trust and encourage to improve services. PT. X must conduct supplier evaluations and provide feedback according to the results. The evaluation will help supplier improvements in delivery, quality or communication.

Lack of attractiveness consists of 7 suppliers dominated by bottleneck material. Bottleneck material has a small amount of purchase thus loyalty is difficult to build. There is no communication with each other if no purchase order. Delivery performance and

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price of bottleneck materials are not attractive to buyers. PT. X needs to increase interaction, evaluate suppliers, and make substitutions if needed. The function of Supplier evaluation is to see supplier performance. Evaluation is carried out to answer whether the supplier is still worth maintaining, if not the next step is supplier substitution. The Supplier pool must be prepared if the supplier cannot perform.

### Develop Strategies and Action Plans

#### Kraljic Portfolio Model

Action plans are formulated from each strategy referring to procurement conditions and literature study (Table 7). Suppliers used for strategic materials must direct manufacture (not retailer) to ensure the security of supply. Chemical material has been carried out in collaboration with suppliers resulting to substitute imported chemicals for domestic. Companies need to involve suppliers in improving product quality, loyalty, payment flexibility, and delivery flexibility (Perdana & Mulyono, 2021). Relationships with suppliers must be longer (Kraljic, 1983). Companies are advised to maintain good relations, maintain performance, and long-term contracts with longer periods of more than 1 year (Adi et al., 2017). Long-term relationships with key suppliers should always contribute to the competitive advantage of the firm (Gelderman & Van Weele, 2003). Strategic materials require good planning and forecasting to avoid stockouts (Suliantoro et al., 2014) (Kraljic, 1983). Supplier selection must be done to get good supplier performance. Strategic partners should be world-class suppliers, they are alert and high performing, not only in a technical but also in an economical sense (Gelderman & Van Weele, 2002).

**TABLE 6.** Strategy and Action Plan for Kraljic Portfolio Model

Quadrant	Material	Strategy	Action Plan
Strategic	Chemical, Imported Chemical, Packaging, energy, Imported Chemical	Supplier Development	<ul style="list-style-type: none"> <li>● Direct purchase to manufacture</li> <li>● Focus in supplier development and improve idea</li> <li>● Supplier selection by supplier audit</li> <li>● Improve forecasting accuracy</li> <li>● Long term contract</li> <li>● Create market intelligence report routinely</li> </ul>
Leverage	MRO, Electronics, IT, warehouse, Construction, Electric, Safety	Exploit purchasing power	<ul style="list-style-type: none"> <li>● Contract for 6 month until 1 year with fix price</li> <li>● Consolidation according to brand</li> <li>● Direct purchase to manufacture for big demand</li> <li>● Increase Term of Payment (TOP)</li> </ul>
Bottleneck	Imported MRO, Laboratory, Imported Vitamin, Mineral, Water Treatment	Inventory control	<ul style="list-style-type: none"> <li>● Keep safety stock</li> <li>● Develop inventory monitoring system</li> <li>● Focus on increase supplier pool</li> </ul>

Quadrant	Material	Strategy	Action Plan
			<ul style="list-style-type: none"> <li>Contract 6 -12 month with authorized distributor</li> </ul>
Non Critical	Tools, Stationary	Sourcing supplier	<ul style="list-style-type: none"> <li>Add supplier pool from nearest location</li> <li>Involve all supplier in bidding</li> </ul>
		Improve bidding system	<ul style="list-style-type: none"> <li>Purchase volumes Standardization</li> <li>Consolidation in procurement</li> </ul>

The risk of bottleneck material supply is high so the firm needs to control the inventory. The risk of over-dependence on suppliers should be eliminated by finding new suppliers or avoiding single suppliers (Gelderman & Van Weele, 2005). Besides that, if the supplier is already an authorized distributor it became an advantage for the organization. A better deal is made by concentrating regular supply to one supplier (Gelderman & Van Weele, 2002). Bottleneck material strategy by establishing good relationships with trusted companies in terms of quality and making long-term contracts (Perdana & Mulyono, 2021). Consignment system, long-term contracting with an emphasis on quality and assurance supply, and ultimately keeping stocks (Gelderman & Van Weele, 2003).

Optimizing purchasing power is the right strategy for material leverage (Kraljic, 1983), (Adi et al., 2017). Purchasing power can be applied by bidding on several suppliers to get the lowest price (Gelderman & Van Weele, 2005). Additional Terms of Payment can be proposed for leverage material. Suppliers with good quality characteristics, loyalty, and high flexibility in terms of payment and delivery are very necessary (Adi et al., 2017). Material can be sourced directly from manufacturers or brand distributors (Perdana & Mulyono, 2021). Long Term Contract (LTC) can be proposed (period 6 months to 1 year) to create an effective process. (Kraljic, 1983) suggests a combination of spot purchases and contracts within a certain period of time. Spot purchases can create price competition between suppliers. Competitive bidding and short-term contract are feasible options to exploit the leverage position (Gelderman & Van Weele, 2003).

The Strategy for noncritical positions is to create a system to simplify the procurement process. Reducing the indirect purchasing cost which is connected with administrative activities (ordering, invoicing, and buying process) (Gelderman & Van Weele, 2003). Process efficiency is required in noncritical materials (Kraljic, 1983), Grouping the material is one of the strategies for process efficiency (Caniëls & Gelderman, 2005). Grouping can be based on function, usage, or brand. The purchase strategy can be combined with spot purchase (Adi et al., 2017). To make purchasing more efficient it must be standardized (Kraljic, 1983) (Gelderman & Van Weele, 2003).

### Supplier Relationship Matrix

Supplier Strategies developed from the combination of Kraljic’s matrix and supplier relationship. The strategy output, area number 1 (Green) is the position of a strategic relationship, area 2 (Yellow) is a collaborative relationship, and area 3 (grey) is the

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transactional relationship (Figure 5). From 3 strategies, 16 action plans were developed for each position (Table 8).

<i>Strategic</i>	KIMI-1 KIMI-2	PAC-2 MINI-1 MINI-2	ENR-1 ENR-2	KIM-1 KIM-2 PAC-1
<i>Bottleneck</i>	MIN-1 MIN-2 MROI-2	VITI-1 VITI-2	WWT-1 WWT-2	MROI-1 LAB-1 LAB-2
<i>leverage</i>	MRO-2	ELT-2 SFT-1 IT-1 SFT-2 IT-2	LOG-1 LOG-2	MRO-1 KON-1 ELK-1 KON-2 ELK-2 ELT-1
<i>Noncritical</i>	STR-2	TLS-1	TLS-3 STR-1 STR-3	TLS-2
	<i>Lack of Attractiveness</i>	<i>Buyer Attractiveness</i>	<i>Supplier attractiveness</i>	<i>Mutual attractiveness</i>

*Supplier Relationship*

**FIGURE 5.** Integration between Kraljic Portfolio Model and Supplier relationship matrix

- Strategic Relationship

There are 5 suppliers included in this strategy and all of them supply strategic material. The organization must maintain existing relationships and provide opportunities for strategic or long-term contracts. The key elements of the buyer-supplier relationship are long-term relationships, communication, and integration which are followed by various levels of transaction (Rajagopal & Rajagopal, 2009). Organizations must prioritize resources for strategic relationships. To maintain the relationship, PT. X has made regular visits to the head office or factory site. Leaders from buyers and suppliers also have an external agenda to increase closeness such as dinner. The organization has not yet made a strategic contract and is also not fully consistent in its commitment to building long-term relationships. Several times organization is influenced by other suppliers who offer very low prices which is temporary. This usually happens because the supplier's product is not absorbed by the market or inventory level in surplus condition.

- Collaborative Relationship

There are 24 suppliers from 3 quadrants of the Kraljic Portfolio Model (Strategic, Bottleneck, and leverage quadrants) that are included in collaborative relationships. Collaborative strategies in general shows that the suppliers still have great potential to be developed. In the case of supplier position on lack of attractiveness but Kraljic quadrant is strategic, bottleneck or leverage, if the supplier development success it will have a positive impact. Closer communication by involving leaders will be able to increase trust between suppliers and buyers. In the

case of a supplier of bottleneck material, package contracts may be proposed to give suppliers opportunities and take advantage of the relationship. Organizations need to design an attractive contract so that suppliers who have good performance are more interested. Relationship development needs to be considered so that supplier performance increases with long-term resource allocation. Supplier relationship improvement requires long-term resource allocation because it takes time to build good relationships (Olsen & Ellram, 1997). In the case supplier of leverage material, suppliers can be used as benchmarks if there is new materials request to build communication.

TABLE 7. Strategy and Action Plan for Supplier Relationship

Material	Supplier	Strategy	Action Plan
Strategic	Mutual Attractiveness	Strategic	<ul style="list-style-type: none"> <li>Maintain existing good relationship</li> </ul>
	Supplier Attractiveness	Strategic	<ul style="list-style-type: none"> <li>Provide strategic partnership opportunity</li> </ul>
	Buyer Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Coordination with higher level if there is discrepancy</li> </ul>
	Lack of Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Conduct regular meetings/plant tour/supplier audit</li> </ul>
Bottleneck	Mutual Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Offer purchase package</li> </ul>
	Supplier Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Create attractive contract to improve attractiveness</li> </ul>
	Buyer Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Product development to upgrade performance</li> </ul>
	Lack of Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Resources allocation to build long relationship</li> </ul>
Leverage	Mutual Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Used as a benchmark if there is new material</li> </ul>
	Supplier Attractiveness	Collaborative	<ul style="list-style-type: none"> <li>Build communication by increasing order frequency</li> </ul>
	Buyer Attractiveness	Transactional	<ul style="list-style-type: none"> <li>Take advantage in price negotiation</li> </ul>
	Lack of Attractiveness	Transactional	<ul style="list-style-type: none"> <li>Purchase with small allocation volume</li> </ul>
Noncritical	Mutual Attractiveness	Transactional	<ul style="list-style-type: none"> <li>Short term (1 – 3 month) contract opportunity</li> </ul>
	Supplier Attractiveness	Transactional	<ul style="list-style-type: none"> <li>Communication to attract bidding participation</li> </ul>
	Buyer Attractiveness	Transactional	<ul style="list-style-type: none"> <li>Ensuring the contracts are finish and clear</li> </ul>
	Lack of Attractiveness	Transactional	<ul style="list-style-type: none"> <li>Supplier substitution</li> </ul>

### Transactional Relationship

There are 12 suppliers from 2 quadrants of the Kraljic Portfolio Model (leveraged and Noncritical) in a transactional relationship. In the case supplier of leverage material,

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the organization can exploit its attractiveness to take advantage in price negotiations. High attractiveness and strength of the relationship will be able to make suppliers offer competitive prices. The allocation of purchase volume is better minimized, the large allocation is focused on suppliers in collaborative relationship positions. In the case of suppliers of noncritical and leverage material, an action plan is based on the supplier relationship quadrant. In the mutual attractiveness quadrant, short-term contracts can be given from 1 month until 3 months. In the condition of supplier attractiveness organizations must maintain communication so that suppliers still participate in bidding. Noncritical material suppliers are not interested to participate in bidding after several times not winning. In the condition of buyer attractiveness, an organization must improve the number of suppliers because current suppliers do not have good performance despite having attractiveness so it can have an impact on delivery risks or quality compliance. The strict control of the agreed agreement should be a concern. In conditions of lack of attractiveness, it is recommended to make supplier substitutions. If supplier attraction is really low or the strength of the relationship is so low that the relationship is ready to end, immediate action is needed (Olsen & Ellram, 1997).

### Gap Analysis

Gap analysis is used to compare the action plan that has been formulated with the actual condition of the company. The information collection was obtained from interviews with employees of the procurement department at PT. X. From the gap analysis for Kraljic's model, 9 action plans (50%) were obtained from all action plans that have not been carried out at this time. Material management action plans that still have gaps include the focus on supplier development for strategic materials, supplier audits as a requirement for strategic material supplier selection, the accuracy of forecasting strategic material needs, market intelligence reports that have not been carried out regularly, and safety stock management for bottleneck materials. Consolidation is still on a fraction of material leverage, Term of Payment material leverage, standard volume is still not applied in all material.

Gap analysis is also carried out on the supplier management action plan. In total, 16 action plans are formulated with each material quadrant and supplier quadrant having 1 action plan. From the gap analysis, there are 9 action plans, or 56% that have not been carried out at this time. Gap Action plans include strategic contracts for strategic suppliers, coordination with strategic suppliers is still at the normative level, purchase package contracts have not been carried out, and collaboration with product development for collaborative suppliers, resource allocation management has not been made into focus, short-term purchases and no supplier substitution.

**TABLE 8.** Gap Analysis between action plans from Kraljic Matrix with the actual condition

Material	Startegy	Action Plan	Actual Condition	GAP
Strategic	Supplier development	Direct purchase to manufacture	Supply from manufacturer	-
		Focus in development	Not yet totally focused on development	O

Material	Startegy	Action Plan	Actual Condition	GAP
		Supplier selection by audit	Not all Supplier selection by audit	○
		Improve forecasting accuracy	Low forecasting accuracy	○
		Long term contract	Several items already ling term contract	-
		Routinr market intelligence report	Market intelligence report not routine	○
Bottleneck	Inventory control	Keep safety stock	There is no safety stock management	○
		Inventory monitoring system	Inventory monitoring system is good	-
		Focus on increase supplier pool	Supplier pool include in KPI	-
		Contract with authorized distributor	Contract for 6 Month until 1 with	-
Leverage	Explot purchasing power	Fix price Contract max 1 year	Fix price Contracts have been execute	-
		Consolidation according to brand	Consolidation done in several material	○
		Direct purchase to manufacture	Direct purchase to manufacture	-
		Increase Term of Payment (TOP)	The TOP Standard for all materials.	○
Noncritical	Sourcing supplier	focused on nearest location	Add supplier with nearest Kraljic matrix	-
		Involve all supplier in bidding	Involve all supplier in bidding	-
	Effective bidding	Volumes Standardization	Already use volume standardization	○
		Consolidation in procurement	Procurement not yet consolidation	○

TABLE 9. Gap Analysis between action plans from Supplier Matrix with the actual condition

Material	Attractiveness	Strategy	Action Plan	Actual Condition	GAP
Strategic	Mutual	Strategic	Maintain relationship	Good relationship	-
Strategic	Supplier	Strategic	Provide strategic contract	No strategic contract	○
Strategic	Buyer	Collaborative	Coordination with higher level	Coordination by in charge	○

## Procurement Strategies Using Kraljic Portfolio

Material	Attractiveness	Strategy	Action Plan	Actual Condition	GAP
Strategic	Lack	Collaborative	Conduct regular meetings	Meeting and visit routinely	-
Bottleneck	Mutual	Collaborative	Offer purchase package	Applied in several supplier	O
Bottleneck	Supplier	Collaborative	Create attractive contract	Already applied the contract	-
Bottleneck	Buyer	Collaborative	Product development	A bit of application	O
Bottleneck	Lack	Collaborative	Specific Resources allocation	Normal Resource allocation	O
Leverage	Mutual	Collaborative	Used as a benchmark	Already used as benchmark	-
Leverage	Supplier	Collaborative	Increasing order frequency	Order frequencies normal	O
Leverage	Buyer	Transactional	Price negotiation	Always Negotiation	-
Leverage	Lack	Transactional	Small allocation volume	Normal purchase Volume	O
Noncritical	Mutual	Transactional	Short term contract	A bit of application	O
Noncritical	Supplier	Transactional	Attract supplier for bidding	Bidding communication	-
Noncritical	Buyer	Transactional	Ensuring contracts fulfillment	All contract is finish	-
Noncritical	Lack	Transactional	Supplier substitution	No supplier substitution	O

The gaps in each action plan that are expected to implement some action plans that have not been carried out. With the entire series of strategy formulation, and action plans, to find gaps with current conditions, it is expected to help overcome problems in procurement and then able to create saving opportunities or cost reductions that can have an impact on achieving cost reduction targets.

## 5. CONCLUSIONS

Based on the Kraljic Portfolio Model on 19 types of materials, 5 materials are included in the strategic quadrant, which are chemicals, imported chemicals, packaging, imported minerals, and energy. In the leverage quadrant, 7 materials were identified,



local MRO, electronics, IT, logistics, construction, electricity, and safety. In the bottleneck quadrant, 5 materials were identified, namely imported MRO, laboratory, imported vitamins, local mineral materials, and water treatment. In the noncritical quadrant, there are 2 materials, tools and stationery. The noncritical quadrant material strategy is sourcing suppliers and creating an effective tender system with a total of 4 action plans. The bottleneck material strategy is in the form of material inventory control consisting of 4 action plans. The leverage quadrant material strategy is to utilize purchasing power with 4 action plans. As well as the strategic quadrant material strategy, namely with a focus on supplier development with 6 action plans.

Based on the integration of Kraljic Portfolio Model and Matrix supplier relationship (Park et al., 2010) the main strategy for managing supplier relationships is to obtain a Strategic relationship that includes 5 suppliers with an action plan namely maintaining existing business relationships and providing opportunities for suppliers to make strategic contracts. Collaborative relationships that include 24 suppliers with action plans such as conducting regular meetings or supplier audits, offering umbrella contracts, and focusing on communication by increasing order frequency. The transactional relationship which includes as many as 6 suppliers with an action plan takes the opportunity to negotiate prices in each tender, make purchases with small allocation volumes, and focus on increasing supplier amount and supplier substitution. Based on the gap analysis in the Kraljic portfolio model action plan, 9 gaps were obtained from 18 action plans, while in supplier relationships, 9 gaps were obtained from 16 action plans. In the short term, organizations can focus on implementing the gaps formed. From the results of research that has been done, the integration of Kraljic portfolio model for material mapping and the supplier relationship matrix for supplier mapping can be used to formulate strategies and action plans for Procurement PT. X in managing materials and suppliers.

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