

# *To Examine Effective Procurement Strategies in Process Fabrication Manufacturing*

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*Abstract:* - Often purchasing is viewed as clerical task issuing purchase orders with little involvement in proactively implementing strategic plans within organisations. Hence, many significant effects to use purchasing as a strategic tool for the organisation are just overlooked. This research will present the characteristics of transactional purchasing and strategic procurement, also the difference between them. The significance and contribution of strategic procurement towards business performance is discovered. By conducting a case study in a manufacturing company, this report will demonstrate how purchasing can transform from tactical to strategic orientation by employing Kraljic Purchasing Portfolio Model (KM). The usefulness and benefits of the purchasing portfolio model is discussed and highlighted. The results implicate useful findings to motivate company wishing to find solutions to carry out transformation on their purchasing department should take serious consideration about adopting the purchasing portfolio model. Recommendations made to switch the products/services from one category to better position in the portfolio matrix.

*Keywords:* - Procurement, Strategic Procurement, Supply Chain, Purchasing, Manufacturing, Portfolio Matrix

## **1 Introduction**

Generally, purchasing department of a small and medium-sized manufacturing company has the flexibility to select just about any of the suppliers in the supply base. In this situation, purchasers will place the order with supplier who commits lowest price and best delivery schedules based on their best judgement. This tactical level in purchasing is handling each order as a single event by optimising the price, quality, and delivery. Such practice adopted by many purchasing practitioners where they do not have the advantage of sufficient time on their hands. The day-to-day management of manufacturing operations is rather dissimilar comparing with handling long-term strategic duties. Occasionally, these purchasers do not have the higher expertise required to move from tactical to strategic purchasing. Their primary aim is to serve the production lines to keep it operating and the best technique in such operational contexts is tactical sourcing. The problem associated with this practice is that purchasing decisions are mostly interrelated and the attention should not be merely on single decisions but rather attempt to optimise the comprehensive solution [1].

Nowadays many enterprises have not progressed beyond the initial stages of the transition from a purely tactical purchasing to strategic supply

management [2]. The increase in strategic significance of purchasing and supply management is due to the purchasing function has strong financial impact to a company's profit [3]. Therefore, a research is conducted with case study at 'ABC', a manufacturer in Malaysia to motivate this aspect in small and medium-sized enterprises (SMEs). The idea is to explore how purchasing can be a strategy, not just dealing with transactional activities but to adopt strategic orientation and include risk-management in managing the supply base of the company. This is also to ensure the purchasing practices meet the latest ISO 9001:2015 requirements that incorporated term "Risk-based Thinking" for the continual improvement of the quality management system [4].

## **2 Background Literature**

A comprehensive literature review was undertaken to gain an understanding of reactive purchasing practice and how purchasing can contribute to a business through implementation of effective strategies. The literature review was conducted through extensive range of literature within the topic. The findings of the literature review have been used mainly to verify the information obtained during interviews and data collection.

## 2.1 Tactical Purchasing vs. Strategic Procurement

Every business requires inputs of goods and services from external suppliers or providers to meet organisation's needs. Purchasing is the organisational unit which responsible to acquire the right quality of goods and services, in the right quantity, at the right time, from the right source, at the right price. The roles of purchasing from responding to requisition, sourcing, requesting quotes, placing orders till expediting the supplies. Traditionally, main objective of purchasing is to solicit the lowest possible price. When it comes to buying materials and supplies, it is usually operating by routine approach that is often reactive. However, this approach carries a relatively reactive behavior of purchasing where the effort is on transactions rather than on relations and more on an operational or tactical level rather than on a strategic one. Tactical purchasing is a short-term and transaction-oriented process to support and response to production needs to ensure it running smoothly, this commonly practiced in small to medium-sized manufacturing organisations. Purchasing role in many SMEs was isolated from the other organisational functions and was subordinated to other departments, especially under production due to purchasing activities mainly provide support to production needs to keep production operates smoothly. Earlier studies highlighted that purchasing is running in a reactive approach when users contact purchasing with a specific need [5].

According to [6], purchasing is perceived as 'transactional' when it is concerned with looking for a supplier who is keen to trade the goods or services required for an acceptable amount of money. Furthermore, the purchaser's interest is to obtain as much resource as possible at the lowest possible price. Studies explain that the necessary duties of purchasing such as agreeing the price, issuing purchase orders, follow-up overdue deliveries, responding stakeholder queries are operational and tactical, it fails to carry any strategic direction [7]. The studies claim that purchasing activities involved in ordering or calling off suppliers, non-critical items, expediting, receiving and storage supplies, maintaining inventory and arranging payment are mainly transactional and commercial. Other studies comment that purchasing was a reactive clerical role that involved in the purchasing process only on receiving purchase requisition for materials, supplies, or services and working in a non-value-adding mode, it placed orders according to the decisions and actions of others [8]. They further highlight that in addition, orders were frequently

awarded directly to suppliers by production and engineering personnel before the purchase requisitions and purchase orders were completed. Purchasers in a non-sophisticated purchasing function handling daily issues with suppliers and taking up their time mostly on clerical and administrative jobs.

Consequently, purchasing is always seen as a "Cinderella" department needed for business operations instead of strategic for its success while other functional units like Finance, Sales and Marketing are perceived as more strategic for the performance improvement [9]. A low-sophisticated purchasing department will be seen mainly as a clerical function with minimal power to make decisions [10]. Appraisal of performance in an immature purchasing will be based on the clerical jobs it handles, for example amount of purchase orders issued [11]. Purchasing role is usually under the material management within manufacturing companies. Thus, purchasing duty generally has no concern on materials requirement, build long-term relationships with suppliers, or consider the end users' needs [12, 13, 14]. Studies assert that purchasing is basically a support function although it may impact broadly in organisations [15]. Researchers believes that it is extremely difficult for purchasing to create and maintain competitive advantage, he further concludes that "purchasing typically has no significant strategic role to play, and that the function's activities are operational in nature" [16].

However, [17] argued the opposite since there is an extensive of theoretical base underlying strategic management, latest improvements in the resource-based view clarify that purchasing is certainly a strategic oriented, and much empirical evidence indicates that purchasing and supply management contribute to sustainable competitive advantage [18]. He lastly proves that purchasing is a strategically relevant activity. Besides, there have been numerous of studies that recognised the influence of the purchasing to organisation performance such as [19, 20, 21, 22] found that improved in efficiency of purchasing function could have a significant impact on the overall performance of the organisation. A study carried out by [23] highlighted that purchasing strategies have a major positive impact on the performance of manufacturing that includes organisation's competitive priorities. Studies conducted a study shows that not only does purchasing directly contribute to the company's bottom line, it is also a key strategic partner in fostering supply management capabilities, which may create strong

strategic advantage [24]. Nowadays, purchasing can emerge as a key source of firm's competitive advantage. A business can increase its market position by developing a purchasing strategy that reflects the character of its competitive strength [25]. Therefore, the key difference between tactical purchasing and strategic procurement is that tactical purchasing does not focus on the interests of entire company, and it is not intended to consider how the capabilities of a supplier could support the broader needs of the organisation, it focuses on the needs of the production whereas strategic procurement looks at the big picture. A study shown in table 1 that compared the activities of transactional with strategic purchasing [6]. Studies clarifies the differences in his article by pointed out 15 attributes of each approach in Table 2 [26].

Reactive Buying	Proactive Buying
Purchasing is a cost center	Purchasing can add value
Purchasing receives specifications	Purchasing and suppliers contribute to specification
Purchasing rejects defective material	Purchasing avoids defective supplies
Purchasing reports to finance or production	Purchasing is a main management function
Buyers respond to market conditions	Purchasing contributes to making markets
Problems are supplier's responsibility	Problems are shared responsibility
Price is key variable	Total cost and value are key variables
Emphasis on the present, on today	Emphasis strategic
Systems independent of suppliers	Systems may be integrated with suppliers' systems
Users or designers specify	Buyers and suppliers contribute to specification
Negotiations win/defeat	Negotiations win-win (or better)
Plenty of suppliers means security	Plenty of suppliers means lost opportunities
Plenty of stock means security	Plenty of stock means waste
Information is power	Information is valuable if shared

Table 1: Comparison of Reactive Buying and Proactive Buying [6]

By transform the purchasing as an operational into a strategic function, purchasing can be the key contributor to an organisation competitive advantage [27]. One of the reasons is the supply area in almost all manufacturing organisations generally is the biggest single category of spend, typically accounts for 50-80% of total revenue [28, 29, 5, 30]. Expenditures of purchased supplies, equipment, materials, and services often constitute at least 60 percent of a product's or service's cost [8]. Studies found that majority of the cost of goods is spending to purchase raw materials, machineries, and services [31]. Thus, it is clearly to realised that purchasing has great influence on the company's balance sheet than any other role required to make the organisation decently profitable. Organisations recognize the substantial cost savings that can arise from effective purchasing decisions. If the purchasing function handles such tremendous company expenses, then why is it still stay operate on short-term and transactional activities? [32].

This has thus expanded the importance of developing strategic procurement. Unlike reactive

purchasing, which is transactional and day-to-day operations, strategic procurement is future oriented and seeks for opportunities to deliver competitive advantage [28]. In the twenty-first century, modern purchasing is strategic and can be called "procurement" [33]. Procurement and purchasing were synonymous, but "Procurement" is a broader term than "purchasing", it indicates the more proactive, relational, strategic, and integrated role of the function in modern businesses. Other studies define procurement strategy as the decision-making plan for buying the necessary materials and services to sustain operations in line with overall business strategy [34]. To be precise, strategic procurement poses a proactive attitude towards a company's purchasing power and encourages a win-win sourcing strategy with its suppliers. Regardless of the procurement reporting level, procurement practitioner should contribute to business strategy by providing supply market knowledge with decision-making and to competitive advantage by maximising the effectiveness of the procurement function [7].

## 2.2 Kraljic Purchasing Portfolio Model

As the purchasing role is deemed can greatly impact a firm's competitive advantage and success, developing a strategic purchasing practice is vital for today's business. In this regard, adopting a purchasing portfolio approach has grown popular in both academia and within businesses to enhance strategic purchasing [35]. Portfolio model is defined as "a tool that combines two or more dimensions into a set of heterogeneous categories for which different (strategic) recommendations are provided." [36, 37]. Several models were developed to help manage the supply base of a business and some have become broadly adopted across the industry. One of the most renowned portfolio models in strategic procurement is call Kraljic Matrix (KM) created by Peter Kraljic in 1983 [38]. Since then, it has motivated many other scholars to carry out further study into purchasing portfolio models. Earlier research has underlined that KM is a useful method to manage complex supplier base [39]. It remains as foundation for many organisation's purchasing strategy over various sectors [40]. Best example of several large industrial companies like Shell, Nobel, Akzo, Philips, Alcatel, and Siemens are using purchasing portfolio method [18]. A survey found that close to 50% of small companies and 85% of big companies applied KM in development of purchasing strategies [41]. Basically, Kraljic's idea of KM concerns reducing vulnerability of supply and maximising potential

buying power [38]. According to him, KM is providing an effective platform for collecting marketing and company information, forecasting the upcoming supply set-ups, figuring out available purchasing opportunities, and for determination of specific supply strategies for critical goods and materials. As supplier is the key account for a great portion of the value creation associated to the products and services of buying firm, managing the firm's supplier base is becoming a crucial strategic purchasing subject, and thus the need for differentiated approaches to purchasing action increases. Studies advised that differentiation is necessary in managing the supplier relationship because not all suppliers have to be dealt in the same manner [39]. Hence, KM approach is an appropriate tool for purchasing to classify all its purchased materials by segmenting them in a 2x2 matrix as a guidance for planning purchasing strategies and handling the supplier relationships in a segregated manner. The classification is based on two dimensions: profit impact and supply risk with "low" and "high" level, leading to four categories: non-critical items, leverage items, bottleneck items and strategic items [38] as per Figure 1.



Figure 1: Kraljic Matrix (KM)

It recommends distinctive supplier management strategy for each category. Study considered KM as simple tools for assessing the goods and services that purchased by the company and to identify those that needed to manage because they are essential to the company and those that will offer cost-reduction opportunities with low risk [42]. Supply risk is about the possibility for an unforeseen event in the supply items to disrupt operations. Profit impact explains the impact of a supply item upon the company's bottom line. Studies stated that the supply risk and profit impact are affected by three factors [43]. The Market risk that represents a degree of the suppliers' availability for the items, form of competition and entry barrier of new suppliers to the marketplace. The *Performance Risk* examines the performance and quality offered by

suppliers, including access and applicability to technological advancements. And finally, the *Complexity Risk* looks on the complexity affecting the supply risk. Similarly, on the profit impact, the influence on profitability, purchase criticality, and the total value of purchase is equally seen as important factor. There are also four areas of items as non-critical items, leverage items, bottleneck items and strategic items. *Non-critical items* feature low risk and low profit impact. Substitute products are readily available in competitive supply market with plenty of suppliers. *Leverage items* associate a low risk but high profit impact. Items in this group are standard items which are easily available from a range of sources. *Bottleneck items* carries a higher level of risk but low profit impact. These items are critical for the production process, lack of such items can delay production lines but do not have a major financial impact. And finally, *Strategic items* represent higher impact on profit with high risk. These items carrying unique specifications, or it is custom designed, they are vital to the production and changing suppliers for these items usually is difficult as technology of the supplier is important.

After classification of items categories, assessing the bargaining power of the suppliers against own strength as a purchaser. Investigating supply market with thorough consideration of quality, quantity, and the key strengths of existing suppliers. Collectively, Kraljic emphasised the position of understanding the supplier strength and firm's purchasing powers through appropriate market analysis. This step concerns strategic positioning of the items classified in the four groups. it allows company to discover opportunities and vulnerabilities in the supply market and enables to formulate counterstrategies. In the purchasing portfolio matrix, there are three basic risks categories subject to the position in the matrix of item categorised: (1) exploit, (2) balance and (3) diversify. The typical circumstance is that if different items and suppliers are considered, the purchaser will have different roles. When the company is stronger than its supplier, the company will have greater leverage in negotiations. The "exploit" strategy is employed when the buyer holds a dominant role and the supplier's power is moderate or small. Nevertheless, it must be careful not to take any aggressive approach too far that it places long-term supplier relationship at risk. Company should follow a "balance" strategy with an equal power situation. A "diversify" strategy is used when the supplier dominates, this also mean the company should reduce supply risks by seeking alternative material or sources. In simple, Kraljic's

recommendation is company should pursue preferential treatment if it can bargain from a strong position. Whereas company may have to offer inducements if bargaining from weakness, this will lead to longer contracts or higher prices to guarantee a sufficient supply. Last step is development of long-term action plans and opens the possibility of improving the circumstances in earlier step. The earlier steps have dealt with volume, cost, vendor selection, substitute of material, inventories and so forth. The last step allows the general procurement strategy to be strengthened. This can include ensuring long-term supplies and acting based on the risks posed by the company. Top management must make decision with clear objectives, actions, roles, and different measurements. This should relate to strategies that considering both time and criteria for action for critical purchasing materials.

### 3 Research Framework

The research investigated manufacturing case company from Malaysia. Case study is a source of knowledge related to organisational behaviors in a particular business aspect. The goal of the case study is to investigate specific subjects within the boundaries of a specific context, situation, or institution. It helps to gain a practical knowledge other than a theory. Studies by [44] defined case study as “an intensive study about a person, a group of people or a unit, which is aimed to generalised over several units”. As [45] states, case study opts for analytic rather than statistical generalisation, which is to generate a theory that can allow researchers to understand other similar cases, phenomena, or situations. According to [46], there are three types of case study which include exploratory, descriptive, and explanatory case study. Each of them has a different approach and target for the final objectives. A business case study may be unique for its own features but at the same time very general for a specific industry. In this research, the case study at a SME manufacturing company in Malaysia is an exploratory case study. Exploratory research is most used for further define company issues and areas for potential growth.

This research begins with the issues and the general problem area based on the purchasing practices. A literature review and important theory concerning the subject will then be presented and applied on the case company. The collected information from the literature review and the case study will then be the foundation of the strategic procurement framework, which will be developed for SME manufacturing for strategically managing their supply base. The research aims to examine

strategic moves for purchasing in terms of supplier base management in the case company - ABC. The following research objectives were defined to answer the above research questions:

- RO1. To figure out the difference between transactional purchasing and strategic procurement.
- RO2. To examine and analyse the current purchasing practices at the case company.
- RO3. To formulate purchasing strategy for supplier base management.
- RO4. To segment the supplier base and to incorporate strategic supplier relationship.

To answer the above research questions, the study through an empirical study identifies how purchasing strategy be transformed from tactical to strategic oriented in managing the supplier base. First, the study examined existing literature to identify and understand theoretical models and frameworks in this context. A case study analysis is then implemented within a process equipment manufacturer in Malaysia.

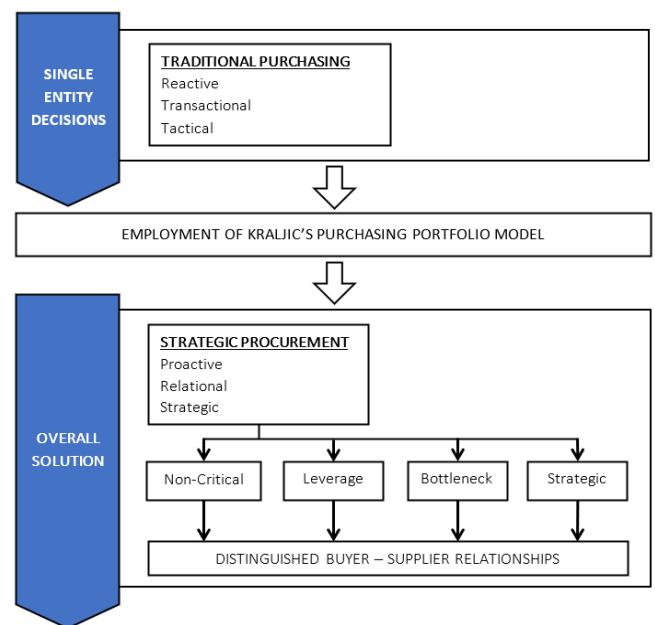


Figure 2: Conceptual Research Framework

Finally, the study concludes by underlining the contribution of the research focus and the objectives. A conceptual framework developed is as shown in figure 2. Conceptual framework provides an outline of the research and guiding the research scope and findings. Data collection methods can be divided into two types which are qualitative and quantitative data collection methods. A qualitative data collection method generally focuses on the

collection of data that is not amenable to numerical measurement such as words, emotions, and feelings.

Qualitative research is about understanding the context of a phenomenon or a certain experience. Contrarily, the quantitative data collection involves collection of information that is in the numerical form, it is measurable and verifiable. Quantitative research is based on mathematical and statistical techniques to understand a certain phenomenon in the context. Studies states that both qualitative and quantitative aspects are often accommodated in research about management and management issues [47]. This research adopted multiple methods that combined both qualitative and quantitative data collection methods. Qualitative data used to gain understanding the purchasing practice in the case company whereas quantitative data is analysed to explore the perception about purchased items in the case company so that it can be classified by KM in order to develop appropriate procurement strategy.

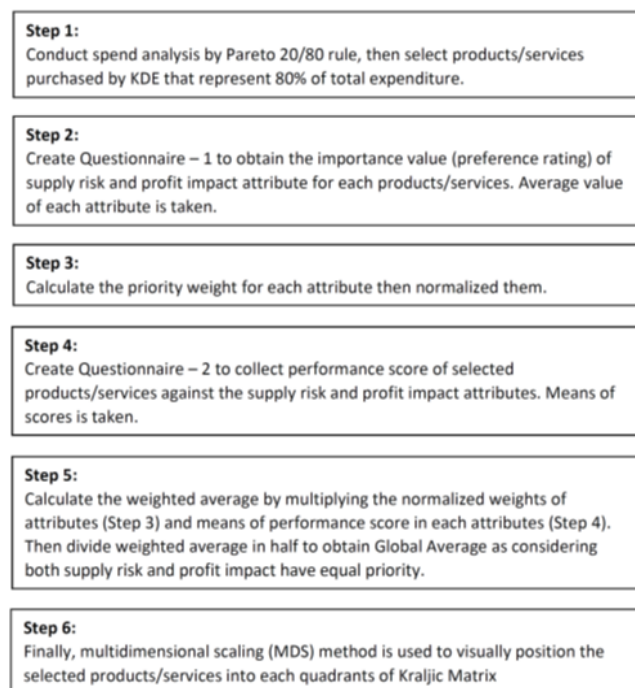


Figure 3: Flowchart of steps to classify selected products/services into Kraljic Matrix [48]

A flowchart shown in figure 3 presented to summarises the steps guiding towards products/services classification into the quadrants of KM. The data collected is combination of primary and secondary data, in terms of a case study and literature review. The primary source for the empirical study of the research will be information that the researcher observed during the employment at the case company, response from semi-structured

interview and questionnaire with the purchasing in case company.

The secondary data will be information found on the case company profile, company website and peer reviewed articles. The research began with understanding and identification of current purchasing practices and problem in case company through semi-structured interviewed with the purchasing in the organisation. During problem identification, investigation of data was done to discover the constraints faced by the case company related to the purchasing practices undertaken, then framed as research questions. Further to that, to carry out a strategic procurement planning, this research used spend analysis method and Kraljic's purchasing portfolio model as a basis to classify the products/services purchased by ABC in the quadrants of the KM. The application of the methodology for classify purchased products/services by applying KM is demonstrated with data pertaining to ABC.

Before proceeding to the classification of purchased products/services into KM, it is necessary to determine which products/services need to be analysed and classified into the KM. This is due to not everything needs to be classified into KM. Pareto 80/20 rule was used to analyse the expenditure based on year 2019/2020 then select the products/services that have the high spending made by ABC. According to [48], classifying of items in the KM depends on various attributes of supply risk and profit impact. This was assessed subjectively by the respondents based on their own experience. But the subjectivity was eliminated through objective evaluation of dimensions and attributes by normalised the contribution of multiple respondents' perception, that is, group decision making. Questionnaires were distributed to several employees of ABC, a total of five persons were requested to answer the research questionnaires.

These employees were involved in purchasing and logistics activities within the company. The questionnaire was distributed to identify importance value (priority weight) of supply risk and profit impact for each product/service purchased by the company. 10-point Likert scale was used in the questionnaire where 1 being 'Very Low' and 10 being 'Extremely High'. Finally, multidimensional scaling (MDS) was used to create an overall visual positioning of the selected 20 goods and services into four quadrants of the KM by using the total utility score of each product/service.

## 4 Data Analysis and Findings

### 4.1 Case Company Background

ABC is one of the Malaysian SME, an engineered solutions provider who specialise in many niche equipment fabrication, system and plant design and installation. ABC supplies wide-ranging quality engineering products and services for various industries, such as the design, fabricating and on-site commissioning of pressure vessel, heat exchanger system, water & waste treatment, and other process equipment. Operations in ABC managed by functional departments such as Sales and Proposal, Engineering Design, Procurement, Project Management, Production, Quality Control Department and Finance. ABC procures a large variety and quantity of raw materials, products, works, and services to carry out process equipment fabrication. ABC's products constructed by components such as different types of plate materials, tubes, pipes, fittings, flanges, gaskets, bolts, and nuts. These semi-finished raw materials are sourced from local and oversea markets. The products purchased by ABC range from welding consumables, motor, fan, grating, agitator, and paint materials. Sub-contractors are appointed for the provision of workers in production process such as manpower supply for welding and fabrication work, in quality control includes engaging consultancy services, inspection and testing, in final process such as sand blasting and painting, logistics for delivery.

### 4.2 Purchasing in Case Company

Purchasing department in ABC is reporting to Chief Financial Officer (CFO) so that the CFO can maintain tight control over the cash flow. ABC has no recognised Head of Procurement or overall procurement manager. A purchase requisition is used to initiate the purchasing process in ABC. More than one department will issue the purchase requisition as purchasers require input from various parts of the company as some materials/services require the expertise of technical specialists. Materials/services are usually identified by production department based on research requirement and specification, some materials for major parts will be requested by the project management department, these requesters will carry out the material-take-off and furnish the information of required materials/services to purchasing for buying. Purchasing activity is mostly executed at user or requestor level. Where a dedicated purchaser is available, requisitions are passed to the purchaser

to place order, normally specifying the supplier, remaining price, and terms for purchasing to negotiate with supplier. Generally, the purchasing's roles in ABC are receiving purchase requisitions, solicit and evaluate quotes from supplier, issue purchase order, receiving goods/services and process payment to supplier. Sometimes final decisions of buying were made by other department such as production, project management, quality control or engineering. Nevertheless, product availability, lead time, price and quality are important criteria in the buying decision. Performance of purchasing is one of the important elements on managing the purchasing department, it is measured in terms of the amount of money saved by the department and the responsiveness of the purchasing process against purchase request due to face pace environment. Performance of suppliers is another critical aspect in ABC purchasing, as ABC is ISO 9001 certified company, it is necessary for companies that wishing to do business with ABC to register as a supplier so that their company establishment and financial background as well as the ability to constantly supply according to ABC requirement are evaluated. According to purchasing in ABC, there is no long-term contract or partnership had been established with any supplier, thereby the transaction with suppliers are based on case by case purchase order only.

However, based on the understanding of purchasing practices in ABC implies that it is more relate to the transaction part of the procurement process, it is straightforward, consists of routine actions, focus only on obtaining the requested goods/services in the moment rather than future transactions. Purchasing in ABC possess characteristics of tactical purchasing where their primary concern is about lowest price, high quality, and short lead time rather than service, trust, collaboration, and relationship. Their emphasis is on immediacy and operations; thus, market research is limited, and buyer-supplier relationship management is minimal. The supplier base is broader and more varied, but relationships is lacking in depth and longevity. There is absence of procurement or product input strategy. In fact, a lot of suppliers are used in total and multiple suppliers are used for the same product and often the same item. Even the purchase of regular or repeated products is treated as separate requirement, like the company previously had never purchased the item. Consequently, purchasing may miss the opportunities of valuable negotiation, partnerships, and process improvements. If purchasing in ABC wish to being strategic, they should aim to reduce



the tactical jobs and spend more time on those strategic matters. They can investigate the amount of money spent in each category of products or services and use this as analysis to identify opportunities for improvement.

### 4.3 Spend Analysis

Spend analysis is the action of gathering spend data from all purchasing sources, cleaning up data, classifying the data and evaluating it with a view to understanding the spending pattern and finding saving opportunities. In this case study, discover and understand the company spend is essential before formulating purchasing strategies.

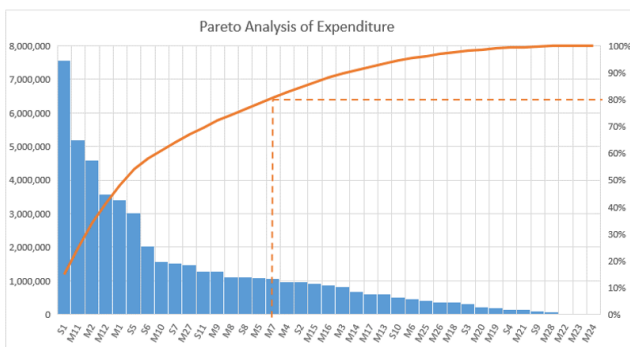


Figure 4. Pareto Chart for Expenditure at ABC

Spend analysis is used in the beginning as it is an important basis in the category management work. Pareto 80/20 rules is a useful tool to perform spend analysis and provide better visibility of ABC spend areas.

M1	Carbon Steel Plates
M2	Stainless Steel Plates
M5	Stainless Steel Seamless Pipes
M7	Stainless Steel Welded Pipes
M8	Standard Nozzle Flanges
M9	Taylor Made Girth Flanges
M10	Tubesheets
M11	Tubes
M12	Finned Tubes
M27	Consumables
S1	Manpower Supply
S5	Machining & Drilling
S6	Non-Destructive Test Services
S7	Consultation/Inspection Services
S8	Sand Blasting & Painting
S11	Logistics (Transportation)

Table 2. Selected Products/Services for Classification Process in Kraljic Matrix.

According to the spend data of ABC based on total cost purchase made by ABC, the analysed products/services was divided in 39 purchasing categories, this consists of 28 types of products and 11 types of services. Products are purchased either import from overseas country or local suppliers whereas services are engaged with local suppliers. These 39 categories of products and services were then sorted in a Pareto Chart as shown in Figure 4 to visually highlight the products or services that are representing the 80% of the annual purchase value in ABC. These 80% annual purchase value from 16 types of products/services were then selected for the classification process in KM (Table 2).

### 4.4 Importance Value of Supply Risk and Profit Risk Attributes

Before mapping the selected 16 products/services in quadrants of the KM, the importance value of supply risk and profit impact attributes were obtained by surveying the 5 respondents using questionnaire. The responses were collected and then the normalised importance weights of each attributes were calculated as per Table 4. When considering the supply risk attribute in purchasing, ABC deemed that market risk is most important when they are buying products/services for the company which is resulting in 52.05% of importance weight.

Supply Risk		Profit Impact	
Attribute	Normalized Importance Weights	Attribute	Normalized Importance Weights
Market Risk	52.05%	Impact on Profitability	42.39%
Performance Risk	13.70%	Criticality of Purchase	33.70%
Complexity Risk	34.25%	Cost/Value of Purchase	23.91%

Table 3: Important Value of Supply Risk and Profit Impact Attributes

The second important attribute is complexity risk which is having 34.25% importance weight. The least important attribute is performance risk. On the other hand, the top priority in considering the profit impact attribute for ABC when they are purchasing products/services for the company is the impact on profitability, which possess 42.39% importance weight. The second priority is criticality of purchase (33.70%). The cost/value of purchase attribute has the least importance weight for ABC to consider when they are buying any products/services. Table 3 presents the important value of each supply risk and profit impact attributes perceived by ABC.



### 4.5 Mapping in Kraljic Matrix

The average performance scores of the sixteen products/services per supply risk and profit impact attribute, as well as the weighted and global average for each dimension is shown in table 4.

Products/Services	Market Risk	Performance Risk	Complexity Risk	Weighted Average	Global Average	Supply Profitability	Criticality of the purchase	Cost/Value of purchase	Weighted Average	Global Average
	52.05%	33.70%	34.25%			42.39%	33.70%	23.91%		
M1 Carbon Steel Plates	7.40	4.80	2.40	5.33	2.67	7.60	7.60	7.20	7.50	3.75
M2 Stainless Steel Plates	6.40	2.60	1.60	4.24	2.12	7.80	7.80	7.80	7.80	3.90
M5 Stainless Steel Seamless Pipes	8.00	3.40	2.00	5.31	2.66	3.60	3.20	3.40	3.42	1.71
M7 Stainless Steel Welded Pipe	7.40	3.60	2.00	5.03	2.51	3.20	2.80	2.60	2.92	1.46
M8 Standard Nozzle Flanges	4.60	3.00	2.00	3.49	1.75	2.20	2.40	2.40	2.32	1.16
M9 Taylor Made Girth Flange	7.80	5.40	7.20	7.27	3.63	5.00	6.40	6.00	5.71	2.86
M10 Tubesheets	7.80	6.60	6.40	7.16	3.58	4.20	5.80	6.60	5.31	2.66
M11 Tubes	6.80	6.60	4.80	6.09	3.04	9.20	7.60	7.60	8.28	4.14
M12 Finned Tubes	6.80	7.20	6.00	6.58	3.29	9.20	7.60	7.60	8.28	4.14
M27 Consumables	3.00	6.60	4.20	3.90	1.95	1.60	1.80	1.60	1.67	0.83
S1 Manpower Supply	6.40	5.60	2.60	4.99	2.49	5.20	4.80	3.40	4.63	2.32
S5 Machining & Drilling	6.60	7.40	5.60	6.37	3.18	4.60	4.80	5.60	4.91	2.45
S6 Non-Destructive Test Services	7.80	7.60	4.40	6.61	3.30	3.80	4.20	3.80	3.93	1.97
S7 Consultation/ Inspection Services	8.60	7.20	5.00	7.18	3.59	5.80	6.60	7.40	6.45	3.23
S8 Sand Blasting & Painting	4.40	3.20	3.00	3.76	1.88	3.20	3.80	4.00	3.59	1.80
S11 Logistics (Transportation)	1.40	2.20	3.00	2.06	1.03	2.00	2.40	3.40	2.47	1.23

Table 4: Summary of Performance Scores for Selected Products/Services

Then, multidimensional scaling (MDS) method is used to calculate the position of each selected product/service for mapping in the four quadrants of KM as per result in figure 5.

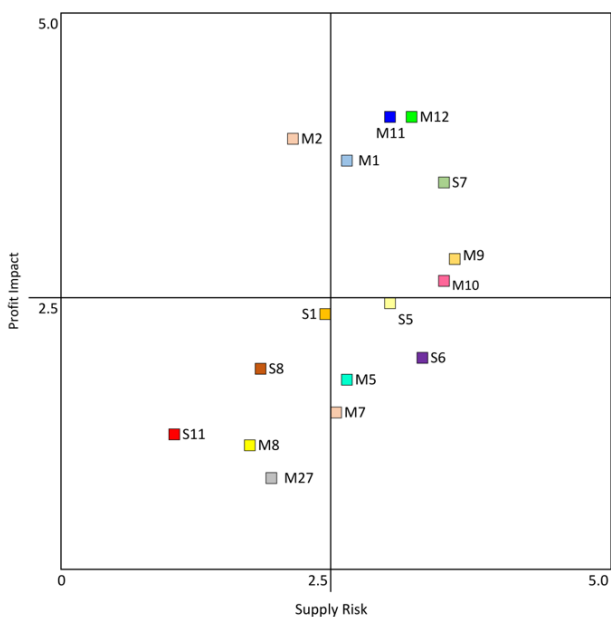


Figure 5: Interpretation of Kraljic Matrix for Selected Products/Services

The KM mapping produced from MDS indicated that selected 16 types of products/services are plotted in three different quadrants of the two-dimensional matrix. Five products/services of Standard Flanges, Consumables, Manpower Supply, Sand Blasting/Painting, Logistics (Transportation) are mapped in the first quadrant of the KM (bottom left) that is non-critical category and has low supply risk and low profit impact. Only 1 products/services fall into top left quadrant of the KM, which is

Stainless Steel Plates, this item is identified for the low supply risk and high profit impact.

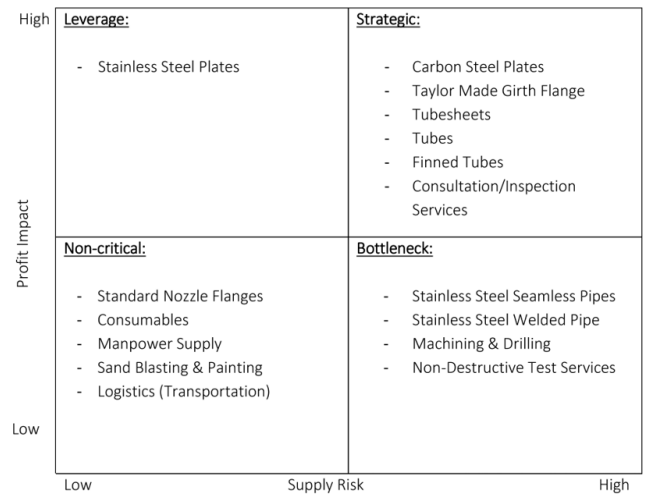


Figure 6: Classification of 16 Products/Services in the Quadrants of Kraljic Matrix

The bottom right quadrant of the KM is bottleneck category which consists high supply risk and low profit impact products/services like Stainless Steel Seamless Pipes, Stainless Steel Welded Pipe, Machining & Drilling, and Non-destructive Test Services are fall into. Products/services like Carbon Steel Plates, Taylor Made Girth Flange, Tubesheets, Tubes, Finned Tubes, and Consultation/Inspection Services are positioned in the top right quadrant of the KM (Strategic products/services) due to high supply risk and high profit impact. Figure 6 presents the result after classification of 16 selected products/services in the KM.

### 4.6 Purchasing Strategies

#### Non-critical group:

Products in this group are simple product with high level of standardisation, it based on simple and mature technology. It involved very low engineering effort and expertise; no customisation required. Services in this group are technically simple and well-structured process that required small capital investment. There are usually a lot of suppliers for this group of products/services available for replacement need, therefore the market is highly competitive. Suppliers are mostly small company doing trading business without proprietary technology. Generally, the unit value of the products/services in this group is small. Strategies that can be used for purchasing of these products are inventory optimisation and order optimisation via scheduled ordering processes or spot purchasing due

to the products are readily available in the market and can be easily obtained. It is crucial to focus on reducing administrative costs when buying products in this group.

**Leverage group:**

Products in this group are also highly standardised and many reliable suppliers. Products in this group can be highly impacted the overall quality of the finished products. Value of products in this group possess high percentage of the total manufacturing costs. Few large and well-established suppliers are available in the market. Strategy can be utilised when purchasing of these products is exploitation of purchasing power. This can be achieved through competitive tendering. Another strategy is to find products that can be used to substitute existing products. Relationship with supplier can be short to medium term supply contracts, it is better than long term collaboration.

**Bottleneck group:**

Products/Services in this group often from few qualified suppliers. it is having strong supplier proprietary technology. Company always heavily dependent on the supplier for products/services in bottleneck group. It is technically complex products/services, but the value is not significant impact the company profit. The strategy for this group is volume insurance to ensure continuity supplied. Due to the products located in this group having a high supply risk, it is crucial to ensure that the products are readily available. Diversify strategy can be implemented for the bottleneck products/services to reduce dependency of suppliers and risk associated. Developing plans to reduce supplier dependency by adapting products and investigating alternative products and suppliers is critical. Having more suppliers will increase the complexity of the supply base.

**Strategic group:**

Characteristic of the products in this group is low level of standardisation with heavy customisation. The products are adjacent to company's core competency. It is generally carrying a large proportion of total manufacturing costs. It can greatly impact the quality of the finished products. Services in this group often complex in technical and based on new technology that required strong industrial expertise. Products/services in this group represent a substantial value to the company regarding a great influence on profit and a high level of supply risk. These products/services usually can only be sourced from limited number of suppliers

resulting a significant supply risk. Strategy used for this group can be an accuracy in demand forecasting. Primary goal in purchasing for products/services in this group is to reduce the chances of supply outage. It is necessary to have contingency planning to solve outage when it happens. Building long term supply relationships via long term contracts or strategic partnerships with the supplier is essential. The important risk-mitigation plans for strategic items include build rapport and strategic partnerships with suppliers and seeking alternative partners to lower the risk of over-dependence on a single partner.

## 5 Conclusions

The focus of this research has been the formulation of purchasing strategy for the company supplier base management to carry out a strategic move for purchasing. This research demonstrated an example to motivate the SME in this aspect in terms of transforming the purchasing from tactical to strategic orientation. Traditionally, purchasing practice in small to medium size enterprises is performed mostly in reactive and transactional way. No strategic functions on purchasing management are held. Therefore, realising the importance of strategic purchasing and understanding strategic approaches is helpful for SME to gain competitive advantage of the business. The research has conducted deep literature findings on the topic to attain understanding on characteristics of transactional purchasing and strategic purchasing and figure out the difference between them, then, effort was put to develop a strategic approach for purchasing by adopting a well-known purchasing portfolio model – Kraljic Matrix. The result showed the usefulness of Kraljic Purchasing Portfolio Model in helping the purchasing to establish a strategic practice in managing their supplier base.

The beginning of the findings in this report showed that traditional purchasing in manufacturing company tends to be reactive, functional, focused on short term issues, measured primarily on the price saving and delivery. The focus on relationship management is not a priority. Involvement in the company overall objective is also usually quite minimal. Therefore, purchasing role was deemed as isolated department from other functions of organisations. It is also considered as clerical role; their activities are operational with no strategic direction and lack of decision making. It is concluded that operational or tactical purchasing is dealing with meeting the short-term, single event and daily purchasing needs of the business, it aims to sustain daily production activities. Whereas

strategic procurement is looking at long-term, ensuring timely supply of products/services that is vital to the business and ability to fulfil its core business goals. It is proactive in nature and focused on long-term value-adding activities. Strategic approach looks further than simple cost saving actions. It is also including framework agreements, category strategies development and supplier's performance monitoring. The literature review indicated extensive number of studies on strategic approach to purchasing can create significant impact on company performance and it can be strategically relevant to contribute to company competitive advantage. This is proven by many scholars that generally an organisation spending 50 to 80 percent of total revenue on purchasing of products or services as input for production such as raw materials, equipment, and services. This created an opportunity for purchasing to help organisation recognised the substantial cost saving. Therefore, the report stresses that adopting strategic approach in procurement enable to contribute to the success of a business and improve company profitability.

The case study in this research revealed the purchasing behavior in the manufacturing company remain transactional and working on single solution basis when buying products/services for the company. This purchasing practice resulting in missing opportunities to leverage the purchasing power and drive profitability within the organisation. To transform the tactical purchasing practice, a strategic tool is required for the purchasing. To strategically manage the supplier base, portfolio models can be used. The one that is useful and popular model employed by companies worldwide is the Kraljic Purchasing Portfolio Model which is using a matrix to analyse the purchasing portfolio of a company. The Kraljic Matrix assists a company to gain an insight into process and technique of the purchasing department and how it spends its effort on different products or services. The case study showed that by applying KM into purchasing portfolio, different strategies can be developed for supplier categories. It has proven that utilising Kraljic purchasing model, organisations can professionalise and enhance its purchasing efficiency leading to significant cost savings. To avoid unnecessary risks, it is critical to classify the products/services across the four quadrants. The four quadrants representing four types of product/service characteristics according to level of supply risk and profit impact. This helps purchasing recognised where their products/services are categorised in terms of supply risk and profit impact and identify whether the balance of power lies with

them or with their supplier. Once this is known, purchasing can implement an appropriate purchasing strategy for each category of the KM.

The research also demonstrated how the classification of products/services can be done in the KM. Before the classification, spend analysis is required to examine the amount of money spend in each category of products/services. The research showed that Pareto 20/80 Analysis is an appropriate tool for purchasing to study the overall spending value of company then identify the purchased products/services that accounting the majority expenses (80%) so that the classification of KM can focus on the major category of products/services. To classify the selected products/services into KM, information about how the company perceived the importance level of supply risk and profit impact attributes is necessary to make known. This is because organisations may weight the importance of each supply risk and profit impact attribute differently. Strategies implementation is very much depending on the characteristics of the products/services and the supply market. This case study clearly demonstrated how the KM deliver the supplier segmentation. The result of this study contributes to deeper and better understandings about the influence of Kraljic Purchasing Portfolio Model in strategic purchasing. The aim is to help purchasing maximise supply reliability and reduce costs, by making the most of their buying power.

Thereby, purchasing can move from transactional oriented to a strategic oriented. The case study showed case company had successfully employed purchasing portfolio model as an enabler to facilitate the transformation from transactional purchasing to strategic procurement. Purchasing portfolio model guides organisation to differentiate the importance and risks of the products/services, supplier, and activities in purchasing, and develop distinctive purchasing strategies and practices which can result in improved business performance. This research contributes to SME manufacturers on how to transform the transactional purchasing to strategic procurement by adopting the purchasing portfolio model to implement purchasing strategies. The results deliver beneficial message to company managements who wish to find solutions to evolve their purchasing department should take serious consideration about adopting the purchasing portfolio model. Following the key concluding points, the paper presents some key points for recommendations to the case company and identifies future research aspects that can be adopted from the key findings from this research studies.

## 6 Recommendations and Future Research

Although Kraljic Matrix provides a framework to implement distinguished strategy for each category in the four quadrants, there are likelihoods of moving the products/services in the matrix from one category to another for the betterment of supply management. Studies had suggested some additional strategies for the individual quadrant that do take into consideration the shifting of products/services around the different quadrants [36]. For instance, right side of the matrix consists bottleneck and strategic quadrant featured with high supply risk, by moving these two categories to left side of the matrix means pursued to minimise the supply risk.

For Bottleneck items, it is recommended to de-complex the supply of this product/service. It means making the products less complex by either searching for alternatives products or suppliers. Developing a new supplier is also an option. The aim is to minimise the level of supply risk and reduce the level of dependence on a supplier. Thus, it is moving towards non-critical quadrant. The other approach is focus only single supplier who is the approved supplier. This creates a greater negotiating position for the purchasing company hence the bottleneck items can be shifted to better position. Products/services in bottleneck or non-critical quadrant can move to leverage quadrant. This can be done by pooling together in large quantities to increase the purchasing power of the company. The pooling approach can be implemented through a framework contract initiated with a qualified supplier, or by vendor managed inventory (VMI) plan. Standardisation is another choice whereby the one standard product can be purchased rather than dissimilar forms of the same product. This can lead to lesser costs of direct and indirect purchasing.

Leverage products/services can move to become strategic items by establish a strategic partnership. Company can carry out supplier assessment on key buying criteria which the buyer himself specifies. If company's confidence in the supplier's performance is adequate, strategic partnerships can be considered. Strategic products/services can become a leverage items by supplier development program. In case of strategic partnership turn into non-optimal with under-performing partner, supplier development can promote through providing a training to improving the quality of the supplier.

Alternative, the undesirable partnership may terminate although it is a painful process but to reduce the dependency on the supplier involved. Purchasing company will have to source and develop a new supplier. It is advisable for purchasing to take more care to maintain good relationships with suppliers although pursuing partnership negotiation is hardly to be successful. Where possible, the purchasing should attempt to shift to a supplier with more attractive account. Another option is for the purchasing to tie the order of strategic and bottleneck products/services with other products/services which are of more interest to the supplier, so that to improve the supplier's perception of the purchaser's account to key or upgrading. Overall, it is recommended for the purchasing to increase efforts to switch products/services out of the strategic and bottleneck categories.

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