

Positioning the State of Purchasing in Small and Medium Sized Enterprises

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This study examines the distinct purchasing activity of small and medium sized enterprises (SMEs) under the two dimensions of the purchasing portfolio matrix (PPM), using empirical data collected in the Winter of 2012. Resulting analysis presents the current state of SMEs' purchases, measures the degree of SMEs' purchasing development, and compares the degree of SMEs' purchasing development among each of the four stages of SMEs' purchases. The evidence of this study suggests that the majority of SMEs' purchases belong to the leverage category, which requires materials management emphasizing effective cost and materials flow management. Results also imply that SMEs showed some similarities and differences in their purchasing development. This paper seeks to provide a unique perspective on SME purchasing by classifying the purchases of SMEs and exploring what stage of purchasing SMEs are faced with on the basis of PPM. Based on the statistical analysis, this study also tries to provide managerial implications for SMEs to improve their purchasing practices.

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I. INTRODUCTION

The recent business environment is characterized by rapid technological changes, short product life cycle, global sourcing, and high cost pressure, posing substantial challenges and complexities to companies. Due to the fast technological changes and short product life cycle, companies face a significant pressure for adjusting their strategy. Global sourcing implies a fair degree of risk to companies. Companies are also forced to further reduce their cost to be competitive in the marketplace. As a result, it becomes important for firms to align their strategy to these changing market environments. Towards this goal, previous purchasing literature has suggested a purchasing portfolio approach (Kraljic, 1983;

Olsen and Ellram, 1997; Dubois and Pedersen, 2002; Wagner and Johnson, 2004; Gelderman and Semeijn, 2006; Padhi, Wagner, and Aggarwal, 2012). Kraljic (1983) first proposed the purchasing portfolio matrix (PPM). His purchasing portfolio matrix aims at developing different purchasing strategies on the basis of two dimensions: the strategic importance of a firm's purchases and its supply complexities. Based on the two dimensions, a company's purchases can be classified into four categories, such as non-critical, bottleneck, leverage, and strategic items, and the company can devise a distinctive purchasing and supply strategy for each item. Since its development, the PPM has been considered one of the important models for purchasing and supply strategy. Despite this notion of the

PPM in the academics and practitioners, little is known about the application of the PPM.

While the majority of the studies in purchasing and supply management have focused on the large organizations, very few empirical studies exist regarding purchasing and supply management within small and medium sized enterprises (SMEs) (Ellegaard, 2006; Adams, Kauffman, Khoja, and Coy, 2016). The dearth of research on purchasing in SMEs primarily comes from the misperception that purchasing activities of SMEs are just the same as those of large organizations, only smaller in scale (Ramsey, 2001). However, many researchers stated that this view might be incorrect for the following reasons (Ramsey 2001; Wagner, Fillis and Johansson, 2003; Vaaland and Heide, 2007; Paik, Bagchi, Skjott-Larsen, and Adams, 2009). First, SMEs suffer from a scarcity of internal resources. They also tend to be more reactive and exert less influence on their external market environment. These researchers further indicated that managers in SMEs often focus on areas that require immediate attention, and are forced to take a short-term focus with little room for strategic thinking in their purchasing. As a result, SMEs show a distinct organizational behavior and provide a specific context to the purchasing task, compared to large organizations (Ellegaard, 2006).

Little attention on the application of PPM and purchasing in SMEs resulted in a research gap concerning purchasing in these organizations. In order to address this gap, this study attempts to examine the purchases of SMEs on the basis of Kraljic's purchasing portfolio matrix (PPM). Using the empirical data obtained from purchasing professionals of SMEs in US, this study seeks to classify the purchases of SMEs and to explore what stage of purchasing SMEs are currently faced with. Although the PPM has been widely recognized by the academics and

practitioners, little attention has been given to the application of the PPM into SMEs. Besides, most purchasing literature regarding the purchasing portfolio approach was based on a very limited number of case studies (Gelderman and van Weele, 2003; Luzzini, Caniato, Ronchi, and Spina, 2012). Therefore, undertaking empirical research into the current state of purchasing in SMEs on the basis of the PPM contributes to the body of knowledge in the field of purchasing.

Another related goal of this study is to measure and compare the degree of purchasing development in SMEs on the basis of the classification from the purchasing portfolio matrix (PPM). Many purchasing literature suggests that the higher the competitive pressure from business environments, the more measures are taken to further develop purchasing function (Burt *et al.*, 2003; Johnson, Leenders, and Fearson, 2006; Paik, Bagchi, Skjott-Larsen, and Adams, 2009). In other words, a company's purchasing development is dependent upon the purchasing situation faced by the company. Thus, the PPM can help a purchasing manager consider the complexity of the firm's purchases and develop the strategy relevant to the purchasing situation. By measuring and comparing the degree of purchasing development among four different classifications from the PPM, this study attempts to obtain more empirical evidence about the current state of purchasing and to explore any similarity and difference of purchasing development in SMEs.

The rest of this paper is structured in the following sections. Section 2 provides a brief overview of the previous literature related to this study. Section 3 briefly reiterates the research objectives, followed by the research methodology in Section 4. Section 5 discusses the results of the data analysis. Section 6 concludes with a

summary of the data analysis and research limitations.

II. LITERATURE REVIEW

2.1. Purchasing Portfolio Model

Kraljic (1983) introduced a portfolio model in the area of purchasing. He identified two dimensions, the strategic importance of a firm’s purchases and its supply complexities, to understand a company’s need for a supply strategy. By evaluating a firm’s situation in terms of these two dimensions, purchasing managers can determine the type of supply strategy the company needs in order to exploit its purchasing power and to reduce its

supply risk. The strategic importance of a firm’s purchases describes the economic importance of the purchase to the company in terms of its impact on total cost, quality, and productivity, and it can be assessed in terms of the percentage of purchase in total costs and its effect on quality and productivity. The supply complexities assesses the difficulty of managing the purchase situation and includes the technological complexity, the pace of technological changes of the purchased items, and the characteristics of supply market. With the high and low levels for each of the two dimensions, a company’s purchases can be classified into four categories: non-critical, bottleneck, leverage, and strategic, as shown in Figure 1.

Strategic Importance	High	Leverage	Strategic
	Low	Non-Critical	Bottleneck
		Low	High

Supply Complexity

FIGURE 1. KRALJIC PORTFOLIO MATRIX (PPM).

Based on the four categories, he proposed the four different stages of purchasing sophistication. For a non-critical item, a focus should be on purchasing management whose key performance criterion is a functional efficiency. He indicated that simple market analyses, efficient processing, and inventory optimization normally suffice for this item. For a bottleneck item, managers need to place an emphasis on sourcing. Decisions for this item include securing volume and inventory, control of vendors, and backup plan. The key performance criteria for the bottleneck item should be cost management and reliable sourcing. An exploitation of full purchasing

power, vendor analysis and selection, product substitution, pricing strategies/negotiation come into play on issues affecting a leverage item. The key performance criteria for this item include cost/price and material flow management. Finally, a strategic item requires supply management whose key performance criterion is a long-term availability. The main tasks for this item involve accurate demand forecasting, development of long-term supply relationship, make-or-buy decisions, risk analysis, logistics, inventory, and vendor control, and so forth.

Olsen and Ellram (1997) extended the purchasing portfolio model proposed by

Kraljic. The main goal of their paper was to describe the use of portfolio models in understanding supplier relationship. Based on two dimensions that include the strategic importance of the purchases and the difficulty of managing the purchase situation, they categorized the company's purchases. They also developed a normative portfolio model to manage the supplier relationships associated with each of the categories. In developing the normative portfolio model, they introduced relative supplier attractiveness and strength of the relationship as the dimensions of the model. Finally, they proposed strategies and action plans based on the result of the two portfolio models.

Dubois and Pedersen (2002) argued that the Kraljic's model was limited in explaining power and dependence in buyer-supplier relationships. By limiting the analysis to concern only given products in a purely dyadic context, the Kraljic's model might fail to recognize great opportunity to improve productivity. In order to address the limitation, they proposed an industrial network portfolio approach to increase the awareness of the importance of interaction and networking. Caniels and Gelderman (2007) also used a purchasing portfolio model in understanding power and interdependence in buyer and seller relationships. Their findings reported that companies maintain a portfolio of differentiated supplier relationships, and also suggested that strategic items do not necessarily need power balance.

Gelderman and van Weele (2003) pointed out that little was known about the actual use of purchasing portfolio models in practice. They argued that most publications were conceptual or anecdotal by nature and there are many issues and unanswered questions from the literature. Using the case studies, they described how purchasing professionals used portfolio models in order to develop effective differentiated purchasing

strategies. Their research findings indicate that there is no simple, standardized blueprint for the application of the portfolio analysis for the practitioners. They concluded that the professionals require reflecting on results, critical thinking and sophistication of purchasing function.

Using over 50 interviews with managers and archival data from 12 multinational companies, Wagner and Johnson (2004) extended purchasing portfolio models by examining how supplier portfolios can be configured, developed, and managed to contribute to the firm's competitive advantage. They explored how firms should approach the configuration and the subsequent management of supplier relationships and supplier portfolios in supply chains. The results indicated that, by assembling superior supplier bases, developing suppliers and integrating them into product development and manufacturing, strategic supplier portfolios can contribute to competitive advantage.

2.2. Purchasing Development

Past literature suggests a number of purchasing development models. To our knowledge, Reck and Long (1988) first developed a purchasing development model with four different stages. The four stages include the passive stage, the independent stage, the supportive stage, and the integrative stage. At the beginning stage, the purchasing function primarily reacts to requests from other departments. During the first stage, the purchasing function spends a high proportion of their time on quick problem-solving and routine transactions. The second stage of purchasing development involves professionalizing the purchasing function. A company starts to adopt the latest purchasing techniques and practices, but its direction is still independent of the

company's overall strategy. After this stage, the purchasing function tries to support the firm's competitive strategy, and then finally the firm's purchasing strategy is fully integrated with the overall strategy and constitutes part of an integrated effort to develop a strategic business plan.

Freeman and Cavinato's purchasing development model (1990) is very similar to that of Reck and Long. They indicated that the development of the purchasing function must be aligned with the overall strategic development of a business. They presented four phases of the purchasing planning. In the initial phase, purchasing is a task-oriented, clerical, and reactive function. In phase two, the purchasing function places an emphasis on minimizing the cost, and the management style still tends to be somewhat reactive, but the management starts developing plans for future with some proactiveness. In the third phase, the purchasing focus is on supporting the lines of business and contributing to business goals through value analysis. Purchasing activities at this level of development concentrate on supply chain management and on positioning itself for contributing to the overall business goals. In phase four, the purchasing function as an entrepreneurial team member is responsible for product development and line of business results. At this strategic level of the purchasing development, the emphasis is on developing long-term relationships with key suppliers. Also, the number of business partners is reduced, and long-term partnership arrangements are established.

Anderson and Katz (1998) also developed a purchasing management development framework based on the five levels (Level 0 through Level 4) of procurement development pathways to savings and revenue enhancement. They viewed that, as the company's position moves from Level 0 (Buy for Less) to Level

4 (Sell Better), the opportunities for cost savings and revenue enhancement improve dramatically. As companies move up the procurement pathways, they view their suppliers as assets that can enhance their capabilities, not simply sources of goods and services that must be played against each other in a relentless drive for unit-price reductions. Anderson and Katz also emphasized that one of the ways to gain sustainable competitive advantage through a sourcing arrangement is to integrate suppliers into the buying organization's core processes, rather than simply as vendors to be kept at arm's length. At this level, the supplier-customer relationship is not viewed as just buying or selling products or services, but as extensions of the buying organization.

Burt, Dobler, and Starling (2003) presented another model of purchasing development. Their purchasing continuum chart shows four stages of purchasing development. Stage 1 is entitled clerical purchasing. At this stage, purchasing involves clerical activities and focuses on processing paperwork and confirming the actions of others. Skill requirements at this level are clerical in nature. Stage 2 is referred to as mechanical purchasing. At this stage, purchasing is transaction-driven and the primary emphasis is to reduce purchase cost. The relationship with suppliers is often a transactional and an adversarial one. Stage 3 is proactive purchasing. Purchasing at this stage has a professional staff and reports to upper management. Suppliers are considered resources that need to be managed, although the relationship is somewhat transactional and collaborative. The major emphasis in this stage is on cost, quality, and timeliness. Purchasing function is also actively involved in source selection. The final stage is world class supply management. At this level, supply management is viewed as a core competence. Purchasing strategy is

integrated into the business's overall strategy and the goal of purchasing is to optimize the total cost of ownership (TCO). This requires developing and maintaining long-term supplier relationships.

All of these previous models have identified the following purchasing practices and perceptions as the main elements of purchasing development in an organization.

- Integration of purchasing strategy with overall corporate strategy
- Implementing total cost of ownership (TCO) principles
- Skills needed by purchasing employees
- Method of supplier selection
- Measuring purchasing performance on a regular basis
- Perceived importance of suppliers to the organization
- Recognition of the importance of purchasing in the organization
- Type of supplier relationship

III. RESEARCH OBJECTIVES

The first research objective is to examine the purchases of small and medium sized enterprises (SMEs) on the basis of the Kraljic's purchasing portfolio matrix (PPM). Using the two dimensions from the PPM, the strategic importance and the supply complexity, this study attempts to classify SMEs' purchases into four categories, such as non-critical, bottleneck, leverage, and strategic, and to explore what stages of purchasing SMEs are currently faced with.

The second objective of this study is to measure and compare the degree of purchasing development in SMEs, using the classification from the PPM. After a company's purchases are classified into four categories, this study further tries to gather empirical evidence about the state of purchasing in SMEs and to explore any similarity and difference of purchasing

development among the four categories in SMEs.

IV. RESEARCH METHODOLOGY

In order to achieve the two research objectives, this study used a cross-sectional mail survey. The survey instrument consists of three main sections: (1) the company's purchasing situation, (2) purchasing development within the organization, (3) purchasing organization demographics. The respondents were asked to indicate their perception on seven measure of purchasing situation and eight measures of purchasing development, using a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree), as shown in the Table 1.

The company's purchasing situation measures the strategic importance of a firm's purchases and the supply complexities. Purchasing development measures the type of supplier relationships, the perceived importance of purchasing to the organization, and other factors associated with the characteristics of purchasing management in a company. Along with this, several demographic questions, including company size, were also included in the questionnaire to obtain an insight into a respondent's operations.

Before data collection, the survey instrument was pre-tested to assess content validity. Five questionnaires were administered to four purchasing managers of the local SMEs and one business professor for ambiguity, clarity, and appropriateness of the items in the survey instrument. Based on their feedbacks, the questionnaire was finally developed. Cronbach's alpha was also computed for each of the two measures to assess internal consistency and reliability. As can be seen in Table 2, Cronbach's alpha value for each measure was found to be above the cut-off of 0.6 (Nunnally, 1978).

TABLE 1. PURCHASING SITUATION AND DEVELOPMENT MEASURES.

Purchasing Situation Measures
The goods and services purchased by my company have a major influence on the quality level of my firm's products. (V11)
Purchased goods and services make up a high percentage of total costs in my company. (V12)
The goods and services purchased by my company have a major influence on organizational productivity. (V13)
A significant percentage of our purchased goods and services are technologically complex. (V14)
A significant percentage of our purchased goods and services are undergoing rapid technological change. (V15)
A significant percentage of our purchased goods and services are readily available from suppliers. (V16)
A significant percentage of our purchased goods and services have viable substitute sources of supply. (V17)
Purchasing Development Measures
Our purchasing strategy is fully integrated with and complements the overall business strategy. (V21)
The goal of purchasing is to contribute to a company's competitive advantage, not just minimizing the purchase cost. (V22)
Purchasing in my company requires strong interpersonal, analytical, and cross-functional skills. (V23)
Supplier selection is based on a wide range of criteria, including total cost, quality, technical performance, and supplier capabilities. (V24)
Quantitative measures are used on a regular basis to evaluate purchasing performance. (V25)
Suppliers are considered to be an important resource that plays a major role in the success of my organization. (V26)
Purchasing is widely recognized by other departments and management as an important function that plays a major role in the success of my organization. (V27)
My company often uses long-term partnership relationships with suppliers of critical commodities. (V28)

The revised survey instrument was sent in the Winter of 2012 to the 1,170 executive members of local affiliations of the Institute of Supply Management (ISM), formerly known as the National Association of Purchasing Management, because they are likely to be knowledgeable about the purchasing practices of their company. The target respondents were asked to complete the survey only if their organization met the

following definition of a small and medium sized enterprise (SME): a firm with less than 500 employees, as suggested by the US Small Business Administration. In an effort to increase the response rate, the survey questionnaires were distributed in three phases (i.e., one mailed survey with cover letter and a postage-paid return envelope, one reminder, and one second survey with cover letter). A total of 212 usable surveys were

received for a response rate of about 18%. Our respondents came from a variety of industries, including aerospace, computer/electronics, utility, electrical equipment, food, chemicals, construction

materials, and so forth. About 70 percent of the respondents have a company size with 100 to 499 employees and the rest have less than 100 employees. Table 2 and 3 show item results and correlation analysis, respectively.

TABLE 2. ITEM RESULTS.

Purchasing Situation Measures (Chronbach's alpha = 0.615)	Mean	Std. Dev.
The goods and services purchased by my company have a major influence on the quality level of my firm's products. (V11)	6.55	0.89
Purchased goods and services make up a high percentage of total costs in my company. (V12)	5.61	1.57
The goods and services purchased by my company have a major influence on organizational productivity. (V13)	5.67	1.38
A significant percentage of our purchased goods and services are technologically complex. (V14)	4.54	1.83
A significant percentage of our purchased goods and services are undergoing rapid technological change. (V15)	4.25	1.86
A significant percentage of our purchased goods and services are readily available from suppliers. (V16)	5.06	1.78
A significant percentage of our purchased goods and services have viable substitute sources of supply. (V17)	4.29	1.82

Purchasing Development Measures (Chronbach's alpha = 0.669)	Mean	Std. Dev.
Our purchasing strategy is fully integrated with and complements the overall business strategy. (V21)	5.01	1.50
The goal of purchasing is to contribute to a company's competitive advantage, not just minimizing the purchase cost. (V22)	5.29	1.82
Purchasing in my company requires strong interpersonal, analytical, and cross-functional skills. (V23)	5.39	1.52
Supplier selection is based on a wide range of criteria, including total cost, quality, technical performance, and supplier capabilities. (V24)	5.94	1.28
Quantitative measures are used on a regular basis to evaluate purchasing performance. (V25)	4.35	1.63
Suppliers are considered to be an important resource that plays a major role in the success of my organization. (V26)	5.43	1.49
Purchasing is widely recognized by other departments and management as an important function that plays a major role in the success of my organization. (V27)	5.67	1.41
My company often uses long-term partnership relationships with suppliers of critical commodities. (V28)	5.31	1.51

TABLE 3. CORRELATION ANALYSIS.

	V11	V12	V13	V14	V15	V16	V17
V11	1						
V12	0.399667	1					
V13	0.387234	0.442374	1				
V14	0.128306	0.314751	0.261965	1			
V15	0.07319	0.206026	0.223379	0.785789	1		
V16	-0.06769	-0.02771	0.069357	-0.06327	0.10047	1	
V17	0.049946	0.03135	0.123122	-0.04769	0.073125	0.576423	1

	V21	V22	V23	V24	V25	V26	V27	V28
V21	1							
V22	0.134661	1						
V23	0.303867	-0.09231	1					
V24	0.268608	0.358644	0.213587	1				
V25	0.374474	-0.0915	0.318729	0.177512	1			
V26	0.289016	-0.02533	0.405665	0.179933	0.313638	1		
V27	0.30456	0.231087	0.099551	0.161802	0.158915	0.243876	1	
V28	0.245712	-0.0949	0.322003	0.153983	0.372826	0.320946	0.279532	1

A test for non-response bias has been performed by comparing the late respondents with the early respondents (Armstrong and Overton, 1977). In this study, the late respondents were considered the non-respondents. No statistically significant differences were found among the survey items tested. This result suggested that non-response bias did not significantly influence the study.

V. RESULTS

5.1. Positioning the Purchases of SMEs

As shown in the Table 1, the first three statements are related to the strategic importance of purchases, while the last four statements are concerned with the supply complexities of their company. In order to classify each respondent into either a high or a low level for the strategic importance as shown in Figure 1, the average of the ratings of the first three statements was computed. Since four is in the middle of the seven-point

Likert scale, if the mean is above four, the respondent was considered to have a high profit impact of their purchases. Respondents were classified for a low profit impact when their average is below 4.

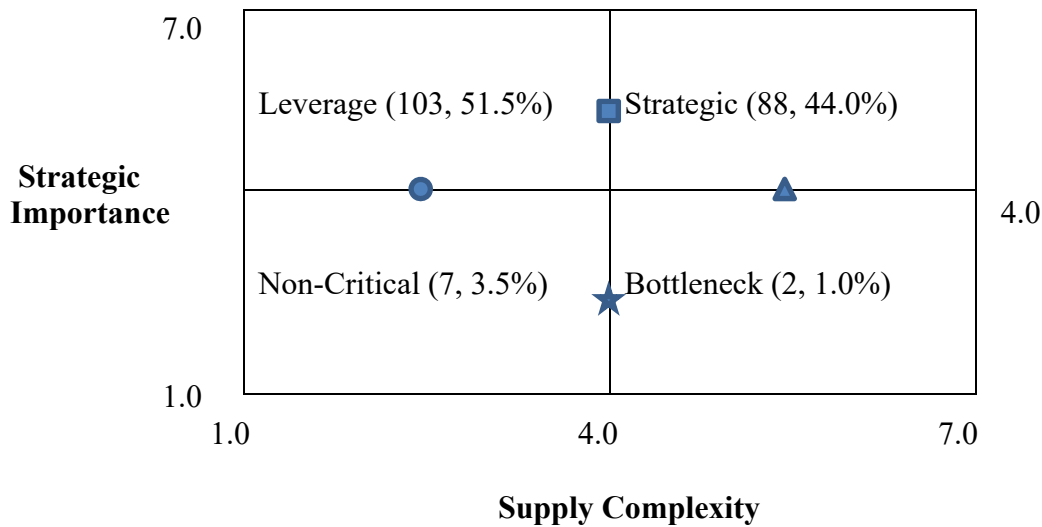
A similar approach was taken to position each respondent on the grid for supply complexity. That is, based on the average of the ratings of the last four statements, each respondent was classified for the supply complexity. Please note that, among the four statements about the supply complexity, the direction of the last two statements is different from that of other two statements. Due to this reason, the respondents' feedback on each of the last two questions was reversely recorded and then used to compute the averages.

After taking these steps, the final sample was reduced from 212 to 200 usable observations, resulting in an effective response rate of about 17 percent. The remaining 12 observations were excluded for data analysis because the averages of their responses were located exactly on four on the

Likert scale for either the strategic importance or the supply complexity. Figure 2 shows the results of positioning the purchases from the respondents. The majority of the purchase category of the respondents is the leverage, followed by the strategic category. The non-critical and bottleneck categories, when combined, received only less than 5 percent.

About 52 percent of the respondents indicated that their company’s purchases belong to the leverage category. This

category involves purchases that are strategically important to the company yet have a low supply risk. According to the stages of purchasing sophistication by Kraljic (1983), this category requires materials management that focuses on cost and materials flow management. When managing these purchases, it is important to exploit full purchasing power in order to lower the cost because the total dollar values of purchases is high.



The numbers in parentheses are the actual number observations and the percentage for each category.

● : 2 observations ■ : 8 observations ▲ : 1 observation ★ : 1 observation

FIGURE 2. POSITION OF PURCHASES IN SMES.

The strategic category is the second highest category (44 percent). This category includes purchases that are difficult to manage and also have a high strategic importance. Based on the purchase’s characteristics, this category requires supply management that focuses on long-term availability. The company should manage these purchases by building and maintaining

a close, long-term relationship with the suppliers.

About 4 percent of the respondents indicated that their company’s purchases are the non-critical items. This category encompasses purchases that have a low supply risk and a low strategic importance. Kraljic (1983) suggested that this category requires purchasing management with a functional efficiency as a key performance

criterion. When managing these purchases, it is necessary to reduce the number of suppliers and to focus on efficient processing and product standardization. The supplier relationship should be managed by setting up a relationship that basically manages itself.

The last purchase category from the respondents is the bottleneck category (1 percent). This category involves purchases that are difficult to manage and have a low strategic importance. Based on the purchase's characteristics, this category requires sourcing management that ensures reliable sourcing. To manage these purchases, the company needs to focus on volume insurance at cost premium if necessary and effective control of vendors.

5.2. Comparing Purchasing Development among the Four Categories

This study also attempts to compare the degree of purchasing development among the non-critical, bottleneck, leverage, and strategic categories in small and medium sized enterprises (SMEs). By doing so, this study tries to explore any similarity and difference of purchasing development among the four categories in SMEs. First, in order to determine whether differences exist in the degree of purchasing development among the four categories, the analysis of variance (ANOVA) was conducted, using 200 observations. After performing the ANOVA, the multiple comparison technique was employed with Fisher's least significant

difference (LSD) method in order to understand which categories are statistically different. Table 4 and 5 summarize the results of the ANOVA for each of the eight measures of purchasing development and the multiple comparison techniques, respectively. Results from the tables imply that SMEs showed some similarities and differences among the four different groups in their purchasing development.

5.2.1. Integration of purchasing strategy with overall corporate strategy

Most purchasing literature indicates that purchasing strategy needs to be integrated with overall corporate strategy. The ANOVA results suggest that not all groups are identical in terms of the degree of the integration between purchasing strategy and overall business strategy. The value of the test statistic is 2.87 and its p-value is 0.0376, which means that there is evidence to infer that the degree of integration of purchasing strategy with overall corporate strategy is different in at least two of the four categories. In order to determine where the difference occurs, Fisher's LSD method was conducted. The results show that the strategic category differs from the leverage group, suggesting that, as the supply complexity increases, the strategic category tends to focus more on the integration between purchasing strategy and overall business strategy relative to the leverage category. No difference exists among all other comparison.

TABLE 4. RESULTS FROM THE ANOVA TEST.

Purchasing Development	Category	Average	Variance	F-Value	P-Value
Integration of purchasing strategy with overall corporate strategy	Non-Critical	4.29	2.24	2.87	0.0376*
	Leverage	4.84	2.28		
	Bottleneck	3.50	0.50		
	Strategic	5.30	2.03		
Implementing total cost of ownership (TCO) principles	Non-Critical	4.86	4.81	1.85	0.1388
	Leverage	5.55	2.45		
	Bottleneck	4.00	2.00		
	Strategic	5.02	4.09		
Skills needed by purchasing employees	Non-Critical	3.43	4.29	6.69	0.0003**
	Leverage	5.28	1.91		
	Bottleneck	4.50	12.50		
	Strategic	5.76	2.00		
Method of supplier selection	Non-Critical	5.00	4.67	2.97	0.0332*
	Leverage	5.92	1.70		
	Bottleneck	4.00	8.00		
	Strategic	6.03	1.25		
Measuring purchasing performance on a regular basis	Non-Critical	3.71	1.24	1.74	0.1608
	Leverage	4.14	2.73		
	Bottleneck	4.00	8.00		
	Strategic	4.61	2.61		
Perceived importance of suppliers to the organization	Non-Critical	3.57	4.95	5.71	0.0009**
	Leverage	5.33	1.85		
	Bottleneck	6.00	0.00		
	Strategic	5.73	1.90		
Recognition of the importance of purchasing in the organization	Non-Critical	5.14	3.48	0.61	0.6091
	Leverage	5.67	1.73		
	Bottleneck	6.50	0.50		
	Strategic	5.71	1.94		
Type of supplier relationship	Non-Critical	3.71	3.57	3.97	0.0089**
	Leverage	5.28	2.20		
	Bottleneck	6.50	0.50		
	Strategic	5.53	1.86		

*: significant at 0.05, **: significant at 0.01

TABLE 5. RESULTS FROM MULTIPLE COMPARISON TEST.

Purchasing Development	Pairs of Population Means Compared	 Difference 	Fisher's LSD
Integration of purchasing strategy with overall corporate strategy	Leverage – Strategic	0.46	0.42
Skills needed by purchasing employees	Non-Critical – Leverage	1.85	1.11
	Non-Critical – Strategic	2.33	1.11
	Leverage – Strategic	0.48	0.41
Method of supplier selection	Non-Critical – Strategic	1.03	0.97
	Leverage – Bottleneck	1.92	1.79
	Bottleneck – Strategic	2.03	1.80
Perceived importance of suppliers to the organization	Non-Critical – Leverage	1.76	1.08
	Non-Critical – Bottleneck	2.43	2.21
	Non-Critical – Strategic	2.16	1.09
Type of supplier relationship	Non-Critical – Leverage	1.57	1.11
	Non-Critical – Bottleneck	2.79	2.28
	Non-Critical – Strategic	1.82	1.12

Note: This table shows only the pairs of population means compared, which are statistically significant at 0.05.

5.2.2. Implementing total cost of ownership (TCO) principles

Total cost of ownership (TCO) requires a purchaser to identify and consider all costs before making purchasing decisions. Emphasizing solely on purchasing costs often fails to address other significant costs. By defining and considering ownership and post-ownership costs, TCO can contribute to a firm's competitive advantage. The ANOVA results show that there is not enough evidence to infer that a difference exists among the four categories in implementing total cost of ownership principles in SMEs ($F = 1.85$; p -value = 0.1388). Given the fact that the means of the four categories are high and closely located each other, this implies that the respondents of this survey are implementing TCO principles, regardless of the purchasing situation they are faced with.

5.2.3. Skills needed by purchasing employees

The ANOVA results indicate that at least two of the four groups are different regarding the perception on skills needed by purchasing employees ($F = 6.69$, p -value = 0.0003). Non-critical group is statistically different from the leverage group and strategic group, according to Fisher's LSD method. This result suggests that, as a company's purchases become more critical and complex, purchasing needs to develop more a closer relationship with other internal groups. However, when the company's purchases are primarily non-critical items, the purchasing function is more likely to be clerical. The findings from the survey reflect this notion. Also the strategic category differs from the leverage category. This implies that, as the supply complexity increases, the skills needed in purchasing might be different.

5.2.4. Method of supplier selection

With $F = 2.97$ and its p -value = 0.0332 from the ANOVA, it can be concluded that the means of the four categories are not equal regarding the

statement that supplier selection is based on a wide range of criteria, including total cost, quality, technical performance, and supplier capabilities. Fisher's LSD procedure shows that statistically significant differences exist in the following pairwise comparisons: non-critical and strategic, leverage and bottleneck. These two pairs represent totally opposite sides in the purchasing portfolio matrix. This clear difference might lead to different criteria for selecting suppliers. Also the strategic category differs from the bottleneck category. These two categories are different only in terms of the strategic importance of purchases, such as total cost and quality. Since total cost and quality are part of the criteria for a selection of suppliers on the statement, the strategy category tends to agree more on the statement relative to the bottleneck category.

5.2.5. Measuring purchasing performance on a regular basis

The ANOVA results show that there is not enough evidence to infer that a difference exists among the four categories in using a regular, quantitative performance measurement ($F = 1.74$; $p\text{-value} = 0.1608$). However, compared to the means of bottleneck, leverage, and strategic categories, the average of the non-critical seems to be relatively low.

5.2.6. Perceived importance of suppliers to the organization

The ANOVA results suggest that not all groups are identical in the perceived importance of suppliers in their organization. The value of the test statistic is 5.71 and its $p\text{-value}$ is 0.0009, which means that there is a strong evidence to infer that differences exist in at least two of the four categories. The results of Fisher's LSD method show that

non-critical group is different from all other three groups. If the company's purchase is non-critical, the company tends to simply maintain the relationship without allocating considerable resources and view its suppliers in an arm's length transaction. This is reflected in the findings.

5.2.7. Recognition of the importance of purchasing in the organization

According to the ANOVA results, there is no evidence to infer that the means of the four categories are different ($F = 0.61$; $p\text{-value} = 0.6091$). Given the fact that the means of all categories are similar and high, it suggests that purchasing is widely recognized by other departments and management as an important function that plays a major role in the success of the organization, irrespective of the purchasing situation they are faced with.

5.2.8. Type of supplier relationship

With $F = 3.97$ and its $p\text{-value} = 0.0089$ from the ANOVA, it can be concluded that the means of the four categories are not equal regarding the statement that my company often uses long-term partnership relationships with suppliers of critical commodities. Fisher's LSD procedure shows that statistically significant differences exist in the following pairwise comparisons: non-critical and leverage, non-critical and bottleneck, non-critical and strategic. This result is identical to the findings from the perceived importance of suppliers to the organization. The supplier relationship under the non-critical category is often managed by setting up a relationship that basically manages itself and does not move further into a long-term, collaborative relationship. The findings of this survey support this notion.

VI. CONCLUSION AND RESEARCH LIMITATIONS

Based on Kraljic's purchasing portfolio matrix (PPM), this study tried to examine the purchases of small and medium sized enterprises (SMEs). The evidence of this study suggests that the majority of SMEs' purchases are in the leverage category, which requires materials management emphasizing effective cost and materials flow management. When managing these purchases, it is important for firms to leverage volume across products and suppliers to reduce the material costs, while maintaining the existing relationship with their suppliers. The second largest category of SMEs' purchases is strategic. This category requires supply management focusing on long-term supply availability by building and maintaining a close, long-term relationship with the suppliers. Unlike the leverage category, the companies need to strengthen the relationship with their suppliers by sharing important information, providing the suppliers with more volumes, inviting the suppliers into product development projects, and so forth. These two categories represent about 96 percent of the responses from the survey.

This study also sought to compare the degree of purchasing development among the four categories in SMEs and to explore any similarity and difference. According to the results of the survey, no difference exists among the four categories in terms of the total cost of ownership (TCO) principles. Similarity is also found among the four categories in using a regular, quantitative performance measurement. Purchasing is widely recognized by other departments and management as an important function across the four categories, too.

The ANOVA results suggest that not all categories are identical in some areas. First, in terms of the degree of the integration between purchasing strategy and overall business strategy, the strategic category is different from the leverage group, implying that the strategic category is likely to place more emphasis on the integration between purchasing strategy and overall business strategy than the leverage category. With respect to the perception on skills needed by purchasing employees, non-critical group differs from the leverage group and strategic group. The strategic category is also different from the leverage category. This result suggests that, as a company's purchasing activities and responsibilities become more critical, purchasing needs to develop more a closer relationship with other internal groups. Regarding supplier selection, significant differences exist in the following pairwise comparisons: non-critical and strategic, leverage and bottleneck, bottleneck and strategic, suggesting that, when the purchasing situations faced by companies are different, they tend to use different criteria for their supplier selection. When it comes to the perceived importance of suppliers and supplier relationship, non-critical group is different from all other three groups. If the company's purchase is non-critical, the company tends to maintain the relationship without allocating considerable resources. However, as the stage of purchasing evolves, SMEs are likely to strengthen the relationship with their suppliers by enhancing communication and collaboration.

The contributions of this study are as follows. First, using empirical data, it attempts to classify the purchases of SMEs and to explore what stage of purchasing SMEs are faced with on the basis of PPM. As indicated in introduction, the research on purchasing in SMEs and the application of PPM in the context of SMEs is limited in the

current body of knowledge. This paper tries to shed light on SME purchasing, using unique dataset.

Second, the result of this study appears to be aligned well with the findings of earlier studies. Olsen and Ellram (1997) extended PPM by introducing a supplier relationship as one of the dimensions for the portfolio model. Wagner and Johnson (2004) further examined the supplier relationship in PPM and emphasized the importance of developing the supplier relationship. The result of this study suggests that, as a purchasing situation evolves from the non-critical items to others in terms of both strategic importance and supply complexity, SMEs tend to appreciate their suppliers and to enhance the relationship with their suppliers.

Third, this study adds to the current body of knowledge in SME purchasing by suggesting that SMEs are likely to implement total cost of ownership (TCO) principles and their purchasing function tends to be widely recognized by other departments and management, irrespective of their purchasing situation. In addition, this study suggests that SMEs are still under development in using quantitative measures to evaluate their purchasing performance on a regular basis. As a result, it can be suggested that SMEs further improve developing and utilizing quantitative performance measurements for their purchasing area on an ongoing basis.

This paper also provides the following managerial implications for SMEs to improve their purchasing practices. According to the evidence of this study, about 96 percent of the respondents belong to either the leverage category (52 percent) or the strategic category (44 percent). These two categories are different only in terms of the supply complexity. Many previous researchers suggested that, as the supply complexity increases, there is a strong need

to develop good supplier bases and integrate the suppliers into product development and manufacturing, leading to a collaborative supplier relationship. The evidence of this study, however, suggests that there is no statistical difference between the two groups in terms of the method of supplier selection, the perceived importance of suppliers to the organization, and the type of supplier relationship. This finding implies that SMEs is still lagging behind in terms of building and further developing a collaborative supplier relationship when they move from the leverage category to the strategic category. Therefore, SMEs need to monitor their purchasing situations closely and align their strategy with the changing purchasing situation accordingly. This is one of the main ideas of PPM.

Although this study offers good insights into the current state of purchasing in SMEs, there are several limitations that provide good opportunities for further research. First, this study used three factors to assess the strategic importance of SMEs' purchases and four factors to determine the supply complexity. Other factors, such as knowledge improvement, technological strength, supplier's power, etc., could be added to capture more of each of the two important dimensions for classification. Similarly, future research needs to include other variables that better account for the degree of purchasing development. For example, purchasing maturity, and the top executive's preference might be other drivers that influence purchasing development (Johnson and Leenders, 2001; Rozemeijer, van Weele and Weggerman, 2003).

Another limitation of this study comes from a very small sample size of the non-critical and the bottleneck categories relative to other two categories. Although this might be a true status of purchasing in SMEs, further research with a larger sample may be

needed to reconfirm the state of purchasing in SMEs. In addition, the results of the analysis of variance and the multiple comparison method should be used with caution due to the low sample size of the two categories.

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