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The Analysis of Purchasing Consortium for Small and Medium Enterprises

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Graphical abstract
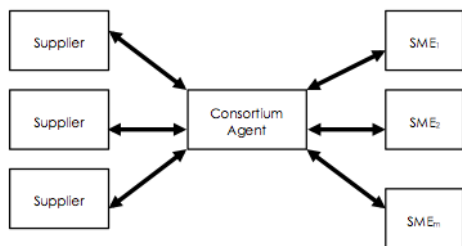
Abstract

Lack of the buying power of small and medium enterprises (SMEs) in purchasing their raw material could hinder their competitiveness. The low buying power generally caused by the fact that SMEs purchase their raw material in small lot. Purchasing consortium offers SMEs to increase their buying power and obtain better pricing through the collective buying mechanism amongst SMEs. This paper proposes purchasing consortium mechanism using joint replenishment and vendor managed inventory. The analysis shows that SMEs gain potential cost savings in sourcing their raw material through the proposed mechanism.

Keywords: Purcashing management, purchasing consortium, small and medium entreprises

1.0 INTRODUCTION

Purchasing management has a significant impact on firm's financial performance and thus firm's competitiveness. Purchasing activities represent the single largest spending (50%-80% of revenue) in all manufacturing firms [1, 2]. Purchasing or supply management has become one of the critical components in supply chain management that can significantly affect companies' performance and profitability. Because of this significant role, purchasing or supply management has been attracting both academics and practitioners to gain more understanding in improving the effectiveness and efficiency of this function.

SMEs have a significant contribution to Indonesia's national economy as they contribute about 55% to Gross Domestic Product of Indonesia, and 95% of total employment. Similar economic impacts of SMEs are also found in other countries [1]. Therefore, improving competitiveness of SMEs will obviously result it a great impact to national economy. Despite their important to the nations' economies, research in the area of purchasing and supply management mainly focus on large companies, little attention has been paid to purchasing practices in SMEs [1, 3]. It is believed that SMEs could benefit from effective and efficient purchasing [2].

SMEs face several problems in dealing with their supplier relationship. First, they have less purchasing power that make them unable to control their suppliers. Second, lack of internal resources including skilled managers cause them unable to search for better suppliers, purchasing solution and searching on global basis [1]. These problems could hinders their effort in achieving effective and efficient purchasing management to maintain their competitiveness.

Purchasing consortium has been considered as one of the solution for SMEs to improve their purchasing practices, particularly in purchasing power. Purchasing consortium is defined as horizontal cooperation between competing buyers that combine their

purchases in order to achieve various benefits [4]. Some of the advantages of purchasing consortium are lower purchasing prices, higher quality, lower transaction costs, and mutual learning opportunity.

Previous research on purchasing consortium has been focusing on the organization aspects of the consortium (for example [5]). Little attention has been paid to the decision making in the operational aspect of this concept. This paper will analyze how purchasing consortium can be beneficial for SMEs. In particular, this paper will analyze whether purchasing consortium actually provide benefits for SMEs. This paper will also
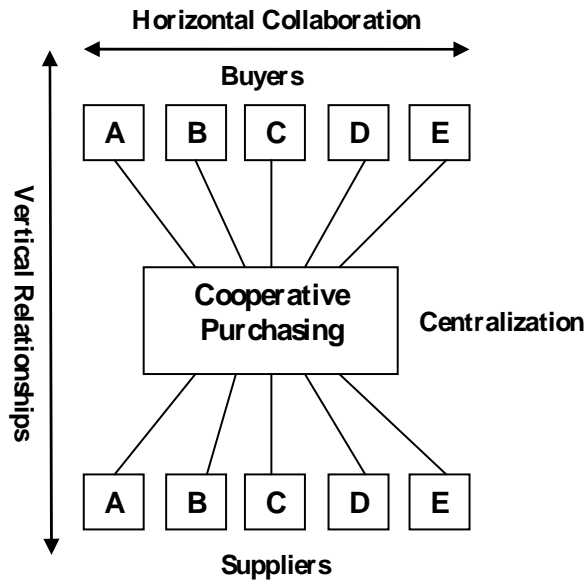
evaluate the mechanism of joint replenishment for purchasing decision. For the purpose of analysis, data from SMEs in footwear industry were used. The method of common replenishment epochs (CRE) proposed by [6] will be used throughout the analysis. The rest of this paper is structured as follows. The following section discusses the literature review on purchasing and purchasing consortium. The methodology is then presented, followed by the analysis and discussions of the case study. Conclusion and future research direction will be outlined at the end of this paper.
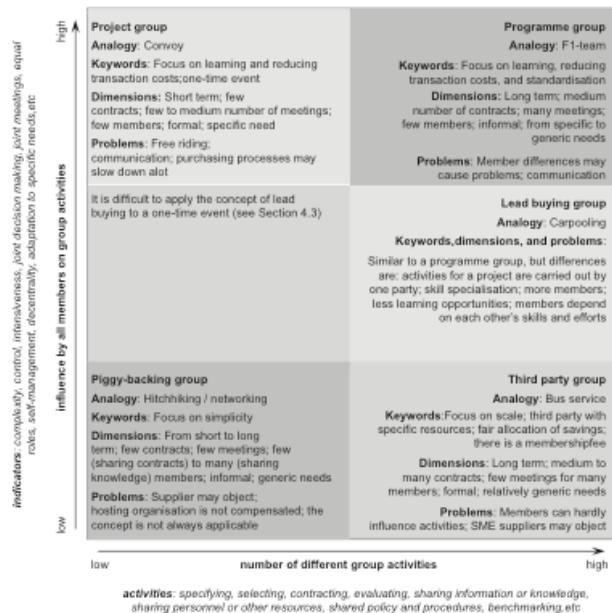

Figure 1 Cooperative Purchasing (Tella & Virolainen, 2005)

Figure 2 Form of Purchasing Consortium (Schotanus & Telgen, 2007)

2.0 LITERATURE REVIEW

Purchasing is regarded as one of the critical activities in supply chain management. Purchasing activities represent the largest spending, ranging from 50%-80% in manufacturing companies [1]. Research also showed that purchasing activities have a significant impact to companies' financial performance. Therefore, it is believed that achieving effective and efficient purchasing management could lead companies to their competitive advantage.

Increased competition in today's market has led companies to find a new source of competitiveness. Collaboration and cooperation amongst independent companies has been seen as a new source for competitive advantage [7]. Independent companies are working together, orchestrating their business process to achiev mutual benefits [8]. Inter-enterprise collaboration is not only vertical collaboration between buyer and supplier but can also be horizontal collaboration where independent companies, event those that are potentially

competitors, working together on particular business function such as purchasing [9] (Keskinocak & Savasaneril, 2008). Horizontal purchasing collabration (or purchasing consortium) has been implemented in many industries. Examples include Covisint in automotive industry and many group of purchasing in health care industry.

In the literature, the terms collaborative procurement, cooperative purchasing, group purchasing, and consortium purchasing are used interchangeably [4, 5, 9]. The term purchasing consortium will be used throughout this paper. Schotanus and Telgen [10] define purchasing consortium as "the cooperation between two or more organizations in a purchasing group in one or more steps of the purchasing process by sharing and/or bundling their purchasing volumes, information, and/or resources". Tella and Virolained [4] depict this purchasing consortium as can be seen at Figure 1. Schotanus and Telgen [10] identify different forms of arrangement that can be applied in purchasing consortium (see Figure 2).

The advantages of purchasing consortium are lower purchasing prices, higher quality, lower transaction costs, reduced workloads, reduced (supply) risks, and learning from each other [4, 10, 11]. Research reported that the nature of relationship in purchasing consortium fits well with the characteristics of SMEs and could provide a new way for SMEs to increase their competitiveness [11, 12].

3.0 METHODOLOGY

3.1 Case Study and Data Collection

As stated in the previous section, the case study comprising ten SMEs in footwear industry was used in this study. The products under study were the raw material for sole of shoes. There are two types of sole materials namely: PVC and TPR.

Data were collected using observation of companies' documents and interviews with the managers as well as the owner of the companies. The collected data were: demand, inventory holding cost, ordering cost, product prices, and lead time. In addition to the SMEs' companies, those data were also gathered from the suppliers.

3.2 The Proposed Purchasing Consortium System

Literature suggests that there are several form of purchasing consortium based on the way the purchasing activities managed [10]. This research will apply the "Third Party Group" form of organization in which buyers (SMEs) form a non-profit organization (as an agent) to act on their behalf to deal with their purchasing activities.
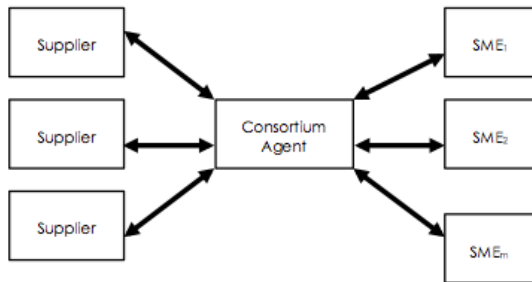

Figure 3. Consortium agent acs on behalf of SMEs in their relationship with suppliers

The proposed system will work in the following way: the agent will act as on behalf of the buyers to negotiate, contract, and determine the order quantity as well as the replenishment time (see Figure 3). The agent will then work following vendor managed inventory (VMI) in which, all the inventory requirement of SMEs will be managed by the purchasing agent. The agent will determine the same replenishment time for all buyers. This replenishment time may cause problems to some buyers. Therefore, following CRE, this system will introduce price discount

to all buyers to encourage buyers to get involved in the system.

4.0 NUMERICAL ANALYSIS OF CASE STUDY

In this section, the numerical analysis from case study will be discussed. The demand from ten SMEs are given in the table 1 below. Some SMEs only use one type of sole either PVC or TPR.

Table 1 Average annual demand of each SME

SME	Average Annual Demand	Proportion of Sole type PPV : TPR	PVC	TPR	Std. Deviation
1	1980	80 : 20	1584	396	4.78
2	995	0	995	0	1.78
3	1190	0	0	1190	1.01
4	655	0	655	0	2.25
5	960	70 : 30	672	288	0
6	625	0	625	0	2.47
7	930	75 : 25	698	232	1.67
8	865	0	865	0	2.47
9	1670	80 : 20	1336	334	1.01
10	1185	0	1185	0	2.4

The unit prices (*UC*) for PVC and TPR are Rp. 240.000 and Rp. 125.000 respectively. Before implementation of purchasing consortium, the buyers' costs are formulated as:

$$g_i^u = UC * D + \sqrt{2 m_i K_i h_i} + h_i z_i S_i \sqrt{LT_i} \tag{1}$$

The ordering cost for each SMEs is assumed to be the same which Rp. 10.000. The holding cost is 10% of product prices and $z = 0.32$, and *lead time* = 0.017. Using those data, the buyers cost before the implementation of purchasing consortium are depicted in the following table:

Table 2 Buyers costs before purchasing consortium

SME.	Buyer cost for PVC (Rupiah)	Buyers cost for TPR (Rupiah)	Total Buyer cost (Rupiah)
1	198,446,206.10	95,350,655.23	293,796,861.33
2	124,728,127.99	-	124,728,127.99
3	-	286,134,916.27	286,134,916.27
4	82,161,719.03	-	82,161,719.03
5	84,289,827.53	69,382,906.83	153,672,734.36
6	78,405,146.25	-	78,405,146.25
7	87,545,812.30	55,916,793.99	143,462,606.29
8	108,454,461.41	-	108,454,461.41
9	169,365,530.32	80,985,946.03	247,852,543.23
10	150,233,640.08	-	148,510,489.79
TOTAL Buyers Cost			1,667,179,605.94

Suppliers cost occurs because each buyers order their own purchase. The suppliers cost is calculated as follows:

$$g_0^u = \sum_{i=1}^{m} \left[(A_s + A_i) \sqrt{\frac{h_i \mu_i}{2K_i}} \right] \qquad (2)$$

where A_s is the setup cost incurred by the vendor for processing the entire set of orders/deliveries and A_i is the setup cost incurred by vendor for processing a specific order from buyer i.

The observation from the case shows that A_s is Rp. 450.000 and Ai is Rp. 300.000. From equation (2), the total cost of the vendor without purchasing consortium is Rp. 151,712,449.79

Under purchasing consortium, the buyer cost is formulated as follows:

$$g_i^C = (UC * D) + \frac{K_i}{n_i T_0} + \frac{1}{2} n_i T_0 \mu_i h_i + h_i z_i \sigma_i \sqrt{LT_i - l_0 + n_i T_0} - \mu_i Z \qquad (3)$$

It was found that the total buyers cost under buying consortium is Rp. 1,255,264,000. While the total cost of vendor under buying consortium is Rp. 46,525,398.71. Table 3 shows the cost comparison between non-purchasing consortium and purchasing consortium. The table shows that under purchasing consortium, the buyers (SME) gain 24.71% of saving while vendor gains about 69.33% of saving.

Table 3 Cost comparison

	Buyers Cost	Vendor Costs
Non Purchasing Consortium (Rp)	1,667,179,605	151,712,449
Non Purchasing Consortium (Rp)	1,255,263,859	46,525,398
Saving (Rp)	411,915,746	105,187,051
% Saving	24.71%	69.33%

5.0 CONCLUSION

The analysis shows that purchasing consortium through common replenishment epochs provides significant cost saving to the member. Using common replenishment epoch, buyers gain about 24% cost saving. In addition, the vendor also gain cost saving about 69%. This is due to better supply coordination through common replenishment epochs.

In order to achieve full implementation of purchasing consortium, good and reliable information system that connects all parties involved is necessary. However, one should consider that SMEs have lack of information technology capabilities. Therefore, the development of robust but yet simple information system, such as using mobile application based on SMS (short message service), could be one of the topics for further research.

In term of organizational aspect, the potential further research topic could be designing the best form of organization that would act as an entity managing purchasing for all SMEs.

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