

SUSTAINABLE PURCHASING STRATEGY IN ELECTRIC POWER GENERATION SECTOR

Nittha Watthanasiripakdee, Walailak University
Thankamon Nueangyao, Walailak University

ABSTRACT

Sustainable procurement is a method of incorporating environmental and social considerations into the procurement process at all stages to minimize negative impacts on environment and human rights. Despite the fact that much has been done in this area, further study is needed to see how sustainable development ideas may be integrated into procurement strategies. The purpose of this study is to assess the components that should be addressed for the application of the sustainability concept in service contracting using a purchasing strategy framework that takes a buyer-supplier relationship and a sustainability perspective into account. The results show that the studied companies' internal movement category matches the criteria of Strategic Commodity, indicating that the products in this category are a risk to strategic supply since they need the buyer to establish a positive connection with the suppliers. To aid in the capture of all elements of a sustainable buying strategy in procurement operations, a systematic approach should be explored.

Keywords: Purchasing Strategy, Purchasing Portfolio Model, Sustainable Procurement, Supply Chain Management, Operations Management

INTRODUCTION

Today, business operations are not limited only to the economic aspect, they also have a significant effect on the environmental and social impacts (Thongrawd, Bootpo, Thipha & Jermstittiparsert, 2019; Junaedi & Jermstittiparsert, 2020). The concept of sustainable development, also called the Triple Bottom Line of Sustainability (TBL), consists of three main dimensions: environmental, economic and social (Klassen & Vereecke, 2012; Schulz & Flanigan, 2016). Companies before seen only the profit of their shareholders, have now taken social and ethic as well as environmental responsibility into their accounts so that they can continue existing in their markets (Mello et al., 2017). A true sustainable development in terms of its strategy formulation and implementation needs to extend along the company's supply chain (Tate et al., 2010; Meehan & Bryde, 2011). Procurement is one of the key areas in implementing the concept of sustainable development in an organisation. It is considered to be the very first stage of supply chain flows. In respect of suppliers, companies that aim to be sustainable must therefore involve their suppliers and establish environmental and social key performance standards (Belotti Pedroso et al., 2021). Hence, the company can achieve a balance between the three pillars: economic growth, environmental protection, and social equality.

To optimise the strategic importance of procurement function, the proper supply decisions should be in line with the characteristics of items and different suppliers cannot be dealt with using the same approach. Hence, the designing strategies for allowing procurement management to deal with various categories and differentiating supplier relationships is known as a purchasing portfolio model (Lilliecreutz & Ydreskog, 1999; Gelderman & Mac Donald, 2008; Drake et al., 2013). The purchasing models are systematic tools that enable the evaluation of the strategic importance of the procurement function. From the purchasing perspective, the models provide differentiated strategic

actions regarding dissimilar categories of products or types of supplier market for the company to gain in supply management (Gelderman & Van Weele, 2002).

Consequently, to develop sustainability, the implementation of the TBL concept within the procurement process is critical specifically in strategic purchasing. Despite the importance of this study area (Meehan & Bryde, 2011; Pagell et al., 2010), very few studies on the topic of strategic sustainable procurement in the power plant industry. Particularly in Thailand where there were few studies conducted a holistic approach to supplier evaluation (Laosirihongthong et al., 2019). More studies should be established on how sustainable development can be applied to procurement strategies (Meehan & Bryde, 2011). This study aims to see how the procurement function can strategically enhance the value of the buyer-supplier relationship while lowering costs and keeping environmental and social justice into account. The researchers evaluate the applicability of Pagell, et al., (2010)'s sustainable portfolio model inter-related with Kraljic's (1983), original purchasing portfolio model, and Olsen & Ellram's (1997) – an approach to supplier relationships. As a result, the study's major contribution is the implementation of a sustainable buying strategy framework in a real-world business.

This paper is structured as follows. The next section provides a review of literature and a research methodology is explained in section three. Then the findings are presented in section four. Finally, the study's implication is discussed and concluded in section five.

LITERATURE REVIEW AND DEVELOPMENT OF SUSTAINABLE PURCHASING STRATEGY FRAMEWORK

In supply chain management, making effective decisions within a timely manner cannot be done without a strong decision support system (Brunaud & Grossmann, 2017). Generally, the supply chain decisions are structured hierarchically and divided into three levels: strategic, tactical, and operational levels. The strategic level includes long-term planning decisions that affect the operation of the entire business. At the tactical level, the organisation plans mid-term decisions to achieve as outlined in the strategic plan and operational level includes short-term decisions relating to the execution of day-to-day operations.

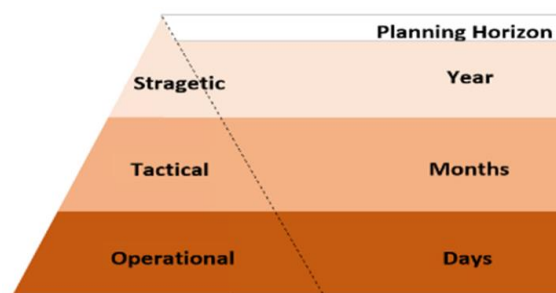


FIGURE 1
SUPPLY CHAIN DECISION HIERARCHICAL LEVEL, ADAPTED FROM BRUNAUD AND GROSSMANN (2017)

Procurement is one of vital activities in supply chain operations. With a well-planned procurement process, it will help to streamline processes and reduce the business's bottom line. Procurement plays a critical part in attaining the company's strategic objectives, as it influences delivery times, operating costs and product/service quality - resulting in a better cost composition and less waste across the supply chain. Regardless of the size or type of the company, the strategic

significance of procurement operations has become apparent in companies in an increasingly dynamic environment (Carter & Narasimhan, 1996; Weele, 2010).

Sustainable Procurement

Sustainable practices have been integrated within supply chain management practices as a part of corporate operations mainly due to the increasing pressures from external sources. The idea of sustainability has to be thoroughly examined by many researchers with various methods (Carter & Rogers, 2008; McWilliams et al., 2014; Paz et al., 2021). Dai, et al., (2016) indicated that sustainability performance of each and every chain link has a significant impact on a company's corporate image. Ruparathna & Hewage (2015) stated that supporting sustainable development through procurement management should address the number of faults that have been found in conventional procurement procedures. Sustainable procurement is a method of incorporating environmental and social factors into all stages of the procurement and contracting process to minimize negative effects on human health, the environment, and human rights.

Purchasing Portfolio Model

Kraljic (1983) introduced an extensive portfolio approach to determine the different purchasing strategies, which has become the most well-known portfolio purchasing model. Kraljic (1983) proposed a four-phase framework for analysing the supply strategy in 2 x 2 matrix providing four of portfolio quadrants as non-critical, leverage, bottleneck, and strategic purchases presented in Figure 2.



FIGURE 2
THE KRALJIC MATRIX, ADAPTED FROM KRALJIC (1983)

The strength of the Kraljic Matrix is simplicity as it provides a strong communication tool to set up a clear purchasing strategy facilitates easy mapping to the organisations' current situation and gives the pricing negotiation power to practitioners. Many authors have extended Kraljic's ideas to develop other portfolio models, for instance Elliott-Shircore, et al., (1985); Hadelier & Evans (1994); Olsen & Ellram (1997); Bensaou (1999); Lillecreutz & Ydreskog (1999); Gelderman & Van Weele (2000); Krause, et al., (2009). However, there are considerable critiques revolving around Kraljic's model. Many scholars (Olsen & Ellram, 1997; Bensaou, 1999; Dubois & Pedersen, 2002; Wagner & Johnson, 2004) believe that the model did not pay enough attention to the conflict of interests in a buyer-supplier relationship. Olsen & Ellram (1997) criticise Kraljic's portfolio model that it can over-simplify when identifying purchasing strategies under each category and the model

provides the independent strategies that are barely linked in long-term purchasing strategy. Van Stekelenborg & Kornelius (1994) also point out that the Kraljic's model does not take the possible strategies and reactions of suppliers into account as a strategic partnership.

Consequently, Olsen & Ellram (1997) introduced a model that built on Kraljic's in the sense of buyer-supplier relationships. Similar to Kraljic (1983); Olsen & Ellram (1997) provide four categories matrix with different suggestive purchasing strategy for each category, but they consider dynamic market conditions and recommend the analysis of the current supplier relationships associated with the purchases. The strategic recommendations are based on the relative supplier attractiveness and the strength of the relationship presented in Figure 3.

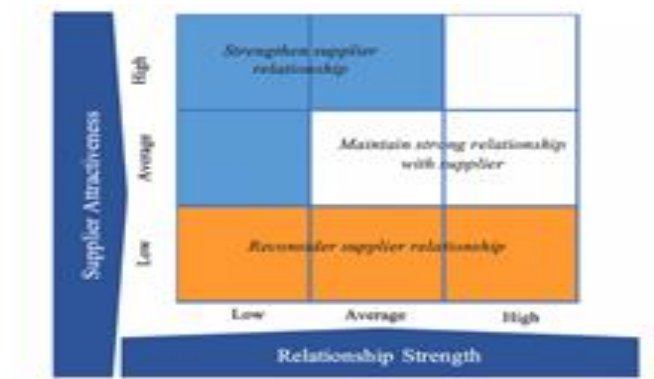


FIGURE 3
SUPPLIER RELATIONSHIP MATRIX BASED ON OLSEN & ELLRAM (1997)

Additionally, neither Kraljic's nor Olsen and Ellram's portfolio model include the idea of sustainable purchasing. Sustainable procurement, policies and practices extend beyond organisational boundaries and incorporate the whole supply chain (Meehan & Bryde, 2011). TBL has become a key to sustainable decision making. To develop sustainable procurement, suppliers should be analysed based on their impact on the 3 dimensions (Meehan & Bryde, 2011; Schulz & Flanigan, 2016). Hence, Pagell, et al., (2010) has introduced an inductive purchasing portfolio model that combines Kraljic's approach with sustainability concept to help explain and predict sustainable procurement. By incorporating sustainability concepts into enhancing the Kraljic's portfolio model, the sustainable purchasing portfolio matrix is presented below in Figure 4.



FIGURE 4
THE SUSTAINABLE PURCHASING PORTFOLIO MATRIX FROM PAGELL ET AL. (2010)

In conflict with the idea of using market-based relationships to leverage price among suppliers, supply-base continuity aims to ensure that all members stay in business and focuses on

making the whole chain thrive together, so supplier development is an essential part of sustainability approach (Pagell, et al., 2010). Pagell, et al., (2010) suggest three categories in place of the leveraged category in Karljic's model. The strategic recommendation is different for each category regarding the different level of TBL elements. Through exploring various portfolio purchasing model's literatures, there is still a lack of connection between the two perspectives and this presents an opportunity to systematically integrate them together. Similar to Formentini, et al., (2019) that integrates three dominant purchasing portfolio models to adopt multiple perspectives in managing a purchasing strategy. The proposed framework has been designed to utilise the three integrated models including Kraljic (1983); Olsen & Ellram (1997); Pagell, et al., (2010). By matching each model with hierarchical decision-making, practitioners will gain strategic perspectives on buyer-supplier relationships and sustainability.

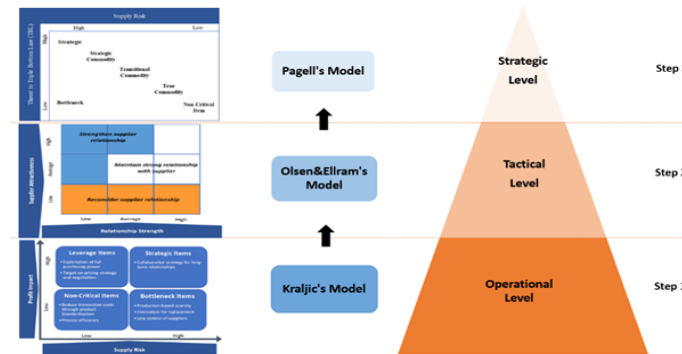


FIGURE 5
DEVELOPMENT OF SUSTAINABLE PURCHASING STRATEGY FRAMEWORK
RESEARCH METHODOLOGY

In this study, a pragmatic multi-methodology approach was used to develop a thorough knowledge of the different strands of the framework and answer the research questions. Given the necessity for practical, realistic answers to guide practice, the adoption of a pragmatic approach was warranted. The study acquired data from all relevant sources, including; (i) academic review on procurement management approaches and tools; (ii) the company's business annual report and (iii) defense literature. The data collection was carried out, which consisted of meetings, semi-structured interviews and company internal documentation. The qualitative data was gathered through the interviews with the relevant employees in different levels in procurement function. The interviews provide factual understanding of the current process operations. The data analysis is a crucial stage in connecting data from academic relevance of purchasing portfolio models from an academic point of view. The alternative purchasing portfolios have been critically evaluated against each other to find the optimal purchasing models, and then develop an integrated framework for strategic planning in relation to purchasing decisions.

The results from the data analysis and the interview are used to highlight directions for improvement. This is mainly achieved by identifying the potential gaps that cannot be dealt with in the current model. This phase consists of proposing alternative models to improve the current procurement process, focusing on supplier relationship and sustainable procurement. Therefore, the purchasing strategies are possible to identify according to the relationship types for each product category. Finally, the framework for driving successful results from implementing category management has been established based on all possible improvements.

CASE STUDY AND FINDINGS

This study considers the largest electric power generation companies in the south region of Thailand. This industry is selected because it seems to create a significant impact in TBL. The key variables in choosing suppliers are: price, quality, operational safety, number of feedbacks from former and current users to suppliers, and their environmental policy.

Application of Kraljic's Model (1983)

To assess the supplier market's complexity and their financial impacts on the category. The Narasimhan (1983) approach is used to weight elements that define a single dimension; rather than evaluating all of the factors and criteria at the same time, the method recommends that they are evaluated separately according to the hierarchical level. In respect to the total score, the scale given in Table 1 was utilised for placement in the Kraljic matrix. The importance scores (risk) are from 1 to 9 and this scale was developed in collaboration with the focus group. Therefore, half of the importance score (4.50) was selected as the quadrant's switching point as shown in Table 2.

Score	Definition
9	Very High Importance
7	High Importance
5	Moderate Importance
3	Low Importance
1	Very Low Importance

		Supply Risk Dimension	
		< 4.5	>=4.5
Financial Impact Dimension	< 4.5	Noncritical	Bottleneck
	>=4.5	Leverage	Strategic

The results in Table 3 show that the supply risk is high (6.51) meaning that the product of the power plant industry is classified in either bottleneck or strategic item.

Supply Risk Dimension	Importance	Weight	Total Score
Complexity of the product/service	7	38%	2.66
Product/service scarcity in the market	7	23%	1.62
Product/service cost changes	6	15%	0.92
Supplier's financial dependence	6	14%	0.83
Supplier Substitution	6	5%	0.3
Competitive Demand	4	5%	0.19
Total:			6.51

For the evaluation of the financial impact, the same analysis as supply risk was performed using the Narasimhan method (1983). The result is shown in Table 4. In terms of the financial impact axis, the level of importance (risk) is also considered high (6.01). As a result of both factors with high scores, products of the power plant industry fall into the strategic category.

Financial Impact Dimension	Importance	Weight	Total Score
Volume and value of purchases	6	54%	3.24
Added value in the supply chain	5	24%	1.21
Impact on product/service quality	8	16%	1.24
Impact on business growth	5	6%	0.31
Total:			6.01

Application of Olsen and Ellram's Model (1997)

To evaluate the relationship between suppliers and buyers, it is necessary to consider supplier attractiveness and supplier-buyer's relationship strength. The same Narasimhan (1983) approach for positioning the buyer and supplier's relationship was applied and rated by the focus group of the case study. Table 5 shows the results of the Narasimhan (1983) weighting method for supplier attractiveness dimension. Based on the scale set in table 2, it can be concluded that the importance scale is relatively high with total score=5.68. (Table 5)

Supplier Attractiveness Dimension	Importance	Weight	Total Score
Suppliers' financial and economic status	4	40%	1.61
Operational performance	8	29%	2.3
Technology and innovation development	6	15%	0.88
Compatible strategy between buyer and supplier	5	13%	0.64
Sustainable aspect concern	7	4%	0.26
Total:			5.68

The results of the relationship strength dimension after weighting with the Narasimhan method was shown in table 6. The score of importance (risk) is also considered high (5.97). As a result, products of the power plant industry fall into maintaining strong relationships with suppliers (the white area) as shown in Figure 3.

Relationship Strength Dimension	Importance	Weight	Total Score
Volume and value of purchases	7	46%	3.23
Exchange relationship characteristics	5	29%	1.47
Cooperation between buyer and supplier	6	15%	0.88

Distance between buyer-supplier such as time, geography, culture	4	10%	0.39
Total:			5.97

Application of Pagell, et al., (2010) Model

In the assessment of sustainability, first is to evaluate with TBL, then the supply complexity is assessed. The importance score results for the supply risk axis can be referred from Table 3. While the leverage quadrant as proposed by Pagell, et al., (2010) was replaced with three additional categories. A questionnaire was applied for the proper placement of the contracts selected to be used as samples of the internal movement category. Table 7 presents the consolidated results of the Narasimhan (1983) weighting Method. Table 1 is likewise being rated by the degree of risk rather than the degree of importance. As a result, the risk is deemed high for each aspect including environmental (5.44); social (6.59); and economic (6.31). The analysis shows that the product of the electric power generation industry falls in Strategic Commodity (Table 7)

TBL Dimension	TBL of Sustainability Factor	Importance	Weight	Total Score
Environmental Impact	Usage of non-renewable resource	5.0	64%	3.19
	Product/service environmental footprint	6.0	28%	1.69
	Supplies' environmental concern policy	7.0	8%	0.57
Total				5.44
Social Impact	Development of local community	6.0	41%	2.47
	Employees' health and safety concern policy	7.0	26%	1.83
	Child/migrant labour issue	7.0	33%	2.29
Total				6.59
Profit Impact	Volume and value of purchases	6.0	45%	2.71
	Added value in the supply chain	6.0	26%	1.57
	Impact on product/service quality	8.0	20%	1.59
	Impact on business growth	5.0	9%	0.44
Total				6.31
Grand Total:				6.11

Results of the study provided the important findings for the literature as well as practices. According to the results, it can be explained by the specific character of internal movement activity in the electric power generation sector especially in Thailand. The products are considered in Strategic Category as they significantly raise risks of supply complexity (supply risk=6.51) and high financial impact (6.01). It is mainly due to the limited number of suppliers from the scarcity of the item that leads to high cost. Hence, the most suitable purchasing strategy is to develop collaborative plans with suppliers. The strategic partners collaborate together toward product and process innovation, in return for long-term commitment with proactive development. For buyer and suppliers' relationship, the results show a moderate to high score of importance in response to relationship strength (5.97) and supplier's attractiveness (5.68). The products fall in the area where purchasing strategy suggests maintaining the strong relationships with suppliers by managing resource allocation within different activities to maintain the relationship strength. In sustainability context, the results pose a significant risk across the TBL (6.11) and high supply risk (6.51) which is considered to be in the strategic commodity category. It also focuses on the relationship with

suppliers due to high supply risk. Considering environmental and social aspects, there is the need to invest in developing relationships with suppliers as their awareness of sustainability grows.

Therefore, regarding the results of the case study, the supplier's relationship must be in armed-length, with the latter developing and closely analysing their financial data, the dependability, what level of sustainable development they concern, how they are perceived in society, and how they reduce the environmental impact from their services provided. All in all, the relationship cannot be built overnight thus long-term contracts are required.

DISCUSSION AND CONCLUSION

This study distinguishes the purchasing portfolio models and develops a systematic sourcing strategy framework. This study contributes to theory and implication by incorporating all key factors of sustainable purchasing strategy. An initially possible action suggested in this paper is to create a systematic framework that links with the three levels of supply chain management decision making. It aims to strategically improve the value of the buyer-supplier relationship, while reducing costs and ensuring environmental and social justice which were lacking in previous discussions. At an operational level, Kraljic's model is used for category identification and segmentation. It provides a strong communication tool to set up a clear purchasing strategy, and facilitates easy mapping to the organisation's current situation. The supplier relationship perspective is at a tactical level using Olsen and Ellram's model. The strategic plans are suggested based on different types of relationships. It helps develop mutual awareness between buyer and supplier and find effective ways of communication. Sustainability becomes three pillars (TBL) of the business profit. However, it has never been easy to take all three aspects into operations. It requires support from the top management to promote sustainable procurement into business strategic planning level (Lee & Joo, 2020). For future development and research possibilities, we believe that the framework may be used in different organisations to include other contextual factors for instance emerging technology in the supply chain and uncertainty such as Covid-19 pandemic. It may also be interesting to combine it with a more sophisticated model to improve supplier's satisfaction with an increase of the relationship strength while retaining the TBL in procurement.

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