



NORTH-HOLLAND

A Portfolio Approach to Supplier Relationships

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The use of portfolio models in marketing and purchasing has been limited. In this study, a three-step portfolio model to assist in managing different kinds of supplier relationships is developed. The critique of portfolio models used in strategic planning is discussed in relation to the proposed model, and suggestions for future research are provided. © Elsevier Science Inc., 1997

INTRODUCTION

The literature on buyer-supplier relationships tends to focus on a single relationship or a single type of relationship, ignoring or downplaying the important interdependencies between relationships and the important task of allocating scarce resources between relationships [1]. Thus, there appears to be a need for the development of models to assist in the management of the company's entire portfolio of supplier relationships. Portfolio models have received a great deal of attention in strategic planning [2]. Porter [3] suggested the use of portfolio models

to analyze competitors, customers, and suppliers, but the use of portfolio models in marketing and purchasing has been very limited [4]. A number of authors have also suggested the possibility of using portfolio models to analyze the company's supplier relationships [5–7].

The purpose of this article is to describe the use of portfolio models in understanding supplier relationships and to develop a normative portfolio model to assist in managing different kinds of supplier relationships. The article describes the use of portfolio models in strategic planning, especially the Boston Consulting Group growth/share matrix, and the use of portfolio models in marketing and purchasing. Based on the literature review and the critique of portfolio models, a portfolio model for managing supplier relationships is proposed, and a set of propositions regarding the managing of supplier relationships is developed. Finally, suggestions for future research are discussed.

LITERATURE REVIEW ON PORTFOLIO MODELS

Portfolio models have primarily been used in strategic decision-making to support resource allocation decisions

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Portfolio models have been most widely used in strategic planning.

among strategic business units. Perhaps the most used, misused, and discussed portfolio model is the Boston Consulting Group's (BCG) growth/share matrix. The model is widely used, even though it has received considerable critique [2, 8–12]. Some of the arguments in favor of and against the use of the BCG matrix are directed toward the portfolio methodology in general and are presented below.

General Use of Portfolio Models

The primary objective of this section is to describe some important considerations when developing a portfolio model. It is important to consider the complexity of the dimensions used to categorize the elements in the portfolio. If the dimensions are very complex, a company can focus so heavily on developing measures and categorizing the elements that they do not realize the full potential of the portfolio model approach in terms of improved resource allocation and communication [13]. On the other hand, if the dimensions are too simple, important variables can be overlooked. Portfolio models need to incorporate all important variables [14].

Portfolio models can have a tendency to result in strategies that are independent of each other [15]. In general, portfolio models concentrate on categorizing a product, a customer, or a supplier relationship. They do not depict the interdependencies between two or more items. Portfolio models have also been criticized because they do not provide guidance on how to choose among the resulting strategies. Using a portfolio model will often suggest a number of possible action plans, from which the com-

pany must choose due to limited resources. The BCG matrix has been criticized because it only provides a categorization of the products in four different groups. It does not provide more specific guidance on how to manage the products *within* the same group [16].

In summary, the research indicates that portfolio models, and especially the BCG model, should be used with an understanding of their limitations and perhaps in combination with other tools. It is important to focus on the concept that a company is an interdependent group of products and services, each playing a distinctive and supportive role [8].

Portfolio Models in Marketing and Purchasing

As described by Capon, Farley, and Hulbert [4] the use of portfolio models in marketing and purchasing has been limited. Marketing and purchasing are essentially mirror images [1], and the models suggested in marketing can, therefore, provide the basis for development of models in purchasing. A number of models have been suggested in the literature. Table 1 provides a summary of a number of articles describing the use of portfolio models in marketing and purchasing.

The models developed by Fiocca [17] and Kraljic [21] are used in this study as a point of departure in the development of a portfolio model to manage supplier relationships. Fiocca [17] suggests a portfolio approach to manage customer accounts. Accounts should be classified based on the strategic importance and the difficulty of managing the account. Based on this classification, the key accounts, i.e., the accounts with high strategic importance, should be analyzed further in a second portfolio, using the dimensions of customer attractiveness and strength of the buyer-supplier relationship. The model suggested by Fiocca is used in a slightly modified form in a case study reported by Yorke and Droussiotis [22].

Kraljic [21] develops a product portfolio model to be used in purchasing as a basis for classifying purchases and setting purchasing strategy. In his model, the products are divided in four groups based on the importance

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TABLE 1
Summary of Articles Describing the Use of Portfolio Models in Marketing and Purchasing

Author(s)	Approach	Conclusions/Contributions
Fiocca, 1982 [17]	Conceptual (marketing)	Develops a portfolio model of customer accounts.
Campbell and Cunningham, 1983 [18]	Conceptual (marketing)	Emphasizes the importance of analyzing both the present customers and the potential customers (tomorrow's customers).
Dubinsky and Ingram, 1984 [19]	Conceptual (marketing)	Argues that companies have to analyze the present and future profit contribution of customers in order to create a balanced mix of customers.
Ansoff and Leontiadis, 1976 [20]	Conceptual (strategic planning and purchasing)	Describes strategic business units (SBUs) and strategic resource areas and the interdependencies between them. The strategic planning for the SBUs should include a strategic planning for the corresponding resources.
Kraljic, 1983 [21]	Conceptual (purchasing)	Develops a portfolio model for products and suggests ways of managing the different buyer-supplier relationships based on the buying power in the relationship.
Turnbull, 1990 [5]	Conceptual (marketing and purchasing)	Suggests a number of areas where portfolio models can be used and argues that portfolio models are a useful tool in purchasing. The author concludes that the use of portfolio models for the management of purchasing functions is a neglected area.

of purchasing and the complexity of the supply market. The model suggested by Kraljic is operationalized by Syson [23].

Summary of the Literature

In summary, it can be concluded that portfolio models have been most widely used in strategic planning. Although the use of portfolio models in strategic planning has been criticized, portfolio models can be a useful tool. As Turnbull concludes:

From the varied natures of the portfolio models reviewed, it is clear that the portfolio concept has a wide scope of application. The flexibility of the portfolio concept for use in the different levels of management and with different levels of sophistication further illustrates its usefulness as a powerful management tool [5, p. 20].

This study suggests that portfolio models can be used as an analytical tool to organize information and create a classification framework of the items included in the portfolio. In purchasing management, portfolio models could be used to improve the allocation of scarce resources by being one method of identifying which groups of products, suppliers, or relationships warrant greater attention than others.

It is important to emphasize that the process of categorizing the items is perhaps even more important than the classification itself. This is because during the process of categorization, the decision-makers will have to discuss inconsistencies among themselves and agree on the im-

portance of the different products, suppliers, or relationships that are being classified in the portfolio model.

PORTFOLIO MODEL OF SUPPLIER RELATIONSHIPS

Based on the literature review and the critique of portfolio models in general, a multi-step approach to analyze a company's supplier relationships is recommended.

The first step in the portfolio analysis is to take a normative approach and analyze the company's purchases to ascertain the ideal relationship types for major purchases. The next step is to analyze the company's current supplier relationships to determine the way the supply task is managed in the company (descriptive). Finally, the third step is to develop action plans describing how to adapt existing supplier relationships, by comparing the ideal situation (step 1) to the actual supplier relationship (step 2).

Step 1: Analysis of the Company's Purchases

Building on the approaches developed by Fiocca [17] and Kraljic [21], a portfolio model with the strategic importance of the purchase and the difficulty in managing the purchase situation as the key classification dimensions is suggested.

The strategic importance of the purchase describes factors internal to the firm and could include any or all of the factors in Table 2. The list in Table 2 is not comprehensive and will vary among firms.

Decision-makers in the company must come to agreement on the relative importance of each factor.

The competence factors describe the extent to which the item purchased is a part of the company's core competencies. Core competencies include technical advantages, know-how advantages, and specialized investments [24]. The closer an issue to the core competencies of the firm, the greater the strategic importance of the item purchased. An evaluation of the competence factors also includes whether the purchase can improve the knowledge or the technological strength of the buying firm.

The economic factors describe the economic importance of the purchase in terms of the dollar value and the impact on the company's profits. To capture the interdependencies between purchases, the economic factors should also include an evaluation of the extent to which the items purchased are critical to get leverage with the supplier for other buys. The image factors describe the importance of the purchase to the company's image among customers and suppliers.

The difficulty of managing the purchase situation describes factors external to the company, which make the purchase require extra attention and effort to manage and monitor. Table 3 illustrates a number of possible factors.

TABLE 2
Factors Influencing the Strategic Importance of the Purchase

Competence factors

1. The extent to which the purchase is part of the firm's core competencies
2. Purchase improves knowledge of buying organization
3. Purchase improved technological strength of buying organization

Economic factors

1. Volume or dollar value of purchases
2. The extent to which the purchase is part of a final product with a great value added
3. The extent to which the purchase is part of a final product with a good profitability
4. Criticality of the purchase to get leverage with the supplier for other buys

Image factors

1. Supplier critical image/brand name
 2. Potential environmental/safety concerns
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This list is not comprehensive, and the factors may vary with each firm.

The product characteristics include the novelty and the complexity of the product/service to be purchased. If the item to be purchased is new or particularly complex, the company may have to pay greater attention to the supplier relationship. Homse [25] describes product complexity as related to the number of parts and subassemblies (functional complexity), difficulties in producing the product (manufacturing complexity), the need of an extensive trial period (specification complexity), the requirement of extensive training before the buyer knows how to use the product (application complexity), transactions involving complicated commercial arrangements (commercial complexity), or political considerations (political complexity).

The supply market characteristics describe characteristics of the supply market that could warrant greater attention. These characteristics include the supplier's power due to factors such as company size [26], the number of suppliers, resource dependence [27], or the criticality of the item due to lack of substitutability [6]; and the supplier's technical and commercial competence.

The environmental characteristics include an overall assessment of the risk and uncertainty associated with the

TABLE 3
Factors Describing the Difficulty of Managing the Purchase Situation

Product characteristics

1. Novelty
2. Complexity

Supply market characteristics

1. Suppliers' power
2. Suppliers' technical and commercial competence

Environmental characteristics

1. Risk
 2. Uncertainty
-

purchase situation. Ring and Van de Ven [28] describe two types of risk. The commercial risk includes the probability of finding price-performance niches in the market, and the technological risk describes the probability of bringing technology to the market. An assessment of the risk also includes an evaluation of the effect of opportunistic behavior in the supply market. Ring and Van de Ven [28] argue that the risk in general is dependent on the time, information, and control available. The perceived risk is also dependent on the level of uncertainty. Uncertainty can arise in terms of the range of solutions offered by the market (market uncertainty) and the technical content of the solutions offered (technical uncertainty) [29].

To categorize the purchases in a portfolio model, the company needs to assign weights to each of the factors in Table 2 and Table 3 based on the perceived importance of the factor to the company's operations. The literature on supplier selection contains a variety of methodologies to assign weights to a number of factors [30–32]. The methodology described in Narasimhan [30] is outlined in the appendix, using the factors in Table 3.

It should be emphasized that this part of the implementation process is very subjective, and perhaps the most important part. In order to use the portfolio model, the decision-makers in the company must come to agreement on the relative importance of each factor.

Based on the evaluation, the purchases can then be depicted in the portfolio model illustrated in Figure 1. It should be emphasized that each dimension is a continuum used to describe relative measures. It is important that the company use the entire scale. The portfolio model is not very useful if all purchases are categorized as being strategically important.

Figure 1 illustrates four categories of purchases. In the next paragraphs, each category is described and normative suggestions are given on how to manage the relationships associated with the purchases.

The leverage category includes purchases that are easy to manage but strategically important to the company. When managing these purchases, it is important to identify particular value added of the purchase and leverage volume across product lines and suppliers to lower the materials costs. The goal is to create mutual respect in the supplier relationship and communicate requirements further into the future. A good, two-way relationship should be established and could be handled through system contracting. Getting a low total cost is critical, because the total dollar value of purchases in this category is high.

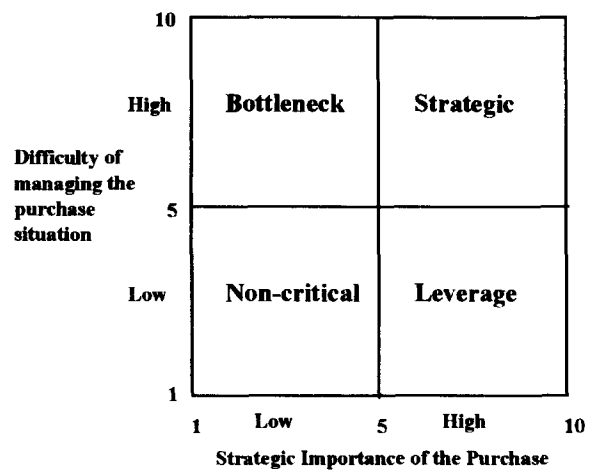


FIGURE 1. Portfolio model.

The noncritical category includes purchases that are easy to manage and with a low strategic importance. The keywords when managing these purchases are standardization and consolidation. The company should reduce the number of suppliers and the number of duplicate products/services (standardize). The supplier relationships should be managed by establishing a relationship that basically manages itself. The company could use blanket order, system contracting, and/or small purchase order charge card (SPOCC). The focus in this category is to reduce administrative costs.

The strategic category encompasses purchases that are difficult to manage and strategically important to the company. The company should manage these purchases by establishing a close relationship with the supplier, focusing on early supplier involvement and joint development of products and services, keeping a long-term value focus and lowering poor performance cost. The supplier should be viewed as a natural extension of the firm.

Finally, the bottleneck category includes the purchases that have a low strategic importance but are difficult to manage. To manage these purchases more effectively, the company should try to standardize the purchases or find substitutes if possible. The company should try to establish some sort of relationship focusing on concurrent engineering and involving the supplier in value analysis in order to lower the cost of operations.

The strategies described for managing relationships in each of the four categories are idealizations. The next step in the portfolio approach is to analyze the actual relationships. Based on an analysis of the ideal supplier relationships versus the company's actual relationships, specific action

The company has to evaluate the relative supplier attractiveness.

plans can be developed in order to improve the managing of the portfolio of supplier relationships.

Step 2: Analyze the Supplier Relationships

To analyze the supplier relationships a second portfolio model is developed. Kraljic [21] focuses on the power balance between the companies and suggests strategies based on the current power balance. If the company has the possibility of using its buying power (buyer's market), it should exploit the market [21]. This seems to be a very dangerous strategy in today's world because market conditions change rapidly. When Lopez was controlling the purchasing organization of General Motors, the company suddenly used its buying power to demand massive cost reductions from their suppliers. The strategy worked in the short run, but has led to problems for GM as the market conditions have changed [33, 34]. The approach in this study suggests that power and the risk of opportunistic behavior are only two factors influencing the appropriate strategy when managing supplier relationships. Therefore, it is recommended that the supplier relationships associated with the purchases are categorized based on the relative supplier attractiveness and the strength of the relationship between the buyer and the supplier.

The relative supplier attractiveness describes the factors that make a company choose a specific supplier. It is necessary to use a contingency approach, because the factors and especially their importance will vary from company to company. Table 4 contains some important factors that could be used to evaluate the relative supplier attractiveness. The table is built on factors adapted from Ellram [35], because some of the factors making a supplier attractive are also the factors used in a supplier selection situation. The list is not comprehensive, and firms may benefit from including other more specific factors. It is important that the company discuss which factors are important and allocate a weight to each relevant factor.

The financial and economic factors include an evaluation of the supplier's margins, financial stability, scale

and experience, and the barriers to the supplier's entry and exit. An assessment of the economic factors also includes an evaluation of the slack [6], which is a measure of the effect of the supplier's activities on the reduction of the buyer's internal economic process costs. The performance factors include a traditional evaluation of delivery, quality, price, etc. The technological factors include an assessment of the supplier's ability to cope with changes in the technology and an assessment of the current and future depth and types of the supplier's techno-

TABLE 4
Factors Influencing the Relative Supplier Attractiveness

Financial and economic factors

1. The supplier's margins
2. The supplier's financial stability
3. The supplier's scale and experience
4. Barriers to the supplier's entry and exit
5. Slack

Performance factors

1. Delivery
2. Quality
3. Price

Technological factors

1. The ability to cope with changes in technology
2. The types and depth of supplier's current and future technological capabilities
3. The supplier's current and future capacity utilization
4. The supplier's design capabilities
5. The supplier's speed in development
6. The supplier's patent protection

Organizational, cultural, and strategic factors

1. Influence on the company's network position
2. The internal and external integration of the supplier
3. The strategic fit between buyer and supplier
4. Management attitude/outlook for the future
5. Top management capability
6. Compatibility across levels and functions of buyer and supplier firm
7. General risk and uncertainty of dealing with the supplier
8. Feeling of trust in relation with the supplier

Other factors

1. Ability to cope with changes in the environment
 2. Safety record of the supplier
-

logical capabilities, the supplier's current and future capacity utilization, the supplier's design capabilities, the speed in development, and the supplier's patent protection.

The organizational, cultural, and strategic factors include an evaluation of the relationship's influence on the company's overall supply chain position. An evaluation of the possibility of opportunistic behavior and other internal and external factors is also important. Finally, the group of other factors includes an assessment of the supplier's ability to cope with general changes in the environment. These changes could include changes in legislation, supply conditions, or the level of competition. Another important factor could be the safety record of the supplier.

The strength of the relationship describes the factors that create bonds between two companies. Table 5 illustrates some factors that could be evaluated; it is not comprehensive.

The economic factors describing the strength of the relationship include the dollar value of the purchase, the importance of the buyer in terms of the percentage of the supplier's sales being purchased by the buyer, and the cost of exiting that market. In this situation, the transaction-specific investments will create exit costs, because the investments cannot be transferred to other customers/suppliers.

The character of the exchange relationship describes characteristics of the exchange situation that create stronger bonds between the companies. If the relationship apart

from exchange of the product/service includes financial or social exchange and/or exchange of knowledge, it is likely that stronger bonds will emerge. The level of personal contact, the number of other partners, and the duration of the exchange relationship also describe the strength of the relationship. The direction and uniqueness of the relationship can be referred to as the particularity of the interaction [36].

The cooperation between buyer and supplier can be described in terms of the level of cooperation in development, the technical coordination, and the integration of management between companies.

The concept of distance between the buyer and the supplier is a function of five factors [37]. The social distance describes the extent to which both the individuals and the organizations in a relationship are unfamiliar with each other's way of working. The cultural distance describes the extent to which the norms and values of the two companies differ because of their separate national characteristics. The technological distance describes the differences between the two companies' product and process technologies. The time distance describes the cycle time between order placement and the actual transfer of the product or service involved. Finally, the geographical distance describes the physical distance between the two companies' locations.

By using the methodology described in the appendix, the company can evaluate the factors described in Table 4 and Table 5 and categorize the actual supplier relationships in a portfolio model as the one depicted in Figure 2.

TABLE 5
Factors Describing the Strength of the Relationship

Economic factors

1. Volume or dollar value of purchases
2. Importance of the buyer to the supplier
3. Exit costs

Character of the exchange relationship

1. Types of exchange
2. Level and number of personal contacts
3. Number of other partners
4. Duration of the exchange relationship

Cooperation between buyer and supplier

1. Cooperation in development
2. Technical cooperation
3. Integration of management

Distance between the buyer and the supplier

1. Social distance
2. Cultural distance
3. Technological distance
4. Time distance
5. Geographic distance

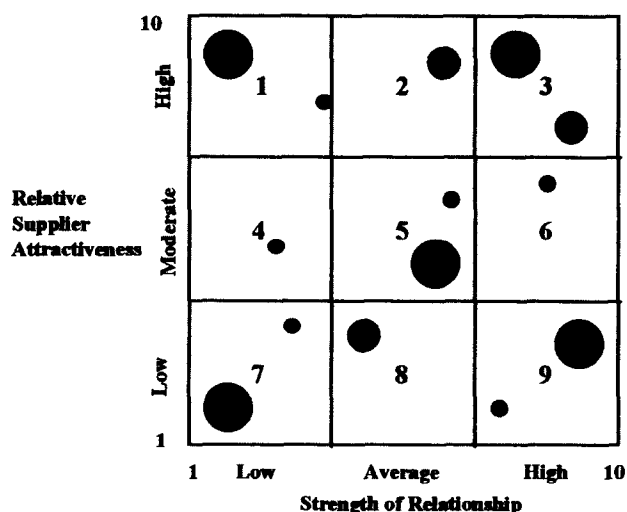


FIGURE 2. Analysis of supplier relationships.

It is very important to strengthen the relationship to keep a loyal supplier.

It is important to emphasize that the company has to evaluate the relative supplier attractiveness. The current supplier should be compared with alternative suppliers to determine the attractiveness. The strength of the relationship should also be confirmed with the supplier to secure an effective allocation of resources. The portfolio model in Figure 2 illustrates a possibility of enhancing the analysis by representing each relationship with a circle where the size of the circle illustrates the current allocation of resources to the relationship.

The next step in the portfolio approach is the development of actions plans for moving from the current to the ideal supplier relationship for purchases depicted in the portfolio in Figure 1.

Step 3: Develop Action Plans

Based on the analyses of the company's purchases, and the ideal strategy suggested (step 1), and the analysis of the actual supplier relationships (step 2), action plans can be developed by comparing these analyses (step 3). The cells in Figure 2 are described in three different groups. Based on the categorization of the associated purchase(s) in Figure 1, examples of possible strategies for relationships categorized in each of the groups are provided. Prioritization guidelines are developed based on the description.

Cell 1, cell 2, and cell 4 include relationships with a high or moderate supplier attractiveness and a low or average relationship strength. These relationships are likely to be desirable because the current supplier is attractive to the company. Based on the classification of the purchase in Figure 1, a number of different strategies are recommended. If the supplier provides a strategically important product/service or the purchase situation is difficult to manage, it is very important to strengthen the relationship to keep a loyal supplier. The relationship can be strengthened by enhancing the communication, providing the supplier with more volume, or involving the sup-

plier in product development or value analysis. It should be emphasized that it takes time to create bonds between the companies, so these relationships should have a high priority. If the purchase is a noncritical or leverage purchase, the company could consider strengthening the relationship without allocating considerable resources to the relationship. To give the supplier more volume is one way of strengthening the relationship without allocating considerable new resources to the relationship.

Cell 3, cell 5, and cell 6 include the supplier relationships where the supplier has a moderate or high relative attractiveness and the relationship is relatively strong. The strategy for these relationships could be to reallocate resources among different activities in order to maintain a strong relationship. This strategy is generally recommended for all types of purchases in Figure 1. However, perhaps the amount of resources could be reduced by managing the relationship more effectively. If the supplier attractiveness is moderate and the associated purchases are noncritical or leverage purchases, the company could consider enhancing the supplier attractiveness by systems contracting or reducing the resources spent to manage the relationship even if this reduces the strength of the relationship. The payoff from a strong relationship is relatively low in this situation.

Cell 7, cell 8, and cell 9 include the relationships with a low supplier attractiveness. These relationships warrant attention because a reasonable strategy would be to change the supplier.

Before changing the supplier, it is important to reconsider the supplier's influence on the company's network position. The supplier could be important in relation to other members of the network (other suppliers or customers). This could be an important reason to maintain the supplier. Other strategies include outsourcing the purchase or using systems contracting to enhance the supplier attractiveness. If the purchase is strategically important or it is a bottleneck purchase (difficult to manage), it is crucial that the company develop an action plan on

Development of a supplier is a long-term focus.

how to secure the delivery or create substitutes. The impetus to work with the current supplier increases with the strength of the current relationship, because it may be more efficient to use resources to develop the current supplier rather than to establish a new relationship. This is especially true if the associated purchases are strategically important or the purchasing situation is difficult to manage (bottleneck purchase). In these situations, it is probably better to work with a known supplier instead of trying to establish a relationship with a new supplier.

Action plans should also be developed for the relationships where there is a high degree of mismatch between the level of resources allocated and the relative supplier attractiveness and/or the strength of the relationship. These relationships can be present in all cells. Based on these considerations, the company can develop a number of action plans to improve the management of the current portfolio of supplier relationships. The successful implementation of the action plans will be dependent on the allocation of resources. Thus, it will probably be necessary to focus on a few action plans. Whereas it is not possible to give a general order of priority for the action plans, it is possible to provide some guidelines.

Based on the description above, the action plans developed will have different goals, and the need for allocation of resources to carry out the action plans will also differ. Three groups of action plans can be identified.

Group 1 includes the action plans with the purpose of strengthening a supplier relationship. The action plans for the relationships in cell 1, cell 2, and cell 4 will typically belong to this group. These action plans will require long-term resource allocation, because it takes time to build relationships. On a short-term basis, the most important thing is to show the willingness to improve the relationship strength. In some cases it may be sufficient to improve the existing communication.

Group 2 includes the action plans with the purpose of improving the supplier attractiveness or the performance of the relationship. The action plans for the relationships in cell 7, cell 8, and cell 9 will typically belong to this

group. The strategy can be either to change supplier or to develop the existing supplier. The action plans in group 2 can have a short-term or a long-term focus. If the supplier attractiveness is really low or the strength of the relationship is so low that the relationship is ready to dissolve, immediate action is required. The development of a supplier is a long-term focus, whereas it may be desirable to replace other suppliers. These action plans will most likely require resources but they can also create savings in the short run if resource intensive relationships are changed.

Finally, group 3 includes the action plans that suggest a reduction of the resources allocated to a relationship. These relationships can be present in all the cells. The action plans will typically have an immediate term focus. The company should look first at the relationships with greatest potential for reducing allocated resources. This should provide the company with resources to implement action plans from the other two groups.

Therefore, it is recommended that the company choose a balanced mix of action plans from the three groups in order to secure the solution to short-term problems and work on the relationships with a long-term impact.

The order of priority of action plans in groups 1 and 2 depends on a number of factors. The company has to compare the need for security of supply and the need for improved purchasing performance. In group 1, the relationships in cell 1 should warrant greater attention than the relationships in cells 2 and 4, if it is the same kind of purchase, because of greater supplier attractiveness or lower relationship strength. Generally, strategically important purchases should warrant greater attention than other types of purchases, if the associated relationships are in the same group. The product's position in the life cycle is another important factor. Relationships that support a declining product/service do not warrant the same resources as a developing or mature product/service, unless it is to develop the next generation of the product or service.

The company should also consider its technology. If the company has invested heavily in specialized machinery, the bottleneck purchases should probably have

The company's purchases and supplier relationships should be analyzed.

higher priority than the leverage purchases, because it is important to secure the supply of all items to keep the factory running. In this situation, the strength of the relationship should warrant greater attention than the supplier attractiveness in order to secure the supply, if the current delivery performance is satisfying. The relationship's importance in relation to the company's network position is also an important factor when establishing the order of priority for the action plans. It is possible that some relationships can be developed through the development of other relationships, and these mediating relationships should then have a higher priority. Finally, it is always important to begin with a success, so it is important to choose the first action plans to be implemented based on the probability of a quick success with some visible results in terms of savings or better supplier performance.

The next section contains a discussion of the model in relation to the general weaknesses of portfolio models.

DISCUSSION

The model and methodology described above have some limitations. The model focuses primarily on manufacturing companies purchasing a variety of products and services. The factors listed in the tables are an example of this focus. These could easily be adapted for a service, government or not-for-profit organization. The methodology described above also focuses on the current situation. Some companies may benefit from repeating the analysis with the future situation in mind as part of their overall strategic planning process. This sort of analysis could provide answers to questions like: Will the strategic purchases be the same in 5 to 10 years? What type of suppliers will be attractive to our company in 5 years? This analysis could also provide input to a number of action plans in order to establish relationships with the suppliers that will be important in the future.

The general weaknesses of portfolio models are discussed in relation to the model developed model in the next paragraphs.

The complexity of the dimensions used in the portfolio model could be a problem in the implementation phase. In the model developed, relatively complex dimensions are suggested. It is important that the decision-makers in the company discuss all the important factors, and these factors will vary from company to company. The methodology leaves room for less complicated measures, because a company can decide to evaluate only a few of the suggested factors. Portfolio models were also criticized for a lack of focus on the interdependencies between the products categorized in the model. In the model developed, the criticality of the purchase to get leverage with the supplier and the supplier's influence on the company's network position describes these interdependencies.

Finally, it was emphasized that portfolio models should provide guidance on how to choose among projects/products. The BCG matrix approach was criticized because it does not provide guidance on how to choose the products to focus on. In connection with the description of the development of action plans in step 3, some guidelines on establishing the order of priority are provided. It is important to emphasize that it is impossible to establish a general order of priority among the action plans. Instead, three groups of action plans are described, and it is recommended that the company implement action plans from each group because the strategic focus is different for the three groups. Additionally, some guidance has been provided on how to choose among the action plans within the same group of action plans. The next section contains a conclusion and suggestions for future research.

CONCLUSION AND FUTURE RESEARCH

This article describes the use of portfolio models in understanding supplier relationships. Based on a general critique of portfolio models and the limited number of models developed in marketing and purchasing, a portfolio model approach to managing supplier relationships has been suggested. It is recommended that the com-

pany's purchases and supplier relationships be analyzed to establish a number of action plans to improve the management of the entire portfolio of supplier relationships. The first step in the portfolio analysis is to categorize the company's purchases according to the strategic importance of the purchase and the difficulty of managing the purchase situation. The description of the portfolio in Figure 1 also provides normative guidelines on how to manage the relationships associated with each of the four categories of purchase situations identified. The second step is to analyze the current supplier relationships, using another portfolio model based on the relative supplier attractiveness and the strength of the current supplier relationships (Figure 2). Normative guidelines are provided on how to develop action plans based on the result of the two portfolio analyses. Finally, some guidelines on how to establish an order of priority among the resulting actions plans have been provided.

Future research includes an extensive empirical testing of the usefulness of the portfolio approach and the normative suggestions in this study. The research methodology should begin with case studies to capture the important aspects of the implementation process. Longitudinal studies in a company could provide information about the usefulness of the portfolio approach. It is difficult to compare the use of the portfolio approach in different companies, because several company-specific factors, such as technology, norms, and values, will influence the management of the company's supplier relationships.

A related area is the development of measures of success for supplier relationships. One aspect of the success of supplier relationships is the relative supplier attractiveness, i.e., the extent to which the current supplier is more attractive in terms of performance, strategic fit, etc., compared with other suppliers. Allocation of resources and the strength of the relationship could also be important measures of the success of the supplier relationship management.

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APPENDIX

This appendix contains a description of the methodology presented by Narasimhan [30]. The methodology can be used to assign weights to factors describing the same dimension according to their perceived significance. Instead of comparing all factors describing the dimension, Narasimhan [30] suggests that factors are compared on different levels in a hierarchy. The factors in Table 3 constitute a hierarchy with three main categories, each with two subcategories, as illustrated in Figure 3.

The purpose of the methodology is to determine the weight of each of the factors on the lowest level of the hierarchy, e.g., product complexity and risk. Instead of comparing all the factors on the lowest level, the factors are compared at different levels, reducing the number of factors that have to be compared. Figure 4 illustrates the general methodology used to compare the factors.

The methodology is illustrated in Figure 5 where the relative importance of product characteristics, supply market characteristics, and environmental characteristics are calculated in an example.

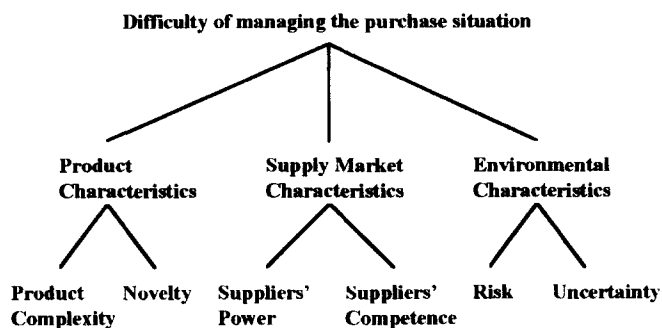


FIGURE 3. Hierarchy of selection factors.

	f_1	f_2	....	f_n	Z	W
f_1	x_{11}	x_{12}	....	x_{1n}	Z_1	W_1
f_2	x_{21}	x_{22}	....	x_{2n}	Z_2	W_2
....
f_n	x_{n1}	x_{n2}	....	x_{nn}	Z_n	W_n
Sum					S	1.0

Where:

n The number of factors.

f_i A factor.

x_{ij} The result of an evaluation of factor i's importance compared to factor j's importance using a scale from 1 (equally importance) to 9 (absolute importance). If factor i is less important than factor j, x_{ji} is evaluated instead. The matrix is completed by using the equation: $x_{ij} = 1/x_{ji}$.

Z_i The geometric mean of row number i:

$$Z_i = \sqrt[n]{x_{i1} \cdot x_{i2} \cdot \dots \cdot x_{in}}$$

S The sum of the geometric means:

$$S = \sum_{j=1}^n Z_j$$

W_i The weight of factor i:

$$W_i = Z_i / S$$

FIGURE 4. Calculation of methodology to compare factors.

In the example, product characteristics are considered to be more important than supply market characteristics and even more important than environmental characteristics.

This procedure is repeated for the subcategories under each main category. One matrix would then include product complexity and novelty, another would include supplier's power and supplier's competence, and the last one would include risk and uncertainty. In the example there are only two levels in the hierarchy, but the procedure can be repeated for three or more levels. Figure 6 illustrates the hierarchy of factors. The numbers in parentheses are the weights calculated for each factor.

In Figure 6 the total weight of each factor on the lowest level of the hierarchy, e.g., product complexity is calculated. This is done by multiplying the weights going down through the hierarchy. The total weight of product complexity in the example in Figure 6 is, therefore, 0.67 multiplied by 0.80 equal to 0.54. The product complexity is, therefore, perceived to determine 54% of the difficulty of managing the purchase situation.

	Product Characteristics	Supply Market Characteristics	Environmental Characteristics	Geometric Mean	Weight
Product Characteristics	1	3	6	2.62	67 %*
Supply Market Characteristics	1/3	1	2	0.87	22 %
Environmental Characteristics	1/6	1/2	1	0.44	11 %
* $(1*3*6)^{1/3} / ((1*3*6)^{1/3} + (1/3 * 1*2)^{1/3} + (1/6 * 1/2 * 1)^{1/3}) = 0.67$				3.93	100 %

FIGURE 5. Illustrative calculation of factor weights.

Figure 6 also illustrates a method to evaluate each purchase. It is recommended that each purchase is rated using a scale from 1 (low) to 10 (high). In the example the product novelty of the product associated with purchase A is low (rating 2), whereas the risk associated with purchase A is rated as being fairly high (rating 8). The total score for the purchase can then be calculated by multiplying the rating with the weight and summarizing the results to a single measure. In the example the total score for purchase A for the difficulty of managing the pur-

chase situation is 5.28 out of 10. Thus, the difficulty of managing the purchasing situation associated with purchase A is categorized as high. It is important that the company use the entire scale when evaluating each purchase. The scale is relative, and companies in different industries cannot compare products. The purpose of the portfolio model is to categorize the company's purchases and supplier relationships to improve the resource allocation between different supplier relationships and not to compare two different companies.

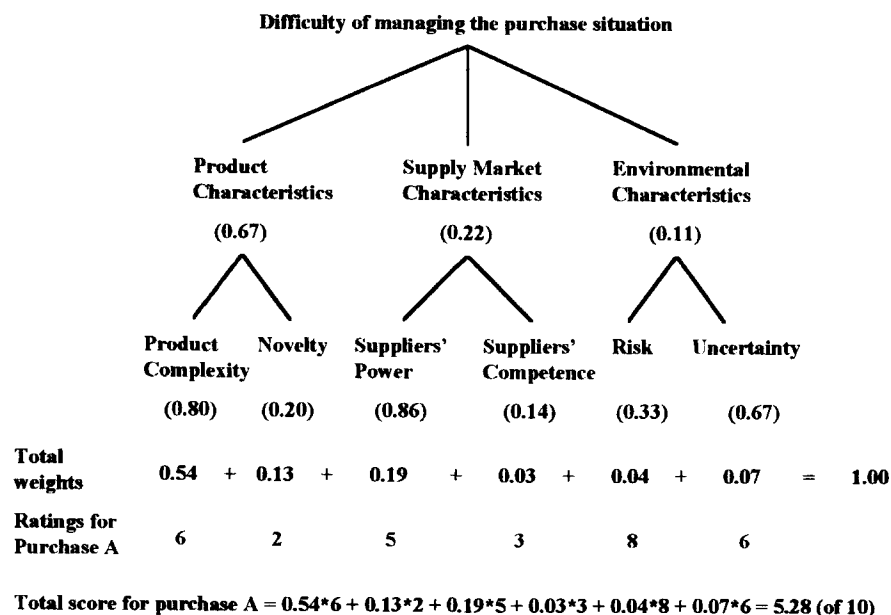


FIGURE 6. Hierarchy of weighted factors.