

Handling measurement issues and strategic directions in Kraljic's purchasing portfolio model

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Abstract

Kraljic's purchasing portfolio model, which was introduced in 1983, still is the dominant approach in the profession. Contrary to the growing use of the Kraljic matrix, there are problems and unanswered questions with respect to measurement and strategic issues. Based on explorative case studies, the critique of Kraljic's model has been disputed and refuted to a large extent. This study describes the solutions of experienced practitioners to the problems which have been put forward in literature. The case studies point out which measurement methods are possible and which supplier strategies are feasible, including additional strategic movements of commodities *within* the matrix. The research findings indicate that there is no simple, standardized blue print for the application of the portfolio analysis. It requires reflecting on results, critical thinking and sophistication of purchasing management.

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1. The Kraljic approach

Recently, purchasing portfolio models have received considerable attention from academic and business world (e.g. Gelderman and Van Weele, 2002, 2003; Leonard and Spring, 2002; Åhman, 2002; Dubois and Pedersen, 2002; Zolkiewski and Turnbull, 2001; Nellore and Söderquist, 2000; Wynstra and ten Pierick, 2000; Gelderman, 2000, 2003; Croom, 2000; Bensaou, 1999; Lilliecreutz and Ydreskog, 1999; Olsen and Ellram, 1997). Obviously, not all products and not all buyer–supplier relationships are to be managed in the same way. In general, purchasing portfolio models aim at developing differentiated purchasing and supplier strategies. Kraljic (1983) introduced the first comprehensive portfolio approach for purchasing and supply management. Kraljic's approach includes the construction of a portfolio matrix that classifies products on the basis of two dimensions: profit impact and supply risk ('low' and 'high'). The result is a 2×2 matrix and a classification in four categories: bottleneck, non-critical, leverage and strategic items, see Fig. 1.

Each of the four categories requires a distinctive approach towards suppliers. Non-critical items require efficient processing, product standardization, order volume and inventory optimization. Leverage items allow the buying company to exploit its full purchasing power, for instance through tendering, target pricing and product substitution. Bottleneck items cause significant problems and risks which should be handled by volume insurance, vendor control, security of inventories and backup plans. A further analysis of the strategic items is recommended. By plotting the buying strengths against the strengths of the supply market, three basic power positions are identified and associated with three different supplier strategies: balance, exploit, and diversify. The general idea of Kraljic's model is to minimize supply risk and make the most of buying power (Kraljic, 1983, p. 112).

Although other models have been developed, Kraljic's approach subsequently became the dominant approach to what the profession regards as operational professionalism Cox (1997, p. 270). Lamming and Harrison (2001, p. 596) confirmed that Kraljic's matrix remains the foundation of purchasing strategy for many organizations across different sectors. Purchasing portfolio models have gained ground in both academic

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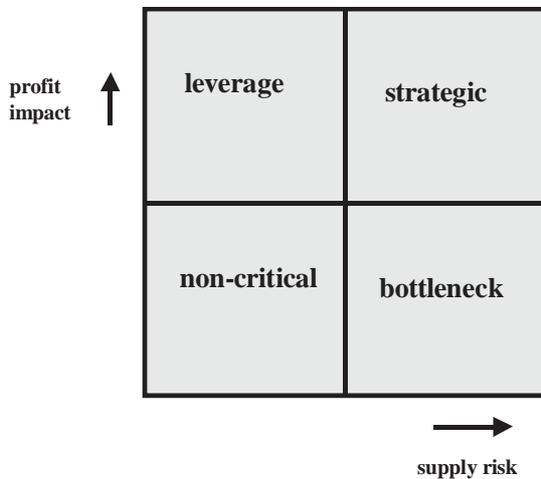


Fig. 1. Dimensions and categories in the Kraljic matrix.

research as well as in practice (Nellore and Söderquist, 2000, p. 246). In the course of time, the Kraljic approach has entered many textbooks on purchasing and supply management. In contrast with a growing acceptance and use of purchasing portfolio models, there are problems and unanswered questions.

2. Critique and unanswered questions

In general, decisions based on portfolio models are proven to be *sensitive* to the choice of dimensions, factors, and weights. Day (1986) concluded that *measurement* is considered to be the Achilles' heel for all portfolio models. What is exactly meant by 'profit impact' and 'supply risk'? How could or should we measure these dimensions in practice? Nellore and Söderquist (2000, p. 246) pointed at the risk that the variables used in portfolio analysis might not be accurate proxies for the dimensions they are supposed to measure. Theory does not provide prescriptions or procedures for measurement, leading Ramsay (1996, p. 15) to conclude that these concepts are 'actually made up of a number of nebulous concepts without operational dimensions'. Olsen and Ellram (1997, p. 105) emphasized that the weighting of each factor is the most important part of the implementation process, but at the same time very subjective. The decision-makers must come to an agreement on the relative importance of each factor. Besides that, there are usually demarcation problems with respect to the measurement of key variables. What is the exact distinction between 'a high' and 'a low' supply risk? If we have problems discriminating between categories, then the classification of products will be arbitrary and so will be the provided recommendations. Homburg (1995, p. 829) concluded that recommendations should

be applied with reserve, especially if a product is positioned near a demarcation line. De Boer (1998, p. 4) suggested a fully customized approach: organizations should determine their own criteria and their own specific threshold values.

The introduction of the Kraljic portfolio approach can be considered as a major breakthrough in the development of professional purchasing. Syson (1992, p. 213) concluded that Kraljic's approach represents 'the most important single diagnostic and prescriptive tool available to purchasing and supply management'. However, others find the Kraljic approach counterproductive, providing recommendations either to exploit power (Olsen and Ellram, 1997, p. 106), or to avoid risk associated with the supplier exercising power (Dubois and Pedersen, 2002, p. 40). It is argued that the complexity of business decisions does not allow for simple recommendations. How could one deduce strategies from a portfolio analysis that is based on just two dimensions? (e.g. Heege, 1981, p. 23; Dubois and Pedersen, 2002, p. 40). In addition, several authors have described and presented similar portfolio models, be it from a rather normative and deterministic perspective: one overall purchasing strategy for *each* cell/category (e.g. Elliott-Shircore and Steele, 1985; Syson, 1992; Van Weele, 1992; Hadelar and Evans, 1994). From such publications it might be assumed that *all* strategic items should be managed by means of (strategic) partnerships. We must conclude that this would be in variance with Kraljic's intention, considering the three different supplier strategies for the strategic quadrant.

Often, the *suppliers' side* of the buyer–seller relationship is considered as a disregarded element in Kraljic's model. The Kraljic approach does not explicitly take into account the possible strategies and reactions of suppliers (Heege, 1981, p. 23; Kamann, 2000, p. 1). In a critical review of the Kraljic approach, Dubois and Pedersen (2002, p. 35) argued that purchasing portfolio models using 'given products' as a point of departure, in addition to a dyadic perspective, may be counterproductive where purchasing efficiency is concerned. Nellore and Söderquist (2000, p. 264) confirmed that it is imperative for any portfolio use to indicate the characteristics of the supplier with regard to the specification generation, the required relationship and the required type of specification for a given component. The design of a product entails issues that are not explicitly considered in portfolio models. Obviously, whether the product is developed by the supplier, the customer or developed jointly impacts on the relationships between parties (Araujo et al., 1999). Mismatches between buyer and seller are likely to occur if one does not take into account how a supplier (i.e. a marketing or sales manager) assesses the situation. And vice versa of course. A partnership is only possible if that is the strategic intent of both parties.

Unquestionably, organizations must match their intentions and strategies.

Lilliecreutz and Ydreskog (1999, p. 68) stated that strategies that are solely based on Kraljic's matrix lack the dynamics of the power that the supplier can obtain. Gelderman and Van Weele (2000) pointed at the natural conflict of interests in buyer/supplier relationships. Both are likely to prefer a dominant power position due to the attached benefits. As a result, positions in the Kraljic matrices will always be amendable to the dynamics of buyer/seller relationships. Parties are inclined to seek for possibilities of influencing their relative power position. Cox (2001, p. 13) explicitly posited that a sufficient condition of success would be the ability to find ways to move from current positions of power to other more favourable positions. The Kraljic framework, however, does not provide guidelines for movements *within* the matrix. It is not clear if and how other positions in the matrix are to be pursued through the implementation of the recommended strategies. Under which conditions would it be advisable and feasible to pursue movements in the matrix? How should those movements be accomplished?

So far, we have discussed a number of issues and unanswered question with respect to Kraljic's portfolio approach. This critique of Kraljic, however, does not include the experience of practitioners. How do purchasing professionals handle such *issues* in practice? In general, what could we learn from their experience? Little is known about the actual *use* of portfolio models in purchasing. Most publications are conceptual or anecdotal by nature. This empirical study addresses the gap between the conceptual problems and the actual employment of purchasing portfolio models. The cases studies clarify the handling of *measurement and strategic issues* by experienced professionals.

3. Methodology

The main objective of the case studies is to identify and to describe advanced current practices with respect to purchasing portfolio models. The cases studies are aimed at answering the following set of research questions:

1. Considering the unclear guidelines and the unanswered questions with respect to the *measurement* of dimensions in purchasing portfolio analysis, how are these issues handled to the satisfaction of experienced purchasing professionals?
2. What kind of *objectives* and *strategies* are applicable, using Kraljic's portfolio matrix?
3. What kind of *movements* are considered in the Kraljic matrix, in terms of current positions, future positions (goals) and means (strategies)?

Three in-depth case studies were conducted, involving Dutch industrial firms. The case companies were selected on their experience with the use of a purchasing portfolio approach. A selective, non-random sample is in line with the exploratory nature of the research questions at hand. Naturally, the composition of the sample is not made with the aim of being statistically representative of a population.

Because we wanted to explore different possibilities of the portfolio approaches, different units of analysis were included. The first case study (at DSM) dealt with the use of a portfolio approach on the corporate level of the company, aimed at *synergy* and *leverage* across business units. For different kinds of products and product groups, the portfolio analysis serves as a framework for strategic discussion and ultimately for starting joint operations. The second case company (Akzo Nobel Coatings) is a large, global business area with plants all over the world. In more than 30 countries comparable portfolio analyses are performed for the different sub-business units (area business units). The portfolio analysis concerns the procurement of ingredients (raw materials), to be used in the end product, coatings. The third case is performed at the business unit level as well. However, the business context differs to a large extent. Te Strake is a fairly small, basically national manufacturer of technologically advanced modules. The importance of the limited number of customers is omnipresent. As a first tier supplier, Te Strake performs the portfolio analysis for each major customer separately: all items are positioned that are used for the production of the custom-made product (module) for a specific customer. Obviously, there is a different business context for the three cases. Appendix A summarizes the main situational factors that describe the most notable case specific circumstances.

Data were collected primarily through semi-structured interviews and secondary resources, such as internet web sites, annual reports, internal reports, and purchasing plans. A total number of 28 interviews were conducted. The case studies entailed the use of a *key-informant method*, interviewing a selected, limited number of participants. Informants were all chosen for their specialized knowledge of and experience with the use of portfolio models in real-life purchasing, notably business unit managers, purchasing managers and senior buyers (judgement sample).

4. Measurement and use

From the various scopes of the case studies, it can be concluded that a purchasing portfolio approach can be applied on many different levels of aggregation. The generic nature of the Kraljic approach allows for

customization, implying that users have to make all kinds of decisions, implementing the portfolio analysis. We have found that measurement issues and strategic issues are handled in different ways. Some of the differences can be explained by differences of scale, scope, value proposition and supply chain position. The conditions on end markets, the requirements of customers, and the overall business strategy were found to be significant circumstances for the selection of purchasing and supplier strategies.

The case studies illustrate differences in use frequency, occasion, and purpose. In every company a champion could be found, introducing and supporting the portfolio analysis. In our case studies, these ‘product champions’ were the highest purchasing professionals in the organization. It should be noted that performing a portfolio analysis means team work. The views of colleagues from different fields of expertise should be added to the more functional purchasing perspective. For a designer ‘replaceability’ might be important, while the production manager might focus on ‘risk of failure’. For reasons of support and implementation, a cross-functional team is required, with representatives from all relevant departments and specialist fields. Fig. 2 summarizes some of the most significant characteristics of the investigated portfolio approaches, examining use issues and measurement issues.

It was found that in all investigated case studies, the positioning of items (the measurement) was followed by a process of reviewing the positions in the matrix and a process of reflection on the consequences. Whatever method is selected, there are always subjective choices, limitations and elements that influence the actual positioning in the matrix. On closer consideration, questions have always to be answered for each position that is found in the matrix:

- Why is an item/product positioned in this specific spot?
- Are the found positions in line with previous expectations?
- Are positions, unintentionally and wrongfully, influenced by the measurement method?
- Are therefore readjustments necessary?
- How should one view and assess the found positions?
- What is the interpretation of the results?
- Where are points of intervention? Which risks are (un)acceptable?

In other words, after the matrix is filled, users reflect on the results. If necessary, manual adjustments are made. In-depth discussions on the positions in the matrix are considered as the most important phase of the analysis. Strategic discussions provide deeper insights and may lead more easily to consensus-based decisions. It is felt by the users that the Kraljic

framework facilitates these important discussions to a large extent.

The *first research question* of this study refers to measurement problems, associated with the use of a portfolio approach: how do experienced professionals handle issues with respect to the measurement of dimensions and factors? This question will be answered, by describing the solutions developed by different professionals. The case studies identified three kinds of different approaches to the *measurement issues*, connected to every purchasing portfolio analysis:

- DSM uses a consensus method,
- Akzo Nobel Coatings uses a one-by-one method,
- Te Strake uses a weighted factor score method.

We found a close connection between the measurement method and the handling of the demarcation problem (‘what is high?’ and ‘what is low?’). The measurement methods also specified other measurement issues, such as the selection of dimensions and the determination of weights and scores.

The *consensus method* is predominantly based on a process of reasoning and discussing. The reaching of consensus is very important when choices are made with respect to the measurement of variables and factors, and ultimately for the positioning of items/product in the matrix. Advocates of this approach regard this as a very attractive feature of the portfolio analysis that is being used. Profound, open discussions about purchasing issues are considered as the most critical part of strategy development. Differences of opinions become very clear, allowing for a true strategic discussion. As a rule, points of view always have to be substantiated by facts. DSM uses this consensus method for years. Users are content with the *flexibility* and possibilities of this consensus-based approach.

Quite a different approach is the ‘one-by-one’ method that is used by Akzo Nobel Coatings. Just one key variable is selected per dimension. The financial value of items comes very close to the profit impact, the supply risk is usually operationalized by the number of (alternative) suppliers. As a result, positions in the matrix can be determined in a rather *quick* and *unambiguous* way. The one-by-one method is quite popular with purchasing professionals. The user does not need an advanced information system that includes quantitative or quantifiable data on a set of factors. A related benefit is that it allows for the comparison of different matrices that use the same variables. In addition, the method allows identifying to what extent products can shift to another quadrant. For instance, suppose product A is a raw material that is only available from one mine in the world, owned by one supplier. Suppose product B is a raw material of which the buying company requires its specifications to meet extremely high-quality elements. Obviously, products A

	DSM	Akzo Nobel Coatings	Te Strake BU - E&P
Use issues			
Frequency, occasion	irregularly, in response to changes	regularly, fully integrated with daily practice	incidentally, on major customer level
Main advocate and project manager	director purchasing services	purchasing vice president of each BU	strategic buyer of the business unit
Main purpose	to identify and to develop synergy and leverage across BU's	to detect and to cope with supplier dependence	to assess risk and to identify possibilities
Measurement issues			
Method	consensus method	one-by-one method	weighted factor score method
Dimensions	- strategic importance - supply risk	- value of purchases - number of suppliers	- profit impact - supply risk
Determination of factors	during the analysis, basically unlimited	in advance, factors are dimensions	in advance, limited number
Measurement of factors	consensus based	objectively	consensus based
Determination of weights	implicitly, during the analysis	n.a.	explicitly, in advance
Aggregation of sub scores	consensus based	n.a.	arithmetic (additive model)
Demarcation	consensus based	objectively: * the upper half of the matrix contains all items that add up to 80% of the total purchase value * 3 or more available suppliers is a low supply risk	the midpoints of the two constructed scales

Fig. 2. Characteristics of the purchasing portfolio approaches.

and B will be positioned in the strategic quadrant. While product A can hardly be shifted, product B could be moved towards the leverage quadrant, provided that its specification would be defined less strict, which opens the market to more supplier. In other words, additional background information is needed on products, markets and suppliers, in order to avoid that opportunities or threats might be neglected.

Te Strake uses a 'weighted factor score' method that includes a number of factors for each dimension. The method allows for a completely customized approach, deciding on factors, weights, and (usually) scores. Total scores per dimension are calculated in an additive model. Through the multiplication of scores and weights, the sub-scores are added to a single value.

Implicitly, it is assumed that a lower score on a factor can be compensated by a higher score on another factor. The user of an additive model should ask himself if this is an acceptable line of reasoning. For instance, if there is just a single supplier delivering a certain product, then there is a maximal dependence on this supplier. Would it be possible that the resulting supply risk is compensated

by other factors? Other disadvantages of the weighted method are:

- depending on the level of aggregation, it could be necessary to dispose of a large number of quantitative data that are rarely available in a purchasing information system,
- working with constituent factors, the overall picture can be hard to see, especially when dealing with large number of factors and weights.

On the other hand, the portfolio analysis can be fully customized, according to one's own views and requirements. All relevant factors can be included in the analysis. Fig. 3 provides an overview of the main differences between these three measurement methods.

The decision on the measurement method can be based on the following selection criteria, which are derived from the specific advantages and disadvantage of the methods:

- the required objectiveness (high?, then 1-to-1),
- number of key factors (high?, then consensus or weighted factors),

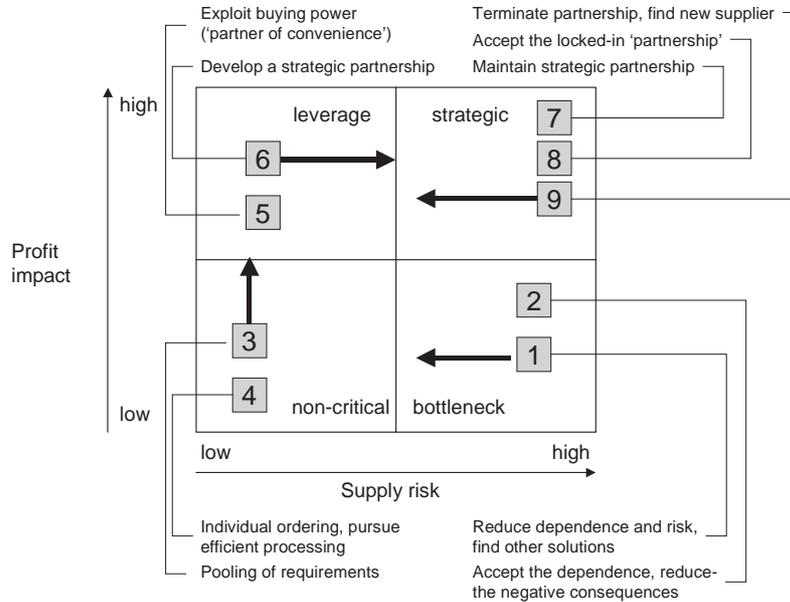


Fig. 3. Overview of strategic directions for all categories.

- available time ('no' time?, then consensus or 1-to-1),
- needed customization and flexibility (high?, then weighted factors).

5. Strategic directions

The investigated cases made clear that the development of portfolio-based strategies requires additional information. In all case studies, it was found that additional information has been included in the portfolio analysis:

- the overall business strategy,
- the situations on supply markets, and
- the performance capacities and intentions of (individual) suppliers.

The business strategy of Te Strake focuses on technological innovations, as first tier supplier. Purchasing and supply have to connect with these basic principles, partnering key suppliers for early involvement in product development and product improvement. The basic points of departure of Te Strake are for instance rather different in comparison to DSM, a firm that operates from an operational excellence perspective, always looking for cost reductions and efficiency. The marketing requirements on end markets are clearly translated by Akzo Nobel Coatings in guidelines for the development of purchasing strategies. Commodity markets are distinguished from niche markets, which affect the selection of purchasing objectives and strategies to a considerable extent. Obviously, the purchasing professional will take into account the

situations on specific supply markets and the assessments of individual suppliers. Items with high supply risks will be treated differently, according to the reliability, the performance, the competences, and the intentions of the connected suppliers.

The *second research question* of this study refers to the objectives and strategies. The research revealed three levels of portfolio-based objectives: the item level, the category level, and the matrix level. In all of the three investigated cases, objectives were formulated at the *item* level. On a *category* level, objectives can be formulated for the four quadrants. For instance, DSM wants to empty the non-critical category as much as possible. Akzo Nobel Coatings employs very detailed, measurable objectives for the categories in the matrix. For example:

- reduce the number of items in the bottleneck quadrant by 5%, or
- increase the value of all leverage items to 50% by reducing the number and value of strategic and non-critical items.

Finally, it is possible to make statements on the *matrix level*. DSM for instance prefers a matrix that is filled in a particular way:

- the bottleneck and non-critical categories should be as empty as possible, by means of standardization and pooling of requirements,
- the leverage category should be filled with 'partners of convenience', meeting key success factors of business units (always price and logistics), while

the strategic category should only include ‘strategic partners’, with the proper capabilities for codesign.

Akzo Nobel Coatings uses an even more sophisticated system of developing portfolio-based objectives. For each area business unit the whole matrix is assessed, mainly based on the situations on their end markets. For instance, niche markets require high-quality ingredients. A logical consequence is that the strategic quadrant will be filled with a relatively large number of key suppliers, with whom close relationships are maintained.

The case studies clarified the selection of portfolio-based strategies for the four categories, which bring us to the question of how to find common ground between those different kinds of strategies. At first sight, we concluded that they were incomparable. However, taking a closer look and taking up a higher level of abstraction, we did find some striking similarities, in spite of the differences in the level of the investigated cases. The strategies and their conditions usually refer to (im)possibilities to *reduce the dependence* on a supplier and to (im)possibilities to *increase buying power*. We will come back to these issues.

6. Moving in the matrix

The *third research question* explicitly refers to possibilities of moving in the matrix. Fig. 3 provided an overview of portfolio-based strategies. The case studies revealed that, additionally to Kraljic’s theory, experienced practitioners were very aware of the different choices within each quadrant. Based on the interviews and the overview of selected strategies, we have concluded that for each category two different kinds of strategic directions can be distinguished:

1. actions to hold the same positions in the matrix, and
2. actions to pursue other positions in the matrix.

Holding on to a position implicitly means that current circumstances are taken for granted. We have observed that a position in the matrix can be accepted for different reasons, sometimes positive, sometimes referring to a negative choice. A position might be preferred because a firm is convinced that it is the best position for a certain item. In other cases a position might be accepted, because there are no realistic possibilities for change. The first type of strategies are of a more active, radical nature. When possible and desirable, other positions in the matrix are identified and pursued. This *dichotomy* between ‘holding position’ and ‘moving to another position’ has laid the foundation of the conceptual model of strategic directions in the Kraljic-matrix, as is visualized in Fig. 3. We will illustrate and amplify on the dichotomy for each product category.

If we take a look at the bottleneck and the strategic quadrant at the right side of the matrix, those movements are pursued that reduce the supply risk. In terms of the matrix, this means moving to the left. Non-critical items are moved upwards, leverage positions could be exchanged for strategic positions. We will elaborate the strategic directions that can be identified in the conceptual model.

Bottleneck items

- (1) *Moving to another position: ‘decomplex the product, find a new supplier’*. Bottleneck items are by definition of low value and of high risk. It should be interesting enough, especially from an economic point of view, to search for other solutions. The most common alternatives refer to the product (broadening specifications/decomplex) or to the supplier (searching, managing and developing suppliers, or cross-sourcing). These measures must lead to a lower level of supply risk and a lower level of the dependence on a supplier. This means a shift towards the non-critical quadrant.
- (2) *Holding the position: ‘accept the dependence on a supplier, assurance of supply’*. If no other options are feasible, then the category remains the same. Common responses to unfavourable bottleneck positions are contingency planning in combination with risk analysis, consignment systems, long-term contracting with an emphasis on quality and assurance of supply, and ultimately keeping (extra) stocks.

Non-critical items

- (3) *Moving to another position: ‘pooling of requirements’*. Preferably, non-critical items are put together in large quantities, increasing the buying power of the firm. If necessary, a process of standardization is pursued. The pooling strategy is executed by a framework agreement with a preferred supplier, systems contracting, a Vendor Managed Inventory system, or an e-procurement solution. The strategic direction is in all cases toward the leverage quadrant, resulting in lower direct and indirect purchasing costs.
- (4) *Holding the position: ‘individual ordering, efficient processing’*. Whenever it is not possible to pool the purchasing requirements, the only remaining option is some type of individual ordering, for instance by means of a purchase card. The purchasing strategy is aimed at reducing the indirect purchasing costs which are connected with administrative activities (ordering, invoicing and buying processes).

Leverage items

- (5) *Holding the position: ‘exploit buying power, maintain a partnership of convenience’*. The generally preferred leverage position can be used for a

rather aggressive supplier management. Competitive bidding and short-term contracts are feasible options to exploit the leverage position. The dominant power position allows for a command strategy. In one of the investigated cases, leverage suppliers are aptly referred to as ‘partners of convenience’.

- (6) *Moving to another position: ‘develop a strategic partnership’*. Exceptionally, the leverage position is abandoned in search for a more strategic partnership with a supplier. A cooperative strategy is only pursued, if the supplier involved is willing and capable of contributing to the competitive advantage of the firm. Such a new role is only feasible for technologically advanced suppliers. The case studies revealed that the move from ‘leverage’ to ‘strategic’ should be considered as an exception to the rule.

Strategic items

- (7a) *Holding the position: ‘maintain a strategic partnership’*. Long-term relationships with key suppliers should always contribute to the competitive advantage of the firm, as we have underlined. Such relationships include mutual trust, mutual commitment, and an open exchange of information. These relationships were found to be rare in the case studies. A successful partnership can be very valuable for both parties.
- (7b) *Holding the position: ‘accept a locked-in partnership’*. On the other hand, a position in the strategic quadrant may be due to unchosen, unfavourable conditions. The resulting ‘locked-in’ situation is commonly caused by a patent position, a monopoly position, high switching costs (asset specificity) or by the directions of a major customer. These circumstances produce an involuntary stay at the strategic quadrant.
- (8) *Moving to another position: ‘terminate a partnership, find a new supplier’*. A partnership may develop in an undesirable way. A supplier’s performance may become unacceptable and incorrigible. This may start a painful process of reducing the dependence on the supplier involved. The firm will have to search, develop and contract another supplier, while bringing the relationship with the non-performing supplier to an end.

With these generic descriptions of purchasing strategies, based on portfolio analysis, we have answered the third research question: what kinds of movements are considered in the Kraljic matrix? We have filtered and analysed the responses in the interviews and summarized

the findings. This process has resulted in an overview of possibilities, which is visualized and represented in Fig. 3.

7. Conclusions

The case studies departed from the contention that we needed to gain a better understanding of how purchasing portfolio models are being used in practice and how they could be used by purchasing professionals in order to pursue effective differentiated purchasing strategies. Publications have identified a number of problems and unanswered questions, but they do not reveal how purchasing professionals actually handle those issues. This study has clarified these issues, describing advanced practices with respect to purchasing portfolio models. The research questions referred to *measurement* issues and portfolio-based *strategies*.

The investigated cases provided useful insights in the possibilities and actual employment of purchasing portfolio analysis. The cases studies revealed three distinctive measurement methods:

- (1) consensus method,
- (2) one-by-one method,
- (3) weighted factor score method.

Each method satisfies the needs and expectations of the different users. The reason for this can be found in the additional steps that have to be taken in the portfolio analysis. Before strategic actions are determined, it is imperative to complete a further process of *interpreting and reflecting* on the results. The filling of a matrix should be considered as the starting point of portfolio analysis, definitely not the finishing point. After the matrix is filled, it is imperative that users reflect on the results. If necessary, manual adjustments should be made. In-depth discussions on the positions in the matrix are considered as the most important phase of the analysis. Strategic discussions provide deeper insights and may lead more easily to consensus-based decisions. It is felt by the users that the Kraljic framework facilitates these important discussions to a large extent.

Some argue that the complexity of business decisions does not allow for simple recommendations. How could one deduce strategies from a portfolio analysis that is based on just two basic dimensions (e.g. Dubois and Pedersen, 2002, p. 40)? Actually, the answer is simple: one cannot! In addition to the various factors that constitute the two dimensions of any matrix, we have

found that experienced portfolio users always included additional information on:

- the *overall business strategy* (related situations on end markets),
- the specific situations on *supply markets*, and
- the capacities and the intentions of *individual suppliers*.

Unquestionably, the supplier's side should be included in any strategic thinking on the field of purchasing and supply management. Practitioners have found a reply to the critique of the Kraljic approach, which stated that the supplier's side is a disregarded element in Kraljic's model.

The selection of portfolio-based purchasing strategies was explored as well. Based on the case studies, a conceptual model of strategic directions has been presented, providing insights and overview of the *main strategic choices* for the categories in the matrix. In addition to Kraljic's strategic recommendations, different kinds of strategic responses were identified and described for each item category. A *dichotomy* was identified between:

- strategies to hold a position (1), and
- strategies to move to another position (2).

At the right side of the matrix (in the bottleneck and the strategic areas), movements are pursued in order to reduce a high level of supply risk. In terms of the matrix, this means moving to the left. Non-critical items are preferably moved upwards, exceptionally leverage positions are exchanged for strategic positions. These are the most common *movements* within the matrix.

We have described and discussed the critique of Kraljic's model. Publications have stated questions and problems with respect to:

- the measurement of variables,
- the disregard for the supplier's side,
- the selection of strategies based on two dimensions,
- the limited and deterministic character of the strategic recommendations, and
- the absence of explicit movements within the matrix.

The research findings indicate that experienced practitioners have found effective solutions to these problems. We must conclude that the portfolio approach is very helpful in positioning commodities in the different segments and in developing differentiated purchasing strategies. However, we should bear in mind that there is no simple, standardized blue print for the application of the portfolio analysis. It requires critical thinking and sophistication of purchasing management. Although the findings are based on a limited number of case studies, the authors feel that the study has contributed to a better assessment of the critique on Kraljic's model and to a better understanding of the possibilities of a purchasing portfolio approach in practice.

Appendix A

Context of the investigated cases is described in Table 1.

Table 1

	DSM	Akzo nobel coatings	Te Strake
Investigated unit/level of analysis	Corporate level	Business area coatings	Business unit (E&P) Engineering and Production
Supply chain position	Main manufacturer	Main manufacturer	First tier supplier
Main products	Chemical, biotechnical products and plastics	Decorative and industrial coatings	Mechatronic modules, units and machines
Customers	Large number of industrial markets and customers	Mass markets of professional users and consumers	Small number of industrial customers
Sales	Euro 6.4 billion	Euro 5.6 billion	Euro 39.2 million
Purchase spend	60%	Raw materials: 43%	68%
Organization of purchasing	Basically decentralized with a centralized purchasing unit	System of lead buying, main buying and local buying	Customer focus teams
Main spend groups	Chemicals, raw materials, technical products/services, and physical distribution	Raw materials	Electrical and mechanical parts and components

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