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CONCEPTUALISING SUPPLY CHAIN MANAGEMENT: THE 'SOURCING TRIANGLE'

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Abstract

The aim of this paper is to present a conceptual framework that allows the sourcing activity within a SME engaged in manufacturing and design, to be evaluated strategically. This framework was initially conceived and used whilst in the role of Global Supply Chain manager within a small UK based electronics manufacturer and subsequently developed in a variety of settings. It draws upon the resource-based view of strategy. The sourcing activity of a company is presented as a conceptual framework depicted as a triangle, each apex representing one dimension of sourcing. Each dimension is, in turn, presented as a triangle with each apex representing an element of sourcing. An integral feature of the triangle is how the different elements of the triangle contribute to the overall performance of the sourcing activity. This framework provides a systemic view of sourcing, addressing the aims, means and actualisation of the sourcing activity. It offers those responsible for sourcing (e.g. supply chain managers) within a SME a tool to guide the evaluation of the sourcing activity in a systematic and systemic manner, focusing attention upon issues that might be taken-for-granted and overlooked (e.g. existing practices, competencies). This aids the generation of a strategic view and also the subsequent development of the sourcing activity. The framework presents a novel conceptual and strategic view of sourcing, which focuses attention not only upon a SME's relationship with suppliers, but also upon the effectiveness what is occurring within the company to support these relationships.

Keywords Supply Chain Management, Sourcing Strategy, Procurement, SME, Resource-Based Strategy

Introduction

The operations which handle the supply chain are perhaps the most taken-for-granted part of an organisation's activities, yet for a manufacturing business are likely to represent the most significant costs (Farmer, 1972). Whilst Wills noted in 1977 the increased importance of the ‘supplies function’ within organisations, the need to debate the importance of Supply Chain Management (SCM) in a special issue of *International Journal of Operations & Production Management (IJOPM)* in 2006, reinforces the view of SCM as taken-for-granted. Indeed, generally silent, but vigilant, SCM only surfaces to prominence when costs become a serious organisational concern and there is a need to initiate a cost-reduction programme. However, the supply chain can be a source of on-going opportunity if the organisational conditions are conducive to its effective functioning. This suggests that not only should attention focus upon the composition of the supply chain and its dynamics but also upon the organisational factors that affect the functioning of the supply chain (e.g. the administration of materials, the competencies of buyers and the manner of planning). Indeed, Farmer, in 1972, in drawing attention to the significance of material costs within a manufacturing business states the necessity of planning ‘the sourcing of components from the strategic point of view’ (Farmer, 1972:10), in alignment with corporate planning. Likewise, Kraljic, in 1983, advocates the need for this strategic perspective.

Conceptually, the management of the supply chain can be viewed strategically from two perspectives. The first adopts a strategic perspective to the supply function, whilst the second recognises the need for sourcing strategies appropriate to particular classes of materials and service. Harland et al (1999) introduce and develop the concept of a supply strategy as a ‘holistic approach to managing operations within collaborative inter-organisation networks’ (Harland et al, 1999: 663). Kotabe and Murray (1990) define a sourcing strategy as ‘a strategic arrangement in which to coordinate product innovations, manufacturing process innovations, and sourcing of components supplied for production’ (Kotabe and Murray, 1990: 384). The challenge facing the manager is how to operationalise these concepts to generate useful supply chain management and sourcing strategies.

The aim of this paper is to propose a conceptual framework appropriate to an SME engaged in design and manufacturing activities. The basic premise is that sourcing is a strategic issue not only addressing the manner in which suppliers are managed but also embracing the manner in which the materials / services and sourcing resources are envisaged. It is partly grounded within the resource-based view of strategy presented by Wernerfelt (1984), Prahalad and Hamel (1990) and Teece et al (1997) amongst others. This framework was initially conceived whilst in the role of global supply chain manager within a SME within the Electronics industry and subsequently developed, most recently in action research within a SME operating within the Aerospace industry.

The argument commences with the distinction between appropriation on the basis of ‘lowest cost or value for money’. The notion of Corporate Social Responsibility (CSR) is also introduced on the basis that the issues which CSR embrace cannot be ignored from a sourcing perspective. Returning to the notion of ‘value for money’, this invokes a more sophisticated approach to defining requirements and dealing with suppliers. The former (defining requirements) invokes an approach for thinking about and organising the portfolio of requirements, including the component pool, and also the manner in which they are to be sourced. The latter focuses attention upon the nature of supplier relationships and the supplier selection process. Together they allow a sourcing strategy for each product family to be established. Collectively this invokes a strategic approach to sourcing, which is loosely labelled ‘strategic sourcing’. Furthermore, this is aligned with the elements that are typically associated with Manufacturing Resource Planning (MRPII) and with cost management, as illustrated in Figure 1.

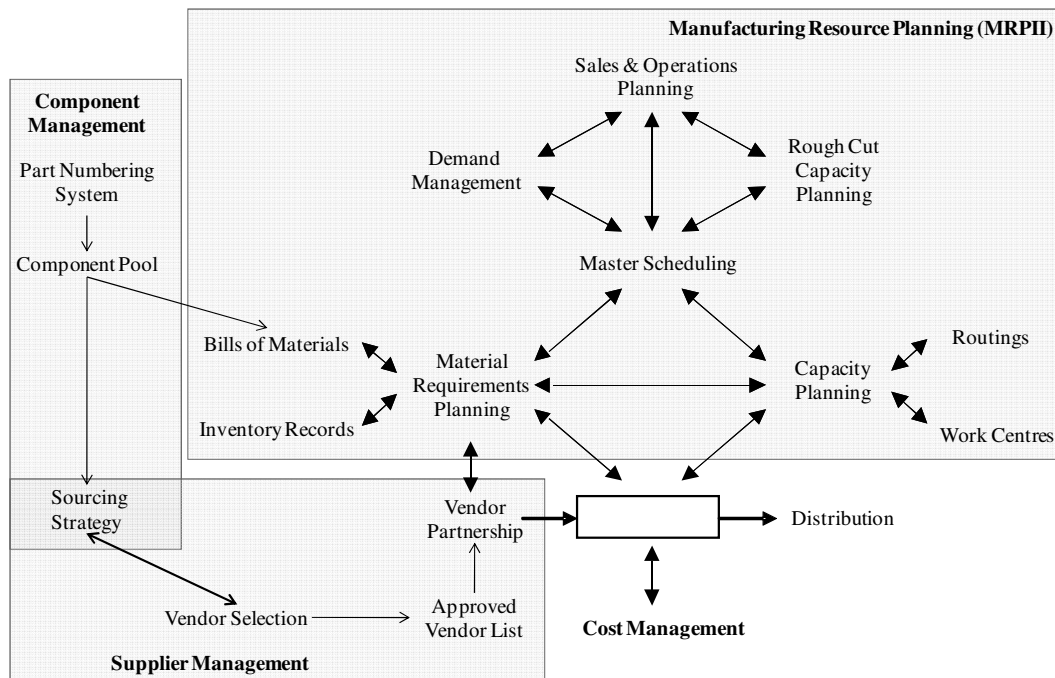


Figure 1 An MRPII architecture and the positioning of a ‘sourcing strategy’ (adapted from Harwood, 2002)

Two further dimensions need to be also considered. The first relates to the resources required to implement the sourcing strategy, which comprise not only the personnel, but also the tools (e.g. MRPII) and policies / procedures which support day-to-day activity. Labelled ‘resourcing strategy’, this entails a strategic view of resourcing issues. The second concerns both the management of the supplier, which includes the selection of the supplier and the ongoing development of the supplier relationship, and the day-to-day management of availability. The emphasis is upon competencies, resources, activity and the management all this, hence is labelled ‘supplier and availability management’.

Central to this integrative framework is the effective functioning of all the different elements giving rise to ‘performance’ considerations. This framework is conceptualised as three triangles, each taking

their place as a vertex of a larger triangle, this symbolising their integration, which is labelled the ‘sourcing triangle’ and illustrated in Figure 2. This conceptualisation offers a coherent framework to guide the systematic and strategic evaluation of all the necessary elements relating to the sourcing of materials / services.

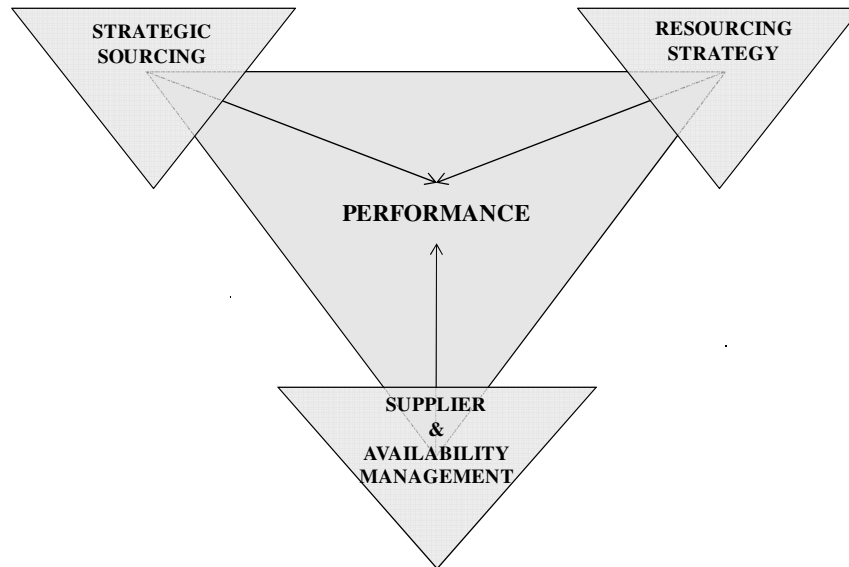


Figure 2 The ‘Sourcing Triangle’

The remainder of the paper develops this argument in more detail. Following a brief discussion of the shift from lowest cost to value for money and the growing importance of issues embraced by the concept of Corporate Social Responsibility (CSR), each of the three dimensions of the procurement triangle is systematically examined. This is followed by a brief discussion about performance and the application of the framework, then concluded with a summary.

From ‘lowest cost’ to ‘value for money’

The ‘Dutch Auction’ is a play-off of one supplier against another to get the best price or lowest cost. However, there is a downside to this which includes constant uncertainty and lack of commitment. Indeed, perhaps the most significant development within the procurement function is the shift from ‘lowest cost’ to ‘value for money’ as a guiding policy. The temptation to pursue a lowest cost policy has been successfully undermined by the recognition of the potential additional costs due to deficiencies in what is sourced at lowest cost. This marks a significant change in emphasis for purchasing and financial managers. Indeed this distinction has been recognised by Local Government in the UK. Since 2001, a ‘Best Value’ initiative has replaced the practice of Compulsory Competitive Tendering (CCT). However, the pursuit of ‘value for money’, presents, as discussed by Glendinning (1988), the challenge of how to define ‘value’.

For the sake of argument, a simplistic view can be taken that ‘value for money’ can be interpreted as the total benefit gained of an item or service in excess of its total cost. However, from a cost

perspective this needs to be qualified. Cost includes not only the cost of acquisition, but also any costs incurred during the working life of the item or service AND the cost of disposal or termination, i.e. the Total Cost of Ownership (TCO). The benefits include financial gain and also any non-quantifiable benefits such as convenience, efficiency and advantage. Thus, this notion implies a more sophisticated approach to the definition of requirements and dealings with suppliers. However, the outcome is not a homogenous approach to sourcing requirements, but is instead a heterogeneous one that is customised to the particularities of specific requirements.

Furthermore, underpinning all sourcing activity are a range of issues embraced by the concept of Corporate Social Responsibility (CSR).

Corporate Social Responsibility (CSR)

Of growing importance are the issues of ethics, work-place practices, human rights, community investment, environment and governance, this all captured under the umbrella of Corporate Social Responsibility (CSR). Furthermore, these not only concern the activities of the buyer company but are also relevant with regard to suppliers and their policies and practices. The temptation to source from low cost countries (e.g. Vietnam, China), may unwittingly expose the company to accusations of ‘exploitation’, as happened with Nike in the late 1990s. Whether this is exploitation of children, destruction of natural resources, human rights violations, there needs to be a clear company policy on such matters and also a code of conduct for suppliers, (Andersen and Skjoett-Larsen, 2009), with the assumption that there is a desire to adhere to the general principles embraced by CSR. This is not without its challenges. Indeed, Zutshi et al (2009), in their study of ‘reputable’ companies and their efforts to ensure that their suppliers did not engage in child labour abuses, highlighted how even these companies can be caught out by supplier deceptions. Nevertheless, despite these challenges, issues relating to CSR cannot be ignored.

Strategic Sourcing

The view of sourcing as a strategic issue is well established. However, what falls within the boundaries of ‘strategic sourcing’ may be debated. The model here distinguishes three key elements: component management, supplier relations and sourcing strategy, each taking their place as a vertex of a triangle (Figure 3). Not only is a strategic view taken of supplier relations, but also of the materials / services being sourced, which together allow sourcing strategies to be developed which should improve security of supply.

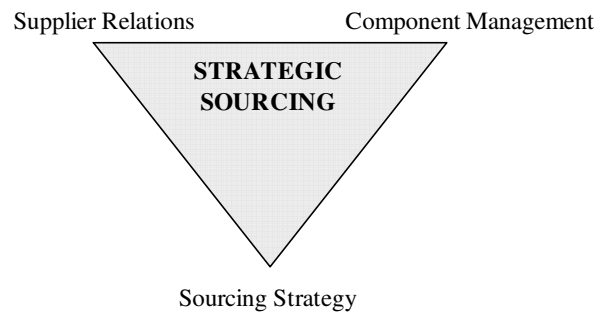


Figure 3 The ‘Strategic Sourcing Triangle’

This specificity of requirements requires their identification and quantification. This will draw upon forecasts of future business, unpacking these to derive long-term estimates of requirements by category (family or commodity type) of materials and services. The categorisation serves two purposes. First, it allows the quantification of requirements and the identification of high volume / value quantities. Second, the essential characteristics are established which must be considered when developing a sourcing strategy for a particular category. The sourcing strategy provides a framework to guide the selection of the suppliers, allowing the strategic role of each selected supplier to be clearly defined. Consideration should be given to the nature of the relationship with the supplier and whether it is to be arm’s length, a partnership or somewhere in between. Suppliers are selected according a range of criteria, a long-term contract is agreed with the approved suppliers, then the supplier becomes operational and the day-to-day relationship ensues. The ongoing relationship is managed to minimise the likelihood that suppliers can make mistakes and ensure that materials are available onsite as required, without excess inventory holding.

Component Management

The notion of component^[1] management involves all activities involved with the administration of components. This includes the process by which new components are approved and assigned a part number and thus become incorporated within the component pool (Figure 1). This encompasses not only direct materials (i.e. those used in production), but also indirect (e.g. stationary, toilet-paper).

Two issues arise. The first relates to the notion of ‘component commonality’ (Slack et al, 2007: 130) and the development of a standard component pool whereby listed components are used in preference to new components. This provides economy of scale procurement benefits, but raises the question of how feasible it is to enforce, particularly if it compromises technical requirements. The second issue concerns the categorization of the component pool, which may draw upon the part numbering system or the chart of accounts. Whilst a large number of categories may be identified, these can be aggregated into families (e.g. capacitors) and types (e.g. film, electrolytic, ceramic) and provide a manageable overview (e.g. 11 families and 54 types were identified in the production

¹ The term ‘component’ is being used loosely here to incorporate discrete items (e.g. nuts/bolts) and assemblies (e.g. power supplies).

component pool of an electronics manufacturer supplying assemblies to consumer electronics companies).

However, it is also desirable to classify components by characteristics. Krajlic (1983) suggests a classification in terms of profit impact and supply risk distinguishing between strategic (high impact / high risk), bottleneck (low / high), leverage (high / low) and non-critical (low / low). However, this raises the practical question of how to quantify this. An alternative approach is to focus on some essential operational distinctions (e.g. commodity, custom, safety critical, long lead-time, value, volume, substitutability). However, whilst attention here is upon production materials, examination of all sourced materials / services reveals a range of categories (e.g. consumables, utilities, capital expenditure items, outsourced activities), each of which, if unpacked may offer the potential for similar treatment.

This dual classification by family/type and operational characteristics allows the salient variety inherent in the sourcing requirements to be revealed so that appropriate sourcing strategies can be developed.

Supplier Relationships

One recurrent theme that has come to prominence over the last few decades concerns the nature of supplier-buyer relationships and the notion of partnership. However, this notion of ‘partnership’ within the supply chain is a long established concept within the supplier-buyer domain. Indeed, in 1979, Arndt discusses long-term collaborative relationships noting that they were not uncommon and referred to them as ‘domesticated’. However, it can be argued that more recently there has been increased attention to the notion of partnerships. Spekman (1988) contends that the recessionary conditions of the 1970s and productivity concerns of the 1980s has focused attention upon more effective procurement practices, which infers attention to the nature of the relationship between buyer and seller.

Underpinning this, is the view that, in contrast to the traditional arm’s length ‘contractual encounters’ or ‘adversarial’ relationships (Spekman, 1988), a closer partnership based relationship potentially offers benefits. Lamming’s (1993) concept of ‘lean supply’ invokes these benefits. In their study of the impact of different SCM practices upon company performance within the UK clothing industry, Valsamakis and Groves found that not only did delivery performance tend to be more reliable in partnerships, they also offered “greater flexibility and responsiveness to customer requirements” (Valsamakis and Groves, 1996: 23). Harland et al state that firms have concluded “that they will readily attain long-term cost reduction (via product or process re-engineering) by forming closer working relationship with ‘key’ suppliers” (Harland et al, 1999: 659). More recently, Lawson et al argues “that partnerships with suppliers can have a strong positive influence on firm performance through the development of joint resources and the exchange of valuable knowledge with these

individual partners’ (Lawson et al, 2009: 2651), though they also highlight that these benefits are difficult to realise, requiring higher levels of socialisation (interaction and communication) and integration (co-specialised resources). The features of a successful partnership were identified by Mohr and Spekman (1994) to include co-ordination (co-ordinated activity to achieve mutual objectives), commitment, trust and communication. However, Spekman et al (1998) note the reluctance and scepticism of buyers towards partnerships, their being more concerned with cost-saving. Indeed, Dwyer et al (1987), drawing upon the metaphor of marriage, reveals that whilst there are benefits, the exclusivity invoked of a partnership may incur opportunity costs arising from ‘better deals’ elsewhere being foregone.

Whatever the nature and scale of this reluctance, for those buyers who have the strategic vision of long-term partnerships, the process of transforming an existing supply base will have the effect of reducing the supplier base. Indeed, Swift (1995) reports upon this trend within US manufacturers in the late 1980s as they shift from multi-sourcing to single and dual sourcing. However, as noted by Spekman et al (1998) partnerships are not appropriate for all trading relationships (e.g. miscellaneous ad hoc purchases or commodities) nor are they necessarily achievable, with attitudes and inequalities (e.g. bargaining power) hindering their formation.

One implication of moving towards increased dependency upon fewer suppliers is the potential risk of disruption to supply. To minimise this potential calls for more sophisticated selection practices (Spekman, 1988; Swift, 1995), which is examined in more detail below. Nonetheless, the sourcing strategy framework presented here provides a rationale which allows the selection of individual sourcing strategies each appropriate to the family and type of item being sourced. The outcome will be a blend of sourcing approaches.

‘Sourcing Strategy’

The sourcing strategy is a systemic view of how all materials will be sourced based upon the concept of partnerships and a lean supplier base. It provides a considered approach towards the selection of appropriate suppliers for a given family or type of components, viewed from a ‘total service’ perspective. For example, Croom et al’s list of sourcing strategies includes ‘sole sourcing, single sourcing, dual sourcing, multi-sourcing, partnering sourcing’ (Croom et al, 2000: 74). The notion of a sourcing strategy presented here concerns the selection of a supplier portfolio appropriate to each family / type in terms of the unique features of each set of requirements and the particular nature of the respective supply chains. Issues to consider could include:

- level of requirements and changes (e.g. high volume, on-going requirements, one-off requirement, unpredictable fluctuations, new orders, cancelled orders, requirement ramp-down).
- features of the items (e.g. safety approved, customised, commodity, high value, bulk volume, heavy weight, long lead-time, high requirement level).

Conceptualising Supply Chain Management–The ‘Sourcing Triangle’

- supplier characteristics (e.g. raw material availability, capacity, production lead-time, product availability, responsiveness to fluctuating demand).
- location / proximity of supplier (e.g. neighbour or other side of world).
- logistics (e.g. sea, air, customs, bonded warehouse).
- frequency of delivery (e.g. daily, weekly, monthly).
- nature of delivery (e.g. just-in-time, periodic delivery).
- in-house inventory levels (e.g. stock-value, shelf-life, slow movement or obsolescence).

One major consideration of any sourcing strategy is the sensitivity of supply to disruption and the ability to source a suitable alternative (Figure 4). Whilst the commodity, which is readily available with a variety of substitutes available, is least likely to pose a threat, the opposite is the case for the speciality or custom item, which is unique with only one source. However, this is to simplify matters.

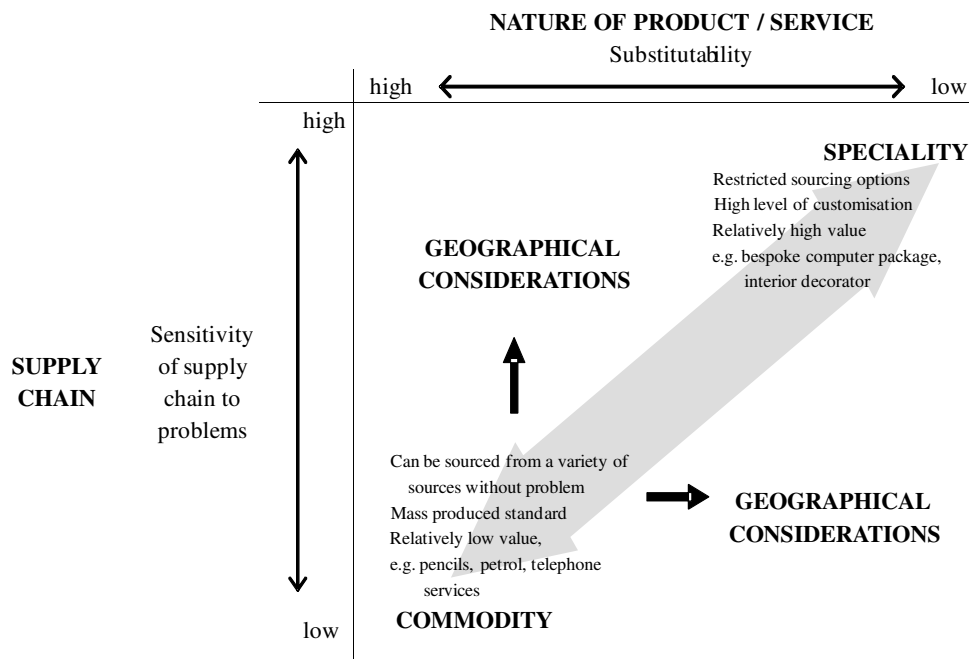


Figure 4 The interplay between supply chain sensitivity and product / service substitutability

There may be geographical considerations, which may restrict choice (e.g. if decision is made that suppliers must be located within a specific region) or increase the possibility of supply disruption (e.g. if decision is made to source from a distant location). Suitable alternatives, available from a distant supplier, may be reduced if there the decision is made to source locally. Likewise, the cost advantages of sourcing high products from a supplier located in a distant low cost country, may be countered by the possible difficulty of securing a replacement batch if there is a problem and the possibility of a line stoppage. Furthermore, the supply chain is global, dynamic and availability may vary over time between famine and glut in a cyclical manner, e.g. semiconductors. Thus, the

sourcing strategy should provide for contingencies, taking into account supply chain sensitivity and material substitutability (e.g. what will hinder an ‘emergency’ delivery if required).

Since a sourcing strategy is a supplier portfolio appropriate to a specific family / type, then a company is likely to have a number of sourcing strategies. An illustrative example of two contrasting sourcing strategies, adapted from those implemented within a SME electronics manufacturer, is presented in Table 1. The first presents the sourcing strategy for a custom item and identifies a portfolio of supplier-manufacturers. The second is for a commodity which is single sourced using a supplier-distributor. Five types of suppliers are identified. The Distributor provides logistics management at the right price and is also a single point of call for technical expertise. The Local Manufacture offers advantages due to proximity (e.g. quick turnaround as in the case of prototyping support). The Low Cost Manufacturer provides competitively priced high volume items. An Alternative Manufacturer may be identified as a second source for dual sourcing / back-up. A Specialist Manufacturer may be required for less common items outside the core component pool. The mix will vary according to the characteristics of the specific family / type.

Family	Printed Circuit Board	Semiconductors
Type	Double sided	Diodes
Characteristics	custom, approvals (3 mths), ship by air, not sea	commodity, replenishment system
Distributor	No	FTYUJULtd. (UK)
Local manufacturer	YTRG Ltd.	No
Low cost manufacturer	UYTHJU Co. (China)	No
Alternative manufacturer	GHYU Ltd. (UK parent, E. Europe site)	No
Specialist manufacturer		
Special Requirements	prototyping facility required	technical support essential
Additional comments	customer may specify manufacturer	able to recommend – provide alternatives

Table 1 An example of the sourcing strategies for both Double Sided PCBs and Diodes

In the example of the custom item, the demand varied considerable from very low volume fast-turnaround, to very high volume, but variable over time. Furthermore, it was company policy to carry no more than a month’s requirement as stock for any item. PCBs were sourced locally to support design’s requirement for 24 hour turnaround and since the volumes were less than 100, the high price is not an issue. In contrast, the unit price of sourcing from China is a fraction of that from the UK and Europe, despite the carriage and duty, which justifies a Chinese supplier for high volumes. The lead-time was four weeks, though items needed to be flown^[2], which was acceptable in view of the relatively low weight and small size. Nevertheless, this presented a planning

² In comparison, another custom item is heavy and the prohibitive cost of air-freighting, despite its low unit price, implies that it goes by sea, which may take six to eight weeks door-to-door from China to the UK.

challenge as volumes fluctuated on a weekly basis and there was only 12 weeks customer notification of end-of-life, which implied that the ramp-down of volume required careful management. An alternative UK based manufacturer had been identified with an East European production site. Whilst moderately expensive in comparison to the Far East, it provided a good alternative with a two week lead-time and was used to source moderate volumes. Since these items required approval by an independent agency (e.g. safety approval of electronic components), the choice of supplier was limited to those whose samples had been approved and, since it takes many months to get approval, approvals had been sought from both suppliers for each of their production facilities.

The Chinese supplier had been chosen for cost reasons, but it had been necessary to consider how this overseas supplier was to be managed. The following questions arise:

- How is quality to be assured?
- What happens if there is a quality problem? How will it be handled? Who will be involved in dealing with it?
- Who will bear the cost of an emergency air shipment if there is a possible shortage perhaps due to an upturn in demand or to a defective batch? How can transportation costs be controlled?
- How much safety stock should be carried? How much buffer stock should the supplier hold?
- What shipping arrangements should be agreed ^[3]? Should a shipping agent be used?
- How should exchange rate fluctuations be managed? How should payments be made?

Concerns about sourcing from China were alleviated in that the UK company had a close relationship with the Chinese company and regularly audited their production facilities. Although this scenario oversimplifies, it reveals some of the issues to be considered.

In contrast, the sourcing strategy for commodities offers an alternative approach, that of single sourcing through a distributor who offers a replenishment facility. Furthermore a variety of commodity types (e.g. diodes, transistors, electrolytic capacitors, resistors) covering a variety of families can be aggregated to present a ‘package’ of items, which individually have small value, but collectively is of significant value, and thereby secure attractive prices. The relationship might not be classified as a partnership in the sense portrayed above, but there is a one-to-one relationship between the buyer and allocated individuals within the distributor. The distributor is able to offer a variety of options regarding supply including the implementation of a replenishment system, whereby requirements can be delivered the next day and also the holding of committed buffer stock to deal with and unexpected surges in demand. One advantage offered is the single point of contact

³ The International Chamber of Commerce’s Incoterms provides an internationally recognised convention governing international trading contracts between supplier’s and buyers.

to access the product range of a wide range of manufacturers as well as specialist technical expertise about these products.

The two examples underline the key intention of the sourcing strategy, to establish the best means of supply in such a way as to ensure continuity of supply, whilst meeting the basic criteria of on-time delivery of the correct number of defect free items at an acceptable cost, and the additional criteria of working together to develop and improve that which is being sourced.

Resourcing Strategy

The resourcing strategy addresses those issues that are perhaps taken for granted–the resources to make sourcing happen. Drawing upon the resourced-based view of the organisation (Wernerfelt, 1984; Prahalad and Hamel 1990; Teece et al, 1997), it is argued that the availability and appropriate configuration of the requisite resources and competencies will establish the capability of the sourcing function to effectively manage both suppliers and availability. Three key elements can be identified that are required if the day-to-day activity is to take place: tools, personnel and policies / procedures (Figure 5).

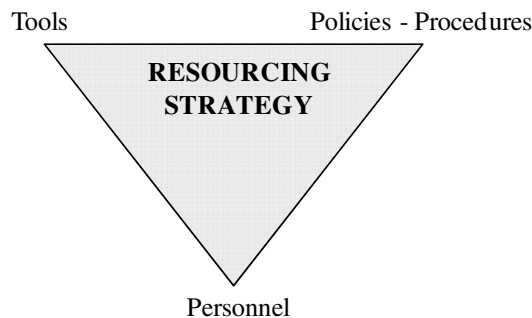


Figure 5 The ‘Resourcing Strategy Triangle’

The tools required for sourcing support the planning, purchasing and replenishment activities. The former relates to the integrated company-wide information systems typified by MRP, MRPII and ERP systems. These planning systems convert forecasts and Sales Orders into material requirements, with agreed planning windows establishing levels of acceptable change, from none within the immediate two week window to open-ended changes beyond twelve weeks. Purchasing tools relate to the administrative systems used to generate Purchase Orders (POs) and to reconcile deliveries for payment (e.g. ‘blanket orders’, consolidated invoices). Replenishment tools are those that support the call-off of materials so that they arrive just-in-time (JIT) (e.g. schedules, kanban). Not to be overlooked are cost management tools. One such is the Bill of Materials (BOMs), which is particularly useful at the design stage to alert to creep in total BOM cost during design. A more proactive approach is ‘target costing’, whereby the total BOM cost is set and there is collective effort during the design stage to meet this target (Swenson, 2003; Feil et al, 2004).

Policies / procedures establish the principles and routines that govern practices. Policies provide a reference to guide decisions and behaviour (e.g. on issues relating to CSR). Procedures reduce process variation by standardising the day-to-day activities. Indeed, the need to expedite can be eliminated if there is a policy of supplier partnership and procedures that govern deliveries. Together, these should reduce the likelihood of unacceptable outcomes (e.g. early deliveries).

The most important element is people, with attention focusing upon their competencies and organisation. Rather than the role being one whereby a shop-floor operator is given a telephone and told to place POs, it requires the development of skills (e.g. supplier evaluation and negotiation) and knowledge (e.g. of suppliers, market trends), raising the issues of training and professional development. Likewise, the question rises as to their effective deployment and whether they can be dedicated to the management of specific sourcing strategies and dealing with specific suppliers (e.g. both supplier selection and day-to-day interaction). Furthermore, is their integration within the activities of the organisation, since everyone will have sourcing requirements.

Collectively, the configuration and embedding of these three elements within the organisation will shape the conditions for the effectiveness of sourcing activities and their management.

Supplier & Availability Management

Whilst the resourcing strategy is concerned with both the creation and management of the conditions for the day-to-day enactment of the sourcing strategy, the third dimension is concerned with the enactment activities themselves, i.e. the management of both suppliers and availability. Constituting the ‘Supplier & Availability Management Triangle’ three elements can be distinguished: selection, integration / development and availability (Figure 6). These are discussed in the next sections.

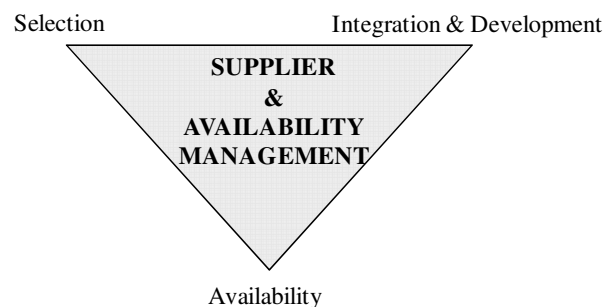


Figure 6 The ‘Supplier & Availability Management Triangle’

Supplier Management

Supplier management concerns the ‘cradle-to-grave’ relationship with the supplier. Wagner (2003) distinguishes three broad supplier management activities: selection (including supplier base reduction), development of capabilities and supplier integration. Whilst ‘selection’ is concerned with

the introduction of the supplier, ‘integration and development’ relate to the maintenance of the relationship; this distinction explaining their positioning as two apexes of the ‘Supplier & Availability Management Triangle’.

Supplier Selection

Supplier selection can take variety of forms from chance encounter or selection on the basis of price alone to systematic evaluation involving a range of criteria, both factual (e.g. plant capability) and soft (e.g. intuition). However, the risk of supplier non-performance and the negative impact upon the business supports the argument for a more rigorous approach, particularly for repeat or complex purchases. One such approach is presented in Harwood (2002: 69-87) for the selection of a supplier of an Enterprise Resource Planning (ERP) system. The complex requirements of both the system and support services justify a systematic evaluative process using a variety of criteria and involving the different organisational stakeholders. This appeal of multiple criteria for selection has been long recognised. Weber et al (1991) revisited the work of Dickson (1966) who identified and ranked 23 selection criteria based upon a survey of 273 North American purchasing practitioners. In their conclusions, they allude to the attraction of quantitative approaches to vendor selection, allowing tradeoffs between criteria to be evaluated. Indeed, analytical approaches involving multiple criteria range from simple scoring to sophisticated programming (Weber et al, 1991; Min, 1993; de Boer et al, 2001; Talluri and Narasimhan, 2005). Whilst these approaches invoke objectivity in the selection process, assigning values to a criterion is inherently subjective and the decision to source from a specific supplier is likely to involve more than one person, raising the potential for conflicts of opinion. However, de Boer et al (2001: 76) in describing criticism of ‘decision models’ responds:

“The key-point is to consider decision models as instruments for eliciting, communicating and scrutinising one's personal and subjective preference structures and uncertainties rather than a rigid format replacing this all.”

Whatever the arguments for or against quantitative approaches, the fundament issue is that evaluation is based upon a multiple of criteria which consider the long term viability of the target organisation, the opportunities for mutual gain and the ability to sustain supply to requirements even though these are likely to change over time. The view is that the relationship extends beyond a mere transaction, in which items are delivered at the right price, quality and time in return for payment, to one in which each partner identifies opportunities for the other to gain. The challenge, as in finding the ‘right’ marriage partner, is in finding the ‘right’ supplier partner. In practice, this is likely to involve site visits in addition to discussions / negotiations about the potential.

Supplier Integration and Development

The concepts of supplier integration and development focus attention upon how entwined the supplier and buyer become in each other’s activities. For example, is the supplier sufficiently

involved with the buyer’s design and production activity to be able to identify technical and cost-saving opportunities, or is there reluctance or hesitance on the part of one or both of the parties? Wagner’s (2003) study of supplier integration (i.e. the meshing of supplier – buyer processes) suggests that integration is most intensive during design specification, pilot production and production stages of the product life-cycle, though even during these stages there is general hesitance and this varies across industries. Does the buyer trust the supplier to manage production line-side stocks, replenish them and invoice for only those items used? This also raises the question of whether the notion of integration, for example with regard to knowledge sharing, has been explored during the selection process. Similar arguments hold for supplier development. For example, a cost-saving opportunity might arise from the modification of tooling or a new approach to set-up which the supplier can exploit for its other customers. In both integration and development the emphasis is upon the long-term.

Availability Management

The third apex of the ‘Supplier & Availability Management Triangle’ relates to ‘Availability Management’. This is concerned with ensuring the timely delivery of requirements in such a way as to minimise stock-holding. In other words, materials are available when they are required for use, hence the focus upon the notion of ‘availability’ rather than, say ‘delivery’. This suggests that buyers themselves have a good relationship with customers to understand both immediate and long term demand and the sourcing implications, this not being confined to the sales function. This utilises the requisite tools to manage both short lead-time, low value commodities and long lead-time, high value custom items as well as any risk inherent in the pipeline. This invokes different approaches being used simultaneously (e.g. MRPII, kanban), each reflecting the characteristics particular to the respective sourcing strategies. This becomes critical as requirements ramp-down with the risk of being left with unwanted stock. It might also be expected that there is general awareness of market-place development, to alert of possible ‘allocation’ issues, but also to take advantage of ‘opportunistic’ purchases arising from specific circumstances presented (e.g. stock clearance).

Pulling it all together

The framework proffered provides a holistic view of company sourcing, specifically from the viewpoint of a SME engaged in design-manufacturing. It identifies three dimensions. The first, ‘strategic sourcing’, can be simply considered as ‘the aim’, i.e. to supply organisational requirements. The second, ‘resourcing strategy’, is the ‘means’. ‘Supplier & availability management’, the third dimension, is the ‘activity’. The framework unpacked is presented in Figure 7. This reveals another, yet un-discussed dimension, which relates to how the whole system performs.

Conceptualising Supply Chain Management–The ‘Sourcing Triangle’

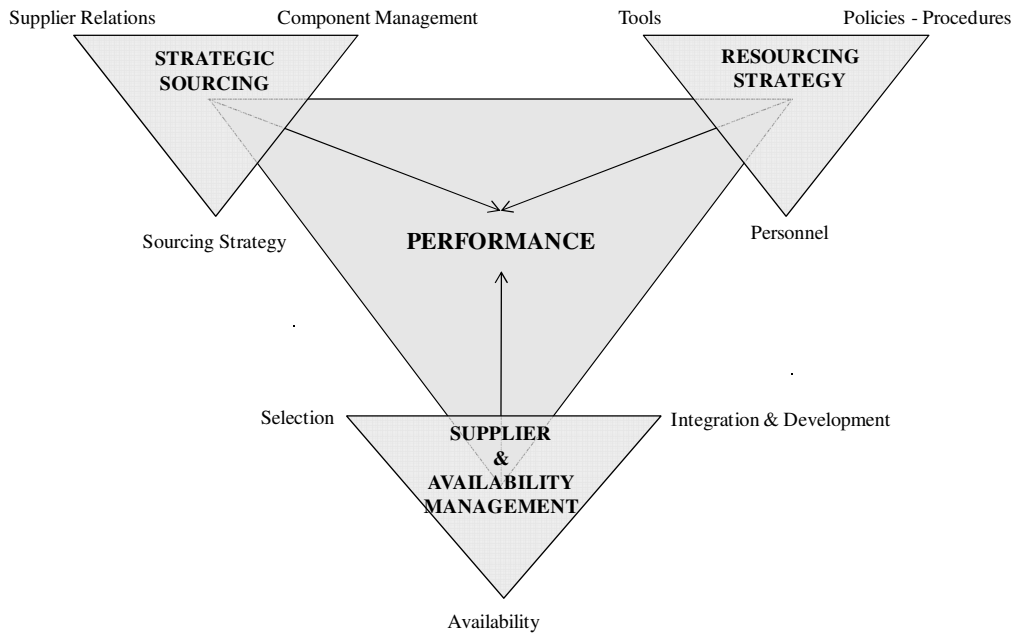


Figure 7 The ‘Sourcing Triangle’ unpacked

Performance

The notion of performance from a sourcing perspective may focus upon the three measurables of supplier timeliness, quality, and price. Important these may be, they do not fully capture the effectiveness of the sourcing function. The scope of the sourcing function relates to all activities concerned with smooth flow of materials to the point of usage, which covers not only supplier activity, but also internal activities, which include design, planning and storage. Each of the three dimensions presented, upon opening, can reveal appropriate measures and targets. For example Strategic Sourcing can be evaluated in terms of the target supplier base defined by the set of sourcing strategies. Likewise Resourcing Strategy can be assessed in terms of administration costs and competency levels. Supplier & Availability Management measures include the percentage of vendors on annual contracts, inventory record accuracy, stock-turnover, stock excess to requirements, slow-moving / obsolete stock, stoppages, shortages, BOM costs. The outcome are a range of performance measures capturing the different features of the sourcing activity.

Application

One final issue which has been hitherto ignored concerns application of the framework. It offers those responsible for sourcing (e.g. supply chain managers) a guide to systematically evaluate the sourcing activity. However, any analysis will reveal a disparity between the framework and actual practices. Whilst the framework is tidy, the analysis of practices will reveal their untidiness and omissions from the framework. Nonetheless the framework identifies many of the key issues facing an organisation with regard to sourcing.

The nine different elements provide headings under which the company’s approach to sourcing can be addressed. Furthermore the interdependency of the elements implies not a linear process of analysis, planning then implementation. Rather, it is an unfolding one. The resources available determine how responsibilities for establishing and implementing sourcing strategies are allocated to individuals. Indeed, one basic constraint to implementation is the lack of or inadequacy of resources, particularly competencies. Knowledge of the suppliers is required to determine the most appropriate sourcing strategy, yet this strategy shapes which suppliers are evaluated. Furthermore, the need for specific sourcing strategies emerges from an analysis of the component pool. To add, implementation is a time consuming activity requiring the participation of all stakeholders. However, the aim is not to produce a document but instead create a dialogue. However, drawing upon the notion of ‘boundary object’ (Star, 1989) a document can focus attention to generate creative discussions about possibilities. The main challenge is the action to improve. Resistance, hesitance, reluctance, inertia and complacency are just a few words to describe barriers to reaping the rewards of a sound approach to sourcing.

Summation

The complexity of sourcing the requirements of an SME engaged in design and manufacturing activity has been conceptualised as a ‘sourcing triangle’. Unpacked, it reveals three dimensions, each of which comprises three elements. It is proposed that examination of the detail pertaining to each of the elements allows the sourcing activity to be examined and developed in a systematic and systemic manner from a strategic perspective. Underpinning this evaluation is the achievement of performance, which is defined in terms of a variety of measures.

However, in contrast to this idealisation, the reality of sourcing is that it is messy. Caught at the interface between demand (e.g. production) and supply (i.e. suppliers), sourcing is an around the clock balancing act, which, despite the best of planning, is fraught with the unexpected and not uncommonly involves problem solving and trade-offs. The challenge is about what can be done, not only to minimise the likelihood that situations arise, that, when they occur, then they can be quickly and effectively resolved.

It is proposed that the framework proffered, despite its idealised view of sourcing, provides an analytical tool to allow the complexity of sourcing to be evaluated and acted upon. By creating the conditions for the effective handling of sourcing, whether it is in the sourcing strategy, supplier selection, the organisation of the operations or any other aspect, the outcome should be a more effective sourcing activity.

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References

- Andersen, M. & Skjoett-Larsen, T (2009) Corporate social responsibility in global supply chains. *Supply Chain Management: An International Journal*, 14(2) p75-86.
- Arndt, J. (1979) Toward a concept of domesticated markets. *Journal of Marketing*, 43 (Fall) p69-75.
- De Boer, L. Labro, E. & Morlacchi, P. (2001) A review of methods supporting supplier selection. *European Journal of Purchasing and Supply Management*, 7(2) p75-89.
- Bozart, C., Handfield, R. & Das, A. (1998) Stages of global sourcing strategy evolution: an exploratory study. *Journal of Operations Management*, 16 p241-255.
- Croom, S. Romano, P. & Giannakis, M. (2000) Supply chain management: an analytical framework for critical literature review. *European Journal of Purchasing and Supply Management*, 6 p67-83.
- Dickson, G. (1966) An analysis of vendor selection systems and decisions, *Journal of Purchasing*, 2(1) p5-17.
- Dwyer, F.R., Schurr, P.H. & Oh, S. (1987) Developing buyer-supplier relationships. *The Journal of Marketing*, 51(2) p11-27.
- Dyer, J.H. (1996) Specialized supplier networks as a source of competitive advantage: evidence from the auto industry. *Strategic Management Journal*, 17(4) p271-291.
- Farmer, D. (1972) The impact of supply markets on corporate planning. *Long Range Planning*, 5(1) p10-15.
- Feil, P., Yool, K. & Kim, I. (2004) Japanese target costing: a historical perspective. *International Journal of Strategic Cost Management*, 2(2) p10-19.
- Glendinning, R. (1988) The concept of value for money. *International Journal of Public Sector Management*, 1(1) p.42-50.
- Harland, C.M. Lamming, R.C. & Cousins, P.D. (1999) Developing the concept of supply strategy. *International Journal of Operations and Production Management*, 19(7) p.650-671.
- Harwood, S.A. (2002) *ERP, the implementation cycle*. Oxford: Butterworth Heinemann.
- Hirakubo, N. & Kublin, M (1988) The relative importance of supplier selection criteria: the case of electronic companies procurement in Japan. *Journal of Purchasing and Materials Management*, 34 p19-24.
- Joyner, B.E. & Payne, D (2002) Evolution and implementation: a study of values, business ethics and corporate social responsibility. *Journal of Business Ethics*, 41 p297-311.
- Kotabe, M. & Murray, J.Y. (1990) Linking product and process innovations and modes of International sourcing in global competition: a case of foreign multinational firms. *Journal of International Business Studies*, 21(3) p383-408.
- Kraljic, P. (1983) Purchasing must become supply management. *Harvard Business Review*, (September-October) 61(5), p109-117.
- Lawson, B., Cousins, P.D., Handfield, R.B. & Petersen, K.J. (2009) Strategic purchasing, supply management practices and buyer performance improvement: an empirical study of UK manufacturing organisations. *International Journal of Production Research*, 47(10) p2649-2667.
- Min H. (1993) International supplier selection: a multi-attribute utility approach. *International Journal of Physical Distribution & Logistics Management*, 24(5) p24-33.
- Mohr, J. & Spekman, R. (1994) Characteristics of partnership Success: partnership attributes, communication behavior, and conflict resolution techniques. *Strategic Management Journal*, 15(2) p135-152.
- Prahalad, C.K. and Hamel, G. (1990) The core competence of the corporation, *Harvard Business Review*, p79-91.
- Slack, N., Chambers, S. & Johnston, R. (2007) *Operations Management*, (5th Edition) Harlow: FT Prentice Hall.
- Spekman, R.E. (1988) Strategic supplier selection: understanding long-term buyer relationships. *Business Horizons*, (July-August) p75-81.

- Spekman, R.E., Kamauff, J.W. & Myhr, N (1998) An empirical investigation into supply chain management: a perspective on partnerships. *International Journal of Physical Distribution & Logistics Management*, 28(8) p630-650.
- Star, S.L. (1989) The structure of ill-structured solutions: boundary objects and heterogeneous distributed problem solving. *in* Gasser, L. & Huhns, M.H. (eds.) *Distributed Artificial Intelligence (Vol. 2)*. San Francisco, CA: Morgan Kaufmann Publishers Inc.
- Swenson, D., Ansari, S., Bell, J. & Kim, I (2003) Best practices in target costing. *Management Accounting Quarterly*, (Winter) p12-17.
- Swift, C.O. (1995) Preferences for single sourcing and supplier selection criteria. *Journal of Business Research*, 32 p105-111.
- Talluri, S. & Narasimhan, R (2005) A note on ‘A methodology for supply base optimization’. *IEEE Transactions on Engineering Management*, 52(1) p 130-139.
- Teece, D.J., Pisano, G. & Shuen, A. (1997) Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7) p509-533.
- Wernerfelt, B. (1984) The resource-based view of the firm. *Strategic Management Journal*, 5(2) p171-180.
- Valsamakis, V. & Groves, G. (1996) Supplier-customer relationships: do partnerships perform better?. *Journal of Fashion Marketing and Management*, 1(1) p9-25.
- Wagner, S.M. (2003) Intensity and managerial scope of supplier integration. *Journal of Supply Chain Management*, 39(4) p4-15.
- Weber, C., Current, J.R. & Benton, W.C. (1991) Vendor selection criteria and methods. *European Journal of Operational Research*, 50(1) p.2-18.
- Wills, G. Hodgson, J. Pearce, C. Phillips, P. & Walters, D. (1977) Purchasing and supply tomorrow. *International Journal of Physical Distribution & Logistics Management*, 8(1) p.3-60.
- Zutshi, A., Creed, A. & Sohal, A. (2009) Child labour and supply chain: profitability or (mis)management. *European Business Review*, 21(1) p42-63.