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Supply chain flexibility as a determinant of supplier selection

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ABSTRACT

This paper examines how buying organisations can configure their supply networks to achieve supply chain flexibility. Supply chain flexibility can be rationalised by considering two key antecedents of flexibility, sourcing and vendor flexibility. Network co-ordinators can group their suppliers under three categories, framework agreement suppliers, preferred suppliers and approved suppliers, each with different flexibility implications. It is possible to maintain a suitable level of supply chain flexibility by maintaining a pool of suppliers in each category. Case studies from the construction sector are used to explore supply chain flexibility, which include a house building contractor from the UK and six of its suppliers.

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1. Introduction

The turbulence of the modern business environment is well documented (Christopher, 2005). Globalisation, technological change and more demanding customers, amongst other drivers, result in higher levels of uncertainty for organisations. Agile supply chains have been promoted as a route to competitive advantage in such an environment with flexibility as a key enabler to cope with high levels of uncertainty (Christopher, 2000; Naylor et al., 1999; Prater et al., 2001; Yusuf et al., 1999). Manufacturing flexibility has been well addressed in the literature (Gerwin, 1993; Koste and Malhotra, 1999; Oke, 2005; Upton, 1994, 1995), but flexibility in the larger context of supply chain flexibility has received less attention by researchers. As Oke (2005) has noted, the subject of flexibility can be complex and confusing. The plethora of research on flexibility has resulted in many perspectives and definitions. Ambiguity regarding terminology still exists, although the fundamental ideas appear to be very similar (Naim et al., 2006).

This paper examines how supply chain flexibility can be achieved in the construction industry, where high

levels of uncertainty arise from project specific demands. The 'strategic partnering' approach to construction has recently been promoted by UK government reports and government bodies, such as the Latham Report (1994) and Constructing Excellence (2003), and there has also been a growing interest by researchers (Akintoye et al., 2000; Beach et al., 2005; Bresnen and Marshall, 2000; Cox and Thompson, 1997; Ireland, 2004). However, in an industry dominated by projects, often varying in frequency, scope and scale, strategic partnerships need to be considered vis-à-vis flexibility requirements. In this paper, we begin by proposing a framework to rationalise supply chain flexibility that identifies two antecedents of supply chain flexibility, vendor and sourcing flexibility. Six supplier case studies are then used to explore vendor flexibility. The paper then addresses combinations of sourcing and vendor flexibility strategies and discusses the implications of these combinations.

2. Literature review

2.1. The agile supply chain

Agility has been proposed as a response to the high levels of complexity and uncertainty in modern markets (Christopher and Jüttner, 2000; Gunasekaran, 1999; Yusuf

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et al., 1999). According to Naylor et al. (1999), ‘agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile market place’. The link between agility and flexibility is widely discussed in the literature (Christopher, 2000; Prater et al., 2001; Swafford et al., 2006). Swafford et al. (2006) propose that the combined effect of different types of flexibilities determine an organisation’s supply chain agility, with flexibility being an antecedent of agility. Christopher (2000) suggests that the origins of agility lie in flexible manufacturing systems.

2.2. Supply chain flexibility

Flexibility is generally perceived as an adaptive response to environmental uncertainty (Gerwin, 1993). More specifically, it is a reflection of the ability of a system to change or react with little penalty in time, effort, cost or performance (Morlok and Chang, 2004; Upton, 1994). Hence, flexibility may be seen as a proactive attribute designed into a system, rather than a reactive behaviour that may in fact result in a detriment to time, effort, cost and performance (Naim et al., 2006). Flexibility may also be seen as having two distinct elements, those internal to the business that describe system behaviour, and those that are viewed externally by customers, which determine the actual or perceived performance of the company (Oke, 2005).

Vickery et al. (1999) have defined supply chain flexibility as an amalgamation of product flexibility, volume flexibility, new product flexibility, distribution flexibility and responsiveness flexibility. Swafford et al. (2006) build on this and develop a model that explores the interactions among flexibilities with respect to design, sourcing, manufacturing and logistics. Prater et al. (2001) identify speed and flexibility of sourcing, manufacturing

and delivery as key determinants of supply chain flexibility. Tachizawa and Thomsen (2007) conclude that there are two main strategies that could be employed at supply chain level in order to increase the flexibility of a supply chain: improved supplier responsiveness and flexible sourcing. A classification of the supply chain flexibility literature can be found in Table 1. The external flexibility of a supply system is determined by these two internal sources of flexibility: vendor and sourcing flexibility. The external flexibility types can be defined as

- new product flexibility is the range of, and ability to accommodate the production of new product;
- mix flexibility is the range and ability to change products currently being produced;
- volume flexibility refers to the range of and ability to accommodate change in production output;
- delivery flexibility is the range of and ability to change delivery dates;
- access flexibility is the ability to provide extensive coverage and reflects the capability of a supply chain to provide the required geographical coverage for different customers (Naim et al., 2006).

Supply chain flexibility is rationalised as comprising of two key concepts: vendor flexibility and sourcing flexibility. Based on the literature, the following definitions are proposed:

1. Vendor flexibility—the specific types of flexibility relating to individual vendors that support manufacturing, warehousing or transport operations.
2. Sourcing flexibility—the ability to reconfigure a supply chain network through selection and deselection of vendors.

Table 1.
Classification of supply chain flexibility literature.

| | Vendor flexibility | | | Sourcing flexibility | | | |
|------------------------------|--------------------|-------------|-----------|---|---|------------------------------------|-----------------------------|
| | Manufacturing | Warehousing | Logistics | Ability to reconfigure the supply chain | Ability to adapt to market requirements | Increasing supplier responsiveness | Integration of supply chain |
| Abrahamsson et al. (2003) | | X | X | | X | | |
| Baker (2006) | | X | | | X | | |
| Das and Abdel Malik (2003) | X | | | | | X | |
| Duclos et al. (2003) | | | X | X | X | | |
| Gerwin (1993) | X | | | | | | |
| Lee (2004) | | | | | X | | X |
| Naim et al. (2006) | | | X | | | | |
| Prater et al. (2001) | X | | X | X | | | |
| Slack (2005) | X | | | | | | |
| Stevenson and Spring (2007) | | | | X | | | X |
| Swafford et al. (2006) | X | X | X | | X | | |
| Swafford et al. (2006) | X | X | X | X | | | |
| Swafford et al. (2008) | | | | | | | X |
| Tachizawa and Thomsen (2007) | | | | X | | X | |
| Vickery et al. (1999) | X | | | | X | | |
| Zhang et al. (2003) | X | | X | | | | X |

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