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Understanding Supply Chain Management

EDWARD SWEENEY

A plethora of supply chain management (SCM) definitions have been developed in recent years. There is evidence of differences in emphasis and approach between different industrial sectors, geographical areas and functional backgrounds. Furthermore, a variety of associated terminologies have also been developed which has added to the complexity. As noted by Ross (1998), this can limit management's understanding of the SCM concept and the practical effectiveness of its application. Nonetheless, SCM has risen to prominence in recent years in both academic and commercial circles. The number of professional bodies involved in the area is also a reflection of the growth in interest in the subject. However, there is still no universally accepted definition of what SCM is (and, indeed, is not). As pointed out in a seminal article by Mentzer *et al.* (2001):

> Despite the popularity of the term Supply Chain Management, both in academia and practice, there remains considerable confusion as to its meaning. Some authors describe SCM in operations terms involving flow of products and materials, some view it as a management philosophy, and some view it as a management process.

This chapter comprises three elements. Part A provides an overview of the historical evolution of SCM and of the various definitions which have been developed. Part B goes on to introduce the author's definition based on the *Four Fundamentals* of SCM. Finally, Part C explains the role within SCM of one of its principal antecedents, namely logistics.

PART A – SCM: EVOLUTION AND DEFINITION

HISTORICAL EVOLUTION OF SCM

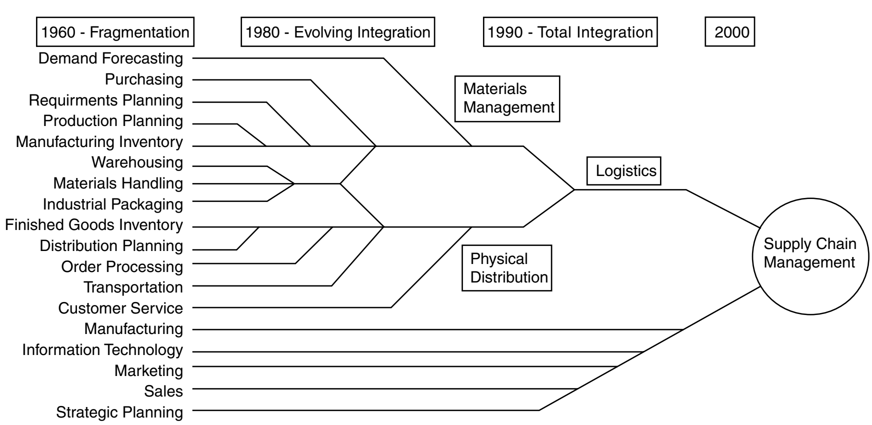
The term SCM was originally introduced by management consultants in the early 1980s (Oliver and Webber 1982). Since then several attempts have been made to place contemporary SCM thinking in an historical context and/or to plot its historical development and evolution. The following sections provide an overview of three of the more useful and widely cited approaches. They also provide a framework for describing some key concepts and models which are now effectively constituent elements of the overall integrated SCM paradigm.

Fragmentation to Integration Model

Battaglia (1994) developed a model which indicates the way in which SCM has evolved from its main constituent functions from the 1960s to date (see Figure 3.1). It indicates that the evolution has involved a shift from highly fragmented to much more integrated approaches with the 1990s characterised as the decade of 'Total Integration'.

During the 'Evolving Integration' decade (the 1980s) various functional areas became integrated into *materials management* and *physical distribution* – these then became further integrated under the *logistics* umbrella. SCM extends this integration further by linking logistics with manufacturing, information technology (IT), marketing, sales and strategic planning. The model provides a useful visual representation of the way in which companies have attempted to move away from the functional stovepipe or silo approach to more integrated approaches, facilitated by IT. It is interesting to note that this model is analogous to two other 'three phase' approaches to logistics evolution.

Figure 3.1: SCM Evolution



Source: Battaglia, A.J. (1994), 'Beyond Logistics: Supply Chain Management (Operations)', *Chief Executive* (*US*), Nov.–Dec., 99, 48–50.

Masters and Pohlen (1994) describe the evolution of logistics management and the role of logistics managers in the following three phases:

1. Functional management (1960–1970): Functions such as purchasing, shipping and distribution are each managed separately.
2. Internal integration (1980s): The management of the supply chain functions of a single facility is unified and it becomes the responsibility of a single individual.
3. External integration (1990s): The management of supply chain functions throughout the chain is unified, requiring cooperation and coordination between links in the chain.

La Londe (1994) also describes the evolution of integrated logistics in three phases:

1. Physical distribution: The distribution of goods is all that needs to be managed by a logistics manager.
2. Internal linkages: It is important for the logistics manager to control both internal supply functions and physical distribution.
3. External linkages: Logistics management requires cooperation in management with upstream and downstream entities to maximise the benefits of the total logistics system.

The specific relationship between SCM and logistics will be discussed in Part C of this chapter.

Lean/Functional to Agile/Customised Migratory Model

Christopher and Towill (2000) use the personal computer (PC) supply chain to illustrate the migration from *lean*, functionally oriented approaches to *agile* and more customised supply chain architectures. They use a model originally developed by Murokoshi (1994) to highlight the four main stages in this evolutionary process (see Table 3.1).

As pointed out earlier, *lean* thinking has its origins in the Japanese automotive industry, in particular in the Toyota Production System (TPS) and the just in time (JIT) paradigm (Ohno 1988; Womack and Jones 2003). The main objective of this thinking was the identification and elimination of non-value-adding activities (NVAs) or waste (*muda* in Japanese). As noted in Chapter 2, an NVA may be defined as: *any activity (or resource or asset) that adds cost (or time) to any supply chain process without adding value from a customer perspective.*[1] In the early 1980s the focus was largely on cost

[1]Author's definition based on Jones *et al.* (1997), Goldrat and Cox (1992), Womack and Jones (2003) and others.

Table 3.1: Migration from Lean/Functional to Agile/Customised Supply Chains

Supply chain evolution phase	**I**	**II**	**III**	**IV**
Supply chain time marker	Early 1980s	Late 1980s	Early 1990s	Late 1990s
Supply chain philosophy	Product driven	Market orientated	Market driven	Customer driven
SC type	Lean functional silos	Lean supply chain	Leagile supply chain	Customised leagile supply chain
Market winner	Quality	Cost	Availability	Lead time
Market qualifiers	(a) Cost (b) Availability (c) Lead time	(a) Availability (b) Lead time (c) Quality	(a) Lead time (b) Quality (c) Cost	(a) Quality (b) Cost (c) Availability
Performance metrics	(a) Stock turns (b) Production cost	(a) Throughput time (b) Physical cost	(a) Market share (b) Total cost	(a) Customer satisfaction (b) Value added

Source: Christopher, M. and Towill, D.R. (2000), 'Supply Chain Migration from Lean and Functional to Agile and Customised', *Supply Chain Management: An International Journal*, 5(4), 206–213.

optimisation through improved efficiency, particularly in manufacturing processes.

As customer service issues such as product availability and lead time evolved from being order (or market) qualifiers to becoming market (or order) winners, the need emerged for not just lean functions and supply chains but for responsive and customer-oriented configurations. In other words, *agility* became a key concern. The agility concept is closely associated with Cranfield University in the UK and with Prof. Martin Christopher in particular (Christopher 2000; Christopher and Towill 2001). Christopher (2000) defines agility as 'a business-wide capability that embraces organisational structures, information systems, logistics processes and, in particular, mindsets'. Flexibility, with its origins as a business concept in flexible manufacturing systems (FMS), is a key characteristic of an agile organisation. In essence, the need for a shift from lean to agile paradigms has been driven by dynamic and increasingly competitive global markets. The concept of mass customisation (MC) is a key driver of this shift.

The MC concept was first coined by Davis (1989) and it promotes the ability to provide individually designed products and services to every customer. This contrasts starkly with the Henry Ford Model T paradigm. It is achieved through high process agility, flexibility and integration (Pine *et al.* 1993; Hart 1995; Eastwood 1996; Da Silveira *et al.* 2001). In short, as markets become more competitive and customers more discerning, there is a need to move towards the MC ideal, and supply chain agility is the route for making this happen. As Christopher (2000) notes, leanness may be an element of agility but it will not in itself provide the degree of organisational flexibility which is increasingly required to meet changing customer requirements.[2]

A final element of the Christopher and Towill Migratory Model worthy of comment is the *leagility* concept. The desirability of being both lean and agile has resulted in the rather contrived term, *leagile*, being coined. A leagile supply chain is defined as one which combines elements of both the lean and agile approaches. In technical terms, leagility involves the strategic use of a decoupling point (Naylor *et al.* 1999). This decoupling point aims to achieve responsiveness to volatile demand downstream (i.e. in the market) while providing level scheduling upstream from the decoupling point. In essence, it is an attempt to get the best of both worlds.

Lummus and Vokurka Historical Perspective

Lummus and Vokurka (1999) suggest that the origins of SCM can be traced to the quick response (QR) programme in the textile industry and later to the efficient consumer response (ECR) programme in the grocery industry.

The origins of QR are often traced back to Blackburn (1991) and a useful definition is provided by Fisher and Raman (1996). In the specific context of the textile sector they describe QR as:

> An initiative designed to cut manufacturing and distribution lead times through a variety of means including information technology such as electronic data interchange, point of sale scanners, and bar coding, logistics improvements such as automated warehousing and increased use of air freight, and improved manufacturing methods, ranging from laser fabric cutting to reorganisation of the sewing process into modular sewing cells.

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[2]He actually makes the point that an industry may be very lean but not be sufficiently flexible or 'nimble' to consistently meet customer requirements profitably. He suggests that the automotive industry might be a case in point.

This definition recognises the central role of IT in the supply chain improvement process and that improving the speed of response to customer requirements demands a focus on both distribution and manufacturing issues. ECR originated from a grocery industry task force that was established in 1992 (Kurt Salmon Associates Inc. 1993) and focuses on the need for quick and accurate information flows in the supply chain as the key to supply/demand synchronisation and inventory reduction. The key common objective of QR and ECR is speed of response to customer requirements – both recognise this as an integral element of value creation. They also recognise the centrality of effective information management in the achievement of this objective.

Lummus and Vokurka (1999) go on to outline other early documented efforts at improving supply chain performance in companies across a range of sectors.[3] Their paper continues with a focus on collaborative efforts aimed at identifying 'best practices' (e.g. the SCOR model developed by the Supply Chain Council, see below) and on the need for a clear linkage between SCM and overall corporate strategy. It concludes by suggesting seven guidelines for companies beginning to manage across the entire supply chain. All seven relate, directly or indirectly, to the need for supply chain companies to work in a more coordinated and collaborative way.

The Supply Chain Council (SCC) was organised in 1996 and initially included 69 practitioner companies meeting in an informal consortium. By 2005, it had grown to approximately 800 members worldwide, across a range of sectors. The Supply Chain Operations Reference (SCOR) model is a product of the SCC and 'provides a unique framework that links business process, metrics, best practices and technology features into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain management and related supply chain improvement activities' (Supply Chain Council 2005). Three key features of the model are important (illustrated in Figures 3A.1–3A.3 in Appendix A, respectively):

1. It integrates the concepts of business process re-engineering (BPR), benchmarking and process measurement into an integrated framework.
2. It is based on five distinct management processes:
   (i) Plan: Demand/supply planning and management.

[3]Hewlett-Packard, Whirlpool, Wal-Mart, West Co., Becton Dickinson, Baxter and Georgia-Pacific Corp.