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# Towards the Sustainable Supply Chain of the Future

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## Towards the Sustainable Supply Chain of the Future

EDWARD SWEENEY AND DANIEL PARK

### INTRODUCTION

A working definition of supply chain management (SCM) – the *Four Fundamentals* – was introduced in Chapter 1. This final chapter reflects on this definition in the light of the detailed issues introduced in each subsequent chapter. It provides a framework for looking ahead and identifying a number of key emerging challenges that are likely to play a significant role in the design and management of the economically, socially and environmentally sustainable supply chain architectures of the future.

### THE *FOUR FUNDAMENTALS* IN REVIEW

As noted in Chapter 1, the *Four Fundamentals* construct represents an attempt to concisely yet comprehensively define the essence of the subject. It seeks to describe the main constituent elements of SCM, as well as position SCM in the overall corporate strategic framework. Furthermore, it aims to provide a definition that is intelligible irrespective of the functional background, business sector or geographical location of the practitioner. The following sections reflect on each of the *Fundamentals* in turn, based on the detailed issues introduced in the earlier chapters. Table 17.1 sets out the main implications of the issues raised in each part of the book on each of the *Fundamentals*. This is not intended to be an exhaustive analysis of the issues raised; rather, the intention is to identify the major implications of our definition of SCM, particularly in view of recent economic and business volatility.

Table 17.1: Reflection on the Four Fundamentals

Book Part	I Globalisation (Chapters 2 and 3)	II Supply Chain Design (Chapters 4, 5, 6, 7 and 8)	III From Transactions to Relationship Management (Chapters 9, 10 and 11)	IV Role of Technology (Chapters 12 and 13)	V Evolving Logistics Challenges (Chapters 14, 15 and 16)
<b>Fundamental</b>					
<b>One – Objectives</b>	<ul style="list-style-type: none"> <li>Strategic Role of SCM (3)</li> </ul>	<ul style="list-style-type: none"> <li>Responsiveness (4)</li> <li>Volatility and uncertainty (5)</li> <li>Resilience and risk culture (6)</li> <li>Customer service (8)</li> </ul>	<ul style="list-style-type: none"> <li>Service orientation (10, 11)</li> </ul>	<ul style="list-style-type: none"> <li>Role of 3PL in integration (12)</li> <li>Digital supply chains (13)</li> <li>ICT in 3PL (12)</li> </ul>	<ul style="list-style-type: none"> <li>Environmental objectives (14, 15)</li> <li>Role of customer service (16)</li> </ul>
<b>Two – Philosophy</b>	<ul style="list-style-type: none"> <li>Added complexity (2, 3)</li> </ul>	<ul style="list-style-type: none"> <li>Dynamic alignment (4)</li> <li>Interconnectedness (5)</li> <li>Integration (8)</li> <li>Performance measurement (8)</li> </ul>	<ul style="list-style-type: none"> <li>Service/product supply chains (11)</li> </ul>	<ul style="list-style-type: none"> <li>Role of 3PL in integration (12)</li> <li>Digital supply chains (13)</li> <li>ICT in 3PL (12)</li> </ul>	<ul style="list-style-type: none"> <li>Internal and external integration (16)</li> </ul>
<b>Three – Manage the Flows</b>	<ul style="list-style-type: none"> <li>ICT as an enabler (2)</li> <li>Role of nation state (3)</li> </ul>	<ul style="list-style-type: none"> <li>Provenance (7)</li> </ul>			<ul style="list-style-type: none"> <li>Environmental impact of material movement (14)</li> </ul>
<b>Four – Relationships</b>		<ul style="list-style-type: none"> <li>Collaboration (6)</li> </ul>	<ul style="list-style-type: none"> <li>Relationship development (9)</li> <li>Communication medium (9)</li> <li>Evolution of relationships (10)</li> <li>Supplier selection (10)</li> </ul>		

### ***Fundamental One: Setting SCM Objectives***

The objectives of SCM are to meet or exceed the required or demanded customer service levels in targeted markets or segments and to optimise total supply chain capital and operating costs. This service/cost approach has long been regarded as central to SCM. But whereas initially SCM was concentrated on issues of operational improvement, it should be recognised that these broader objectives mean that SCM is now first and foremost a strategic issue for organisations. As emphasised in Chapter 2, contemporary SCM contributes to potential differentiation on the basis of the complete corporate business model.

Chapter 8 noted that, as customer service has become a central element, of the differentiation of product offerings, so SCM has assumed a pivotal, strategic role. In this context, and as illustrated in Chapter 5, there is an increasing need for firms to be responsive to evolving customer requirements. For example, as noted in Chapter 16, on-shelf availability (OSA) of products is an important business criterion in the fast-moving consumer goods (FMCG) and grocery retail sectors, and is the customer service output of a successful supply chain system. As the authors of that chapter stated, 'if a product ain't on the store shelf you can't sell it!' Chapter 4 noted that traditionally structured and managed organisations are often incapable of achieving the required level of responsiveness and that 'dynamic alignment' is necessary. This involves segmenting the marketplace along *behavioural* lines, and then linking these customer groups to the enterprise with the appropriate value propositions.

Moreover, as a large proportion of the total cost base of many organisations is tied up in the supply chain, the maximisation of profits requires that a strong focus is given to total supply chain cost optimisation. As discussed in Chapters 2 and 3, globalisation of business and the attendant globalisation of supply chain architectures have sharpened the focus of firms on the key business objectives articulated in *Fundamental One*. The recent global economic turmoil, as well as other sources of risk and uncertainty in the business environment, requires that firms develop a supply chain risk management culture as part of the process of building resilient supply chains (see Chapter 6). Furthermore, the adoption of more service-oriented approaches to SCM has some merit when considering overall SCM objectives. Chapter 10 noted the potential competitive advantage deriving from the management of an efficient and effective supply chain as a result of the adoption of a service-oriented strategy approach rather than a traditional product-oriented approach. Similarly, Chapter 11 suggested that understanding the role of *service* as a fundamental basis of exchange is the key for the future competitive advantage of organisations in volatile global environments.

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Additionally, this is taking place at a time when advances in system technologies are bringing about new standards in time compression, and the life cycles of the product-service mix and of business strategy itself are shortening. This necessitates rapid response and rapid configuration or re-configuration of highly customised supply chains, as specifically addressed in Chapters 2 and 3.

Finally, the analysis in Chapter 14 indicated the magnitude of the challenge confronting supply chain and logistics managers as they prepare their operations for a low carbon world. Chapter 15 outlined one approach to reducing the air pollution impacts of road freight transport in urban areas that policy makers have begun to adopt in European cities in recent years – the introduction of Environmental Zones. This work indicates that, in addition to traditional commercial objectives relating to service and cost, supply chain managers need to consider how best to develop specific objectives in relation to environmental sustainability. The need to create supply chains that are both economically and environmentally sustainable has become a key focus at firm, supply chain and policy levels.

***Fundamental Two: SCM Philosophy***

The central philosophy of SCM is based on the need for supply chain integration (SCI). This is relevant both in terms of the external (i.e. inter-firm) as well as the internal (i.e. intra-firm) supply chain. Chapter 8 suggested that high levels of integration of processes and information is one of the key characteristics of SCM excellence. It also recognised that supply chain activities are often measured very much in isolation from each other. This can lead directly to these activities – both within and external to the focal firm – being managed in isolation and at cross purposes (i.e. ‘what gets measured gets done’).

The issues raised in Chapters 2 and 3 in relation to globalisation have resulted in supply chain architectures becoming more global in complexion. As a direct consequence of their global nature, many such supply chains are exposed to diverse, and often powerful, external forces. As noted in Chapter 2, in this environment SCM has the potential to enable operations of different scales (including relatively small companies) to take advantage of the opportunities presented by opening markets and to withstand increasingly international competition. The recent turbulence in markets around the world has highlighted the interconnectedness of modern global supply chains. As a result of outsourcing and offshoring, companies now find themselves at the centre of a network of suppliers, original equipment manufacturers, distributors and customers. Chapter 5 noted that these networks have become more complex, and with this com-

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plexity comes risk and vulnerability. This results in the need to build both agility (Chapter 5) and resilience (Chapter 6) into the integrated supply chain. The 'dynamic alignment' concept introduced in Chapter 4 takes the SCI concept to a new level whilst retaining the central SCM tenet of synchronisation (or 'alignment') of supply and demand.

Recent developments in information and communications technology (ICT) have facilitated significant changes in the manner in which organisations view SCM and, in particular, the key issue of SCI. Used properly, ICT has the potential to act as a key enabler of SCI. The corollary of this is that, without significant ICT capability, firms are unlikely to be able to realise the required levels of SCI in practice. The trend towards the outsourcing of significant parts of logistics functionality (vertical disintegration) by an increasing number of manufacturers and retailers has characterised the contemporary business environment in recent decades. As a consequence, third-party logistics services providers (3PLs) have been forced to rethink their business configurations, seeking a more integrated approach with customers through expanding their role in the supply chain. The issues discussed in Chapter 12 in relation to this specific aspect of SCI raise many issues for 3PLs, as well as for other upstream and downstream actors.

Much supply chain theory has its origins in manufacturing and focuses on traditional product supply chains. The increasing importance of service industries, particularly in developed economies, has sharpened the focus on the application of SCM concepts in this sector. As noted in Chapter 11, the service-dominant (S-D) view of marketing has major potential implications for the way in which SCM principles and practices are adopted in service-based organisations. Developments in ICT have resulted in another important class of products being developed, i.e. digital products. The nature of these products is such that they do not obey the rules associated with traditional (i.e. physical) product-oriented supply chains. The conceptual digital supply chain framework introduced in Chapter 13 has a strong focus on the factors affecting innovation and innovation cycle management of digital products. The need to reconsider the SCI concept for services and for digital products are key challenges for supply chain professionals in these sectors.

Finally, the focus of *Fundamental Two* is on both internal and external integration. In the context of FMCG and grocery retailing it is interesting to note that Chapter 16 concluded by specifically highlighting the need for (i) better internal supply chain processes (including better communication) and (ii) meaningful collaboration with suppliers that requires improved external communication. This reinforces the role of SCI as an element of the wider SCM paradigm with specific reference to effective internal and external communication.

### ***Fundamental Three: Managing the Flows***

*Fundamental Three* recognises that for a supply chain to achieve its maximum level of effectiveness and efficiency, material flows, money flows and information flows throughout the entire chain must be managed in an integrated and holistic manner, driven by the overall service and cost objectives. Consideration of material flows raises issues about logistics systems, while consideration of information flows raises issues in relation to the enabling role of ICT in SCM.

In relation to the role of the nation state in global SCM, Chapter 3 asked the question: do its logistics systems *lubricate* global supply chains? Interestingly, it concluded that in the specific case of an open economy like that in Ireland there is a need to ensure that it continues to develop a strong, competitive logistics system. It noted that, while it is unlikely in the short to medium term to build a *physical* logistics sector with strong export earnings potential, the whole area of developing, managing and coordinating supply chains might present an opportunity worth developing in its own right in Ireland. The ability to seize this opportunity is dependent upon technology capability and connectivity, as well as on the knowledge and skills of logistics and SCM professionals. Perhaps most interestingly, this opportunity is only possible by decoupling the *physical* material flows in the international supply chain from the information flows. In this context, and as discussed in detail previously (Sweeney, 2007), in the future SCM will become less concerned with the physical movement of material and more with the management of information and knowledge.

Furthermore, the physical movement of products through supply chains (i.e. freight transport) is a major contributor to environmental degradation. Chapter 14 argued that the transition to a low-carbon economy over the coming decades will require fundamental changes in many aspects of freight logistics operations and technology. It went on to highlight possible measures that will be likely to decarbonise logistics most cost effectively, including modal shift, improved vehicle design, load consolidation, increased fuel efficiency and the switch to battery power and biofuels. In the future, radical changes are likely in terms of how material flows through supply chains are handled.

Finally, the role of ICT in the management of information flows is well documented and is a theme throughout this book. Chapter 2 highlighted the importance of managerial systems technology in global networks and Chapter 12 highlighted the role of information systems in the changing 3PL business landscape. From an SCM perspective, it can be argued that managing the information flows is the most critical of the 'flow management' activities. This is because the flow or movement of materials or money is



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usually triggered by an associated information movement. Effective management of material and money flows is, therefore, predicated upon the effective management of the related information flows. From a provenance and traceability perspective (see Chapter 7), the practical opportunities generated by new technologies are extraordinary but the associated managerial challenges are immense.

### *Fundamental Four: Relationships*

Finally, the holistic SCM approach often requires a reappraisal of the way in which both internal and external customer and supplier relationships are created and managed. This is a recurring theme throughout this book. For example, Chapter 6 focused heavily on the building of collaborative supply chain relationships, both internal and external, as part of the process of establishing resilient supply chain operations. Chapter 9 recognised that relationships lie at the heart of interorganisational exchange markets and are a major focus of research in the fields of SCM and marketing. Chapter 10 described the evolution of supply relationship systems in recent decades in terms of four main phases: traditional supply, supply system development, strategic alliance and globalisation. This highlights that relationships have evolved from traditional forms (mainly based on arms-length and cost-based relationships) to approaches founded on strategic trust-based and collaborative relationships.

Relationships are based on communication between two or more entities within the supply chain. Chapter 9 demonstrated that communication practices are a complex phenomenon influenced by the maturity of customer-supplier relationships, and by the product or service context. This has a particular relevance for supply networks where customer value is created through services rather than product-based operations. Furthermore, supplier assessment and selection processes have changed in line with the evolution of customer-supplier relationships. Chapter 10 suggested that there are several complex technical and managerial challenges that need to be addressed if robust assessment methodologies are to be more widely adopted.

## THE SUPPLY CHAINS OF THE FUTURE

The preceding section provided insights into some of the ways in which SCM is likely to evolve in the future. Several contributors to this volume have authored or co-authored books in recent years, each of which provide additional perspectives on possible future directions for supply chains, as well as for SCM as a discipline. For further details readers are referred to



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a number of these. Sweeney and Faulkner (2007) – Chapter 17 in Sweeney (2007) – discusses the ‘new business model of the 21st century’. Chapter 9 in Gattorna (2006) is concerned with ‘new business models for new supply chains’ and has a focus on the concept of ‘embedded alignment’. Chapter 4 of the current volume builds on this material. Chapter 15 of Mangan et al. (2008) discusses new supply chain designs and concludes by noting that ‘essentially supply chains are all about people’ (Mangan et al., 2008: 290). Chapter 13 of Grant et al. (2006) is concerned with logistics strategy and presents a useful overview of future challenges and critical issues in the strategic planning process.

In this context, perhaps the two most insightful contributions are from Westbrook and New (2004) in relation to SCM as a discipline and Christopher (2005) in relation to the likely characteristics of the successful supply chains of the future.

In a speculative manner, Westbrook and New (2004) suggest four possible futures for SCM. The first possibility (‘marginalisation’) is that SCM has no future. The second possible future (‘realisation’) involves an increase in the practical adoption of SCM thinking, with SCM becoming more reality than rhetoric. The third (‘rationalisation’) involves continuing rational development of the various elements of SCM. The final proposed future is labeled ‘canonisation’. As the authors note:

This term refers here not to an elevation to the company of saints .... The sense of canonisation here is one of entering the canon, the canon of approved modes of thinking about business. (Westbrook and New, 2004: 284)

Christopher (2005) highlights the shift from mass production and mass marketing (‘yesterday’s model’) to mass customisation (MC) and one-to-one marketing (‘tomorrow’s model’). He goes on to describe a number of critical ‘business transformations’, all of which have significant implications for the effective management of the supply chains of the future. One of these transformations is that from stand-alone competition to network rivalry. In this context, he notes that:

The companies that will be most successful in this era of network competition will be those that are best able to utilise the resources and competencies of other partners across the network. (Christopher, 2005: 291)

In short, Christopher’s (2005) perspective (and that of other contributors to this book) prompts us to question the generalised applicability of the classical ‘theory of the firm’ to twenty-first century business. The concept, tools and techniques of SCM inevitably create fuzzy boundaries as a result

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of the move from essentially vertical and easily bounded to more horizontal and responsively changing sets of interdependent relationships.

Whilst there is evidence of significant differences in the level of diffusion of contemporary SCM concepts and practices across different sectors – see, for example, Sweeney et al. (2008) – we believe that SCM is unlikely to be either completely marginalised or ‘canonised’ in this era of network competition. Rather, further adoption of existing theory in practice (‘realisation’) and continuing development of SCM’s constituent elements (‘rationalisation’) is more likely. The latter is in line with the work presented in most of the constituent chapters of this volume.

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