Guest editorial

New supply chain models: disruptive supply chain strategies for 2030

Systematic review and the need for evidence

Systematic reviews of management literature have only become common over the past 15 years, and it can be argued that the purpose of such reviews is to aid evidence-based decision-making. Roots of the systematic review approach are to be found in medical and health-care research where appraising and synthesising evidence presented in multiple studies has been critical in limiting bias. The recognition by Smith in the early 1990s in his publication in the *British Medical Journal* (Smith, 1991) that 15 per cent of medical interventions are supported by solid scientific evidence provided an interesting insight into the extent of the problem within medicine and the need for evidence-based practice. This and similar insights provided the impetus for systematic review to be used more efficiently within medical research.

When presenting such works, evidence is critical and to generate it, a robust auditable methodology needs to be applied. If done well, a researcher repeating the study should come to the same conclusions as the original researcher.

This contrasts with many narrative reviews that tell a story from literature. Such weaker reviews take elements from literature that support the author's thesis and ignore any which are not seen to fit. This can result in biased conclusions, not repeatable by other researchers and un-auditable and subjective claims.

Supply Chain Management: An International Journal has pioneered the promotion and publishing of systematic reviews in the area of logistics, procurement and supply chain management (SCM). Our first special issue, published in 2012, focussed on "Building Theory in Supply Chain Management" through systematic reviews of the literature (Volume 17, Numbers 4 and 5 [2012]). The response from this call was overwhelming and resulted in a Parts 1 and 2 having to be published to capture excellent insights from authors. Sister journals have recognised the important contribution that systematic reviews can make and have undertaken similar special issues. For example, the *International Journal of Physical Distribution and Logistics Management* (Volume 45, Numbers 1 and 2 [2015] and Volume 48, Numbers 3 and 8 [2018]). More recently, Durach *et al.* (2017), in the *Journal of Supply Chain Management*, proclaim a new paradigm for systematic reviews in SCM, further highlighting the impact of the approach within the sector.

Our first call for papers in 2012 was launched after experiencing success in applying systematic reviews in a variety of contexts within our business schools. Initially, research students starting doctoral studies and who applied systematic reviews within some of our universities (e.g. Cranfield School of Management) found the approach rigorous and empowering. Evidence provided by such techniques clearly identified "gaps in the body of knowledge" and enabled students to quickly and effectively focus on their desired dissertation topic. Systematic review dissertations were also submitted as a part requirement for master of research degrees, leading to doctorial research. On taught masters programmes, a modified systematic approach was also applied by students undertaking research-based thesis within the university. This approach allowed students to rigorously review literature in a "scientific" way, and methodological steps in the systematic review methodology proved useful by enabling most students to "hit the ground running". The rigour required by systematic reviews also increased the number of MSc thesis research projects developed into refereed academic papers. Because of the success of this approach, the authors were invited to promote the approach globally to research students and academics. The approach is now used readily for teaching and learning at masters and doctorial levels, enabling learners to progress in a structured way but still supporting creativity in interpretation of insights.

The value of systematic reviews in SCM has also been recognised by commercial organisations. As part of research interventions, it was found that companies were willing to "pay" for systematic reviews, enabling a strong evidence-based foundation for commercial leadership.

What makes a good systematic review?

An important question often asked is "what makes a good systematic review?" As will be seen from papers presented in these issues, key components need to ensure that work is evidence-based and robust. A variety of different approaches can be applied, and papers presented in these special issues have aimed to all follow a systematic and auditable methodology.

When introducing the review context and assessing its quality, it is useful to ask the following:

> *Q1.* Has the researcher identified an appropriate focus and scope?

This is particularly important as, firstly, a systematic review requires focussing on a specific, tightly defined area. Before the review can be undertaken, the researcher will often need to produce a more traditional review to identify the specific area to focus on in detail.

When the methodology for the review is being implemented, further questions need to be asked, including:

> *Q2.* Is the review transparent, repeatable and auditable? Have the procedures for searching, selecting, appraisal, data extracting and synthesising been made explicit and are they logical and defendable? Have journal and publication-quality criteria been identified and applied? Has the material excluded and included in the review been fully justified? Are the inclusion and exclusion criteria clear and defendable? Does the reviewer clearly demonstrate what is, and what is not, in the field of study?

For sound results and analysis, the following additional questions need to address the descriptive and theoretical analysis elements of the review:

Q3. Does the reviewer provide a comprehensive field map by using a balanced set of characteristics? Has the reviewer provided a descriptive analysis (for example, geographical, analytical, sector and chronological) within the body of literature? Is the review complete, with no obvious omissions (key authors, concepts, references, journals commonly used, etc.)?

Q4. Has the reviewer identified and demonstrated an understanding of the main theoretical and methodological debates in the field? Has the reviewer provided a thematic and relational analysis of the body of literature? Does the review identify potential research gaps and make recommendations for future investigation?

The basic approach and method of systematic review has remained relatively unchanged; however, the tools and techniques used to provide systematic and auditable insights from the literature are evolving rapidly. The effective use of what could be termed "big data analytics" to mine literature and identify connections has evolved in the past couple of years. For example, Leximancer software (Leximancer, 2018), which analyses text documents to identify high-level concepts and visualise them, is proving invaluable for some investigations. Bibliometric analysis using citation-network analysis is also proving useful as part of the systematic review process; influential publications can be readily identified among clusters and networks of journals, research studies and individual publications (for example, VOSviewer, 2018; CitNetExplorer, 2018). Such tools and approaches can provide novel maps of the subject field and support the identification of common themes and concepts. We anticipate such approaches to be used more effectively in coming years in systematic reviews of the literature.

We have been overwhelmed by the response to our call and received a significant number of high-quality papers. It is hoped that this special issue will become a further benchmark for systematic reviews in the area of SCM and will encourage others to undertake such work by further developing theory in the subject area.

The aim of this special issue was to consider breakthrough and emerging technologies that may influence SCM in your industrial sector or business. There is a gap between these emerging technologies and their use, and we wish to explore this and their potential to reshape industry and ecosystem. A particular challenge for contributing authors has been the "lag" within the academic literature; it can be argued that in such a fast-developing area of breakthrough and emerging technologies, the debate in practitioner literature is at times more relevant and current, with the academic literature following. To capture important practitioner literature, researchers need to modify inclusion and exclusion criteria while maintaining rigour and auditability. It is hoped that this special issue forms the foundations for empirical research in the impact of disruptive technologies in SCM and encourages others to develop theoretical and practical insights in the area.

Overview of special issue, Part 1
Nine articles are summarised as follows:

Article 1: Information Sharing in Supply Chains: A Review of Risks and Opportunities using the Systematic Literature Network Analysis

This submission explores risks and threats related to emerging technologies and impact on information sharing in the supply chain. Current literature focusses on internal hazards related to information sharing, with limited consideration of risks associated with external threats that include intentional and non-intentional information leaks, such as virus attacks. The literature review reveals four clusters where the emergence of Industry 4.0 presents risks, opportunities and implications for SCM:

- protection of supply chain from internal threats;
- asymmetric information in the supply chain;
- technology for data sharing and e-commerce; and
- information for improved supply chain resilience.

Complex supply chains are vulnerable to leakage of information, and the literature review considers how firms mitigate risk and build resilience. Implications for information sharing and managing risks associated with emerging technologies are encapsulated in key constructs related to trust building, interpersonal relationships, collaboration and cooperation mechanisms, government support and institutional and contractual environment.

Article 2: The Self-Thinking Supply Chain

The self-thinking supply chain is related to the adoption of autonomous and predictive capability developments in information communication technologies. The results of the systematic literature review show that the internet of things (IoT) and artificial intelligence are the digital technologies most often associated with a fourth industrial revolution. Automated collection and analysis of massive amounts of data within supply chains enables real-time decision-making, reducing operating costs. The predictive capability supports demand management, minimising the bull-whip effect and reducing failures that lead to supply chain disruption. RFID has been applied in SCM for many years and is the basis of IoT, which reduces the need for human intervention through machine-enabled decisions. Suggested research streams are related to:

- quantifying benefits of technology adoption;
- designing self-thinking architecture in different contexts;
- investigating risks of cyber threats; and
- exploring managerial and policy perspectives of the self-thinking supply chain.

Article 3: Impact of IoT Challenges and Risks to SCM

IoT is defined as a network of physical objects which are digitally connected to sense, monitor and interact with a company and its supply chain. The focus of research has been on the potential value and applications, with limited studies on the negative effects. Within this review, challenges to adoption have been identified as economic (high costs, business model adaptation and unknown business benefits or return on investment); social (privacy concerns, trust issues, impact on human lives and unknown effects on society); technical (security, lack of standards and interoperability, insecure Web interfaces and authorisation); political (lack of legal regulations, security regulations, data usage between organisations and opportunism); network-related (trust,

implementation, strong collaboration, intensive data exchange, power balance and asymmetrical information); and organisational (operational, financial and human resources). To overcome these, academics and practitioners need to look beyond traditional business models, build value through cooperation, build trust and mitigate fears over privacy. Future research should consider how information is delineated between organisations and the impact of trust building and information security within collaboration arrangements.

Article 4: Understanding blockchain technology for future supply chains: a systematic literature review and research agenda

Blockchain technology uses shared data infrastructure that update in real time, process transactions in minutes and allow for the secure exchange of data in a distributed manner. The systematic literature review posed four research questions:

RQ1. To identify the drivers for blockchain deployment in supply chains. The main drivers for seamless connectivity are trust, ethics and social responsibility, supporting growing consumer awareness of product authenticity, provenance and sourcing legitimacy. The review highlighted the dark side of cryptocurrencies, including limited governance systems, regulation and privacy concerns.

RQ2. To identify areas where blockchain provides the most value for SCM. The importance of traceability and visibility are key to large-scale deployment of blockchain, leaving a digital footprint from manufacturer to end user.

RQ3. To explore the challenges and barriers to diffusion within the supply chain. The need to nurture network relationships and develop shared values is highlighted. Unwillingness to share information and associations with criminal activity are key barriers, as well as consumer privacy and environmental concerns related to energy consumption.

RQ4. To develop a future research agenda.

This review provides insights into the value of blockchain technologies in four supply chain areas: extended visibility and traceability; supply chain digitalisation and disintermediation; improved data security; and smart contracts.

Article 5: Traceability for Sustainability: Literature Review and Conceptual Framework

This paper explores how companies embed traceability in their global supply chains by adopting advanced technologies such as IoT, RFID and blockchain. A conceptual framework is derived from the systematic literature review, comprising three main dimensions: governance, collaboration and tracking and tracing. Governance is made up of formal (regulation, compliance mechanisms, codes of conduct and industry standards) and informal mechanisms (trust and relational control). Collaboration is the backbone of SCM and linked to communication and information sharing. Tracking and tracing is related to organisational practices and processes involved in real-time tracing and monitoring of products throughout the supply chain. Visibility and transparency, enabled by technological tools and management systems, are preconditions for effective tracking and tracing. Findings demonstrate that the technologies can only operate when the supply chain is connected in a single ecosystem and support the notion of a circular economy. Enabling technologies opens the door to new possibilities to apply traceable systems, facilitates the development of capabilities and fosters strategic collaboration.

Article 6: Swarm Intelligence Approaches in Supply Chain Management: Potentials, Challenges and Future Research Directions

Swarm intelligence is based on swarm-based algorithms, which have been used extensively in supply chain network design. This article presents generic formulations for optimisation problems in distribution network design, vehicle routing, resource allocation, inventory management and supplier management. One of the challenges for SCM is that all the actors in the supply chain work under different contexts, with different objectives and constraints. In the literature, swarm intelligence focusses on improving problems, and one of the traits of swarm intelligence is capturing the self-organising nature of swarms. The authors suggest that it is imperative that managers have a basic understanding of underlying swarm intelligence algorithms before implementing smart technology software. This paper presents some guidelines for implementation.

Article 7: Smart Industry and the Pathways for HRM 4.0: Implications for SCM

This paper addresses the potential impact of Industry 4.0 on human resource management. The results highlight four key themes: educational changes, employment scenarios, work infrastructure resources and work meaning. Owing to the introduction of technologies and automation, old working activities are disappearing and being replaced with entirely new ones, which may create tensions between humans and machines. As the work environment and required skills sets change, organisations will have to align their HRM strategies and practices with Industry 4.0 to address workforce employment and skills development. The application of digital technologies will alter business models, change work patterns and create new employment opportunities. This has far-reaching implications for education and training, as it may lead to redundancies as labour is replaced by machines. This contribution states that the fourth industrial revolution presents risk (inevitable job losses), opportunities (more efficient production systems) and challenges (introduction of new business models and new education systems) as technology and knowledge management revolutionise operations in organisations and across supply chains.

Article 8: Facing Disruptive Technologies: Aligning Purchasing Maturity to Contingencies

Disruptive technologies are expected to change every aspect of purchasing, including managing the supply base, supply risk and supplier relationships. This submission explores how purchasing maturity and purchasing alignment are suitable approaches to respond to disruptive technologies. Each approach is not helpful on its own, and the study suggests that purchasing must adopt a new approach to respond to disruptive technologies. Purchasing maturity means applying best practice to help purchasing respond to changes in the environment. Purchasing–strategic alignment means linking

purchasing practices to the firm's strategy and provides a method to select the most suitable practices for responding to disruptive technologies. The authors suggest that these two research streams are usually not linked in academic literature, and a contingency perspective is required, whereby purchasing maturity models are contingent on purchasing strategy, thereby ensuring a consistent approach to dealing with technological disruptions.

Article 9: A look into the Past and Future: Theories within Supply Chain Management, Marketing and Management

This submission sets out to identify the most frequently used theories used in SCM research. Thirty theories are briefly outlined that may be appropriate to investigate the implementation and use of disruptive technologies in the supply chain. The broad brush approach aims to support the theoretical development within SCM by drawing upon SCM, marketing and management literature. The results show that supply chain researchers usually rely on a small number of theories and the resource-based view and transaction cost economics are the most prevalent theories used to provide theoretical insights. This comprehensive list of 30 theories may offer alternatives for supply chain scholars to apply a novel theoretical lens to the subject area.

Summary

The systematic reviews in this special edition make a foundational contribution to research into disruptive supply chain strategies. It is recognised that as is the case in many emerging technologies and strategies, some will fall away as research and debates continue to develop. However, we do hope that the papers in this special edition will enthuse academics and practitioners to ask questions and innovate, benefiting society, the environment and the global economy.

References

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Dr Beverly Wagner is the Editor of *Supply Chain Management: An International Journal*. Her interest lies in the area of buyer/supplier relations, which includes inter-organisational cooperation, supply chain management, network organisations and innovation in SMEs. Beverly has been involved in the research of formation and implementation of partnering and business alliances in the drinks and packaging sector, as well as in the microelectronics and oil and gas industries. Over time, the focus of her research changed from investigating supplier and retailer relations to the use of social network techniques for understanding complex inter-organisational relationships. Beverly's current areas of interest lie in the better understanding of how companies implement sustainable business models, innovation management processes, open innovation implementation and value creation in buyer/supplier relationships.