Editorial: Systems approaches are still providing new avenues for research as the foundation of logistics and supply chain management

As a young researcher—admittedly a long time ago—I was struggling with capturing the connections of the many published articles on logistics management. Apparently, many articles dealt with the same topics, yet they were not the same. There seemed to be different viewpoints on what was a scientific contribution and what kinds of methods were allowed. Why did everyone not agree with these questions? Without an understanding of the different research traditions, it was difficult to compare results, validate them and create a meaningful discussion of the various contributions.

Within the Nordic research community, which consists of economists, engineers and management researchers, there were several answers to these questions. In this community, I learnt about systems from engineers. Then, it became clear that there are various philosophies of science that do not have the same understanding of what a theory is and what appropriate methods are. I was searching the philosophy of science literature for a systems perspective and the research implications of such a perspective. To my surprise, I did not find it here, but luckily, I came across a book about methodologies in business research where the systems approach was one of three approaches. I also learnt that, depending on the methodology, the term theory has a different meaning depending on the philosophy of science it originates from. That made a lot of sense to me. Understanding this better, I published my research on this topic in "Schools in Logistics Research" in 2004 (Gammelgaard, 2004). This rather old article is still my daily research guide.

Since my early days as a researcher, a lot has been written about systems and systems theories in operations, logistics and supply chain management (SCM) so that one might think that there is not much more to say about the topic. However, it seems like systems theories of different kinds are still flourishing in the literature, each providing its own recommendations on how to understand modern supply chain and logistics management. It also seems that the new challenges of resilience and sustainability in supply chains have made systems thinking modern again. Below, I highlight some developments in systems approaches and/or theories recently seen in the field.

Society's challenges regarding the COVID pandemic and climate change have called for a deeper understanding of the resilience and circularity of supply chains. The old-fashioned tool of value stream mapping has been rediscovered in an attempt to create an overview of supply chains that have grown ever more complex. For example, Choi *et al.* (2020) suggested that companies should map their supply chains to assess where problems might occur so that responses to disruptions such as COVID-19, can be made in due time. With over 20 years of efficient, global supply chains where only relations to first-tier suppliers were considered relevant, this seems like a very good idea. In line with this argument, Fabbe-Costes *et al.* (2020) proposed the usage of *supply chain maps* as so-called boundary objects. As systems that need to integrate flows of materials and information, supply chains have many boundaries to span. Mapping the supply chain increases communication between the entities of a supply chain so that coordination and integration are improved. Therefore, Fabbe-Costes and co-authors

The International Journal of Logistics Management
Vol. 34 No. 1, 2023
pp. 1-4

0957-4093
DOI 10.1108/IJLM-01-2023-601

have perceived maps as boundary objects, claiming that it is not the map, the territory, but the process of drawing and discussing them that is of value to supply chain actors. As Choi *et al.* (2020), they see supply chain maps increase in importance in these turbulent times.

However, particularly in turbulent times, changes in supply chains can be made very quickly so that supply chain mapping, here as setting the "territory" of the supply chain (Fabbe-Costes *et al.*, 2020), may not only be costly, but also no longer be a true representation of the supply chain once the map has been finalised. Gaur *et al.* (2022) argued that the reason for this problem is that supply chains are vast, complex global networks consisting of business communities rather than chains. This makes transparency very difficult and, at times, impossible because network relations may change quickly when disruptions set in with increased competition for the same resources.

Because supply chains as networks have been discussed in the field for a long time (although apparently not with sufficient emphasis), Jacobides *et al.* (2018) proposed a specific term for densely knitted networks, namely that of the business ecosystem. An ecosystem consists of "... a set of actors with varying degrees of multilateral, nongeneric complementarities that are not fully hierarchically controlled" (p. 2264). An ecosystem is further perceived as an alternative governance structure to that of the vertical hierarchy of supply chains. This means that the companies in an ecosystem may act as a whole, but within the system, there will be both collaborative and competitive relations that may vary over time. Because ecosystems may very well be one new way of looking at supply systems, Gaur *et al.* (2022) referred to systems including generic complementarities and, therefore, that would be more dynamic and change faster over time.

Closely related to the discussions of supply networks and ecosystems is *complex adaptive systems* (CAS) theory. Again, this approach is a critique of the concept of linear supply chains. Important here is that the agents of adaptive systems self-organise and do not wait for a supply chain leader to tell them where to go. Nair and Reed-Tsochas (2019) further emphasised that such systems co-evolve with the external environment, which can be understood as an "interpreted and enacted environment". This means there is a loosening of the system boundaries so that the system does not encompass only system agents. In addition, in the so-called rugged landscape of CAS, it is not possible to see what the optimal solution to a problem is. Nilsson and Gammelgaard (2012)—and later Nilsson (2019)—outlined different assumptions and pathways for CAS theory referring to systems levels, as once outlined by Boulding (1956). As organisations may be perceived as systems on a high level, systems thinking can be applied even in social aspects of management.

Connected to the different levels of systems is also the *systems of systems* (SoS) approach that is often applied in the field of engineering science. With this approach, for example, products and product design, but also supply chains, can be broken down into levels of systems and connected again at a higher level to understand the system as a whole. Jaradat *et al.* (2017) compared the SoS approach with SCM and found many similarities. Jaradat *et al.*'s (2017) article is interesting because it has contributed to the understanding of SCM on a deeper level. Importantly, the hierarchical levels of systems are emphasised as the attributes of emergence and complexity, as in CAS. However, Jaradat *et al.* (2017) claimed that SoS complements SCM and that systems-based approaches have not been seen in mainstream SCM. I agree that systems approaches are not often mentioned explicitly in the SCM literature, but the reason for this could be that systems approaches are considered the foundation of SCM thinking rather than theory. For example, Mentzer *et al.* defined SCM as "... supply chain management is defined as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole" (2001, p. 18). More recently, Carter *et al.* (2015) explicitly used a CAS approach in their

attempt to build a theory of supply chains. Again, to me, this indicates that systems theory can be perceived as the foundation of SCM that directs researchers in formulating relevant research problems and in the choice of research methods, that is, a methodological approach rather than theory.

The boundary of a system is not a given in systems approaches. Traditionally, the boundaries of supply chains have been set from "raw material supplier to end-user", but recent discussions on sustainability and the circular economy have indicated that this boundary is no longer appropriate. New (1997) even suggested that this boundary setting contributed to moving waste in lean systems from supply chains to landfills because waste of resources beyond the system boundaries was not visible to supply chain managers. As such, efficient supply chains have contributed to the overconsumption of world resources without taking responsibility for doing so. Along these lines, Wieland (2021) applied Holling's panarchy theory, which integrates social and ecological systems, to supply chains. Wieland suggested that our supply chain systems thinking should no longer include just companies, but also politicians, NGOs and other organisations working to conserve the planet. This is a sympathetic and forward-thinking idea, but of course, it complicates systems thinking as boundaries are expanded.

The invited paper of this first issue of vol. 34 of *IJLM*, "Revisiting the whole systems approach: designing supply chains in a turbulent world" by Naim and Gosling, shows another way forward in understanding the foundation of SCM research. The authors have built on the so-called CYNEFIN framework that outlines four different levels of systems: simple, complicated, complex and chaotic. Based on this framework, they have developed a generic, hierarchical model for *designing design science research projects*. An interesting aspect of this model is the methodological pluralism that allows the model to include human and social factors in studying systems. Further, it is of specific interest to *IJLM* that the authors suggest design science research for logistics and SCM in claiming that this type of research is well suited for responding to the main societal challenges of our time, that is, disruptions and climate changes. With this invited paper, *IJLM* encourages you to submit design science research manuscripts. Design science research is very well aligned with the editorial policy of the journal, which emphasises relevance and closeness to practice. With this encouragement, we mirror the call for design science research in related journals (Stange *et al.*, 2022).

Moreover, with a special interest in qualitative studies and methodology in general, *IJLM* also invites you to submit manuscripts that deal with fundamental issues of methodology in systems-based research of any kind. This is important because further scrutiny of systems theories and their methodologies contribute to a deeper understanding of our discipline, thereby creating new and fruitful avenues of logistics and SCM research.

Britta Gammelgaard

References

Boulding, K. (1956), "General systems theory - the skeleton of science", *Management Science*, Vol. 2 No. 3, pp. 197-208.

Carter, C.G., Rogers, D. and Choi, T.Y. (2015), "Toward the theory of the supply chain", *Journal of Supply Chain Management*, Vol. 51 No. 2, pp. 89-97.

Choi, T.Y., Rogers, D. and Vakil, B. (2020), "Coronavirus is a wake-up call for supply chain management", *HBR.org*.

Fabbe-Costes, N., Lechaptois, L. and Spring, M. (2020), "'The map is not the territory': a boundary objects perspective on supply chain mapping", *International Journal of Operations and Production Management*, Vol. 40 No. 9, pp. 1475-1497.

Gammelgaard, B. (2004), "Schools in logistics research?", *International Journal of Logistics Management and Physical Distribution*, Vol. 34 No. 6, pp. 479-491.

Gaur, V., Osadchiy, N. and Udenio, M. (2022), "Why is it so hard to map global supply chains", *HBR.org*.

Jacobides, M.C., Cennamo, C. and Gawer, A. (2018), "Towards a theory of ecosystems", *Strategic Management Journal*, Vol. 39, pp. 2255-2276.

Jaradat, R., Adams, F., Abutabenjeh, S. and Keating, C. (2017), "The complementary perspective of systems of systems in collaboration, integration and logistics: a value-based paradigm of supply chain management", *Systems*, Vol. 5, p. 50.

Mentzer, J.T., DeWitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D. and Zacharia, Z.G. (2001), "Defining supply chain management", *Journal of Business Logistics*, Vol. 22 No. 2, pp. 1-25.

Nair, A. and Reed-Tsochas, F. (2019), "Revisiting the complex adaptive systems paradigm: leading perspectives for researching operations and supply chain management issues", *Journal of Operations Management*, Vol. 65, pp. 80-92.

New, S.J. (1997), "The scope of supply chain management research", *Supply Chain Management: An International Journal*, Vol. 2 No. 1, pp. 15-22.

Nilsson, F. (2019), "A complexity perspective on logistics management: rethinking assumptions for the sustainability era", *International Journal of Logistics Management*, Vol. 30 No. 3, pp. 681-698.

Nilsson, F. and Gammelgaard, B. (2012), "Moving beyond the systems approach in SCM and logistics research", *International Journal of Logistics Management and Physical Distribution*, Vol. 42 Nos 8/9, pp. 764-783.

Stange, R., Schiele, H. and Henseler, J. (2022), "Advancing purchasing as a design science: publication guidelines to shift towards more relevant purchasing research", *Journal of Purchasing and Supply Management*, Vol. 28 No. 1, p. 12.

Wieland, A. (2021), "Dancing the supply chain: toward transformative supply chain management", *Journal of Supply Chain Management*, Vol. 57 No. 1, pp. 58-73.

Further reading

Naim, M. and Gosling, J. (2023), "Revisiting the whole systems approach: designing supply chains in a turbulent world", *International Journal of Logistics Management*, Vol. 34 No. 1.