2022, Vol. 36, No.1, 03-06

Translated Version

Also available in : french

Revue Française de Gestion Industrielle
(French Journal of Industrial Management)
Open access article: www.rfgi.fr

https://doi.org/10.53102/2022.36.01.1112

ISSN: 0242-9780
eISSN: 2804-9284

Editorial

Supply Chain 4.0: Roles and Opportunities for Industrial Management

Ridha Derrouiche [1], *Samir LAMOURI* [2], *Fatiha Naoui-Outini* [3]

[1] *HuManiS Research Center of EM Strasbourg Business School, Strasbourg, France, ridha.derrouiche@em-strasbourg.eu*

[2] *Arts et Métiers - Campus de Paris, École Nationale Supérieure d'Arts et Métiers, Paris, France samir.lamouri@ensam.eu*

[3] *CERIIM - Centre of Research for Innovation and Intelligence in Management, Excelia Business School, La Rochelle, France naouif@excelia-group.com*

Over the past 30 years, the Supply Chain has undergone fundamental changes. With the advent of the digital revolution in the era of Industry 4.0, also known as the 4th Industrial Revolution, a whole new paradigm has emerged. It involves new mechanisms that serve to increase sales, to create added value and harness it. It is no longer a question of simply providing good quality at the lowest cost with an appropriate level of service. In this new environment, the Supply Chain is being extended to link its partners with systems where information is a central element. At the same time, manufacturers are also innovating by offering their customers a wider range of personalised, targeted and intelligent products, giving rise to the concept of Supply Chain 4.0.

Supply Chain 4.0 is currently attracting a lot of interest from both those working in research and in industry. This concept has been developed over the last few years, expanding and building on the Industry 4.0 concept.

For both concepts, many breakthrough technologies play an important role and create a real competitive advantage for companies and Supply Chains. Some of these technologies, principally related to Supply Chain 4.0, include Big Data Analytics, Blockchain, Internet of Things, Artificial Intelligence, Machine Learning, Digital Twin, Chatbots, Automation and Robotics, to name but a few.

Each of these exciting new technologies has a major role to play in current and future Supply Chains. For example, the Internet of Things (IoT) and Big Data Analytics are enabling greater Supply Chain transparency, robotics and automation are completely transforming warehouses, whilst drones and autonomous robots are providing new ways to deliver to the customer with greater efficiency.

This type of Supply Chain 4.0 has an important role and requires manufacturers to take responsibility for the entire value chain right up to the end customer. All partners must also be able to provide an end-to-end service oriented and targeted towards the end customer, where flows and processes are monitored and assessed along the entire value chain. To this must be added the necessary adjustments to the whole cycle, based on

---

Citation: Derrouiche, R., Lamouri S., Naoui F. (2022). Supply Chain 4.0: Roles and Opportunities for Industrial Management. *Revue Française de Gestion Industrielle*, 36(1), 3–6. https://doi.org/10.53102/2022.36.01.1112

customer information and its analysis, as well as allowing for situations, still all too common, where information is lacking or a malfunction means information can only be estimated, and is sometimes based on unreliable sources.

The digital transformation of a Supply Chain can only be as strong as its weakest link. It is important that all partners in a Supply Chain apply digital transformation at all levels and across all processes. It is therefore time for them to rethink the management and driving of their Supply Chain 4.0.

In this context, this special issue of the *Revue Française de Gestion Industrielle* 'Supply Chain 4.0: Roles and Opportunities for Industrial Management' presents an academic and managerial overview of the changes brought about by the introduction of the concept of Industry 4.0 in the Supply Chain. The five articles selected for this issue are complementary and representative of the research work on new concepts that are still little broached in research literature.

The first article, by ***Latifa BENHAMOU, Vincent GIARD and Pierre FENIES***, presents an intelligent design and production tool for customising continuous mass production in the field of fertilisers. This article is based on research into the optimal chemical composition of a small number of semi-finished products, the feasible combinations of which make it possible to cater for a very wide range of customised finished products. The merits of this Intelligent Supply Chain approach to continuous production is illustrated through four studies.

The two articles that follow address the issue of adopting Blockchain technology.

The article by ***Lamiae BENHAYOUN and Tarik SAIKOUKT*** is a pioneering contribution to academic and practical knowledge by explaining the nature of the interdependent factors for Blockchain adoption in the Supply Chain and their potential links. The authors recommend future research opportunities to extend their findings.

Then, the article by ***Mathieu LESUEUR-CAZE, Laurent BIRONNEAU, Gulliver LUX and Thierry MORVAN*** raises the question of the potential of Blockchain for logistics and, more generally, for Supply Chain Management and its principles of flow and process management. This article therefore attempts to take a future-oriented look at the uses of this technology for logistics and SCM.

The fourth article, by ***Samia CHEHBI-GAMOURA***, deals with purchasing in the context of Supply Chain 4.0. The author puts forward a new approach by hybridisation of multi-criteria analysis and risk-averse chains using reinforcement learning. A validation framework based on the experience of a French car manufacturer is used as a preliminary scenario. The initial results are promising.

The last article, by ***Anne-Lise DUMOUTIER, Jérôme LIONS and Patrick BURLAT,*** deals with the digitalisation of CONWIP (constant work in progress) systems. This solution, which is part of Industry 4.0, offers many advantages such as synchronisation with ERP/MES, replication of control panels in several places in the workshop, and automatically capitalising on field data. The concept of the Digital Twin is discussed as a perspective.

Finally, this special issue ends with the review of a book on the same theme: '**Supply Chain 4.0: Improving supply chains with analytics and Industry 4.0 technologies',** by the authors ***Emel Aktas, Michael Bourlakis, Ioannis Minis and Vasileios Zeimpekis***. This collective book of 12 chapters sheds light on how some Industry 4.0 technologies can improve Supply Chains.

Ultimately, we hope that this special issue will stimulate discussion and, more importantly, provide a better understanding of the various concepts and applications related to Supply Chain 4.0 technologies (although some researchers are already talking about Supply Chain 5.0). This issue is becoming extremely important given the key role of these technologies and their transformational impact on current and future Supply Chains.

To conclude, we would like to thank all the authors for their contributions and all the reviewers for their outstanding work and constructive feedback.

REFERENCES

Babiceanu, R. F., and R. Seker. 2016. 'Big Data and Virtualization for Manufacturing Cyber-physical Systems: A Survey of the Current Status and Future Outlook'. Computers in Industry 81: 128–137. https://doi.org/10.1016/j.compind.2016.02.004

Bidet-Mayer, T. 2016. *L'industrie du futur: une compétition mondiale*. Paris : Presses des Mines.

Derrouiche R. & Lamouri, S. (2020) Special issue: 'Supply Chain 4.0, Logistique & Management', 28:1, 1-3, https://doi.org/10.1080/12507970.2020.1718335

Dijkman, R. M., B. Sprenkels, T. Peeters, and A. Janssen. 2015. 'Business Models for the Internet of Things.' International Journal of Information Management 35: 672–678, https://doi.org/10.1016/j.ijinfomgt.2015.07.008

Lee, J., B. Bagheri, and H. A. Kao. 2015. 'A Cyber-Physical Systems Architecture for Industry 4.0-based Manufacturing Systems'. Manufacturing Letters 3: 18–23. https://doi.org/10.1016/j.mfglet.2014.12.001

Moeuf, A., R. Pellerin, S. Lamouri, S. Tamayo, and R. Barbaray. 2018. 'The Industrial Management of SMEs in the Era of Industry 4.0'. International Journal of Production Research 56 (3): 1118–1136. https://doi.org/10.1080/00207543.2017.1372647

Moeuf, A., S. Lamouri, R. Pellerin, S. Tamayo, and V. E. Tobon. 2019. 'Identification of Critical Success Factors, Risks and Opportunities of Industry 4.0 In SMEs'. International Journal of Production Research, 1–17 JCR. https://doi.org/10.1080/00207543.2019.1636323

Rosin, F., P. Forget, S. Lamouri, and R. Pellerin. 2019. 'Impacts of Industry 4.0 Technologies on Lean Principles.' International Journal of Production Research, 1–18 JCR. https://doi.org/10.1080/00207543.2019.1672902

Schumacher, A., S. Erol, and W. Sihn. 2016. 'A Maturity Model for Assessing Industry 4.0 Readiness and Maturity of Manufacturing Enterprises.' Procedia CIRP 52: 161–166. https://doi.org/10.1016/j.procir.2016.07.040

Seiger, R., C. Keller, F. Niebling, and T. Schlegel. 2015. 'Modelling Complex and Flexible Processes for Smart Cyber-physical Environments'. Journal of Computational Science 10: 137–148. https://doi.org/10.1016/j.jocs.2014.07.001

Shiyong, W., W. Jiafu, D. Li, and Z. Chunhua, 2016, 'Implementing Smart Factory of Industry 4.0: An Outlook'. International Journal of Distributed Sensor Networks, (4): 1–10. https://doi.org/10.1155/2016/3159805

Terkaj, W., T. Tolio, and M. Urgo. 2015. 'A Virtual Factory Approach for in Situ Simulation to Support Production and Maintenance Planning.' CIRP Annals 64: 451–454. https://doi.org/10.1016/j.cirp.2015.04.121

Trappey, A. J. C., C. V. Trappey, U. Hareesh Govindarajan, A. C. Chuang, and J. J. Sun. 2016. 'A Review of Essential Standards and Patent Landscapes for the Internet of Things: A Key Enabler for Industry 4.0'. Advanced Engineering Informatics. https://doi.org/10.1016/j.aei.2016.11.007

BIOGRAPHIES

Ridha Derrouiche is a research-active faculty member at EM Strasbourg and a member of the HuManiS Research Center. He holds a PhD in Industrial Engineering from the University of Lyon. He carried out various projects during a one-year posting at Chiang Mai University in Thailand where he was the Director of the Franco-Thai ICT Centre, the Coordinator of the Euro-Thai ETHICS-FED project (Euro THai Implementation of Cooperative Study - For Economic Development) and a member of the e-LINK project (east-west Link for Innovation, Networking and Knowledge exchange). His research focusses on the field of Collaborative Supply Chain. He is particularly interested in the creation and sharing of value between Supply Chain partners.

Samir Lamouri holds a PhD in GSI (Industrial Systems Engineering) from INPL and an HDR qualification from Sorbonne University. He is a professor at *Arts et Métiers* ParisTech. For more than ten years, he was a partner at Proconseil, an industrial strategy consulting firm, one of the largest French firms specialising in industrial performance, where he acquired expertise in operations management, advising more than forty European, American and Asian clients. His research work focusses on the development of optimisation models for industrial and logistics management problems and

information systems, as well as operational excellence and Industry 4.0.

Fatiha Naoui-Outini obtained her PhD in Supply Chain Management in 2010 at IAE Caen. She is a research-active faculty member at Excelia Business School, a member of CERIIM, and a research associate at NIMEC. Her research work focusses on the following areas: Supply Chain Management and Customer Service Performance (B2B), Global Supply Chains and Innovation, Purchasing Management and Innovation. Dr Naoui organises research days with the aim of bringing together French and international industry professionals and academics to collaborate on research projects relating to specific management disciplines. She is a member of the academic network IPSERA.

[1]***Ridha Derrouiche***, *HuManiS Research Center of EM Strasbourg Business School, Strasbourg, France,* *ridha.derrouiche@em-strasbourg.eu* ,
https://orcid.org/0000-0003-2877-1264

[2]***Samir Lamouri***, *Arts et Métiers - Campus de Paris, École Nationale Supérieure d'Arts et Métiers, Paris, France*
samir.lamouri@ensam.eu
https://orcid.org/0000-0003-3868-9280

[3]***Fatiha Naoui-Outini***, *CERIIM – Centre of Research for Innovation and Intelligence in Management, Excelia Business School, La Rochelle, France*
naouif@excelia-group.com