

Reconfiguring business processes in the new political and technological landscape

Digital supply chains are being used to inform new requirements for digital infrastructures and standards and the potential for connecting App and Device-aware consumers with their product-service supply chains (Boston Consulting Group, 2015). At the heart of digital supply chains are big data analytics and cloud-based sensor intelligence (Manyika *et al.*, 2011). It is therefore necessary to explore how big data, industrial Internet of Things and cloud computing will combine with alternative production processes such as continuous, additive, flexible/collaborative automation. The emergence of digital technologies is driving innovations, in terms of “processes”, “products” (Hennelly *et al.*, 2019) and “services” (Anderson, 2013). This requires greater visibility, alignment and integration across an increasingly complex network of multiple partners, to deliver better “service outcomes” and “customer experience” (D’Aveni, 2015). Yet, very few empirical studies have been conducted to assess the real business value of digitalisation at the firm and supply chain levels, and its impact on BPM. The main objective of this special issue is to collate and present recent research examinations in the field of digitalisation in global manufacturing, end-to-end supply chains, service operations and BPM. Specifically, various scholars and practitioners are invited to help explain and understand new antecedents to supply chain digitalisation – human, machine, process and information technology (IT) based – and their singular and combinatorial impacts on flexibility and performance outcomes. All of the articles submitted and included in the special issue went through a double-blind review process. The introductory article was reviewed and handled by the editor-in-chief of the journal.

Synopsis of articles

Below, a synopsis of the articles included in this special issue is provided.

In the paper “From the boundaries of management to the management of boundaries: business processes, capabilities and negotiations”, the authors Andrea Caputo, Raffaele Fiorentino and Stefano Garzella make a theoretical contribution by advancing knowledge through the systematisation and rationalisation of studies focussed on boundary management and, in particular, through the development of a conceptual framework for boundary capabilities. Findings suggest that “boundary management” – how managers coordinate resources, activities and business processes on the boundaries of the firm – should play a key role in the new competitive contexts, provided by the technological landscape. The analysis suggests that there are some strategic relevant factors for the management of boundaries. These factors are related to three highly related dimensions such as technological, cultural and relational. The boundaries management need to adequately consider these factors when confronting with multiple actors inside, outside and on firm boundaries (Fiorentino, 2016). Specifically, it is easy to recognise the need for delicate relational activity involving compromise and negotiation that organises, structures and formalises in ways considered



appropriate, while supporting relationships of trust, opportunism, power and dependence. Moreover, as managers must continuously interact with multiple partners in digital supply chains, the organisational model of negotiation (OMoN) serves as a means of effectively managing firm boundaries. In this sense, the manuscript finds support for extending the OMoN model (Borbély and Caputo, 2017a) to the management of boundaries. The authors encourage a focus on business processes occurring at firm boundaries and the development of new capabilities in response to the needs of practitioners to ensure best practices of negotiation.

In the paper “Intelligent autonomous vehicles in digital supply chains: from conceptualisation, to simulation modelling, to real-world operations” written by Naoum Tsolakis, Dimitrios Bechtsis and Jagjit Singh Srari, the authors discuss the key challenges associated with existing techniques on the assessment of intelligent autonomous vehicles in supply networks. In this regard, this research proposes a theoretically and empirically derived methodological framework and a practical “toolbox” for the integrated application of conceptualisation, simulation, emulation and physical application of testbeds for the effective design and ex-ante evaluation of digitally enabled supply network operations.

In the paper “Electric sports cars and their impact on the sourcing process” by Gary Graham, Laird Burns, Patrick Hennessey and Roy Meriton, the authors argue that (resulting from the trend towards electric cars) the automobile industry supply chain is expected to be fundamentally reshaped. This will include “network re-design” and a change in the nature of “actor relationships”. In addition, there is a plethora of new, one could define “left of field” suppliers with unique technological capabilities entering the electric vehicle supply chain. Even though they have no previous “legacy”, “experience”, “competence” or “capability” of the sector. Such is the speed of technological disruption and industry shake up. Therefore, the European sports car manufacturers will need to rethink and adjust their business, supply chain and sourcing strategy (processes). This is vital, if they are to keep their superior global brand and market leader competitive position. The authors work identifies that one crucial strategic decision these firms will need to take to maintain their “market leadership” is that of the “make” or “buy” decision. Furthermore, which of the parts of the value creation process should be kept “internal” and which parts should be “outsourced”. Throughout their adaption of McIvor’s “sourcing framework” the authors identify and analyse the operational capabilities needed to sustain competitive advantage at their case study organisation. Four key operational capabilities are emerging in the operating model. The first links to “capacity” and the ability of suppliers to be locally based so that they can deliver high quality products and services in the minimum time (optimising the “time-value” configuration). The second is the “design” of the supplier network. The third relates to “supplier management”. Suppliers will add capability through their ability to be innovative and creative and increasingly be strategically positioned as service innovators and service solution providers, rather than product manufacturers. Finally, the fourth capability relates to the ability of the firm to “integrate” and “align” their marketing and IT planning processes with their sourcing process. From these initial findings, the authors intend to expand their investigation through more advanced case study work with their organisation. This will involve detailed empirical modelling of process efficiency and inventory management.

In the paper “Unlocking innovation in the sport industry through additive manufacturing” by Marlon Meier, Kim Hua Tan, Ming K Lim and Leanne Chung, the authors argue fast changing customer demands and rising requirements in product performance constantly challenge sports equipment manufacturers to come up with new and improved products to stay competitive. This article focusses on how additive manufacturing AM (aka 3D Printing) can enhance the development of new products in the sport industry. Case studies and interview results in several companies were used to analyse the current adoption of AM technologies in the innovation process of the sports

industry, i.e. level of awareness; how it is implemented; and its impact on the innovation process. The findings show that AM provides several benefits when it comes to the innovation process, such as a faster development process, an optimised output, as well as the possibility to create new designs. However, companies are not yet able to enhance the innovation process in a way that leads to new products and new markets with AM. Limitations, including a small range of processable materials and an inefficient mass production system are restraining the full capability of the AM applications.

In the paper “IT capabilities, firm performance and the mediating role of ISRM: a case study from a developing country”, the authors Jean Robert Kala Kamdjoug, Harold Nguengang and Samuel Fosso Wamba conduct a case study applying a hypothetic-deductive approach based on quantitative data collected from 136 surveyed professionals in the field of IS, IT and the related security environment. This paper focusses on the direct impact of IT capabilities on firm performance and the mediating effects of the information security management system (ISMS) on this relationship. The research question developed in this study is: does information security risk management (ISRM) mediate the relation between IT capabilities and firm performance? The findings confirm the direct impact of IT capabilities on firm performance and show that ISMS mediates the relationship between IT capabilities and firm performance. Originality of this paper is that it is among the first to evaluate the mediating role of information security with ISRM on the relationship between IT capabilities and firm performance. In fact, the previous studies establish positive impact of IT capabilities on firm performance where authors recommend the continuous improvement of the maturity level of ISRM process which is expected to produce an enhanced quality of ISMS.

In the paper “Internet of Things adoption for reconfiguring decision-making processes in asset management” by Paul Brous, Marijn Janssen and Paulien Herder, the authors argue that data provenance is necessary to be able to understand the value and the quality of data generated by IoT within organisations and that managers need to adapt new capabilities to be able to interpret the data. The use of IoT can yield many benefits for organisations, but these benefits might be difficult to realise as many organisations are not yet equipped to handle and interpret this data. As such, the objective of this research is to understand how IoT adoption affects decision-making processes. In this paper, the changes in the business processes for managing civil infrastructure assets brought about by IoT adoption are analysed by investigating two case studies within the water management domain and propositions for effective IoT adoption in decision-making processes are derived. The results of the case studies show that IoT can have a transformative effect on business processes and decision processes in civil infrastructure asset management have been transformed to deal with the real-time nature of the data. It is necessary to make organisational and business process changes, develop new capabilities, and implement data provenance and data governance.

The paper “Quality dominant logic in big data analytics and firm performance” by Samuel Fosso Wamba, Shahriar Akter and Marc de Bourmont draws on the resource-based view and information systems quality to develop a big data analytics quality (BDAQ) model. Then, the paper measures the impact of BDAQ on firm performance. The study uses an online survey to collect data from 150 business analysts and IT managers with analytics experience from France. The study confirms that perceived technology, talent and information quality are significant determinants of BDAQ. It also identifies that alignment between analytics quality and firm strategy moderates the relationship between BDAQ and firm performance. The findings inform practitioners that BDAQ is a hierarchical, multi-dimensional and context-specific model. The study advances theoretical understanding of the relationship between BDAQ and firm performance under the influence of firm strategy alignment.

The article entitled “Performance landscape modelling in digital manufacturing firm” is written by Sourabh Kulkarni, Priyanka Verma and Mukundan R. The aim of this research is to update the existing Kauffmann’s NK model to evaluate the manufacturing fitness of strategic business capabilities. Authors propose the grey-DEMATEL-NK based updated model and illustrate its application in a digital manufacturing setting to investigate the sequence for developing cumulative capabilities that can yield the maximum payoff. The pilot model proposed in this article presents Q–F–C–D is the optimal sequence for achieving maximum manufacturing fitness (competitive payoff). Interestingly, this sequence is different from that of traditional manufacturing (Q–D–F–C), proposed in line with the cumulative capabilities’ theory. In this way, the article opens the need for investigating the firm-specific sequence of cumulative capabilities across traditional and digital manufacturing context.

In the paper “How to turn managers into data-driven decision makers: measuring attitudes towards business analytics” written by Kevin Carillo, Nadine Galy, Cameron Guthrie and Anne Vanhems, the authors implement a multi-stage research design in order to develop and validate a measurement instrument that captures the attitude towards business statistics, the foundation of business analytics. The rationale behind such development is that it is crucial for organisations engaging the path of the data-driven transformation, to engender among their employees, a positive attitude towards business analytics. This research also has direct implications for business schools as it can help to better prepare future managers to evolve successfully in a data-driven business world.

Patrick Hennelly

Royal College of Art London, London, UK

Jagjit Srail

Department of Engineering, University of Cambridge, Cambridge, UK

Gary Graham

Business School, University of Leeds, Leeds, UK, and

Samuel Fosso Wamba

Department of Information, Operations and Management Sciences, Toulouse Business School, Toulouse, France

References

- Anderson, C. (2013), *Makers: The new Industrial Revolution*, Crown Business, New York, NY.
- Boston Consulting Group (2015), “Industry 4.0: the future of productivity and growth in manufacturing industries”, available at: www.bcgperspectives.com
- D’Aveni, R. (2015), “The 3-D revolution”, *Harvard Business Review*, Vol. 93 No. 5, pp. 40-48.
- Hennelly, P., Srail, J., Graham, G., Meriton, R. and Kumar, M. (2019), “Do makerspaces represent scalable production models of community-based redistributed manufacturing?”, *Production Planning & Control*, Vol. 30 No. 7, pp. 540-554, doi: 10.1080/09537287.2018.1540056.
- Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C. and Byers, A.H. (2011), *Big Data: The next Frontier for Innovation, Competition, and Productivity*, McKinsey Global Institute.

About the authors

Patrick Hennelly is Research Fellow in Distributed Manufacture for a Circular Economy for the Materials Science Research Centre, Royal College of Art. Previously, Patrick was Research Assistant in the Centre for International Manufacturing at the Institute for Manufacturing, University of Cambridge. He has been Lead Guest Editor for a special issue on “Rethinking supply chains in the age of digitalisation” in *Production Planning and Control Journal*. Patrick has assisted in the selection and

management of papers, reviewers as well as the preparation of the editorial for four special issues of *Futures*, *Technological Forecasting and Social Change*, *Production Planning and Control* and *SCM: An International Journal on the Smart Cities and Operations Management theme*. He has presented conference papers at POMS, EurOMA, Cambridge's Annual International Manufacturing Symposium and the Annual European Decision Science Institute Conference. He has taught operations and supply chain management modules at undergraduate and postgraduate levels at Leeds University Business School. His research interests lie in the areas of supply chain management, distributed manufacturing circular economy and localised production systems. Patrick Hennelly is the corresponding author and can be contacted at: pah70@cam.ac.uk

Jagjit Srari is Head of the Centre for International Manufacturing, Institute for Manufacturing, University of Cambridge where he received the PhD Degree in Engineering, Manufacturing and Management. His research work and that of his group involves working closely with Industry in the analysis, design and operation of international production, supply and service networks. Current research areas include global value network analysis, service network integration, supply network resilience, sustainable industrial systems network design and the development of new forms of supply network that support emerging industries. Research projects are cross-sector in nature but include supply network and industry transformations linked to specific challenges within pharmaceuticals, food, automotive and aerospace.

Gary Graham's work to date focusses on the impact of the internet and digital technologies on supply chains, logistics and distribution operations. He has authored 3 books, 30 research papers and has worked on ESRC/EPSRC, British Academy, the Foreign and Commonwealth Office and EU research grants investigating the economic and social consequences of disruptive innovation on the music, news media and information intensive sectors. His recent work focusses on the deployment of creative ethnographic "bridging techniques". This includes both between business and users and universities and communities.

Samuel Fosso Wamba is Full Professor at Toulouse Business School, France. Prior, he was Associate Professor at NEOMA Business School, Senior lecturer at the School of Information Systems & Technology (SISAT), University of Wollongong, Australia. He earned an MSc Degree in Mathematics, from the University of Sherbrooke in Canada, an MSc Degree in E-commerce from HEC Montreal, Canada, and a PhD Degree in industrial engineering, from the Polytechnic School of Montreal, Canada. His current research focusses on business value of IT, business analytics, big data, inter-organisational system (e.g. RFID technology) adoption and use, e-government (e.g. open data), supply chain management, electronic commerce and mobile commerce. He has published papers in a number of international conferences and journals including *European Journal of Information Systems*, *Production Planning and Control*, *International Journal of Production Economics*, *Information Systems Frontiers*, *Business Process Management Journal*, Proceedings of the IEEE, AMCIS, HICSS, ICIS and PACIS. He is organising special issues on IT-related topics for the *Business Process Management Journal*, *Pacific Asia Journal of the Association for Information Systems*, *Journal of Medical Systems*, *Journal of Theoretical and Applied Electronic Commerce Research*, *Journal of Organizational and End User Computing*, *Production Planning & Control* and *International Journal of Operations & Production Management*.