Guest editorial

Transforming operations and production management using big data and business analytics: future research directions

Introduction

Big data analytics (BDA) is defined as a holistic approach to managing, processing and analyzing the 5V data-related dimensions (i.e. volume, variety, velocity, veracity and value) to create actionable insights for delivering sustained value, measuring performance and establishing competitive advantages (Fosso Wamba *et al.*, 2015). BDA has captured the imagination of both practitioners and scholars for its high operational and strategic potentials across various industries including marketing, financial services, insurance, retailing, healthcare and manufacturing. For example, manufacturing firms including GE, Rolls Royce and Ford have been successfully using BDA for maintenance (e.g. engine failures) and supplier risk management (Jobs *et al.*, 2015). BDA has also improved business intelligence on the behaviour of customers as well as consumer profiling (European Commission, 2013). As such, the extant literature identifies big data as the "next big thing in innovation" (Gobble, 2013, p. 64), "the fourth paradigm of science" (Strawn, 2012), or "the next frontier for innovation, competition, and productivity" (Manyika *et al.*, 2011, p. 1).

From the operations management (OM) standpoint, big data potentials include: improved organizational decision making (Cheng *et al.*, 2016), strong customer relationships, robust risk management and operational efficiency (Cheng *et al.*, 2016), improved fraud reduction, just-in-time recommendations, enhanced supply chain innovation capabilities (Dutta and Bose, 2015) and better overall customer experience (Tweney, 2013).

More broadly, BDA-related applications can be used in a variety of operations contexts including production equipment, industrial automation, sales force information systems, building management systems and power plan conditions tools. It is reported that BDA has been used to facilitate real-time diagnosis and detection of production issues, as well as facilities automation, and thus reducing considerably downtime costs. Likewise, BDA could allow real-time process measurement and monitoring for superior quality management, logistics and order fulfilment cycles (George *et al.*, 2014). For example, Wilkins (2013) stated that "by observing causal factors for quality issues, process variability and energy efficiency through the manufacturing process, big data analysis becomes the basis for gaining a competitive advantage" (p. 1). In a similar spirit, Chae (2015) developed and proposed Twitter analytics for analyzing supply chain tweets. The author argued that supply chain tweets can be used by key stakeholders for hiring professionals and sharing information. Fulgoni (2013) argued that BDA offers "the ostensible benefits of providing consumers with an easy way to find the lowest price for any product while also arming marketers with dramatically expanded advertising optimization capabilities" (p. 372). Similarly, Opresnik and Taisch (2015) proposed a big data strategy in servitization through which manufacturers can leverage various opportunities offered by the combination of big data and servitization to create new revenue streams, reduce product and services prices and achieve firm differentiation. Dutta and Bose (2015) in their study on the big data project at a manufacturing company named Ramco Cements Limited in India argued that the key success factors for any BDA project are a "clear understanding of the business problem, a detailed and well planned step-by-step project map, a cross functional project team, adoption of innovative visualization techniques, patronage and active involvement of top management and a culture of data driven decision making" (p. 293).

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Despite some reported successes in the literature, OM researchers need to retain a healthy scepticism until rigorous research has been done in operations contexts. That is why this new phenomenon should have the attention of OM researchers, and hence the call for papers for this special issue. The focus of this special issue was to invite OM scholars and practitioners to look at the ways and means to co-create and capture business value from big data in terms of new business opportunities, improved performance and competitive advantage. The results will in turn reveal the implications of big data on OM practices and strategies.

All papers accepted in this special issue are in line with our early objectives. The papers comprise seven standalone research articles. Five articles are published in this issue: Kache and Seuring (2017), Matthias *et al.* (2017), Sykes *et al.* (2017), Mehmood *et al.* (2017) and Ramanathan *et al.* (2017). The remaining articles are published in *IJOPM* regular issues and are Aloysius *et al.* (2016) and Chong *et al.* (2016).

First, echoing the core theme of this special issue on the effect of BDA on operations, the article by Kache and Seuring (2017) entitled "Challenges and opportunities of digital information at the intersection of big data analytics and supply chain management" contributes to theory development in supply chain management by investigating the potential impacts of BDA on information usage in a corporate and supply chain context. Using a Delphi study, the authors identified 43 opportunities and challenges linked to the emergence of BDA from a corporate and supply chain perspective.

In the second paper entitled "Making sense of big data – can it transform operations management?" by Matthias *et al.* (2017), the authors focus on application and exploitation of big data to create competitive advantage. They present a framework of application areas and how they help the understanding of targeting and scoping specific areas for sustainable improvement. Their findings indicate that there is opportunity to create sustainable competitive advantage through the application of big data. However there are social, technological and human consequences that are only now beginning to emerge which need to be addressed if true long-term advantage is to be achieved.

In the third paper (Aloysius *et al.*, 2016), "Exploiting big data for customer and retailer benefits: a study of emerging mobile checkout scenarios", the authors explore the potential of mobile checkout in the retail store which has the promise to be a rich source of big data. It is also a means to increase the rate at which big data flows into an organization as well as the potential to integrate product recommendations and promotions in real time. They argue that despite efforts by retailers to implement this retail innovation, adoption by customers has been slow. Based on interviews and focus groups with leading retailers, technology providers, and service providers, the authors identified several emerging in-store mobile scenarios; and based on customer focus groups, the authors identified potential drivers and inhibitors of use.

In the fourth paper (Chong *et al.*, 2016), "Predicting online product sales via online reviews, sentiments, and promotion strategies: a big data architecture and neural network approach" the authors investigate if online reviews (e.g. valence and volume), online promotional strategies (e.g. free delivery and discounts) and sentiments from user reviews can help predict product sales. The authors designed a big data architecture and deployed Node.js agents for scraping Amazon.com pages using asynchronous input/output calls. The completed web crawling and scraping data sets were then pre-processed for sentimental and neural network analysis. The neural network was employed to examine which variables in the study are important predictors of product sales. They found that although online reviews, online promotional strategies and online sentiments can all predict product sales, some variables are more important predictors than others. The authors found that the interplay effects of these variables become more important variables than the individual variables themselves. For example, online volume interactions with sentiments and discounts are more important than the individual predictors of discounts, sentiments or online volume.

In the fifth paper, "Big data breaches and customer compensation strategies: personality traits and social influence as antecedents of perceived compensation" by Sykes *et al.* (2017), the authors draw on the literature on personality traits and social influence to better understand the antecedents of perceived compensation and the effectiveness of compensation strategies. They studied their propositions using data collected in the context of Target's large-scale data breach that occurred in December 2013 that affected the personal data of more than 70 million customers. In total, the authors collected data from 212 breached customers. Their results show that customers' personality traits and their social environment significantly influences their perceptions of compensation. In addition, they found that perceived compensation positively influences service recovery and customer experience.

In the sixth paper, "Exploring the influence of big data on city transport operations: a Markovian approach" by (Mehmood *et al.*, 2017), the authors aim to advance knowledge of the transformative potential of big data on city-based transport models. They develop a Markov model with several scenarios to explore a theoretical framework focussed on matching the transport demands (of people and freight mobility) with city transport service provision using big data. The model is designed to illustrate how sharing transport load (and capacity) in a smart city can improve efficiencies in meeting demand for city services. The study provides new understanding about load sharing and optimization in a smart city context. Mainly, the authors demonstrate how big data could be used to improve transport efficiency and lower externalities in a smart city. Further, they show how improvement could take place by having a car free city environment, autonomous vehicles and shared resource capacity among providers.

In the seventh paper, "Role of social media in retail network operations and marketing to enhance customer satisfaction" by (Ramanathan *et al.*, 2017), the authors develop a conceptual model for the social media era. They combine the idea of loyalty-based and value-based models. Then, they employed a survey questionnaire method to elicit opinions of retail customer satisfaction based on social media reviews, service operations and marketing efforts.

Future research directions

BDA enables OM transformation at many levels. While the current special issue offers some preliminary results of the use of BDA in OM, there are still many unanswered questions that require further research.

The motivation for BDA-enabled operations optimization includes improved decision-making, better processes and opportunities for new types of products and services enriched with data (PWC, 2013). Consequently, examining the impact of BDA analytics on the entire decision-making process (e.g. set goals, gather information, weigh evidence, assess options, take action and review the action) should be included in future research. However, some scholars point to the fact that BDA may "cultivate a short-term decision-making mindset" (p. 373) which could generate negative impacts on the firm including eroding long-term brand equity (Fulgoni, 2013). Thus, future research should also focus on the impact of BDA on the overall firm decision making culture, as well as looking at the tradeoff between a BDA-enabled short-term decision-making mindset vs a BDA-enabled long-term decision-making mindset. Furthermore, sensors and other devices located within processes will collect large amounts of data that firms will seek to use to optimize their processes both within the organization and across the supply chain. Research needs to examine how to best make use of that data for process improvement, where sensors should be located, what data should be filtered out vs what data are most useful, and how often process changes should be made in a 5V-environment. Finally, in an effort to improve market share and increase customer satisfaction, firms will seek to use big data to enhance their product and service offerings. How organizations can use this data to improve services or add data-enabled enhancements to their products needs to be investigated.

There are several obstacles to adopting and making use of big data that need further research. Among other things, these include security, privacy (O'Flaherty, 2016; Martin, 2015; Nunan and Di Domenico, 2013), ethics (Martin, 2015; Miller, 2014; Nunan and Di Domenico, 2013) and governance (Miller, 2014; Cole, 2016) issues. For example, how can we insure worker privacy in an era of big data collection of employee activities? Can big data be used to enhance security or is BDA a threat to security? What are the ethics of the mass collection of data that are easily analysed and shared? It would be interesting to examine the various mechanisms that support the exploitation or hindrance of BDA at the plant location, organizational and supply chain levels. How do we balance BDA-enabled benefits with these issues that should be included in future research. Also, the mass collection of data (structured and unstructured) makes it very difficult for many organizations to cope with data governance (Cole, 2016). Hence, it will be interesting to explore the best governance strategy related to BDA at various levels (e.g. plant location, organizational and supply chain). Similarly, future research should test and validate the observations made by (Cole, 2016) when he highlights the difficulties arisen "when organizations are required to govern content that they did not create and do not own but may be responsible for – or find value in" (p. 9).

The emergence of big data creates opportunities for various theoretical explorations, such as understanding surveillance capitalism and the prospect of information civilization in the context when "Google and other actors learned to obscure their operations" (Zuboff, 2015, p. 85), extending S-D logic and value co-creation in the context of big data driven smart service systems (Maglio and Lim, 2016), building predictive theory "where patterns often emerge before the reasons for them become apparent" (Agarwal and Dhar, 2014, p. 446) and specifically, in the context of "individual and group behaviour, team social dynamics, coordination challenges, and performance outcomes" (George *et al.*, 2014, p. 325). In addition, Loebbecke and Picot (2015) call for exploring the impact of digitization and analytics on business model and societal employments, Akter and Fosso Wamba (2016) shed light on transaction cost theory in investigating big data on lean operations and quality management and Ji-fan Ren *et al.* (2016) illuminate the relevance of resource-based view in conceptualizing the BDA capabilities.

Another fruitful area for future research could be examining complementary investments, mediating factors and other specific BDA assets needed for improved plant location, organizational, and supply chain performance. Indeed, prior studies argued that specific information systems assets lead to "various types of economic performance" (p. 153) (Schryen, 2013). For example, it would be interesting to assess the relative contribution of each of the BDA 5Vs on their relation to firm competitive advantage. Would the mass collection of data lead to more investments in data storage capacity, which then would have other unforeseen benefits? In this line of thinking, looking at the most cost-effective architecture that will facilitate the integration of BDA technologies at the plant location, organizational and supply chain levels would be an interesting research topic.

Finally, further research needs to investigate the extent to which current OM theories are relevant to assess the implementation and impact of BDA across various sectors. Also, what new theories enabled by BDA and where these new theories should best be applied would be relevant future research questions.

To help frame future research directions, we propose these questions can be viewed through two different lenses: the level of decision-making and the level of analysis. In terms of the level of decision-making, we suggest BDA can impact operational decisions on a moment-by-moment basis, tactical decisions that occur weekly or monthly, and strategic decisions that higher level management make on a semi-regular basis. Furthermore, adoption and impact of BDA can be viewed at different levels of analysis including at the process level, the firm level, across the entire supply chain, or at a societal level. By viewing research issues regarding BDA from these perspectives we believe we can propose a number of different future research directions as shown in Table I.

Research questions based on level of decision-making	
Operational-level	How does BDA impact operational-level decision making at different stages of the decision-making process?
	What complementary investments are needed to best make use of big data at the operational level?
Tactical-level	How does BDA impact tactical-level decision making at different stages of the decision-making process?
	What complementary investments are needed to best make use of big data at the tactical level?
Strategic-level	How does BDA impact strategic-level decision making at different stages of the decision-making process?
	How can BDA impact strategic product/service decisions?
	What complementary investments are needed to best make use of big data at the strategic level?
Research questions based on level of analysis	
Process-level	How can BDA be used to improve internal and external processes?
	What complementary investments are needed to best make use of big data to improve processes?
Firm-level	Where should sensors and other big data collection devices be located to improve processes within the firm?
	How does BDA impact employees in terms of security and privacy? What data should be collected and analysed? Who should know about this?
	How should firms devise and implement data governance policies and best practices in an environment of BDA?
Supply chain-level	How can partners be motivated to introduce sensors and other big data collection devices to improve processes along the supply chain?
	To what extent should BDA be used to monitor trading partner actions? Is this ethical? How should partner data be secured?
	How should firms devise and implement data governance polices and best practices when handing partner data?
	What complementary investments are needed to best make use of big data to improve supply chain processes and relationships? Who along the supply chain should make these investments? How will they be incentivized?
Societal-level	Should sensors be placed throughout public areas to collect big data to improve societal-level processes? Where should they be located?
	How can BDA be used to improve homeland security? What are the dangers of such use?
	How does BDA impact privacy at the societal level?
	What complementary investments are needed to best make use of big data at the societal level? Who should make these investments? How will they be incentivized?

Table I.
Future research questions on big data analytics

We believe BDA offers major potential to transform operations and production management. How BDA is adopted and used will determine the extent to which benefits are realized and transformation occurs. We hope the framework and questions posed here, as well as the articles in this special issue, will motivate other researchers to explore how BDA are adopted, used and impact OM processes and relationships.

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References

Agarwal, R. and Dhar, V. (2014), "Editorial – big data, data science, and analytics: the opportunity and challenge for IS research", *Information Systems Research*, Vol. 25 No. 3, pp. 443-448.

Akter, S. and Fosso Wamba, S. (2016), "Big data analytics in e-commerce: a systematic review and agenda for future research", *Electronic Markets*, Vol. 26 No. 2, pp. 173-194.

Aloysius, J.A., Hoehle, H. and Venkatesh, V. (2016), "Exploiting big data for customer and retailer benefits: a study of emerging mobile checkout scenarios", *International Journal of Operations & Production Management*, Vol. 36 No. 4, pp. 467-486.

Chae, B. (2015), "Insights from hashtag #supplychain and Twitter analytics: considering Twitter and Twitter data for supply chain practice and research", *International Journal of Production Economics*, Vol. 165, pp. 247-259.

Cheng, S., Zhang, Q. and Qin, Q. (2016), "Big data analytics with swarm intelligence", *Industrial Management & Data Systems*, Vol. 116 No. 4, pp. 646-666.

Chong, A.Y.L., Li, B., Ngai, E.W.T., Ch'ng, E. and Lee, F. (2016), "Predicting online product sales via online reviews, sentiments, and promotion strategies: a big data architecture and neural network approach", *International Journal of Operations & Production Management*, Vol. 36 No. 4, pp. 358-383.

Cole, B. (2016), "Big data era requires new approach to information governance strategy", *Computer Weekly*, pp. 6-10.

Dutta, D. and Bose, I. (2015), "Managing a big data project: the case of Ramco Cements Limited", *International Journal of Production Economics*, Vol. 165, pp. 293-306.

European Commission (2013), "Big data analytics & decision making", available at: http://docplayer.net/5365914-Business-innovation-observatory-big-data-analytics-decision-making-case-study-8-enterprise-and-industry.html (accessed 20 December 2015).

Fosso Wamba, S., Akter, S., Edwards, A., Chopin, G. and Gnanzou, D. (2015), "How 'big data' can make big impact: findings from a systematic review and a longitudinal case study", *International Journal of Production Economics*, Vol. 165, pp. 234-246.

Fulgoni, G. (2013), "Big data: friend or foe of digital advertising?", *Five Ways Marketers Should Use Digital Big Data to Their Advantage*, Vol. 53 No. 4, pp. 372-376.

George, G., Haas, M.R. and Pentland, A. (2014), "Big data and management", *Academy of Management Journal*, Vol. 57 No. 4, pp. 321-326.

Gobble, M.M. (2013), "Big data: the next big thing in innovation", *Research Technology Management*, Vol. 56 No. 1, pp. 64-66.

Ji-fan Ren, S., Fosso Wamba, S., Akter, S., Dubey, R. and Childe, S.J. (2016), "Modelling quality dynamics, business value and firm performance in a big data analytics environment", *International Journal of Production Research*, pp. 1-16.

Jobs, C.G., Aukers, S.M. and Gilfoil, D.M. (2015), "The impact of big data on your firms marketing communications: a framework for understanding the emerging marketing analytics industry", *Academy of Marketing Studies Journal*, Vol. 19 No. 2, pp. 81-92.

Kache, F. and Seuring, S. (2017), "Challenges and opportunities of digital information at the intersection of big data analytics and supply chain management", *International Journal of Operations & Production Management*, Vol. 37 No. 1, pp. 10-36.

Loebbecke, C. and Picot, A. (2015), "Reflections on societal and business model transformation arising from digitization and big data analytics: a research agenda", *The Journal of Strategic Information Systems*, Vol. 24 No. 3, pp. 149-157.

Maglio, P.P. and Lim, C.-H. (2016), "Innovation and big data in smart service systems", *Journal of Innovation Management*, Vol. 4 No. 1, pp. 11-21.

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, San Francisco, CA.

Martin, K.E. (2015), "Ethical issues in the big data industry", *MIS Quarterly Executive*, Vol. 14 No. 2, pp. 67-85.

Matthias, O., Fouweather, I., Gregory, I. and Vernon, A. (2017), "Making sense of big data – can it transform operations management?", *International Journal of Operations & Production Management*, Vol. 37 No. 1, pp. 37-55.

Mehmood, R., Meriton, R., Graham, G., Hennelly, P. and Kumar, M. (2017), "Exploring the influence of big data on city transport operations: a Markovian approach", *International Journal of Operations & Production Management*, Vol. 37 No. 1, pp. 75-104.

Miller, S. (2014), "Collaborative approaches needed to close the big data skills gap", *Journal of Organization Design*, Vol. 3 No. 1, pp. 26-30.

Nunan, D. and Di Domenico, M. (2013), "Market research and the ethics of big data", *International Journal of Market Research*, Vol. 55 No. 4, pp. 2-13.

O'Flaherty, K. (2016), "Using big data to uncover DEVIANT BEHAVIOUR", *SC Magazine: For IT Security Professionals (UK Edition)*, pp. 12-15.

Opresnik, D. and Taisch, M. (2015), "The value of Big Data in servitization", *International Journal of Production Economics*, Vol. 165, pp. 174-184.

PWC (2013), "Capitalizing on the promise of Big Data: how a buzzword morphed into a lasting trend that will transform the way you do business", available at: http://docplayer.net/1475548-Capitalizing-on-the-promise-of-big-data-how-a-buzzword-morphed-into-a-lasting-trend-that-will-transform-the-way-you-do-business.html (accessed 20 December 2015).

Ramanathan, U., Subramanian, N. and Parrott, G. (2017), "Role of social media in retail network operations and marketing to enhance customer satisfaction", *International Journal of Operations & Production Management*, Vol. 37 No. 1, pp. 105-122.

Schryen, G. (2013), "Revisiting IS business value research: what we already know, what we still need to know, and how we can get there", *European Journal of Information Systems*, Vol. 22 No. 2, pp. 139-169.

Strawn, G.O. (2012), "Scientific research: how many paradigms?", *EDUCAUSE Review*, Vol. 47 No. 3, pp. 26-34.

Sykes, T.A., Kude, T. and Hoehle, H. (2017), "Big data breaches and customer compensation strategies: personality traits and social influence as antecedents of perceived compensation", *International Journal of Operations & Production Management*, Vol. 37 No. 1, pp. 56-74.

Tweney, D. (2013), "Walmart scoops up Inkiru to bolster its 'big data' capabilities online", available: http://venturebeat.com/2013/06/10/walmart-scoops-up-inkiru-to-bolster-its-big-data-capabilities-online/ (accessed 15 October 2013).

Wilkins, J. (2013), "Big data and its impact on manufacturing", available at: www.dpaonthenet.net/article/65238/Big-data-and-its-impact-on-manufacturing.aspx (accessed 17 February 2014).

Zuboff, S. (2015), "Big other: surveillance capitalism and the prospects of an information civilization", *Journal of Information Technology*, Vol. 30 No. 1, pp. 75-89.

Further reading

Tan, K.H., Zhan, Y., Ji, G., Ye, F. and Chang, C. (2015), "Harvesting big data to enhance supply chain innovation capabilities: an analytic infrastructure based on deduction graph", *International Journal of Production Economics*, Vol. 165, pp. 223-233.

Zhong, R.Y., Huang, G.Q., Lan, S., Dai, Q.Y., Chen, X. and Zhang, T. (2015), "A big data approach for logistics trajectory discovery from RFID-enabled production data", *International Journal of Production Economics*, Vol. 165, pp. 260-272.

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