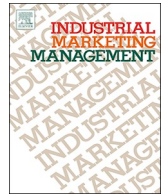




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Editorial

Analytics in the era of big data: The digital transformations and value creation in industrial marketing

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ABSTRACT

Big data analytics has been a topical area in the past decade. Despite it is emphasized as a promising tool for the B2B sectors, there is a short of academic studies about this phenomenon in the industrial markets. Existing big data analytics focuses more on the consumers' marketing aspect, while in fact both the consumers' data and the machine-generated transaction data can be gathered and analysed at the interorganisational level. Subsequently, there is a need to increase the attention on the B2B aspects of big data analytics and the interactions of stakeholders. This paper, therefore, investigates the digital transformation enabled by big data analytics in the industrial markets and provides a conceptual framework. It solicits research articles that provide insights into various industrial contexts of this topic and applied both qualitative and quantitative approaches to identify the big data gathering and applications for value creation.

1. Big data

Big data research is no doubt one of the most important areas in the past decade as well as its impacts on the industries. Despite the track of research of applying data analysis such as data mining, statistics, information systems have continued for a number of decades, it was not until the last 10 years that the industries and academia started to pay more attention to the development of big data studies and applications. As it can be observed, in the past decade, the volume of data has immensely increased along with the development of data-generating, extracting, addressing, storage, and output technologies, particularly the connected Internet of Things (IoT) devices along as well as new database technologies, e.g., NoSQL. Those IoT products such as small phones, tablet pc, and wearing devices are worldwide adopted by the consumers as well as all types of industries. As predicted by the International Data Corporation, it is projected by 2025, there will be 175 Zettabytes of data increased from 41 zettabytes in 2019 and only 2 zettabytes in 2010 (Erevelles, Fukawa, & Swayne, 2016; Holst, 2019; Reinsel, Gantz, & Rydning, 2018). Among them, 79.4 Zettabytes are to be created by IoT devices and 87 Zettabytes reside in the public cloud environments.

The trend of increasing data volume has brought in a great number of potential opportunities. In the early 2010s, the term big data emerged on the horizon and the characteristics of big data are studied and explained what led to the booming of the track of research, analysis, and applications. It is noted that big data study is different from traditional data analysis.

Defined by Manyika et al. (2011, p1), "Big data refers to datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze" and it is further assumed that there will be an increasing number of datasets qualifying the features as big data. It will positively impact marketing, merchandising, and supply chain operations Manyika et al. (2011). Since the dataset size is beyond the traditional database capacity, it implies that vast data sets are gathered in multiple platforms and resources such as social media networks, electronic websites, customer sales records, and mobile devices as the size can be as big as some

terabytes to many petabytes. To use those data, it may require multiple tools with specialised design and data professionals to collect, manage and analyse the data sets (Goyal, Hancock, & Hatami, 2012; Zhang, Wang, and Pauleen, 2017). Moreover, Davenport, Barth, and Bean (2012) highlight the features of focusing on big data flows rather than stocks, the needs of having data scientists and product/process developers working together, and subsequently data analytics are extended into the core business, operational, production functions from its previous information technology dominant status.

There are subsequently a few studies published in the related marketing journals. For example, user-generated big data is analysed for strategic branding and marketing analysis (Tirunillai & Tellis, 2014) that 350,000 consumers' comments. Through the analysis, managers can observe and judge how brands compete on multidimensional space and ascertain the quality of their services and products and thus to enhance the competitiveness in the market under the increase of price transparency with big data. On the other hand, it is found that consumers generate relevant information at all stages of the decision-making cycle, their behaviour, the consumer products/services, and all the associated data. Big data growing bigger every second, every day, particularly driven by the consumers' use of social media tools, IoT devices, shopping apps/websites, and online communities. It is noted that the study of consumer behaviour can be largely benefited from the collection of big data (Hofacker, Malthouse, & Sultan, 2016). Despite there are various aspects looking into big data applications and studies, in essence, it is generally accepted that big data is not just about the volume but also the velocity and variety information assets that demand cost-effective, innovative forms of information processing and thus enable enhanced insight, decision making, and process automation (Wang, Kung, Gupta, & Ozdemir, 2019).

The definitions and consumers' studies imply the further extension of using big data in the industrial marks. When analysing big data, it involves with the typical four stages of data research, description of a phenomenon, explanation of the data, prediction of the next event &

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trend, and eventually control the pattern to gain benefits and avoid the risks. Big data analytics in marketing surely follow these principles. For example, an analyst can raise a few topics from observing a set of online shopping records: what is the relationship between the consumers' spending power and the receipt types, are there any implications from the demographical data, are the peak selling hours the same among retailers or different even it is an internet channel? These questions can eventually form a core business problem about the prediction of sells for promotion, distribution and inventory preparation that would involve Business-to-Business (B2B) activities. These activities include both data generated from the machine and human interactions at the b2b level and there are great potential and huge pay-off in using new applications of big data analytics in B2B sales (Goyal et al., 2012).

2. Big data and B2B analytics

As Wiersema's (2013) B2B Agenda reported that B2B analytics is one of the three emerging areas in the industrial marketing domain, marketers and academics start to pay increasing attention to the need to harness the potential of B2B big data and analytics (Lilien, 2016). Big data analytics is a combination of skills, technologies, applications, and processes that enable organisations to analyse an immense volume, variety, and velocity of data across a wide range of networks to support decision making and action taking (Wang et al., 2019; Wang & Hajli, 2017; Wang, Kung, Wang, & Cegielski, 2018). Proponents of the application of big data claim that when properly applied, big data analytics helps increase profit ratio, support evidence-based management, streamline administrative complexities and identify new business opportunities (Järvinen & Karjaluoto, 2015; Wang & Hajli, 2017). In B2B markets, for instance, big data analytics can help sellers transform cold sales calls to warm sales calls and understand buyers' intention to purchase by monitoring buyers' browsing behaviours on the websites (Lilien, 2016).

However, B2B lags behind B2C in big data analytics adoption because most of the existing customer analytics approaches are designed to address B2C business problems (Lilien, 2016). B2B firms are suffering from a lack of proper IT infrastructure to support marketing analytics and internal leadership on analytics (Leefflang, Verhoef, Dahlström, & Freundt, 2014). An investigation conducted by Lilien, 2016 further indicates that most of the customer data have not been analysed in meaningful ways, resulting in inefficient marketing tactics and campaigns. To fully enjoy the benefits brought forth by big data analytics, therefore, a need exists in exploring ways of how big data analytics can be leveraged to help B2B firms differentiate customer solutions and sustain profitability (Barbosa, Vicente, Ladeira, & Oliveira, 2018).

Prior research has suggested that the ability to transform data into insights, knowledge and informed decisions has become a new type of organizational capability, representing a key foundation for B2B industrial competition (Bohanec, Borštnar, & Robnik-Šikonja, 2017; Järvinen & Taiminen, 2016). In fact, exponentially increasing volumes of data in various formats from internal sources (e.g. customer, product and marketing automation data) and external sources (company events social media content) challenge a B2B organization's IT governance and data processing capacity (Leefflang et al., 2014). Researchers and practitioners need to think in earnest about how technical and human resources can be collocated for exploiting big data's value (Braganza, Brooks, Nepelski, Ali, & Moro, 2017; Wedel & Kannan, 2016). Success will demand not only the development of new applications but also new perspectives on how big data analytics could facilitate the evolution of managerial practices, generate explicit returns, and potentially create new value-generating business models.

3. Big data analytics and digital transformations

Big data is a source of meaningful signals and most of them are not analysed by the enterprises since big data were mostly ignored because of technology limitations (Dykes, 2015). In the past, data are mostly recorded following the patterns of data attributes and stored in the

relational databases. Traditionally managers put their eyes on the historical sales records and the customer feedbacks and surveys. In the era of big data analytics, enterprises are capable to detect the hints from the unstructured and indirect data in various platforms and react based on the analysed outcome. For instance, if the ads click-through rate and the number of “likes” about a brand falls to the ditch, it is unlikely the sales volume can have a positive result. Likewise, it is possible now professional analytics can get contents of discussion threads and popular searching words with the text mining skills to find out what the customers concerns about and even the associations of the contents.

What is the implication here for the industrial markets? The examples can be found as below: Netflix, Facebook, and Google collect huge customer data, which is the most valuable asset of their business status. From the past search and purchase records, they are able to provide attractive advertisements to the customers. At the same time, those data are intelligently used by the marketing content providers to decide when, where, and who should be targeted for the promotion. Likewise, websites such as tripadvisor.com and expedia.com can be a great reference for a number of industries and vendors including chain hotels, airlines, and rental car companies and etc. Eventually, organisations can get a better sense of what makes their products successfully hit their demands.

In order to gain the business value of big data analytics, the first action for organisations is to establish business objectives with proper antennas to receive all sorts of signals. As new technologies break the extant limitations, enterprises are able to shed the lights on the “dark data” (Schembera, 2019) which were previously not possible to be gathered or analysed. Similar to all kinds of physical antennas in the wireless network, big data antennas need protocols to open the gates to receive data signals that are two folds – the managerial readiness and information technology infrastructural readiness (see Fig. 1).

The business should then define the data sources and adjust the scope with the development of the organisation as well as the business value chain/supply chain involved. Starting with the integration of internal enterprise systems data and gather information about the trends of the consumers' markets and technology developments, organisations would also get benefits from the data generated from the trading partners in upstream, downstream, and horizontal collaborators to look into the opportunities (Barbosa et al., 2018). These virtually linked entities, while some could be partially owned by the target organisation, can potentially share databases and information resources and to make mutually agreed decisions with the output of big data analytics. Application programming interfaces (API) and intermediate database systems are necessary in order to reconcile various datasets (Wang, Pauleen, & Chan, 2013). They are built as a set of functions in the system dashboard in order to estimate the potential of the outcome and applying into real action such as product and marketing development. The analytics are very often designed by the key account-based marketing so as to ensure the actions can fulfill the demands of the major customers and markets. In sum, it is believed that ongoing research would align with the components in the digital transformation processes of B2B big data analytics.

4. Scanning the issues

Corresponding to the demands, this special issue is prepared to consist of 14 research articles and each has been addressed for at least 2 to 4 round reviews and revisions. These papers cover a very wide range of contexts, such as the context of the banking sector, online distributor, the airline, social media platforms, and apps. There are case studies, surveys, text mining and other algorithms presenting a number of approaches in investigating the phenomenon. This special issue gathers reports from international sources, as data used in papers in this issue come from different countries including the United States, China, and EU countries.

The collection of papers in this special issue provides novel insights into the current literature on big data analytics and B2B. An important starting point is the articles by Yang, See-To, & Papagiannidis, 2020,

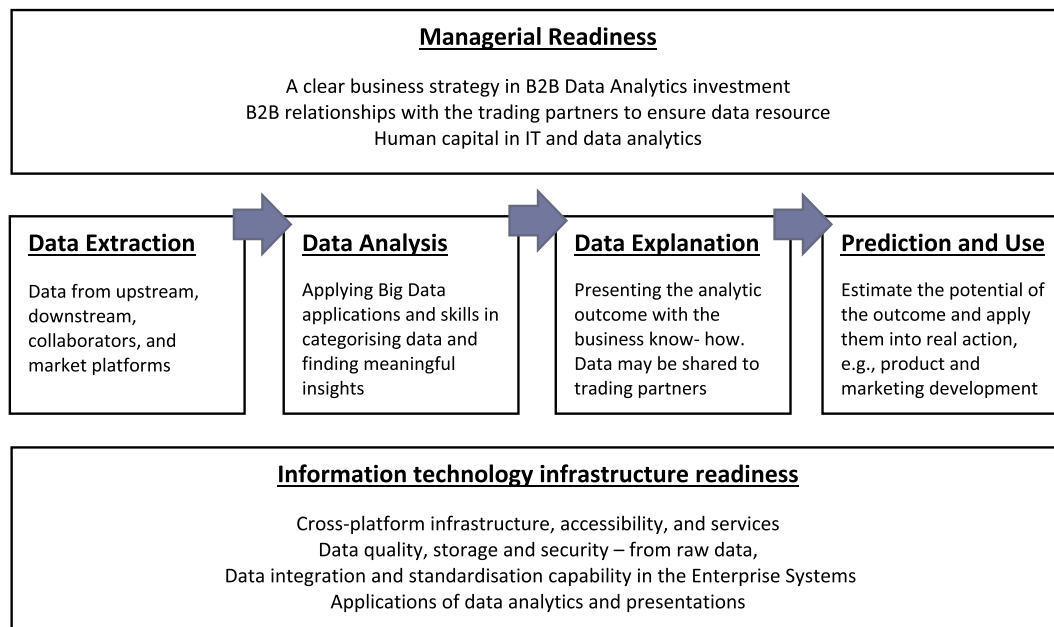


Fig. 1. Digital transformation and Big Data Analytics to generate a valuable outcome in the industrial market.

Liu, 2020, Hsiao, Wang, Wang, & Kao, 2020 and Holland, Thornton, & Naudé, 2020 which present novel big data analytical methods to showcase how B2B firms can leverage data from enterprises and social media for creating business insights. Yang et al., 2020 utilise corporate emails to gain valuable marketing insight and thus guide managers' decision making through advanced analytical approaches such as Latent Semantic Analysis (LSA) and Probabilistic Latent Semantic Analysis (PLSA). Their findings identify the discussion clusters of 621,000 emails that can be used for monitoring the product demand trends and informing B2B marketing strategies.

Using Latent Dirichlet Allocation (LDA), along with data visualization tools, Liu, 2020 examines how user-generated content (UGC) from social media platforms has differential impacts on stock performance for B2B and B2C firms. The integrated dataset that contains 84 million tweets and 8 years of stock record for 407 companies from the S&P 500 index was used. Their findings show that UGC has a stronger impact on B2C firms' stock performance than B2B firms. Negative UGC would play a significant role in stock performance.

Similarly, analyzing social media data, Hsiao et al., 2020 firstly explore the interactions between private labels and national brands in the fashion industry and then examine how these interactions affect the popularity and subsequent sales of private labels. The results from the ordinary least squares (OLS) regression analysis show that the presence of large national brands has a positive spillover effect on the popularity of private labels on social media which results in the improved sales of private label products.

Using an online panel data provided from ComScore where one million consumers' behaviours from the United States are tracked and recorded, Holland et al., 2020 adopt new B2B analytics approaches (e.g. visualization of market networks) to investigate the online performance of competitors in the US airline market. Specifically, the authors offer a diagnostic tool to help airline firms' manager to better understand their competitive position and adjust their strategic marketing planning with a comprehensive view of the networked airline market. Meanwhile, Feng, Li, Lin, & Ning, 2020 utilise data collected from over 90 mobile apps capturing a wide variety of customer interests and activities to predict firms' sales performance. The results reveal that customers' purchase on mobile apps is influenced by their hedonic value and social capital.

Given the lack of empirical research on exploring the role of big data analytics in creating business value, the papers of Sena & Ozdemir,

2020, Hallikainen, Savimäki, & Laukkanen, 2020, Zhang & Xiao, 2020, and Sun, Hall, & Cegielski, 2020 fall in the empirical stream of big data analytics research and provide sound evidence highlighting the importance of big data analytics on the evolution of B2B managerial practices. The article by Sena & Ozdemir, 2020 investigates the effect of supply chain partners' investment in big data analytics on a focal retailer's technical performance. Using secondary data sources from ORBIS, KLEMS and QLFS, they argue that retailers would benefit from their upstream partners' investment in BDA in terms of technical efficiency and progress over time.

The paper by Hallikainen et al., 2020 examines the mechanisms by which customer big data analytics in B2B firms indirectly influence sales growth and customer relationship performance through the moderating role of analytics culture. A multi-industry dataset from 417 B2B firms was used. Their findings show that the use of customer big data significantly fosters sales growth and improve customer relationship performance, and such an effect would be stronger for firms who have a high level of analytics culture. Likewise, using survey data of 128 B2B innovation projects, Zhang & Xiao, 2020 find that customers involving in B2B innovation projects as data provider and data analysts are most likely to facilitate new product innovation. They further explore the moderating role of customer need tacitness and diversity in the customer involvement-new product innovation link.

Integrating the diffusion of innovation theory, institutional theory, configuration theory, and technology-organization-environment (TOE) framework, Sun et al., 2020 explore technological, organizational, environmental enablers of big data analytics adoption in a B2B context. They use fuzzy-set qualitative comparative analysis to find the potential configurational patterns of big data analytics adoption. The results highlight the importance of relative advantage and their complementarity with technology resources and environmental conditions when adopting BDA.

The papers of Boldosova, 2020, Hajli, Tajvidi, Gbadamosi, & Nadeem, 2020, Hung, He, & Shen, 2020, Zheng, Zhang, & Song, 2020 and Sivarajah, Irani, Gupta, & Mahroof, 2020 set out to answer the key question of how does big data analytics contribute to business value through using a qualitative approach. Boldosova, 2020 demonstrates how the utilization of big data analytics and storytelling can enhance B2B sales in the sheet metal manufacturing industry, while Hajli et al., 2020 explain how the deployment of big data analytics enables B2B firms to acquire customer agility, thereby enhancing the likelihood of

new product success through three case studies. Evident from a commercial bank in Asia, Hung et al., 2020 report how the use of big data analytics can improve supply chain finance and the efficiency of marketing campaigns. Collecting data from the big data platform at JD.com, Zheng et al., 2020 study the choice of logistics distribution mode faced by e-commerce enterprises. Finally, taking a B2B sustainability view, Sivarajah et al., 2020 argue that big data and social media analytics play a vital role in enabling B2B firms to reach a balance between satisfying sustainable goals and attaining firms' long-term profitability. Overall, these successful cases recognise that big data analytics could be a key role to achieve firm growth and trigger innovation in today's business environment.

5. Conclusion

The guest editors hope to include as many relevant topics as possible. Like many other areas, the goal of applying big data analytics is to aim for gaining bits of knowledge either via human analysis or automated intelligent recognition in order to make better decisions. In the context of industrial marketing, research can be further done in referencing the conceptual framework discussed, particularly the gaps positioning on the connections of these items mentioned inside the framework. For example, how the business relationship affects the collections, analysis, and presentation of big data among the trading partners. Cultural factors and human factors in interpreting the cross-platform and multinational sourced data. B2B collaboration and strategies following the outcome of data analytics such as the following studies after the categorising of apps data from the consumers' markets. In sum, there is still a huge potential for future studies. We would like to express our gratitude to Professor Adam Lindgreen and Professor Anthony Di Benedetto, the Editors-in-Chief, to support and publish this special issue. The guest editors are also grateful to all the reviewers for their efforts in providing valuable comments and critics throughout the reviewing processes. Finally, we thank all the authors and submissions for their research works in this area.

Declaration of Competing Interest

None.

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