Editorial

# Cognitive computing, Big Data Analytics and data driven industrial marketing

## ABSTRACT

The integration of cognitive computing and big data analytics leads to a new paradigm that enables the application of the most sophisticated advances in information and communication technology (ICT) in business, including industry, business to business, and related decision-making process. The same paradigm will lead to several breakthroughs in the subfield of industrial marketing: a field both promising and extremely challenging. This special issue makes a case that cognitive computing and big data are a source of a new competitive advantage that, if properly embraced, will further consolidate industrial marketing management position in the of core the decision-making process of businesses operating locally and globally. In this vein, the value added of this special issue is twofold. On the one hand, this special issue communicates high quality research on big data analytics and data science as it is applied in industrial marketing management; On the other hand, it proposes a multidisciplinary approach to the study of the design, implementation and provision of sophisticated applications and systems necessary for data-driven industrial marketing decisions.

## 1. Introduction – Cognitive computing and Big Data Analytics for data-driven marketing decisions

For the first time in history, we are able to transform raw data, produced in masses, into knowledge and understanding, therefore strengthening our capacity to take informed- and data-based decisions in the fields of business and policymaking (Visvizi & Lytras, 2019a, 2019b). Simultaneously, the empirical implications of the big data paradigm (Lytras, Raghavan, & Damiani, 2017) lead to the emergence of new services and new business models. In this way, not only our perception of business and entrepreneurship transform, but also our views of respective businesses' innovation potential change. From a different angle, cognitive computing emerged as a new computational paradigm that allows to integrate machine learning and artificial intelligence and apply them in context of information systems (Lytras, Visvizi, Damiani, & Mthkour, 2018). As a result, the application of cognitive computing in industrial marketing management opens new avenues of possibilities as regards decision-making.

This special issue makes a case that the of cognitive computing and big data in the field of industrial marketing management are a source of its new competitive advantage. If properly handled, it will further consolidate industrial marketing management position in the of core the decision-making process of businesses operating locally and globally. The papers included in this special issue stipulate that several conditions have to be fulfilled to allow the emergence of what has been termed here as 'cognitive industrial marketing management framework'. Fig. 1 beneath offers a visualization of these. The following paragraphs offer further insight into it.

## 2. The cognitive industrial marketing management framework

The design of an integrated data and services eco-system for industrial marketing decisions requires a multi-dimensional approach (see Fig. 1 below). Clearly, this list of factors is not exhaustive. It highlights, however, the variety and complexity of the complimentary facets of the framework. More research is needed to explore in greater depth, and then apply, each of these facets of the framework. This special issue sought to do that.

- Standardization and modelling of data sets capable of supporting end-to-end marketing processes integration
- Sophistication of smart machines-driven decision-making capability for the provision of interoperability and sustainability of smart industrial marketing services
- Design and implementation of business to business marketplaces, with advanced match-making capabilities and recommendation services
- Advanced user profiling and data syndication for understanding buying behaviors
- Provision of distributed business to business services
- Aggregation of transactional and analytical data for the provision of analytics solutions including dashboards and visualizations of industrial marketing big data
- Development of novel industrial markets and commercialization of relevant value adding services.
- Evolution of industrial marketing management big data research towards enhanced decision making
- Advanced tracking and traceability of industrial marketing decisions

## 3. Cognitive Industrial Marketing Management framework: opportunities and caveats

The onset of the cognitive turn in industrial marketing management creates a variety of opportunities with regards to methodology, research approaches, and application. It encourages the development of new frameworks and functionalities that, naturally, push the discovery process towards interdisciplinary and multidisciplinary research agendas. Advances in computational engineering and the resultant potential entailed in data mining and data analytics bear the promise that at last we will be able to handle the vast amount of data effectively.
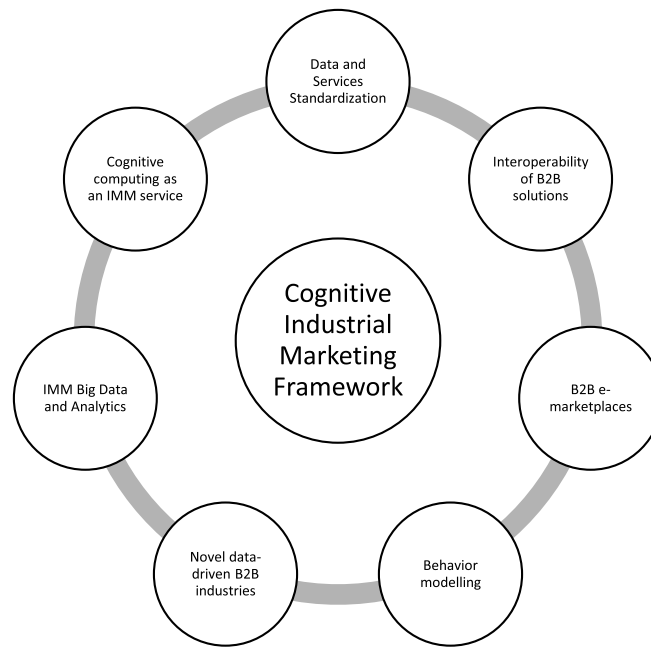
**Fig. 1.** Cognitive Industrial Marketing Management framework.

In the field of industrial marketing management, it could lead to new ways of employing data for better marketing decisions and strategy in global industrial and business-to-business markets. It could also mean that data could be employed more effectively, thus informing marketing decisions sensitive to ethical and social considerations yet to emerge. In brief, the promise inherent in predictive analytics, seen as a part of the cognitive turn in industrial marketing management, would allow industrial marketing management to transform the way business is done. Of course, that promise comes at a price.

Several questions need to be addressed at the political and regulatory level today if the potential of data mining and data analytics is to be exploited to the benefit of our societies (cf. Lytras & Visvizi, 2020), also in the field of industrial marketing. Several developments over the past few years highlighted that a consensus needs to be formed as to how to handle the emerging issues and challenges related to the availability of data and their management (Visvizi & Lytras, 2019a, 2019b). Here, it is necessary to mention the net neutrality principle and the resulting debate (cf. Glass & Tardiff, 2019). It is also important to mention the General Data Protection Regulation (GDPR) (cf. Calzada & Almirall, 2020), implemented in the European Union (EU). GDPR has far-reaching implications as regards the twin-questions of which data is available and which data is not. This has obvious consequences for data mining and data analytics. From a different angle, the questions of who and how will have access to the advanced tools of data mining and data analytics, sheds light on the complex ethical dimension inherent in the Cognitive Computing and Big Data Analytics debate. All these developments reflect on industrial marketing management and the possibilities will (or not) be created in the field. This suggests that a multi-stakeholder debate is needed to organize regulatory issues pertaining to data ecosystems and their utilization.

## 4. Overview of the special issue

The articles in this special issue cover a wide range of topics and approaches to the topic of cognitive computing and its application in the field of industrial marketing management. As such, this special issue addresses several topical questions and issues, including:

- To what extent and how exactly big data analytics can boost organizational performance? The linkage between organizational performance and advanced big data predictive analytics is a buoyant field of research that holds great promise for the industrial marketing management. The design, implementation and provision of efficient predictive analytics will soon be a priority in industrial marketing management.

- *To what extent and how cooperation will drive the Success of Suppliers in B2B Crowdsourcing Innovation Projects? A Large Scale Data Perspective».* Suppliers' network cooperation is another key aspect of application area for cognitive computing within the B2B agenda of IMM. The data utilization and the cooperation approach poses critical questions for the implementation of crowdsourcing innovation projects.

- *Growth Hacking: Insights on Data-Driven Decision-Making from Three Firms:* The understanding of data-driven decision making capabilities in IMM requires a deep analysis on growth aspects and insights. Within this context the adoption of case study method from various firms informs best practices and lessons leant. It is critical for future research directions to investigate contributions from case studies in B2B markets aiming to contribute to the body of knowledge on the cognitive IMM research area

- *Social media marketing of IT service companies: Analysis using a concept-linking mining approach*: The evolution of Social networks research and their adoption from IMM for B2B markets provides novel insights for the exploitation of this channel for advanced analytical processing. Advance data mining methods such as text mining, sentiment analysis, concept mapping and linking provide new tools to marketeers for personalized B2B services.

- *Real-time big data processing for instantaneous marketing decisions: a problematization approach*: One of the most critical areas of Cognitive computing for IMM research is related to real time big data processing. The aggregation of data, the application of sophisticated computational models and the support of instant marketing decisions requires critical enhancement is various aspects of a problematic context. Data provision and availability, dynamic distributed algorithms for real time processing as well as real time analytics at a big scale are key future research directions.

- *A Multi-dimension Framework for Value Creation through Big Data*: The evolution of Big Data and Cognitive computing research requires also significant contribution in the methodological domain. Frameworks and models trying to describe the value creation

process through big data are required for the strategic adoption of cognitive IMM.

The following four papers have more linkage to Cognitive Computing and Big Data Analytics research domain with indirect implications for IMM and B2B markets research:

- *A big data driven framework for demand-driven forecasting with effects of marketing-mix variables*: For future research it is interesting to investigate similar metaphors for IMM decision making, related to sophisticated forecasting
- *A framework for big data analytics in commercial social networks: a case study on sentiment analysis and fake review detection for marketing decision-making*: The application of Sentiment Analysis over Social networks for B2B can provide useful insights.
- *Can Data-Driven Precision Marketing Promote User AD Clicks? Evidence from Advertising in WeChat Moments*: Social networking platforms, very shortly will provide novel industrial markets. Data-driven precision industrial marketing over massive social networks will be in the future a significant research domain.
- *An Empirical Case Study on Indian Consumers' Sentiment towards Electric Vehicles: A Big Data Analytics Approach*: B2B markets and IMM must consider in the near future the implications of consumer marketing research over supply chains and manufacturing plans. The capacity of

## 5. Conclusions: theoretical and applied contribution of the special issue the literature of cognitive computing and Big Data Analytics for data driven marketing decisions

The papers in this special issue permit some reflections on the impact of cognitive computing and big data analytics towards a new generation of IMM systems, services and applications.

First, there is a list of open issues for current and future research in the domain. The following agenda is not exhaustive but highlights the variety of potential contributions in the domain:

- Cognitive Computing and Big Data Analytics for Advanced Marketing Decisions in High Tech Industries
- Data Driven Bold Innovation in High Tech Industries
- Cognitive Computing and Machine Learning approaches to marketing decisions
- Big Data Analytics and Data Driven sentiment analytics, emotions analysis for marketing purposes
- Maintenance of indexes and key performance indicators related to sensitive personal and business data
- Transparent and ubiquitous platforms for social mining in industrial contexts
- Granularity of business data and ethical issues for Industrial Marketing
- *E*-marketplaces of Data in High Tech Industries
- Big Data Big Data Analytics and Data Driven Marketing Decisions in High Tech industries in Customer Relationship Management Systems and Marketing Promotions
- Methodologies, Research Designs and smart services for the secure of privacy and security of individuals', teams' and businesses' data key challenges to effective data mining and analytics across high tech industries
- Regulatory challenges and issues of data driven marketing decisions
- Contentious issues inherent in data mining and data analytics, including ethical considerations
- Big data and data analytics: case studies and best practices
- Open government services in context of the Cognitive Computing and Big Data Analytics paradigm
- The role of international organizations, incl. The OECD, the EU etc. in shaping the Cognitive Computing and Big Data Analytics debate,

- Cognitive Computing and Big Data Analytics for the decision-making process at local, regional, national and global levels
- Cognitive Computing and Big Data Analytics for inclusive sustainable socio-economic growth and development
- Cognitive Computing and Big Data Analytics for business model innovation (BMI)
- Case studies and best practices
- Cognitive Computing and Big Data Analytics management: algorithms, architectures, infrastructure
- Cognitive Computing and Big Data Analytics and safety and security issues: transmission surveillance, intrusion detection,
- Big Data and Data Analytics: redundancy analysis and missing data handling
- Big Data and Data Analytics: cryptography, accessibility, services

Second the ideas communicated in the published papers of this special issue contribute significantly on the theoretical body of knowledge of the domain:

1. The quest for Data and Services Standardization will be a key trend for future Cognitive IMM domain.
2. The evolution of Interoperability in B2B solutions requires a multidimensional integration of cognitive and artificial intelligence enabled infrastructures.
3. The future B2B e-marketplaces, will be based on sophisticated cognitive platforms, capable of analyzing on real time scale big data analytics for enhanced decision making.
4. Behavior modelling, and deep understanding of buying patterns over distributed cognitive B2B systems, will require a transparent, ubiquitous collection of transactional data and preferences.
5. The integration of cognitive computing in industrial markets and the development of a novel B2B data ecosystem will lead to the establishment of novel data driven B2B industries.
6. Big Data and Analytics for industrial markets and decisions will promote new solutions for visual analytics and key performance indicators targeted to B2B markets.
7. Cognitive computing will evolve soon as a unique capability for B2B markets and systems. This will lead to the establishment of a new market for cloud cognitive IMM services.
8. Future research in the domain will promote interdisciplinary research to investigate the connections between B2B research, Industrial Marketing and Data Science domains.

Towards the evolution of Cognitive IMM significant issues related to data protection, privacy (Calzada & Almirall, 2020), sustainability and smart cities (Visvizi & Lytras, 2019a, 2019b) will also be involved. Multi and inter-disciplinary research will provide significant contributions towards knowledge intensive, data driven, market oriented sustainable solutions. The role of higher education for the delivery of skills and competencies is also critical (Visvizi, Daniela, & Chen, 2020).

## References

Calzada, I., & Almirall, E. (2020). *Data ecosystems for protecting European Citizens' digital rights, transforming government: People, process and policy.* https://doi.org/10.1108/TG-03-2020-0047 [forthcoming].

Glass, V., & Tardiff, T. (2019, April). A new direction for the net neutrality debate. *Telecommunications Policy, 43*(3), 199–212. https://doi.org/10.1016/j.telpol.2018.05.002.

Lytras, M. D., Raghavan, V., & Damiani, E. (2017). Big data and data analytics research: From metaphors to value space for collective wisdom in human decision making and smart machines. *International Journal on Semantic Web and Information Systems, 13*(1), 1–10. https://doi.org/10.4018/IJSWIS.2017010101.

Lytras, M. D., & Visvizi, A. (2020). Big Data research for social science and social impact. *Sustainability, 2020*(12), 180. https://doi.org/10.3390/su12010180.

Lytras, M. D., Visvizi, A., Damiani, D., & Mthkour, H. (2018). The cognitive computing turn in education: Prospects and application. *Computers in Human Behavior, 92*, 446–449. https://doi.org/10.1016/j.chb.2018.11.011 March 2019.

Visvizi, A., Daniela, L., & Chen, C. W. (2020). Beyond the ICT- and sustainability hypes: A case for quality education. *Computers in Human Behavior.* https://doi.org/10.1016/j.chb.2020.106304.

Visvizi, A., & Lytras, M. D. (Eds.). (2019). *Politics and technology in the post-truth era*Bingley, UK: Emerald Publishinghttps://books.emeraldinsight.com/page/detail/Politics-and-Technology-in-the-PostTruth-Era/?K = 9781787569843.

Smart cities: Issues and challenges: Mapping political. In A. Visvizi, & M. D. Lytras (Eds.). *Social and economic risks and threats*Elsevierhttps://www.elsevier.com/books/smart-cities-issues-and-challenges/lytras/978-0-12-816639-0.

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