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Big Data and Competitive Advantage: Some Directions and Uses

Big Data e Vantagem Competitiva: Algumas Direções e Usos

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ABSTRACT



The competitive in global market requires a continuous transformation in information technology contents, mainly by the insertion of new tools and techniques that rapidly evolve and are absorbed by members of the organizations. This advanced of new technologies in organizations scenario brought challenges addressed to need to collect, store, process and transform their data into relevant information to create competitive advantage. In highly dynamic business environments, the possibility of generating information pushes companies to use efficiently a huge volume of data, in both resources and capacities approaches. This paper aimed to analyze the relation between Big Data and competitive advantage using the resource-based view and the dynamic capabilities. Three international databases were used and analyzed 29 articles. Results indicated that both the resource-based view and the dynamic capabilities approach are used to analyze Big Data as competitive advantage creator. Two aspects were evidenced: the combined approaches can result in more consistent analyses; and the lack of a robust theoretical framework for Big Data analysis is evidenced by the predominance of descriptive articles and practical reports.

Keywords: Innovation. Technology. Information Management. Competitiveness.

RESUMO

A competitividade no mercado global exige uma transformação contínua nos conteúdos de tecnologia da informação, principalmente pela inserção de novas ferramentas e técnicas que evoluem rapidamente e são absorvidas pelos membros das organizações. Este cenário de avanço de novas tecnologias nas organizações trouxe desafios enfrentados pela necessidade de coletar, armazenar, processar e transformar seus dados em informações relevantes para a criação de vantagem competitiva. Em ambientes de negócios altamente dinâmicos, a possibilidade de geração de informações impulsiona as empresas a utilizarem de forma eficiente um grande volume de dados, tanto em recursos quanto em capacidades. Este artigo teve como objetivo analisar a relação entre Big Data e vantagem competitiva utilizando a visão baseada em recursos e as capacidades dinâmicas. Três bases de dados internacionais foram utilizadas e analisados 29 artigos. Os resultados indicaram que tanto a visão baseada em recursos quanto a abordagem de recursos dinâmicos são usados para analisar Big Data como criador de vantagem competitiva. Dois aspectos foram evidenciados: as abordagens combinadas podem resultar em análises mais consistentes; e a falta de um referencial teórico robusto para a análise de Big Data é evidenciada pela predominância de artigos descritivos e relatórios práticos.

Palavras-chave: Inovação. Tecnologia. Gestão da Informação. Competitividade.

1 INTRODUCTION

The competitive landscape of global market environments requires a continuous transformation in information technology (IT) contents, mainly by the insertion of new tools and techniques that rapidly evolve and are absorbed by members of the organizations. Innovations in telecommunications, multimedia channels and new hardware and software resources allow the generation and capture of data for the generation of information and the production of knowledge (Laurindo et al., 2001). The technological development allows a large generation and availability of data that can be observed and transformed into information for decision-making. This technological evolution is increasingly present in the social and economic sciences, as well as in the daily life of individuals and organizations.

From inaccessible sources and under the control of a few people in the past, data nowadays are gaining volume and availability. This large volume of data called “Big Data” offers endless conditions of treatment and use. Although there is no consensus on Big Data's conceptualization, from a business point of view this can be defined as “datasets whose structure and size go beyond the capacity of capturing, storing, managing and analyzing that common software holds, and which are transformed into information” (Trevisan & Brito, 2015, p. 25). According to Chen, Mao, and Liu (2014) data sets cannot be perceived, acquired, managed and processed in a timely manner by traditional software or hardware tools.

Seeking a competitive advantage in increasingly dynamic markets is a continuous challenge in business. Firms direct their objectives to build competitive advantage (Viana, Neto, & Añez, 2014) and this may explain various levels of business performance, as well as the success or failure of corporations.

Competitive advantage occurs when a firm is more successful than its current or potential competitors. The superior performance of a firm within the competitive environment is an empirical and common indicator of competitive advantage (Côrte-Real, Oliveira, & Ruivo, 2017).

Associating Big Data with the generation of competitive advantage in the business environment has relevance as Big Data quickly establishes itself in several activities with a large volume of financial support (Melo, 2016).

Previous studies on competitive advantage associated with Big Data are important due to the evolution of IT, which is commonly applied to the creation of competitive advantage. In addition, Big Data analysis is a latent issue in academic and business spheres. With a holistic

approach for data management, processing and analysis, Big Data enable value creation, performance measurement, and competitive advantage construction (Wamba et al., 2017).

Finally, innovating and gaining a competitive advantage by using Big Data goes far beyond data collection and strategy configuration based on these data. Only that would be insufficient for a company to get the expected advantage (Prescott, 2016). For an organization creates a true competitive advantage, internal capabilities and resources must be analyzed to identify the drivers of differentiation and innovation.

A new environment for business emerges, with challenges and uncertainties to overcome, addressing numerous of possibilities both in academia and in business. This paper aimed to analyze the relation between Big Data and competitive advantage using the resource-based view and the dynamic capabilities. The expectation is to contribute to the theoretical development of the use of Big Data as a generator of competitive advantage, with applications in business. The following questions were investigated: Do the articles jointly address the terms Big Data and competitive advantage? The authors list Big Data as a generator of competitive advantage? Do the authors classify Big Data in the context of the resource-based view, dynamic capabilities or both? What kind of approach did the authors use to consider Big Data as a generator of competitive advantage?

2 THEORETICAL BACKGROUND

2.1 Big Data

Big Data can be defined as “datasets, which could not be captured, managed, and processed by general computers within an acceptable scope” (Chen, Mao, & Liu, 2014, p.173). Big Data also defined as a new architecture composed of techniques and technologies that allow the discovery of hidden values in large databases, requiring new formats for the large-scale integration of data sets that are highly complex and highly diverse (Hashem et al. 2015).

Big Data's fields of action are vast, encompassing new, rapidly growing segments of data such as media and entertainment, healthcare, and surveillance. Social networking solutions like Facebook, Foursquare and Twitter are new data sources where consumers provide almost continuous data flows about themselves. This type of generation and data capture, due to the network effect, expands at high speeds (Gantz & Reinsel, 2011).

From the managerial perspective is important to note that Big Data encompasses much

more than just a lot of data, provides management information to support decision-making (Sonka, 2014). The promise and value of Big Data go beyond what is known, limited only by human capabilities, then organizations must pay attention to the implications and failures to reach the full potential of Big Data (Chibba & Cavoukian, 2015).

The Big Data features can be summarized as 4Vs: volume, variety, velocity, and value (Hashem et al., 2015). Volume refers to the amount of data generated (all types) from different sources and from a continuous expansion that can result in the creation of information and observable patterns through data analysis.

Variety refers to the different types of data collected, including video, image, text, audio and numerical data records in a structured or unstructured format. Velocity refers to how fast data transfer occurs as content changes constantly due to the introduction of complementary data, archived or transmitted from multiple sources. The important aspect of Big Data refers to the process of discovering hidden values of data sets with various types and rapid generation (Hashem et al., 2015).

The big challenges of Big Data are related to the acquisition, storage, management, and analysis, since traditional systems of management, and analysis are based on relational database management systems (RDBMS). This type of system has a high cost and is only applicable to structured data. Therefore, a more viable alternative to the infrastructure requirements for Big Data is the Cloud Computing (Chen, Mao & Liu, 2014).

Some possible solutions for storing and managing large-scale disordered datasets are distributed file systems (Howard et al., 1988) and NoSQL databases (Cattell, 2011) that can be used to process tasks in clusters, such as web pages for example.

Other challenges to developing the use of Big Data are observed by Chaudhuri, Dayal, and Narasayya (2011), Labrinidis and Jagadish (2012) and Agrawal et al. (2011) and include: data representation; redundancy; data lifecycle management; analysis mechanisms; confidentiality of data; energy management; dispensability and scalability; and cooperation (Chen, Mao & Liu, 2014).

Companies can strategically stand out in the market using Big Data resources combined with a service-oriented manufacturing model. Mastering advanced technology combined with a service-oriented model can effectively increase the competitive advantage of companies (Zhang et al., 2017a)

2.2 Competitive Advantage

Competitive advantage is an advantage that the firm has in a market, which differentiates it from its competitors, through attributes that it holds and is offered to its customers (Porter, 1986). These advantages arise from firms, which based on a given territory, generate determinants of their competitiveness and of the territory in which they operate. Competitive advantage is determined by decisive characteristics that allow firms to create and maintain competitiveness (Coutinho et al., 2005).

According to Vasconcelos and Cyrino (2000), there are two theoretical axes guiding the competitive advantage. Firstly, the competitive advantage is explained by external factors such as market processes (Austrian School - Hayek and Schumpeter) and industry structure (Structure-Conduct-Performance Model - Scherer and Ross and Positioning Analysis - Porter). Second axis, the competitive advantage is explained by the internal factors, specific of the firm, such as resources and competencies: Resource-Based View (RBV); and dynamic capabilities (DC) (Vasconcelos & Cyrino, 2000).

This study focused on the second axis, since innovating in IT to create a competitive advantage using Big Data depends on specific resources and internal capabilities of each firm to generate, store, process and manage information.

2.3 Resource-based view (RBV)

Efficient management of resources creates conditions for companies generating competitive advantages on markets in which they operate. According to Barney (1991), companies can differentiate through their resources and not every resource can generate a competitive advantage. For this occur, four requirements should be met: a) resource must be valuable to exploit opportunities and/or mitigate threats in the business environment; b) resource must be rare among current and potential competitors; c) resource must be imperfectly imitable (difficult to imitate); d) there must be no equivalent substitutes for this resource, which are valuable, but not rare or imperfectly imitable (Barney, 1991). Thus, resources can generate competitive differentials according to their availability, specificity and ability to add value to final products.

The concept of resource-based vision shows a competitive heterogeneity between companies. Each company has its own characteristics, inimitable and intangible, resources that allow a differentiated and superior performance that allow opportunities for the generation of competitive advantage (Habbershon & Williams, 1999).

A firm is unique in its strategic resources. Heterogeneous characteristics can potentially create advantages over competitors since every firm can hold exclusive resources that are not perfectly movable to others. It allows firms maintaining a competitive advantage for long periods (Almarri & Gardiner, 2014). The theory examines relations between internal characteristics and processes of a firm, as well as its performance. Competitive heterogeneity arises from the premise that the closest competitors differ in resources and capacities in an important and lasting way (Helfat & Peteraf, 2003).

The resource-based view has been increasingly used by scholars and strategists within organizations to identify management phenomena and the discussions is proposed by several authors (Jang, 2013). They mention that corporate resources play a key role in explaining phenomena such as: the strategic management of the organization (Barney, 2001a, Barney, 2001b), strategic alliances (Eisenhardt & Schoonhoven, 1996, Wassmer & Dussauge, 2012), business diversification (Silverman, 1999), new product development (Henard & McFadyen, 2012, Verona, 1999), cooperation between firms (Combs & Ketchen Jr., 1999), marketing (Srivastava, Fahey & Christensen, 2001), international small business management (Westhead, Wright & Ucbasaran, 2001), entrepreneurship (Zahra, Hayton & Salvato, 2004) and firms' innovation (Galunic & Rodan, 1998) (Jang, 2013).

In summary, the resource-based view highlight that some firms show better competitive performance by differentiating their capabilities and resources. This approach initially focuses on the internal relationships of firms and points that the resources and capacities that generate competitive advantage should be protected within the firms. However, the resource-based view recognizes, in a more current approach, that value generation may also result from combinations of internal resources with existing resources beyond the boundaries of the firm.

This advance is evidenced by the focus on the formation of competitive advantage initially from the internal resources to an overall view, considering the importance of relational resources and the institutional environment in which firms exist (Viana, Neto, & Añez, 2014).

2.4 Dynamic capabilities

Companies that present advantages in a global market can rapidly respond with product innovation and flexibility. They also can manage, coordinate and establish competences, in internal and external environments (Teece & Pisano, 1994).

Dynamic capabilities is defined as the intelligence of a company to integrate, develop or redesign its internal and external competences to compete in environments that change quickly (Teece, Pisano & Shuen, 1997). It reflects the firm's ability to develop innovative ways of obtaining competitive advantage as well as environmental conditions in the market in which the company operates.

Dynamic capabilities as a source of competitive advantage, "dynamics" is the changes of environmental characteristics resulting from the need for strategic responses in a market in which time-to-market (period of analysis and product launching in the market) and timing (response in the right time) are crucial. "Capability" is the strategic management, adequacy, and adaptation of organizational abilities in internal and external environments, as well as the management of resources and competencies to change such environments (Teece & Pisano (1994).

Meirelles and Camargo (2014) highlighted that studies on dynamic capabilities has rapidly evolved for diverse areas of knowledge, mainly in dynamic markets with continuous technological changes. This helps to maintain a competitive advantage. The same occurs in complex environments where strategic resources and internal competencies, by themselves, are not enough.

Winter (2003), approached dynamic capabilities with a more comprehensive concept, based on the organizational routine: an organizational capability is a high-level routine - behavior that is learned, highly standardized, repetitive or quasi-repetitive, in part based on tacit knowledge - which gives the management a set of decision options to produce significant results.

According to Eisenhardt and Martin (2000, p. 1105), "dynamic capabilities are a set of specific and identifiable processes such as product development, strategic decision-making, and alliancing". Dynamic capabilities contain idiosyncratic features in their details and emerge from past situations (path dependence). However, there are points of significant convergence between firms and, from the managerial sphere; such points are called "best practices".

Classification for dynamic capabilities is divided into two views (Meirelles, & Camargo, 2014). The first comprises a set of behaviors, organizational abilities and capabilities and the second, processes and routines of organizations. The existence of dynamic capabilities in the continuous accumulation of experiences and knowledge base of an organization is considered. The authors proposed a more comprehensive definition based on behaviors and abilities; routines and processes; and mechanisms of learning and governance

of the knowledge.

3 METHODS

To answer the four questions proposed in this paper the systematic literature review with the approach proposed by Fink (2013) was used, comprised seven steps: 1) raising a research question; 2) database selection; 3) choosing research issues; 4) application of the practical selection criteria; 5) application of the methodical selection criteria; 6) review; 7) synthesis of results. Suess-Reyes and Fuetsch (2017), Thonemann and Schumann (2018), Barth and Rieckmann (2016) and Osagie et al. (2016) also adopted this procedure.

After raising the research questions, three databases widely used in research on areas of administration were selected: Web of Science; Science Direct; and Scopus. The database Scopus were used as a gauge of the results for the other two databases since it comprehends information not included in the other databases. The reason for choosing these databases was: a) quantity and quality of the information provided; b) familiarity with the use; c) availability and accessibility via CAPES journals system.

The terms “competitive advantage” and “Big Data” were searched and their respective results are presented in Table 1, divided into bases and selection steps.

Table 1 – Search and selection procedures

Bases e terms	Step 1	Step 2	Step 3	Σ (1-2-3)
Web of Science TS= (“Competitive Advantage” AND “Big Data”)	51	-32	-4	15
Science Direct (“Competitive Advantage” AND “Big Data”)	24	-19	0	5
Scopus (“Competitive Advantage” AND “Big Data”)	69	-56	-4	9
Total	144	-107	-8	29

Source: prepared by authors.

All scientific journals were analyzed investigated regardless of their impact factor, following the same reasoning line proposed by Suess-Reyes and Fuetsch (2017). Work papers, symposium and conference publications, as well as manuals and book chapters were excluded.

In step 1, a wide search of documents in the three databases was done using competitive advantage and Big Data terms. The search for the terms were title, abstract and keywords. The search criteria for selecting and including articles were: full articles and open

access in the Portal Periódicos CAPES; scientific paper from journals with peer reviewer classified in Quartil 1 (Q1) or Quartil 2 (Q2) according with JCR Index; published in English between January 2010 to December 2017; Administration, Economics, Accounting, Finance, Computing, Engineering and IT areas were considered. Journals from Computing, Engineering and IT areas were included since that the Administration area was at the scope. The search resulted in 144 articles.

In step 2, duplicate articles, publications in non-English language, documents not available in full version and other kind of documents, with just two terms and they were not related, out of the areas established and they not classified. Tittles and abstracts were examined and eliminated 107 documents, 78 duplicated, and 29 for not addressing the research approaches in this part of the paper.

In step 3, all articles were read and eight articles were excluded due to the following reasons: unavailability; non-English publication; not addressing the research approach; and non-academical publication (manual). Finally, 29 articles composed the database for analysis.

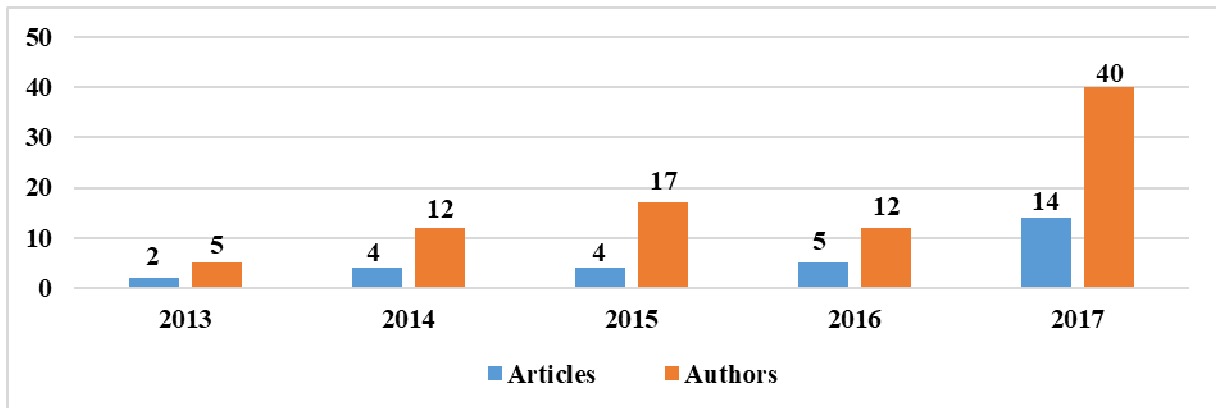
4 FINDINGS AND DISCUSSION

To analyze the results, the previously introduced research questions will be taken up:

1. Do the articles jointly address the terms Big Data and competitive advantage?

The analysis was performed on articles searched on databases from 2010 to 2017. Figure 1 shows the evolution of the scientific publications and the number of authors over the researched period, considering only those 29 selected articles:

Figure 1 - Evolution of the number of publications and authors



Source: prepared by authors based in research data.

There were no publications that jointly addressed Big Data and competitive advantage between the years 2010 and 2013. The number of publications and authors have gradually increased from 2013. The authorship evolution, four from the 86 listed authors stand out with the publications: Liu, Y. (2017a, 2017b); Carayannis, E. G. (2013, 2017); Ren, S. (2017a, 2017b); e Zhang, Y. (2017a, 2017b).

The articles were published in 21 different journals. The Journal of Cleaner Production and the Journal of Knowledge Management with three articles each one, followed by California Management Review, Information & Management, International Journal of Production Economics and Journal of Intelligence Studies in Business, with two articles on the issue of this study.

2. The authors list Big Data as a generator of competitive advantage?

Some authors' signed relating Big Data to the generation of competitive advantage as well as techniques and methods used to create the advantages. Of the 29 selected articles, 17 studies addressed Big Data as a generator of competitive advantage such as: Alharthi, Krotov and Bowman (2017); Carayannis et al. (2017); Chaurasia and Rosin (2017); Côte-Real, Oliveira and Ruivo (2017); Grover and Kar (2017); Khan and Vorley (2017); Matthias et al. (2017); Wang and Byrd (2017); Zhang et al. (2017a); Nudurupati, Tebboune and Hardman (2016); Gupta and George (2016); He et al. (2015); Opresnik and Taisch (2015); Tan et al. (2015); Fawcett and Waller (2014); Kabir and Carayannis (2013); and Ribarsky, Wang and Dou (2013).

In the other 12 articles, the relationship presented was indirect. The execution of processes that included Big Data can result in the generation of competitive advantage. In the majority, the competitive advantage is mentioned in a generic way.

3. Do the authors classify Big Data in the context of the resource-based view, dynamic capabilities or both?

Few authors make Big Data classification explicit within the resource-based view and dynamic capabilities. Only Nudurupati, Tebboune, and Hardman (2016) classified Big Data as a company resource and approach it by the resource-based view. Carayannis et al. (2017); Côte-Real, Oliveira and Ruivo (2017); Wang and Byrd (2017); and Kabir and Carayannis (2013) approached Big Data by the dynamic capabilities of a firm.

On the other hand, Gupta and George (2016), Opresnik and Taisch (2015) used both approaches to justify Big Data as a generator of competitive advantages. The last authors considered resources as a source of competitive advantage; however, resources cannot persist in dynamic environments, therefore, cannot be a sustainable advantage. To avoid this, capabilities should result in superior performance. The construction of dynamic capabilities is crucial for “constant pursuit of the renewal, reconfiguration and re-creation of resources and capabilities to address the environmental change [...] the ‘ultimate’ organizational capabilities that are conducive to long-term performance” (Opresnik & Taisch, 2015, p. 182).

4. What kind of approach did the authors use to consider Big Data as a generator of competitive advantage?

According to the answers for the question two, 17 studies addressed Big Data as a generator of competitive advantage in a diversity of approaches such as knowledge management; performance management; marketing strategy; production strategy; decision-making; organizational processes; and resources and capacities (Table 2).

Table 2 - Big Data relationship with Competitive Advantage approach

Approach	Authors
Knowledge management	Khan and Vorley (2017); Carayannis et al. (2017); Côte-Real, Oliveira and Ruivo (2017); Kabir and Carayannis (2013).
Performance management	Nudurupati, Tebboune and Hardman (2016); Fawcett and Waller (2014).
Marketing strategy	He et al. (2015); Ribarsky, Wang and Dou (2013).
Production strategy	Zhang et al. (2017a); Opresnik and Taisch (2015).

Organizational processes	Matthias et al. (2017); Chaurasia and Rosin (2017).
Decision-making	Wang and Byrd (2017); Alharthi, Krotov and Bowman (2017); Tan et al. (2015).
Organizational resources	Grover and Kar (2017); Gupta and George (2016)

Source: Web of Science, Science Direct and Scopus (2017).

All articles analyzed in this phase addressed Big Data as a generator of competitive advantage by different approaches. These approaches have in common the generation, acquisition, and storage of data as well as the concern with processing them to extract information useful for the creation of competitive advantage.

Knowledge management was indicated by Khan and Vorley (2017) as a key factor in efficient business processes and competitive advantage. The authors designated the Big Data textual analysis as a knowledge management facilitator. According to the authors, generating quality knowledge through Big Data analysis is of fundamental importance for the development of competitive advantages.

Competitive advantages result from knowledge management and decision-making in the organizational intelligence context. Decision-making requires understanding and dimensioning of the Big Data exploitation processes, in which the most important aspect is the proactive analysis, targeted to improve both the individual and the team performances within organizations (Carayannis et al., 2017).

The adoption of Big Data analysis allows effective knowledge management (both internal and external) that helps to increase the firm's agility through the identification of threats and opportunities, use of opportunities and attainment of competitive advantage by adjusting the technological environment (Côte-Real, Oliveira & Ruivo, 2017).

Efficient Big Data management can produce sources of competitive advantages. However, there is a need for combining staff, tools, and data, together with the development of a data-oriented culture. Data created during operating processes and activities, associated with the development of staff's abilities, can be a great potential for developing a competitive advantage (Kabir & Carayannis, 2013).

Nudurupati, Tebboune, and Hardman (2016) approach Big Data by organizational **performance management**. Organizations interested in technological developments such as the Internet of Things (IoT) or social media might create new products and business models. Currently, data are easy to obtain and have a low maintenance cost, which is a good reason to use Big Data (Fawcett & Waller, 2014).

He et al. (2015) developed a market analysis tool based on **marketing strategies** (commercialization). Companies should develop abilities of social media competitive analysis to produce differentials over competitors and in an innovative approach to evaluate, monitor and compare social media data of various brands and companies.

Monitoring market actions through Big Data is important because Big Data analyses are linked to strategies that, in certain circumstances, can drive the users' actions on social media such as Twitter and Facebook (Ribarsky, Wang & Dou, 2013).

Big Data is also linked to **production strategies** of products and services. The exploitation of Big Data can be the next step for the value creation after product actualization in a manufacturing service ecosystem (MSE). A manufacturing company can differentiate by the type of Big Data exploitation strategy and efficient Big Data use in the servitization process, thus stimulating the most important of the "Vs" – Value (Opresnik & Taisch, 2015).

Zhang et al. (2017a) affirm that companies can strategically differentiate in the market by using Big Data resources combined with a service-oriented manufacturing model. The mastery of advanced technology combined with a service-oriented model can effectively increase the competitive advantage of companies.

Efficient management and improvements in the **organizational processes** are important to make strategies work. The Big Data solutions applied to these processes offer conditions for organizations exploiting and making use of the technology to create competitive advantages. Such application is highlighted since social, technological and human demands occur. Consequently, these current demands must be met as the long-term real advantage is reached (Matthias et al., 2017).

On the other hand, the use of Big Data can still be a complex organizational process, especially with regard to the use of an appropriate platform for the organizational infrastructure. The process of developing usability capabilities will also demand the attention of managers. This process consolidated could generate competitive advantages for organizations (Chaurasia & Rosin, 2017).

In general, management processes are driven by **decision-making**, which should be made with a basis on diverse information and situations observed from various sources. Big Data appears as an important tool and source of competitive advantage.

Conceptual models in information technology using the views of resources and capabilities can influence the effectiveness of decision-making. However, this is an area that needs to be better explored to become effective (Wang & Byrd, 2017).

The potential of growth is big; however, Big Data can only generate competitive advantage if managers use techniques that structure and link various data sets to create a coherent image of a specific problem. Extracting important and useful information for a better view of the problem is the key to obtain a competitive advantage in dynamic business environments (Tan et al., 2015).

Big Data and its capacity for analyzing and using complex data sets are increasingly perceived by companies as the most important source of competitive advantage of the 21st century. The Big Data potential of increasing internal and external efficiency and improving the profitability and competitiveness of organizations is very big (Alharthi, Krotov & Bowman, 2017).

Although not explicitly, the study of Grover and Kar (2017) presented Big Data and its variables as an **organizational resource**. For the aforementioned authors, the correct choice of tools for a given focus, allows to identify problems and, consequently, to elaborate a set of approaches or means for the solution of these. Thus, Big Data and its applications are tools for solving complex problems in various organizational environments (Grover & Kar, 2017).

However, the Big Data potential for competitive advantage should be necessarily associated with the resources and capacities of organizations, as previously mentioned. This was previously pointed by Gupta and George (2016), that Big Data can generate competitive advantage when used together with other capacities of the firm.

Finally, human abilities and intangible resources are necessary. In addition to technical and managerial availability, it is important for a company to apply all the organizational learning and culture to enhance the Big Data potential. According to Gupta and George (2016), only the conjoint effect of resources could create a specific capacity for the firm. By itself, it is not probable that Big Data could represent a source of competitive advantage since Big Data can be accessed by many organizations.

5 CONCLUSION

This paper provided a systematic literature review on the Big Data and competitive advantage issues. In the results of 29 articles, analyzed Big Data is approached as a generator of competitive advantage. However, seven articles classified in the perspective of the resource-based view or dynamic capabilities, four addressed to dynamic capacity, one resource-based view and two others addressed to both perspectives.

In these articles, several approaches justify the generation, or maintenance, of competitive advantages by using Big Data resources, either by using Big Data analysis, or by using large volumes of data in conjunction with other tools.

Although the analysis of the articles did not make it explicit, we believe that the best way to analyze and describe Big Data as a generator of competitive advantage is through its integration with the resource-based view based and dynamic capabilities. Seem to be valid classify data as an enterprise asset, because resources are needed to foster the generation, storage, processing of data, as well as financial and human resources.

It still difficult to affirm that Big Data can generate a competitive advantage only from a resource-based view, especially in the long term. This is because resources are available for any organization. Therefore, peculiar or exclusive information, once obtained, would be the differentiator to add value in a product or service. The differential would be a rarity because the information is not available to competitors; thus, difficult to imitate and consequently irreplaceable.

On the one hand, the resource-based view can define Big Data as the generator of competitive advantage, because organizations need specific capabilities to extract valuable information to create competitive advantage in dynamic and competitive business environments. Dynamic capabilities can complement the resource-based view analysis to explain how Big Data can generate a competitive advantage.

The lack of a robust theoretical framework for Big Data analysis is evidenced by the predominance of descriptive articles and practical reports. Hence, more elements are necessary to classify Big Data as a generator of competitive advantage only in the resource-based view. Yet, dynamic capabilities should complement Big Data when this is classified as a resource.

In practice, organizations need rapid adaptations to create a competitive advantage by using the vast availability of data existing under the most diverse forms and levels of structuring. For this, modern equipment, up-to-date processes, intelligent systems, and user training are indispensable.

This review contributes to discussions on the state-of-the-art of the themes here suggested: Big Data; competitive advantage; resource-based view; and dynamic capabilities, themes that are little discussed conjointly in the searched literature.

The major limitations of this study were the content of some publications' abstracts that did not describe clearly or not bring evidence about the use of resource-based view and dynamic capabilities in its discussion, and the practical bias of the most publications showing

little theoretical discussions. The lack of theoretical background in the articles is probably because Big Data is a new theme with unknown facets, although much discussed. However, this is only an assumption, without the pretension of being confirmed by this research.

For future research, it is suggested to deepen in other fields of science that might benefit from Big Data, exploring all possible alternatives of use. In the context of the applied social sciences, it is proposed more coverage for the subject, addressing not only the competitive advantage but also the strategic business management.

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