Big data oriented business models: the 7vs of value creation

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Research context. *Recently, the interest of engineering and managerial literature in big data has grown considerably (Chen et al., 2012). In particular, the focus of related researches from engineering scholars has been on how to store and analyze the constantly growing amount of data (Cohen et al., 2012; Xu et al., 2014). Instead, managerial literature has analyzed the potential of big data analysis in order to investigate customers' behavior (Davenport et al, 2011), the importance of big data information in decision making (Brynjolfsson et al., 2011; McAfee et al., 2012), and the role of big data and 'internet of things' in increasing firms efficiency (Waller and Fawcett, 2013). Due to this growing awareness on the potential of big data application, nowadays big data represent one of the principal fields of managerial literature (Chen et al, 2012). Nevertheless, despite the growing number of studies on big data and big data analysis, some unsolved questions still exist. For example, no researches specifically focused on how big data influence business models. Furthermore, since literature has prevalently focused on how traditional firms can use big data, few studies exist on how firms business models prevalently doing big data analysis differ from the business models of other kind of firms (George et al, 2014).*

Theoretical background. *Big data have recently been described as the next great thing in management practice, as the next frontier in regards of digital innovation, and as a significant revolution for managerial science (Manyika et al., 2011; McAfee et al., 2012). Moreover, data scientist has been addressed as the 'sexiest' job of 21st century (Davenport and Patil, 2012). Multiple reasons have been identified as underlying this growing interest. Firstly, big data have changed significantly and positively the traditional Customer Relationship Management strategies (Barton and Court, 2012; Spiess et al., 2014). Second, big data analysis allows to increase the supply chain efficiency, thus allowing management to effectively monitor supply channels and to notice possible 'bottleneck' in those channels (Waller and Fawcett, 2013). Third, information deriving from big data are becoming instrumental in marketing strategy formulation and in creating customized promotions (Davenport et al., 2011; Erevelles et al., 2015). Finally, big data implementation in support of decision making systems is positively related with better productivity and better overall economic performances (Brynjolfsson et al., 2011; McAfee et al., 2012). Big data capacity to transform management, hence, is directly related with the informative content of big data. Differently from traditional databases, in fact, big data are characterized by the '7Vs', which are volume, velocity, variety, variability, veracity, visualization, and value (Erevelles et al., 2015; Zaïane, 2015). Sheer volume is the first characteristic differentiating big data. Only databases exceeding the petabyte in effect can be classified as big data (McAfee et al., 2012; Erevelles et al., 2015). Then, in respect of traditional static databases, big data generation by users of digital technologies is continuous and faster (Madden, 2012). As a result, velocity characterizes big data technology. Big data variety refers to non structured data that may assume various forms, for example many big data are prevalently composed of video and audio files (Erevelles et al., 2015). Moreover, big data are characterized by intrinsic variability, in fact a big data may contain information on many different topics coming from various moments of time (Mishra, 2015). In addition to this, a database could also be considered as a big data whether composed of verifiable information. Big data should be easily consultable too, thus increasing their visualization (Lycett, 2013; Ali-ud-din Khan et al., 2014). Finally, information contained in a big data may be worth to be analyzed and, hence, reveal the intrinsic value of the data itself (Mishra, 2015). The first four characteristics of big data, namely volume, velocity, variety, and veracity, can be viewed as historical characteristics of big data, which were traditionally identified by IBM in 2012 (IBM, 2012). Variability, visualization, and value, instead, can be considered as modern, or additional, features. Such seven aspects, labeled as '7Vs', are what differentiates big data from traditional databases. Since big data ability to create value is directly related with the aforementioned 7Vs, contextualizing them in a business model framework may help the understanding of how big data oriented firms are able to create value. In this research, we build on the widely acknowledge Osterwalder (2004) Canvas Business Model (see also, Osterwalder and Pigneur, 2010). In such a model, firms' main features are conceptualized in 9 poles of attention, or 'building blocks': key partners, key activities, key resources, cost structure, value proposition, customer*

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relationship, distribution channels, client segment, and revenue flows. We will particularly focus on value creation, which represents how a firm is able to generate value by manipulating productive factors in order to produce something different or new (Osterwalder and Pigneur, 2010). Actually, business models are particularly useful to understand how firms create value since they are graphical representation of firms' architecture (Morris et al., 2006; Zott and Amit, 2010).

Structure of research: *The aim of this research is to demonstrate how business models of big data oriented firms differ from business models of other firms, particularly focusing on how the 7Vs elaboration of big data represents the main added value of such firms. In order to do so, the research is composed of four principal parts. The initial part concerns big data in managerial science, building on the comprehensive literature review on the characteristics of big data, principal uses of big data by managers, and most important emerging topics about big data for management (Brynjolfsson et al., 2012; Chen et al., 2012; McAfee et al., 2012; Waller and Fawcett, 2013). The second part relates to the increasingly diffused concept of business model (Morris et al., 2005). In particular, the attention is on Osterwalder Canvas Business Model (2004) and each singular element of such a framework. The third part is about the development of the conceptual framework. Actually, theories on big data will be associated with researches on business models and a reassuming framework will be illustrated in order to show the principal differences of business models of these firms in respect with traditional ones. Finally, in the conclusive part some managerial implications and some suggestions for future researches are proposed.*

Objectives. *The principal objective of this research is related with demonstrating how the elaboration of the 7Vs of big data represents the main added value not only for big data oriented firms, but also for firms providing services using big data as the main 'raw' material. In particular, the research is focused on assessing how the principal activity creating value for big data oriented firms is effective: (a) managing volume and velocity, (b) homogenizing variety, (c) reducing variability, (d) selecting truthful and worth information, and (e) allowing a better visualizability of data. In addition to this first objective, we also attempt to assess whether business model of big data oriented firm may be interpreted as a self-sustaining dynamic loop, which is based on perpetual generation of data from firms' customers and technology users. A reassuming conceptual framework will also be developed to illustrate the main results.*

Methodology. *The construction of the proposed conceptual framework is based on key insights emerging from main literature on big data and from principal literature on business model. The conceptual framework, specifically, has been developed by contextualizing in a business model framework the characteristics of big data and the process of big data generation. The main characteristics of big data, such as volume, velocity, variety, variability, veracity, and visualization are conceptualized as instruments able to support managerial decision (Brynjolfsson et al., 2012; McAfee et al., 2012; Waller and Fawcett, 2013; Mishra, 2015). As far as concerns the elements composing a business model architecture, we build on Osterwalder (2004) seminal work on business model and the modern pertinent literature (Osterwalder and Pigneur, 2010; Zott and Amit, 2010).*

Findings. *From the proposed conceptual framework, it emerges how the deconstruction of big data complexity, which descends directly from the main characteristics of big data, represents the principal added value of big data oriented firms. Specifically, the most relevant activity-based added value appears to be: the management of volume and velocity of big data, the homogenization of variety, the reduction of variability, the confirmation of truthfulness of a data, the extraction of worth information from a big data, and finally the reduction of a big data into a user friendly visualization of data by managers and decision makers. Moreover, the main result of our proposed conceptual framework refers to the fact that big data oriented business models may be interpreted as a strategic dynamic loop: in fact, the internet utilization by online users and digital customers produces a flow of data which constitutes the consequently analyzed big data. At this point, the big data oriented firm exploits such a flow of information and is able to transmit an elaborated information to its customers, thus allowing them to implement customized marketing campaigns. Finally, thanks to the internet and modern digital platforms the online users are able to contribute to the generation of the information flow by using a technological device and internet. Then, the constant generation of big data from users and customers (Erevelles et al., 2015) is instrumental for those firms in order to have sustainable business models.*

Research limits. *This study is a theoretical study whose main contribution is a conceptual framework. Thus, the principal limitations of this paper are the traditional ones of pure theoretical researches presenting frameworks which directly descend from literature review. In particular, the absence of empirical analysis can be identified as the main limitation.*

Practical implications. *The main practical implications of the study are related with the proposed conceptual framework. The framework, in fact, could be considered as a useful strategic map for managers of firms which are starting the transition towards big data oriented business models. Moreover, it could also be useful for managing big data oriented firms needing to map their added value activities and to represent them graphically. The conceptual framework could furthermore become the basis of future researches aiming at exploring empirically how big data oriented firms, along with firms using big data, create value.*

Originality of the study. *This study can be considered as a pilot study on big data business models. The originality lies in the propositions made in the proposed conceptual framework. Actually, few studies focus on how the value creation of those firms descends from the elaboration of the 7Vs. Moreover, we attempt to contribute to the literature on big data business models interpreting them as a self-sustaining dynamic loop, which connects the involved actors trough information flows.*

Suggestions for future researches. *This research is entirely theoretical and, then, the results don't descend from any empirical analysis. Due to this limitation, it is possible to make two suggestions for future researches. First, it seems necessary to validate the present analysis by using qualitative methodology, in particular a suggestion may be to implement case study analysis to investigate the actual business models of big data firms. Second, the authors suggest to conduct a survey on big data manager in order to confirm the proposed conceptual framework.*

Key words: *Big Data; Business Model; Data Analytics; 7vs; Digital Economy; Value Creation*

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