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RESEARCH PAPER

A Bibliometric Analysis of Research on Big Data and Its Potential to Value Creation and Capture

Saba Abdian[1,2], Masoumeh Hosseinzadeh Shahri[2*], Ameneh Khadivar[2]

1. Jheronimus Academy of Data Science (JADS), The Joint Graduate School of Tilburg University and Eindhoven University of Technology, 5211 DA, 's-Hertogenbosch, the Netherlands
2. Department of Management, Faculty of Social Sciences and Economics, Alzahra University, Tehran, Iran

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Abstract
The emergence of big data is a radical shift in the business context, leading to a change in value creation and capture. This phenomenon is a newborn concept in the business and management literature confirmed by the growing number of publications over recent years. This paper presents an updating comprehensive bibliometric analysis to describe and assess the scientific landscape of value creation and capture based on leveraging big data in the literature. Bibliometrix and VOSviewer were selected as software tools for descriptive and network bibliometric analysis based on the Web of Science Core Collection database from 2011 until 2020. By implementing bibliometric analysis such as analysis of citations and co-occurrence of keywords, we have recognized the most prominent and influential authors, papers, journals, countries, and four potential clusters of current trends in studies. These four trends of value creation and capture from big data studies are: 1) strengthening the basic knowledge of value creation in the big data era, 2) data-driven business model and value capturing, 3) dynamic capabilities and centrality of knowledge, and 4) digital transformation of the service industry. Finally, by identifying the existing research gaps, future research directions in each cluster are demonstrated.

Keywords: value creation, value capture, business model, big data, bibliometric analysis.

1. Introduction

Big data has a tremendous potential for value creation and capture (VCC) in organizations. It has been recently referred to as "the next big thing in innovation" (Gobble, 2013, p. 64) and "the fourth paradigm of science" (Strawn, 2012). Big data refers to the storage, management, analysis, and visualization of massive amounts of structured and unstructured data characterized by high Volume, Velocity, and Variety (the 3Vs, see Table 1), which necessitates innovative and cost-effective information processing to improve insight (Ardito, Petruzzelli, et al., 2019). Recognizing the most effective methods of collecting, storing, and analyzing large amounts of data is not the ultimate goal; rather, the primary concern is generating actual business value from it (Hartmann et al., 2016).

The complex nature and characteristics of big data and its novel analytical procedures and presentations (called big data analytics, see Table 1) have led organizations to leverage it as a valuable asset in recent years (Mikalef et al., 2020). It must be noted that the business value of

* **Corresponding Author, Email:** mhshahri@alzahra.ac.ir

big data is not simply about reducing costs but is about getting actionable insights, which offers intelligence to improve new products and services and also facilitate decision-making processes (Furtado et al., 2017). However, it is difficult for organizations to eventually use this opportunity and create and assess big data's monetary value in practice (Brinch et al., 2020; Grover et al., 2018; Trabucchi & Buganza, 2020). Due to this, unfolding big data with the aim of VCC has become increasingly crucial for both academic researchers and experts. In particular, business and management scholars have investigated this phenomenon from different perspectives (Amankwah-Amoah, 2016; Davenport, 2013; Ren et al., 2017; Zeng & Glaister, 2018a; Zeng & Khan, 2019).

In one viewpoint, the critical aspects of VCC from big data in organizations are enhancing knowledge management, decision making, and firm performance through strengthening the companies' abilities to transform it into valuable output (Ciampi et al., 2020; Ghasemaghaei & Calic, 2020; Mikalef et al., 2019; Mishra et al., 2019; Müller et al., 2018). Indeed, many organizations are looking for new ways to use big data to boost performance and gain a competitive advantage (Elia et al., 2020). In this regard, Lavalle et al. (2011) identified that the best performers use big data on a larger scale of their daily operations and decision-making processes than low performers do. Similarly, McAfee and Brynjolfsson (2012) demonstrated that the more companies equip themselves with big data processes in their organizations, the better they perform in terms of financial and operational indicators. In addition, Gunasekaran et al. (2017) identified the significance of big data and predictive analytics in realizing the business value and increasing firm performance.

From a different perspective, additional aspects of VCC from big data can be identified, such as driving digital business strategies, transforming and facilitating visibility of supply chains (Philip Chen & Zhang, 2014; Wamba et al., 2017), and increasing market share (Ren et al., 2017, p. 5011). Besides, Manyika et al. (2011) proposed five dimensions in which big data can be widely used to create value. These five dimensions include: 1) making the data transparent and easily accessible to all relevant actors in an organization, 2) proposing tailored offerings, 3) improving performance, 4) supporting decision making, and 5) developing innovative business models, products, and services. For instance, companies can enhance production processes or develop innovative after-sales service offerings based on the data generated by their consumers related to the current product. Finally, big data can transform revenue mechanisms, and value capturing configurations or existing business models or even result in the emergence of completely new business models in some industries (Grover et al., 2018; Hartmann et al., 2016; Heck, 2020).

Even though current studies on the derivation of VCC from big data have been rapidly increasing in the last few decades, there appear to be limited and fragmented theoretical and practical understandings of this topic area through business contexts (Côrte-Real et al., 2019; Gnizy, 2019; Loebbecke & Picot, 2015; Mikalef et al., 2019; Sumbal et al., 2019; Wamba et al., 2017). Thus, review studies in the fields of big data, business, and management are required to enrich this field's theories. As a result, review studies are looking into the potential of big data in sustainable supply chain management (e.g., Rialti et al., 2019; Zhang et al., 2020) as well as in the area of business process management (e.g., Ardito, Scuotto, et al., 2019; Wamba & Mishra, 2017). Moreover, a few review papers on value creation and capture from big data exist and will be discussed in more detail here.

To the best of our knowledge, review papers on the value creation from big data are primarily written from the perspective of information systems (IS) and multidisciplinary fields of studies, i.e., from a technical standpoint, rather than solely from the business and management literature (see Appendix.1). For instance, based on the systematic literature review of IS journals, Fosso Wamba et al. (2015) presented different perspectives and

applications of big data and a framework of value creation and related issues. In another review of IS-leading journals, Akter and Wamba (2016) studied the distinction between value creation for e-commerce companies through traditional analysis and big data analytics. Likewise, Günther et al. (2017) addressed big data's social and economic value at three levels of work-practice, organization, and supra organizational based on the literature review of information systems. Additionally, Elia et al. (2020) conducted a systematic literature review of papers in a multidisciplinary field of studies and proposed five categories of value dimensions for companies that adopt big data. In addition, Saggi and Jain (2018) debated value creation and realization of big data as a decision-making tool. Finally, Wiener et al. (2020) tried to assess the current literature related to big data business model (BDBM) types, dimensions, and deployment.

These review papers have a strong focus on the value creation part from a technical point of view, and they do not cover the publications that investigate how to capture value from big data. There is only one exception by Wiener et al. (2020) that has examined big data business models and considered value capturing under the subject of big data business model dimensions. In addition, they have mainly used qualitative methods such as systematic literature reviews in terms of methodology perspectives. Finally, there are also some other papers with quantitative analysis, such as the bibliometric method, that differ in their units of analysis, for instance, investigating big data under the subjects of sustainable supply chain management (Zhang et al., 2020) and business process management (Matthias et al., 2017). Therefore, the theoretical gap addressed in our paper is the lack of performing a literature review that can unravel the VCC from big data in the context of the business and management field using a quantitative bibliometric method. More clearly, understanding the current studies and proposing a research framework for future studies on this subject seems to be of great importance. As a result, this paper performs bibliometric analysis to provide a comprehensive map of literature, its intellectual structure, and the social network structure of VCC from big data. This paper will assist researchers in the areas of value creation and capture from big data in three ways:

1. To note the most eminent and influential authors, journals, institutions, and countries
2. To identify the main pattern of co-occurrence of keywords and collaborations analysis
3. To determine the main trends and clusters of VCC publications from big data and provide valuable information for further investigations

Table 1. Definitions of Big Data, Big Data Analytics, and the Characteristics of Big Data

	Sample definitions
Big data	1. Big data is the storage, management, analysis, and presentation of extremely massive and complicated datasets (Russom, 2011). 2. Big data is a term used to describe huge datasets above the usual software tools used to handle them promptly (Gantz, 2012). 3. Big data refers to a wide range of dimensions, sizes, and complex and dynamic interactions that exceed the capacity of traditional procedures or technologies to collect, organize, analyze, and exploit them efficiently (Sun et al., 2015).
Big data analytics	1. Big data analytics refers to data mining tools and analytical methodologies that a business can use to analyze big data to improve its performance in various ways (Kwon et al., 2014). 2. Big data analytics is defined as utilizing various analytic approaches such as descriptive, predictive, and prescriptive outcomes (Lamba & Dubey, 2015). 3. Big data analytics refers to the tools and procedures that are frequently used to extract relevant insights from large amounts of data (Ghasemaghaei & Hassanein, 2015).
Big data attribution	**Sample definitions**
Volume	Volume refers to the amount of big data growing exponentially (Akter & Wamba, 2016; George et al., 2016).
Velocity	Velocity refers to the rate at which big data is collected, processed, and analyzed in real-time (Akter & Wamba, 2016; George et al., 2016).

Variety	Variety refers to the multiple sorts of big data collected from structured and unstructured data sources (Akter & Wamba, 2016; George et al., 2016).

2. Data Source and Methods

Bibliometrics refers to "collecting, handling, and analyzing quantitative bibliographic data, derived from scientific publications" (Debackere et al., 2002). For this research, we adopted three techniques that are one of the main methods of bibliometric analysis, namely citation analysis, co-occurrence, and collaboration analysis.

The first method is citation analysis, which is based on the idea that authors cite valuable works. The most popular analytical units comprise the annual trend of publications, most productive authors, most influential journals, and the most cited references, institutions, and countries (Dzikowski, 2018, p. 281). Therefore, citations are supposed to measure influence (Van Raan, 2003, p. 20). Collaboration analysis is the next technique used to show the partnership based on the author, country, and affiliations. Finally, the last technique is the co-occurrence analysis (a word association method) of author keywords. The word association method determines a significant relationship between words that share co-occurrence. More profoundly, the co-occurrence analysis evaluates the keywords repeated among different papers and evaluates them in the same document in three formats: network map, density map, and overlay visualization (Martínez-López et al., 2018, p. 439).

In this research, we have intensely focused on co-words analysis based on the co-occurrence technique. One of our research aims is to cluster the current research trends and indicate the future research gaps through VCC from big data. Therefore, this technique, which is an effective way of mapping the strength of association between the words, is used to extract the whole purpose of the identified papers (Aria & Cuccurullo, 2017). By employing this method, the general conceptual framework and the main thematic clusters of the current research area can be presented.

The literature data used in this study were downloaded from the Science Citation Index Expanded (SCIE) and the Social Science Citation Index (SSCI) databases in Web of Science. SCIE and SSCI are the most commonly used databases covering more scholarly and valid publications than other databases (Liao et al., 2018, p. 141). The process of choosing a research query started with a screening of the fundamental paper about "big data"/"big data analytics" and "value creation," "value capture," or "business model." Therefore, the authors searched for papers with the following keywords in title, abstracts, and keywords. After several iterations to define a research query, the final query and inclusive criteria were achieved, which are shown in Table 2. The initial result regarding the final research query was comprised of 501 papers. After two rounds of screening, the documents with the following criteria were excluded:

- The papers that were primarily concerned with the technical aspects of big data potential,
- The ones that are not in the scope of organizations, and
- The papers that are not primarily focused on the VCC from big data or big data analytics.

Table 2. Inclusive Criteria for Bibliometric Analysis

Inclusive criteria	Description
Data source	Web of Science Core Collection
Indexed in	SCI-EXPANDED, SSCI
Search string	("big data*") AND ("value*" OR "value creat*" OR "value captur*" OR "business model*")
Category field	Management OR Business
Document type	Paper

Language	English
Timespan	2011-2020

In the end, 122 related papers were selected and downloaded on 23 October 2020 in the format of BibTex and Plaintext. Bibliometrix R-package and VOSviewer version 1.6.15 were used to perform a comprehensive bibliometric analysis. Bibliometrix is a tool programmed on the R platform (Aria & Cuccurullo, 2017, p. 959), which in this research was used for descriptive analysis and some network analysis like collaboration and keyword co-occurrences analysis. To better interpret these results, the paper uses the VOSviewer software to visualize better the keyword co-occurrence parts (Cobo et al., 2011, p. 1382). Visualization of similarities (VOS) is one of the popular mapping techniques implemented, which is completely focused on visualizing bibliometric networks and has a powerful co-occurrence analysis (Van Eck & Waltman, 2014, p. 285).

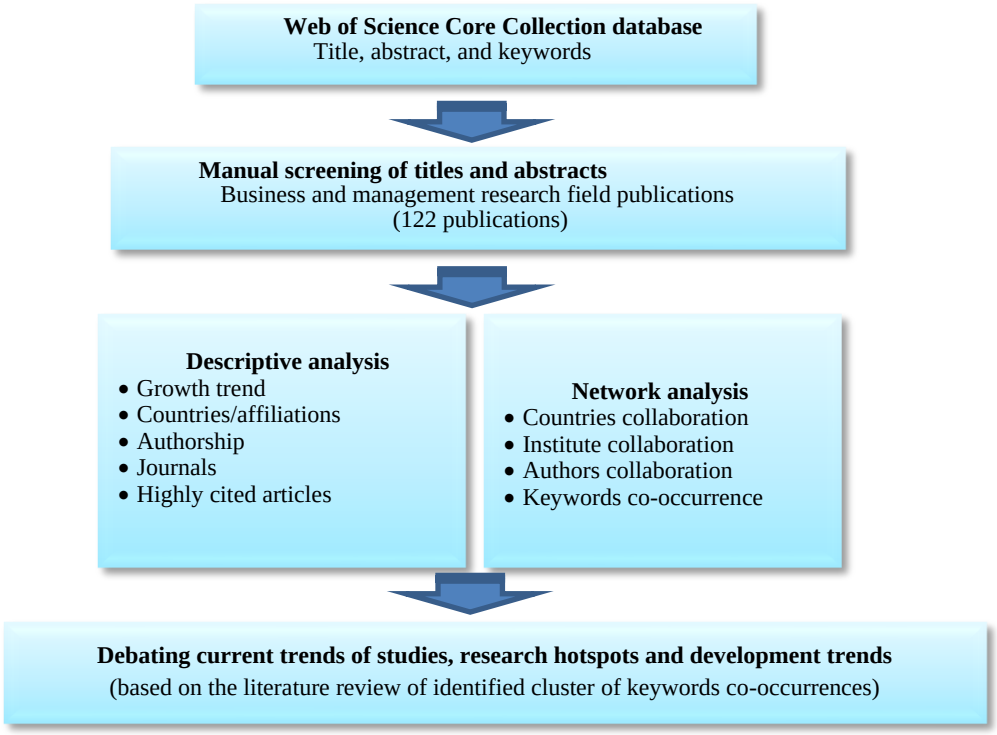

Figure 1. Research Methodology

3. Results and Discussion of the Bibliometric Analysis

In this section, the bibliometric analysis results of selected papers are detailed in two main parts. Section 3.1 contains some descriptive analysis such as the trend of publications, productive journals, institutions, and countries, and identifies the most cited papers and frequently used keywords and keywords plus. Next, section 3.2 is related to the network analysis of co-occurrence of keywords, collaboration, and section 3.3 explains the current studies trends. In Figure 1, the steps of analysis are shown.

3.1. Descriptive Analysis

Below, we address the following findings: an overview of general results, the number of publications per year presenting the longitudinal spread of publications, the most cited papers, the most productive authors, the journals with the highest citation per paper, the institutions

with the highest citation per document, and the countries with the highest publication productivity.

3.1.1. Main Information

In this study, a total of 122 papers listed on the WoS database were considered, taken from 54 journals written by 298 authors affiliated with 196 institutions from 29 countries. Table 3 gives us a summary of all the papers under review for our examination of the field of VCC derived from big data. As can be seen, it contains the number of publications for the period of 2011-2020, with a total number of 9696 ref ences cited. This period underlines the novel nature of this topic in the literature.

Table 3. Main Bibliometric Information of Selected Papers (Source: Bibliometrix)

Criteria	Results
Documents	122
Sources	54
Keywords plus	391
Author's keywords	449
Period	2011-2020
Average citations per documents	34.11
Authors	298
Authors of single-authored documents	18
Authors of multi-authored documents	280
Single-authored documents	18
Documents per author	0.41
Authors per document	2.44
Co-authors per documents	3
Collaboration index	2.60
Institutions	196
Countries	29
Cited references	9696

3.1.2. The Annual Trends of VVC From Big Data Related Publications

The first paper regarding VCC from big data appeared in Web of Science in 2011. Figure 2 shows the growing pattern of VVC from big data research in each year from 2011 to 2020, which contains two stages in the publication trend. The first stage covers the period from 2011 to 2016, in which publications related to this topic increased slowly. Since 2017, in the second stage, the number of publications has increased significantly. Furthermore, by 2019, the number of annual publications has increased and has had the highest record in that year.

It must be noted that the number of papers for 2020 is incomplete, and the indicated number of publications is up to 23 October 2020. However, the number of publications in 2020 up until October is higher than whole number of publications in 2018. The trend line follows an exponential distribution, showing a slow growth rate during initial years and rapid growth in later years. This increasing trend highlights that a growing number of scholars, practitioners, and academicians have been paying attention to the VCC development from big data.

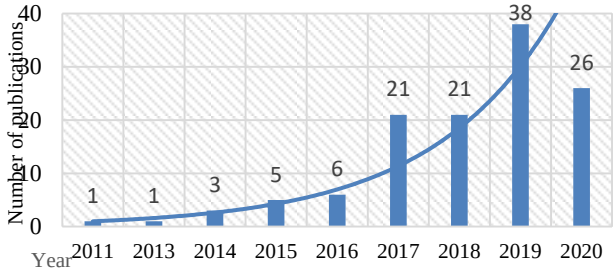

Figure 2. The Annual Trends of VCC From Big Data

3.1.3. Most Productive Authors

The 122 publications from the Web of Science Core Collection involved contributions from 298 authors. Table 4 shows the top ten contributing authors in detail. Out of the total contributing authors, 260 (87.24%) authors appeared only once in the publications, 22 authors (8.46%) appeared twice, 8 (3.07%) authors appeared thrice, four authors appeared four times (1.53%), and two authors appeared five times (0.76%), and finally, two (0.76%) authors appeared six times.

"Patrick Mikalef" and "John Krogstie" are the most productive authors, having collaborated on 6 papers in VCC from the big data domain, with a total citation of 143. They presented a theoretical model and future research themes for leveraging big data in organizations regarding internal and external factors, leading to an increase in business value and competitive performance (Mikalef et al., 2018, 2020). "Shahriar Akter" is the next prominent author with 158 citations who, based on a literature review, explored big data analytics aspects and business value in e-commerce (Akter & Wamba, 2016). Moreover, in another paper, he validated the fundamental role of big data analytics quality in firm performance (Fosso Wamba et al., 2018).

Table 4. Most Productive Authors of VCC From Big Data

Rank	Author	Number of publications	TC	H_index	G_index	M_index
1.	Mikalef P	6	143	4	6	1.333
2.	Krogstie J	6	143	4	6	1.333
3.	Akter S	5	158	4	5	0.8
4.	Wang YC	5	383	4	5	1
5.	Buganza T	4	48	4	4	1
6.	Oliveria T	4	107	3	4	0.75
7.	Ruivo P	4	107	3	4	0.75
8.	Trabucchi D	4	48	4	4	1
9.	Boura M	3	64	2	3	1
10.	Corte-real N	3	107	3	3	0.75

3.1.4. Most Frequent and Relevant Journals

The 122 publications were published in 54 journals. The top ten journals with the highest number of research publications and the total number of citations on VVC from big data are displayed in Table 5. In the case of several publications, the top journals were *Information and Management* and *Technological Forecasting and Social Change*, with ten research papers per each and the total citations of 151 and 356, respectively. Although they have the same number of publications, the citations of the journal *Technological Forecasting and Social Change* are twice more than the journal *Information and Management.* One of the reasons is that half of the papers in the *Information and Management* journal were published in 2020. However, there were eight papers on *Technological Forecasting and Social Change* journals published before 2020.

In this list, the maximum number of citations belongs to the *Journal of Service Research*, with 575 total citations and three publications in this field. Moreover, 51% of journals published no more than two papers in this regard.

Table 5. Most Frequent and Relevant Journals

Rank	Source	Freq	Total citation	Cum freq
1.	Information and Management	10	151	10
2.	Technological Forecasting and Social Change	10	356	20
3.	Journal of Business Research	8	220	28
4.	Journal of Management and Information Systems	6	224	34
5.	Business Process Management Journal	5	24	39
6.	Industrial Marketing Management	5	10	44
7.	International Journal of Operations and Production Management	4	198	48
8.	Journal of Knowledge Management	4	128	52
9.	Management Decision	4	50	56
10.	Journal of Service Research	3	575	65

3.1.5. Most Cited Papers

The most cited papers globally and locally are shown in Table 6. Respectively, global citations measure the number of citations a document has received from records in the entire WoS database. Local citations count the number of citations a paper has received from documents included in the analyzed collection.

The title of the most global and local cited paper (Lavalle et al., 2011, p. 21) is "Big Data, Analytics, and the Path From Insights to Value" with 556 global citations and 37 local citations. In this study, MIT Sloan Management Review collaborates with the IBM Institute to help organizations respond to using analytics to gain customer insights and guide action.

The second most globally cited paper is "Service Research Priorities in a Rapidly Changing Context" by Ostrom et al. (2015), with 525 global citations. In this paper, through a multidisciplinary research initiative, one of the most service research interests is deeply comprehending the value creation mechanism by combining the significant role of customers, employees, and technology. Furthermore, Chen et al. (2015) published a paper titled "How the Use of Big Data Analytics Affects Value Creation in Supply Chain Management." This paper is the second most locally cited among 122 papers, which investigated the organization's usage and impacts of big data analytics through two kinds of value creation in supply chain management.

Table 6. Top Globally and Locally Cited Papers

Rank	Document	Title of the paper	Local citations	Global citations
1	Lavalle et al. (2011)	Big data, analytics, and the path from insights to value	37	556
2	Chen et al. (2015)	How the use of big data analytics affects value creation in supply chain management	13	106
3	Vidgen et al. (2017)	Management challenges in creating value from business analytics	12	77
4	Côrte-Real et al. (2017)	Assessing business value of big data analytics in European firms	12	81
5	Davenport (2013)	Analytics 3.0.	11	95
6	Tambe (2014)	Big data investment, skills, and firm value	10	84
7	Akter & Wamba (2016)	Big data analytics in e-commerce	8	133
8	Günther et al.(2017)	Debating big data: A literature review on realizing value from big data	8	97
9	Ostrom et al.(2015)	Service research priorities in a rapidly changing context	6	525
10	Wang et al. (2018)	Big data analytics: Understanding its capabilities	6	74

3.1.6. Most Productive Countries

The United States, with 19 published papers and 1714 total citations, is at the top of this list, and after that, United Kingdom is in the second place with 15 published papers and 276 total citations. The top ten most productive countries related to VCC derived from big data are indicated in Table 7. This table shows that developed countries, apart from China and Vietnam (which published less than 0.06 percent of the papers in this domain and are considered developing countries), published more papers on VCC derived from big data. Developed countries are already leading in benefitting from big data, and there is a lack of research related to estimating the potential of big data for VCC in developing countries.

Table 7. Most Productive Countries

Rank	Countries	No of papers	Total citations	Total citations per year
1.	USA	19	1714	90.2
2.	UK	15	276	18.4
3.	Australia	14	353	25.2
4.	Italy	13	131	10.1
5.	Germany	6	384	64
6.	China	7	120	17.1
7.	France	6	134	22.3
8.	Norway	5	139	27.8
9.	Denmark	4	66	16.5
10.	Portugal	4	107	26.8

3.1.7. Most Productive Affiliations

The most productive affiliation is related to Politecn Millan School of Management in Italy, from a developed economy with seven published papers. The most productive affiliations and the number of papers published by each in VCC from big data are revealed in Table 8. The rest of the top ten most productive affiliations are also from countries with developed economies, except for King Abdulaziz University in Saudi Arabia.

Table 8. Most Productive Affiliation

Rank	Affiliations	No of papers	country
1.	Politecn Millan School of Management	7	Italy
2.	Norwegian University of Science and Technology	6	Norway
3.	University of Wollongong	6	Australia
4.	University of Massachusetts	5	United States
5.	University of Liechtenstein	5	Germany
6.	University of Queensland	4	Australia
7.	King Abdulaziz University	4	Saudi Arabia
8.	London Business School	4	United Kingdom
9.	Montpellier Business School	4	France
10.	University of New South Wales	3	Australia

3.1.8. Most Frequent Words

The author keywords “big data” and “big data analytics” were dominant, while in the keywords-plus, the terms “management” and “big data” were dominant. The top ten frequently occurring author keywords and keywords-plus are presented in Table 9. In the 122 publications related to VCC from big data, 449 author keywords were found with a total

occurrence of 668 times. Among them, 367 author keywords appeared only once, accounting for 81%.

Table 9. Most Frequent Words

Author keywords	Number of papers	Keywords-plus	Number of papers
big data	44	management	30
big data analytics	15	big data	27
value creation	14	innovation	21
business model	8	performance	18
business value	8	firm performance	17
internet of things	8	systems	17
analytics	7	technology	17
industry 4.0	5	information-technology	16
value	5	strategy	15
business analytics	4	competitive advantage	14

3.2. Network Analysis

In this section, the network analysis of bibliometric results is performed. This study employed two popular network analysis methods to extract the central theme and trend and cluster the current studies on VCC from big data, namely collaboration analysis and co-occurrence of authors' keywords.

3.2.1. Collaboration Analysis

Collaboration analysis was performed based on the author, country, and affiliation, and the results are shown in Figures 3, 4, and 5. The links and nodes in Figure 3 depict the co-authorships and the authors, respectively. Moreover, the text size reflects the publication frequency. Nine clusters are identified in the network map, which demonstrates the strong collaboration among these authors. Figure 4 presents the bibliographic network with collaboration links between various countries. The evidence from the network reveals strong collaboration between the USA, the United Kingdom, and Australia. The institution's collaboration network is displayed in Figure 5. The three clusters displayed in the network indicate a strong collaboration among those institutions.

The most substantial cluster of the author collaboration is between "Patrick Mikalef," "Ilias O. Pappas," "John Krogstie" from the Norwegian University of Science and Technology, Norway, and "George Lekakos" and "Maria Boura" from the Athens University of Economics and Business, Greece. There is also a strong collaboration between "Kandampully J" from Ohio State University, "Buoye A" from Fordham University Schools of Business, "Dorgu T" from Florida State University, and "El-manstrly D" from the University of Edinburgh. Figures 4 and 5 show the relationship between these universities and the United States and the United Kingdom.

Figure 3. Author Collaboration Networks

Figure 4. Country Collaboration Networks

Figure 5. Institution Collaboration Networks

3.2.2. Three-Field Plot

A three-field plot is used to visualize the relationships between authors, affiliations, and countries. These elements related to the VCC from big data literature are depicted in Figure 6 by colored rectangles. Further, the higher the rectangles in the figure, the higher the number of relations among the elements of each category. The analysis demonstrated the collaboration of authors in terms of their affiliations and countries.

This plot can identify the most important universities in each country and the major authors researching the field of VCC from big data literature. The analysis of the top authors, countries, and affiliations indicates that in terms of authors, the most collaborators are "Patrick Mikalef," "John Krogstie," and "William Yu Chung Wang." Besides, considering countries, the United Kingdom and Australia are the most collaborating countries in this field. After London Business School, Fordham University, and the University of Liechtenstein are the most collaborated affiliations.

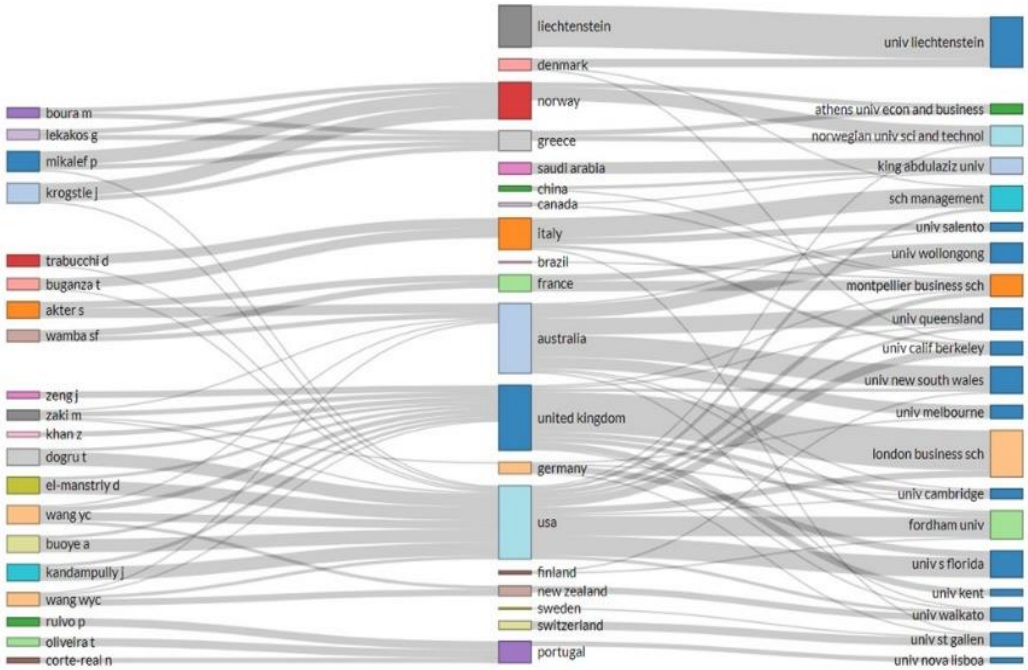

Figure 6. The Three-Field Plot

3.2.3. Co-Word Analysis

Co-word analysis aims to identify the co-occurrence of words and their network and to visualize the density of the keywords of selected papers. Co-word analysis implies the whole purpose of the paper and can be applied to full text, abstract, and keywords (Aria & Cuccurullo, 2017, p. 959). This analysis employs the association method of normalization through author keywords from the Web of Science database to suggest the general conceptual framework and the main thematic clusters of the current research area. Sixty four out of 419 author keywords met the threshold based on their occurrences and were considered for applying network, density, and overlay network analysis.

With this number of keywords that met the threshold, four main clusters appear in the network visualization of VOSviewer software (Figure 7) and author keywords co-occurrence network map (Figure 8). Each cluster displays a different color, and the keywords grouped into one cluster together with the same color seem to reflect matching and relevant topics. Moreover, the author's keywords' density map is revealed to analyze the co-occurrence of keywords (Figure 8 depicts a co-occurrence density map of author keywords). This type of visualization aids in clearly identifying the most important color areas. The larger and the higher the weights of surrounding items of a point are, the redder the color will tend to turn. The point's color would tend to be blue (Van Eck & Waltman, 2014, p. 285). It is observed that the keyword of "value creation" is in the orange area in the close vicinity of "big data."

Through this viewpoint, as depicted in Figure 7, the field appears to be comprised mainly of four clusters. These four clusters are principles of value creation from big data (First Cluster-Red), data-driven business models and clarifying the mechanism of value capturing (Second Cluster-Green), knowledge management by leveraging big data analytics capability (Third Cluster-Blue), and digital transformation of the service industry (Fourth Cluster-Yellow).

The overlay visualization is presented to complete the study of the co-occurrence of keywords (Figure 8). This figure shows the changes in research topics over several years. Each keyword in this diagram is colored by a score based on their average year of occurrences. The oldest topics are colored blue, and then after that, the more recent topics belong to green and yellow colors. This figure reveals that the area of studies regarding VCC from big data in the business and management field has evolved from a previous concentration on information technology topics such as information systems, IT strategy, and knowledge management (oldest keywords) to more specific and strategic topics such as business value, dynamic capability view, value creation, business model and digital transformation of blockchain platforms through the internet of things, and machine learning in the future. The four main clusters and prominent keywords in each cluster are as follows:

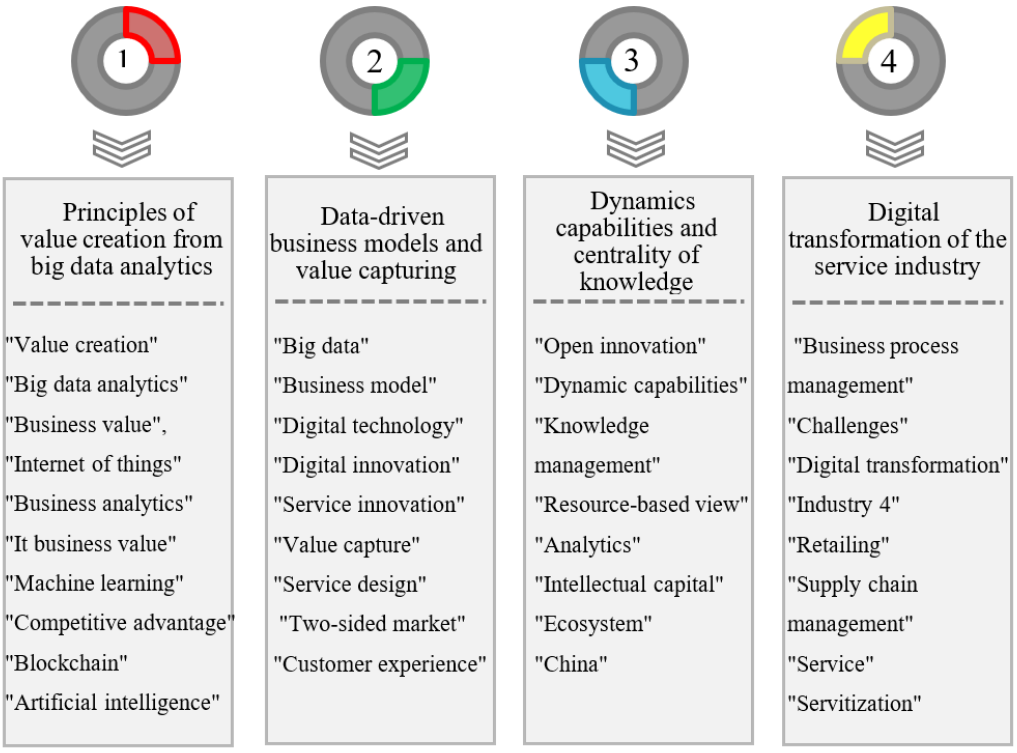

Figure 7. Four Clusters and Some of the Important Keywords of the VCC From Big Data

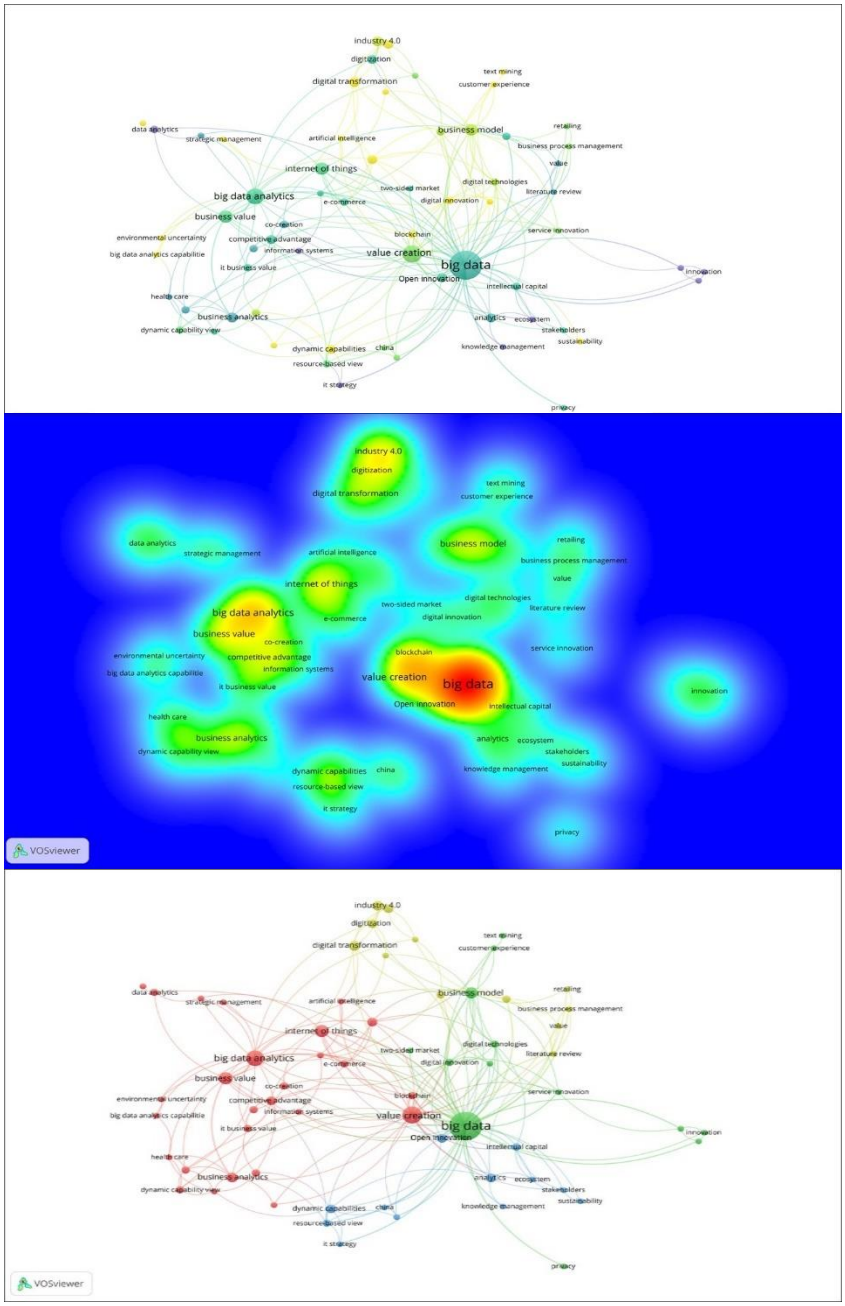

Figure 8. From Top to Bottom: Author Keywords Co-Occurrence Network Map, Author keywords Co-Occurrence Density Map, and Overlay Visualization of VCC From Big Data Publications

3.3. Discussion on Current Research Trends and Possible Research Gaps Based on the Literature Review

The research on VCC derived from big data has grown dramatically in the last decade due to its novel nature (Mikalef et al., 2019). Overlay visualization of author keywords (Figure 8) depicted that the earlier publications of VCC derived from big data in business and management studies mostly inclined to get insight from analytics and related opportunities and challenges (e.g., Davenport, 2013; Lavalle et al., 2011). Later, attention shifted to more strategic parts, such as the digital transformation of blockchain, platforms, and emerging new data-driven business models (e.g., Sorescu, 2017).

In order to better understand the current trends of studies, we use the literature review based on four clusters identified from the analysis of the network maps (author keywords co-occurrence network map in Figure 8) in the previous section. At least ten of the most cited papers related to the author keywords of each cluster are chosen and studied in order to identify current research studies and future research gaps. It must be noticed that some of the references cover more than one cluster topic and are therefore cited in two or more clusters.

3.3.1. Red Cluster: Principles of Value Creation From Big Data Analytics

The first cluster (Red cluster) of author keywords co-occurrence network map in Figure 8 demonstrates numerous studies discovering the initial principles of how big data generates value and affects organizations. This topic has been investigated from two different perspectives. The first stream of research has tried to identify the primary principles and give a framework of "value creation" from new digital technologies and tools such as "big data analytics," "machine learning," and "artificial intelligence." Several studies in this area have attempted to identify the concept, characteristics, nature, and processes of big data analytics in terms of how they achieve business value through their organizations (Côrte-Real et al., 2019; Grover et al., 2018; Philip Chen & Zhang, 2014; Zeng & Glaister, 2018) or extract value from various infrastructure such as social media channels (Dong & Yang, 2020; Tempini, 2017). Others have addressed this issue from the standpoint of "organizational capabilities" and the ways to manage data to maximize its value. In particular, these studies have pointed out that the data itself does not generate value, but the firm's capability of harnessing it and the manner of data management are the crucial criteria (Chen et al., 2015; Müller & Jensen, 2017; Zeng & Glaister, 2018). Moreover, regarding big data as the main driver of the emergence of the "value co-creation" paradigm, some studies have tried to strengthen the concept of value co-creation from the point of view of an organization, customers, and other third parties (Dragicevic et al., 2020; Jayashankar et al., 2019; Kunz et al., 2017; Line et al., 2020; Xie et al., 2016).

The second and the stronger research stream in the first cluster has looked into the effect of big data value creation on "firm performance" and "competitive advantage" (Bozic & Dimovski, 2019; Côrte-Real et al., 2017, 2019; Gnizy, 2019; Grover et al., 2018; Krishnamoorthi & Mathew, 2018; Lavalle et al., 2011; Mcafee & Brynjolfsson, 2012; Song et al., 2018; Wilkin et al., 2020; Ylijoki & Porras, 2019). This stream concentrates on the strategic management perspective and indicates that big data can positively impact organization, market, and social performance if it has a fundamental strategic role (Akter & Wamba, 2016; Dong & Yang, 2020; Mikalef et al., 2019; Reis et al., 2020). In this regard, some other studies have also pointed out the significant effect of "big data analytics capability" and data quality on firm performance (Corte-Real et al., 2020; Fosso Wamba & Akter, 2019; Surbakti et al., 2020; Wamba et al., 2017).

Future studies can contribute more to the theoretical part based on this cluster's identified main keywords and research trends (Figure 9). For instance, more research is needed in terms of the nature, characteristics, and deployment of new technologies. These studies can compare the different capabilities and impacts of big data, the internet of things, and machine learning on VCC (Corte-Real et al., 2019; Mcafee & Brynjolfsson, 2012; Philip Chen & Zhang, 2014; Reis et al., 2020). Furthermore, from the strategic point of view, understanding external and internal organization factors affecting VCC from big data seems to be necessary (Chiang et al., 2018; Gnizy, 2019). Finally, assessing social media's business value regarding the implication of big data can be another essential future research field in this cluster (Dong & Yang, 2020; Tempini, 2017).

3.3.2. Green Cluster: Data-Driven Business Models and Clarifying the Mechanism of Value Capturing

The second cluster (Green cluster) of author keywords co-occurrence network map in Figure 8 clarifies value capturing from big data in organizations and data-driven business models from firms' and customers' viewpoints. Some papers aimed to strengthen theories by proposing frameworks and patterns related to the "data-driven business model" (Culot et al., 2020; Jabbour et al., 2019; Sorescu, 2017). Other studies attempted to define established firms' challenges in creating new digitally-based business models and having a digital transformation in their organizations (Mugge et al., 2020; Nguyen Dang Tuan et al., 2019; Ritter & Pedersen, 2020). Finally, there were other works published that were interested in recognizing different value capturing strategies from this massive amount of data through multiple or "two-sided platforms" regarding the customers' perspectives (Chiang et al., 2018; Hartmann et al., 2016; McColl-Kennedy et al., 2019; Trabucchi et al., 2017; Urbinati et al., 2019).

As can be figured out, data-driven business models (DDBM) are at the early research stage. Notably, most of the literature conceptualizes the elements and nature of DDBM, and only a few empirical papers are published. As a result, more empirical research in different industries is recommended to precisely examine the nature of DDBMs in practice (please see Figure. 9). Moreover, recognizing the success drivers of having a data-driven business model in different industries and between service-oriented and manufacturing firms can help organizations understand the necessary conditions and perquisites to get a more competitive advantage (Hartmann et al., 2016; Jabbour et al., 2019; Sorescu, 2017). Furthermore, it is essential to explain the differences and similarities in digital transformation regarding value capturing mechanisms of established and start-up companies (Hartmann et al., 2016; Lokshina et al., 2018; Wiener et al., 2020). Finally, evaluating consumers' engagement and perspectives through multi-sided business model innovation can be an important area of research for future studies (Ritter & Pedersen, 2020; Smyth et al., 2018).

3.3.3. Blue Cluster: Knowledge Management by Leveraging Big Data Analytics Capability

The third cluster (Blue cluster) of author keywords co-occurrence network map in Figure 8 highlights the importance of dynamic capabilities and the centrality of knowledge in the big data analytics literature. The first research stream, primarily through empirical research, examines the relationship between the dynamics capabilities enabled by big data analytics technologies on competitive advantage and firm performance (Bozic & Dimovski, 2019; Conboy et al., 2020; Côrte-Real et al., 2017; Mikalef et al., 2018, 2019, 2020; Wang & Hajli, 2017). The second research stream tried to broaden the strategic theories and research frameworks related to the interactions and changes between knowledge management and big data analytics (Corte-Real et al., 2020; Dragicevic et al., 2020; Khan & Vorley 2017; Pauleen & Wang 2017; Zeng & Glaister 2018). Finally, the firms' adoption of open innovation strategy and ecosystem is another field of study for creating value from big data analytics (Trabucchi et al., 2018; Urbinati et al., 2019; Zeng & Glaister 2018).

The majority of the studies indicated that big data analytics capabilities could be one of the primary facilitators of creating and capturing value from big data, leading to a more competitive advantage. Therefore, future studies would consider the various industries and contexts in terms of big data dynamic capability to figure out how to improve this capability through each industry (Côrte-Real et al., 2020; Mikalef et al., 2019, 2020). Moreover, comparing the challenges of developing big data analytics capabilities, the process, and knowledge management issues between developed and developing countries could be another

research gap (O'Connor & Kelly, 2017; Pauleen & Wang, 2017). Figure 9 summarizes the headlines of possible research gaps in this cluster.

3.3.4. Yellow Cluster: Digital Transformation of the Service Industry

The fourth cluster (Yellow cluster) of author keywords co-occurrence network map in Figure 8 analyzed the interaction of digitalization technologies and servitization. In this cluster, studies attempted to develop a theoretical framework for investigating how product firms create value by adding digital services to their manufacturing process (Culot et al., 2020; Frank et al., 2019; Mariani et al., 2018; Paiola & Gebauer, 2020). In this regard, other studies can investigate the different configurations of servitization and digital transformation. Additionally, recognizing insights of value co-creation by big data technologies between companies and consumers can be another interesting research field.

Other studies in this cluster focused on finding different opportunities and challenges faced by supply chain management through big data analytics usage via the VCC processes (Brinch, 2018; Kache & Seuring, 2017; Wilkin et al., 2020). One of the main questions is how supply chain management can adopt business processes by using big data as their primary resource, opening up a new research area.

4. Conclusion and Recommendations

Considering the importance of unfolding VCC from big data in companies, this research used a comprehensive bibliometric analysis of existing business and management literature over the past decade. This paper contributes to the current literature in three aspects by using descriptive and network bibliometric analysis methods. The first aspect is related to investigating the most eminent and influential authors, publications, journals, institutions, and countries. The second aspect is related to identifying the pattern of the co-occurrence of keywords and collaboration analysis. Finally, the last aspect is related to determining the current research trends and gaps for future research studies.

This study demonstrated the bibliometric review of 122 papers from 54 journals from 2011 to 2020 and the WoS database. The most productive authors, sources, publications, countries, and organizations were identified by descriptive bibliometric analysis. According to the findings, the number of studies on this topic has increased dramatically over the last decade, particularly since 2016. The earliest paper on VCC from big data was published in 2011 by Lavalle et al., demonstrating that this was quite a new research field. "Information and Management" and "Technological Forecasting and Social Change" are the most productive journals with ten publications each in this research area. The results show that "John Krogstie" and "Patrick Mikalef" are the most productive authors, each with six publications. It is worth noting that the publishing activity of these authors has increased significantly in recent years. However, the USA is the most productive country with 19 publications. Indeed, the VVC from big data has primarily been influenced by authors from countries like the United States, the United Kingdom, Australia, Italy, and Germany. Besides, Politecn Millan School of Management and the Norwegian University of Science and Technology are the most productive affiliations.

Furthermore, the most cited papers and the most frequent keywords were identified. Lavalle et al. (2011), with 556 global citations and 37 local citations, is the first and most cited paper and can be considered as a pioneering work in VCC from big data. Besides, the analysis of most cited papers demonstrates that most of this research has tried to establish the basic and general concepts and knowledge of VVC from big data (Brown et al., 2011; Chen et

al., 2012; Chen et al., 2015; Davenport et al., 2013; Lavalle et al., 2011; Manyika et al., 2011; McAfee & Brynjolfsson, 2012).

More important results emerged from the network bibliometric analysis. The main co-occurring keywords in the most prominent cluster include “value creation,” “business value,” “business analytics,” “business value,” “internet of things,” “artificial intelligence,” “machine learning,” “co-creation,” “decision making,” “resourced based theory,” “e-commerce,” “environmental uncertainty,” “dynamic capability view” and “competitive advantage.” The findings revealed that the co-occurrence of keywords in the VCC from big data publications is covered in four important areas: 1) strengthening the basic knowledge of value creation in the big data era, 2) data-driven business models and value capturing, 3) dynamic capabilities and centrality of knowledge, and 4) analyzing the impact of digital transformation through supply chain management. Furthermore, the major collaborating countries in this field are the USA, the United Kingdom, and Australia.

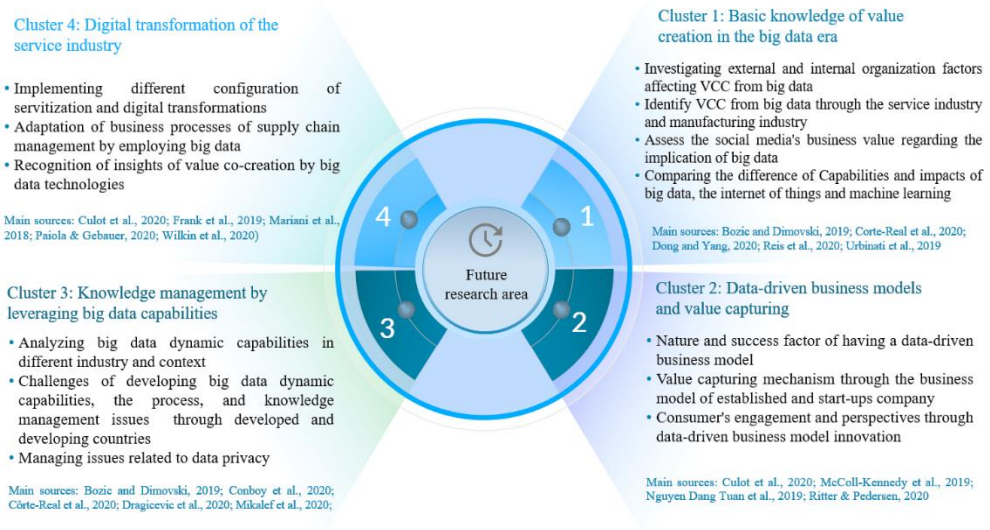

Figure 9. Main Research Streams and Future Research Directions of VCC From Big Data

Finally, the above facts reinforce potential research interests and opportunities in the area of VCC theories from big data. Following this, significant research gaps and potential future contributions are indicated based on each cluster in Figure 9. In summary, future research can develop current theories and frameworks of basic knowledge of value creation by performing empirical studies, especially through different industries. Moreover, analysis of countries’ collaboration has shown that the developed countries greatly contribute to VCC from big data, and there are only a few studies related to developing countries. As a result, there is a considerable opportunity to exploit big data in developing countries.

Furthermore, future research can compare established and start-up companies regarding the value-capturing process from big data. Additionally, knowing how big data will affect supply chain management’s business processes can be another imminent research stream. Lastly, future research can perform a systematic review based on our proposed research guidelines and identify more in-depth outcomes from eminent papers in this field of study.

References

Akter, S., & Wamba, S. F. (2016). Big data analytics in E-commerce: A systematic review and agenda for future research. *Electronic Markets*, *26*(2), 173–194. https://doi.org/10.1007/s12525-016-0219-0

Amankwah-Amoah. (2016). Emerging economies, emerging challenges: Mobilising and capturing value from big data. *Technological Forecasting and Social Change*, *110*, 167–174. https://doi.org/10.1016/j.techfore.2015.10.022

Ardito, L., Petruzzelli, A. M., Panniello, U., & Garavelli, A. C. (2019). Towards Industry 4.0 Mapping digital technologies for supply chain management-marketing integration. *Business Process Management Journal*, *25*(2, SI), 323–346. https://doi.org/10.1108/BPMJ-04-2017-0088

Ardito, L., Scuotto, V., Del Giudice, M., & Petruzzelli, A. M. (2019). A bibliometric analysis of research on Big Data analytics for business and management. *Management Decision*, *57*(8, SI), 1993–2009. https://doi.org/10.1108/MD-07-2018-0754

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Božič, K., & Dimovski, V. (2019). Business intelligence and analytics use, innovation ambidexterity, and firm performance: A dynamic capabilities perspective. The Journal of Strategic Information Systems, 28(4), 101578. https://doi.org/10.1016/j.jsis.2019.101578

Brinch, M. (2018). Understanding the value of big data in supply chain management and its business processes. *International Journal of Operations & Production Management*, *38*(7), 1589–1614. https://doi.org/10.1108/IJOPM-05-2017-0268

Brinch, M., Gunasekaran, A., & Fosso Wamba, S. (2020). Firm-level capabilities towards big data value creation. *Journal of Business Research*, 131, 539-548.https://doi.org/10.1016/j.jbusres.2020.07.036

Brown, D. E., Famili, F., Paass, G., Smith-Miles, K., Thomas, L. C., Weber, R., ... & Maldonado, S. (2011). Future trends in business analytics and optimization. *Intelligent Data Analysis*, 15(6), 1001-1017.

Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS quarterly*, 1165-1188.

Chen, D. Q., Preston, D. S., & Swink, M. (2015). How the use of big data analytics affects value creation in supply chain management. *Journal of Management Information Systems*, *32*(4), 4–39. https://doi.org/10.1080/07421222.2015.1138364

Chiang, R. H. L., Grover, V., Liang, T. P., & Zhang, D. (2018). Special issue: Strategic value of big data and business analytics. *Journal of Management Information Systems*, *35*(2), 383–387. https://doi.org/10.1080/07421222.2018.1451950

Ciampi, F., Marzi, G., Demi, S., & Faraoni, M. (2020). The big data-business strategy interconnection: A grand challenge for knowledge management: A review and future perspectives. *Journal of Knowledge Management*, *24*(5), 1157–1176. https://doi.org/10.1108/JKM-02-2020-0156

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). Science mapping software tools: Review, analysis, and cooperative study among tools. *Journal of the American Society for Information Science and Technology*, *62*(7), 1382–1402. https://doi.org/10.1002/asi.21525

Conboy, K., Mikalef, P., Dennehy, D., & Krogstie, J. (2020). Using business analytics to enhance dynamic capabilities in operations research: A case analysis and research agenda. *European Journal of Operational Research*, *281*(3), 656–672. https://doi.org/10.1016/j.ejor.2019.06.051

Côrte-Real, N., Oliveira, T., & Ruivo, P. (2017). Assessing business value of Big Data Analytics in European firms. *Journal of Business Research*, *70*, 379–390. https://doi.org/10.1016/j.jbusres.2016.08.011

Côrte-Real, N., Ruivo, P., & Oliveira, T. (2020). Leveraging internet of things and big data analytics initiatives in European and American firms: Is data quality a way to extract business value? *Information and Management*, *57*(1), 103141.https://doi.org/10.1016/j.im.2019.01.003

Corte-Real, N., Ruivo, P., Oliveira, T., & Popovic, A. (2019). Unlocking the drivers of big data analytics value in firms. *Journal of Business Research*, *97*, 160–173. https://doi.org/10.1016/j.jbusres.2018.12.072

Culot, G., Orzes, G., Sartor, M., & Nassimbeni, G. (2020). The future of manufacturing: A Delphi-based scenario analysis on Industry 4.0. *Technological Forecasting and Social Change*, 157, 120092. https://doi.org/10.1016/j.techfore.2020.120092

Davenport, T. H. (2013). Analytics 3.0. *Harvard business review*, 91(12), 64-72.

Debackere, K., Verbeek, A., Luwel, M., & Zimmermann, E. (2002). Measuring progress and evolution in science and technology - II: The multiple uses of technometric indicators. *International Journal of Management Reviews*, *4*(3), 213–231. https://doi.org/10.1111/1468-2370.00085

Dong, J Q, & Yang, C.-H. (2020). Business value of big data analytics: A systems-theoretic approach and empirical test. *Information and Management*, *57*(1), 103124. https://doi.org/10.1016/j.im.2018.11.001

Dragicevic, N., Ullrich, A., Tsui, E., & Gronau, N. (2020). A conceptual model of knowledge dynamics in the industry 4.0 smart grid scenario. *Knowledge Management Research and Practice*, *18*(2), 199–213. https://doi.org/10.1080/14778238.2019.1633893

Dzikowski, P. (2018). A bibliometric analysis of born global firms. *Journal of Business Research*, *85*(December 2017), 281–294. https://doi.org/10.1016/j.jbusres.2017.12.054

Elia, G., Polimeno, G., Solazzo, G., & Passiante, G. (2020). A multi-dimension framework for value creation through Big Data. *Industrial Marketing Management*, *90*(November 2018), 617–632. https://doi.org/10.1016/j.indmarman.2020.03.015

Fosso Wamba, S., & Akter, S. (2019). Understanding supply chain analytics capabilities and agility for data-rich environments. *International Journal of Operations and Production Management*, *39*(6/7/8, SI), 887–912. https://doi.org/10.1108/IJOPM-01-2019-0025

Fosso Wamba, S., Akter, S., Edwards, A., Chopin, G., & 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*, *165*, 234–246. https://doi.org/10.1016/j.ijpe.2014.12.031

Fosso Wamba, S., Akter, S., Trinchera, L., & De Bourmont, M. (2018). Turning information quality into firm performance in the big data economy. *Management Decision*, *57*(8, SI), MD-04-2018-0394. https://doi.org/10.1108/MD-04-2018-0394

Frank, A. G., Mendes, G. H. S., Ayala, N. F., & Ghezzi, A. (2019). Servitization and Industry 4.0 convergence in the digital transformation of product firms: A business model innovation perspective. *Technological Forecasting and Social Change*, *141*, 341–351. https://doi.org/10.1016/j.techfore.2019.01.014

Furtado, L., Dutra, M., & Macedo, D. (2017). Value creation in big data scenarios: A literature survey. *Journal of Industrial Integration and Management*, *2*(1), 1750002. https://doi.org/10.1142/s2424862217500026

Gantz, J., & Reinsel, D. (2012). The digital universe in 2020: Big data, bigger digital shadows, and biggest growth in the far east. *IDC iView: IDC Analyze the future*, 2007(2012), 1-16.

George, G., Lavie, D., Osinga, E. C., & Scott, B. A. (2016). From the editors: Big data and data science methods for management research. *Academy of Management Journal*, *59*(5), 1493–1507. https://doi.org/10.5465/amj.2014.4002

Ghasemaghaei, M., & Calic, G. (2020). Assessing the impact of big data on firm innovation performance: Big data is not always better data. *Journal of Business Research*, *108*, 147–162. https://doi.org/10.1016/j.jbusres.2019.09.062

Ghasemaghaei, M., Hassanein, K. & Turel, O. (2015). Impacts of big data analytics on organizations: A resource fit perspective. *Americas Conference on Information Systems.*

Gnizy, I. (2019). Big data and its strategic path to value in international firms. *International Marketing Review*, *36*(3), 318–341. https://doi.org/10.1108/IMR-09-2018-0249

Gobble, M. A. M. (2013). Big data: The next big thing in innovation. *Research Technology Management*, *56*(1), 64–66. https://doi.org/10.5437/08956308X5601005

Grover, V., Chiang, R. H. L., Liang, T.-P., & Zhang, D. (2018). Creating strategic business value from big data analytics: A research framework. *Journal of Management Information Systems*, *35*(2), 388–423. https://doi.org/10.1080/07421222.2018.1451951

Günther, W. A., Mehrizi, M. H. R., Huysman, M., & Feldberg, F. (2017). Debating big data: A literature review on realizing value from big data. The Journal of Strategic Information Systems, 26(3), 191-209.

Gunasekaran, A., Papadopoulos, T., Dubey, R., Wamba, S. F., Childe, S. J., Hazen, B., & Akter, S. (2017). Big data and predictive analytics for supply chain and organizational performance. *Journal of Business Research*, *70*, 308–317. https://doi.org/10.1016/j.jbusres.2016.08.004

Hartmann, P. M., Zaki, M., Feldmann, N., & Neely, A. (2016). Capturing value from big data – A taxonomy of data-driven business models used by start-up firms. *International Journal of Operations and Production Management*, *36*(10), 1382–1406. https://doi.org/10.1108/IJOPM-02-2014-0098

Jabbour, C. J. C., Jabbour, A. B. L. de S., Sarkis, J., & Filho, M. G. (2019). Unlocking the circular economy through new business models based on large-scale data: An integrative framework and research agenda. *Technological Forecasting and Social Change*, *144*, 546–552. https://doi.org/10.1016/j.techfore.2017.09.010

Jayashankar, P., Johnston, W. J., Nilakanta, S., & Burres, R. (2019). Co-creation of value-in-use through big data technology- a B2B agricultural perspective. *Journal of Business and Industrial Marketing*, *35*(3), 508–523. https://doi.org/10.1108/JBIM-12-2018-0411

Ji-fan Ren, S., Fosso Wamba, S., Akter, S., Dubey, R., & Childe, S. J. (2017). Modelling quality dynamics, business value and firm performance in a big data analytics environment. *International Journal of Production Research*, *55*(17), 5011–5026. https://doi.org/10.1080/00207543.2016.1154209

Kache, F., & Seuring, S. (2017). Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain management. *International Journal of Operations and Production Management*, *37*(1), 10–36. https://doi.org/10.1108/IJOPM-02-2015-0078

Khan, Z., & Vorley, T. (2017). Big data text analytics: An enabler of knowledge management. *Journal of Knowledge Management*, *21*(1), 18–34. https://doi.org/10.1108/JKM-06-2015-0238

Krishnamoorthi, S., & Mathew, S. K. (2018). Business analytics and business value: A comparative case study. *Information and Management*, *55*(5), 643–666. https://doi.org/10.1016/j.im.2018.01.005

Kunz, W., Aksoy, L., Bart, Y., Heinonen, K., Kabadayi, S., Ordenes, F. V., Sigala, M., Diaz, D., & Theodoulidis, B. (2017). Customer engagement in a Big Data world. *Journal of Services Marketing*, *31*(2), 161–171. https://doi.org/10.1108/JSM-10-2016-0352

Kwon, O., Lee, N., & Shin, B. (2014). Data quality management, data usage experience and acquisition intention of big data analytics. *International Journal of Information Management*, *34*(3), 387–394. https://doi.org/10.1016/j.ijinfomgt.2014.02.002

Lamba, H. S., & Dubey, S. K. (2015). Analysis of requirements for big data adoption to maximize IT business value. *2015 4th International Conference on Reliability, Infocom Technologies and Optimization: Trends and Future Directions, ICRITO 2015*, 1–6. https://doi.org/10.1109/ICRITO.2015.7359268

Lavalle, S., Lesser, E., Shockley, R., Hopkins, M. S., & Kruschwitz, N. (2011). Big data, analytics and the path from insights to value. *MIT Sloan Management Review*, *52*(2), 21–32.

Liao, H., Tang, M., Luo, L., Li, C., Chiclana, F., & Zeng, X. J. (2018). A bibliometric analysis and visualization of medical big data research. *Sustainability (Switzerland)*, *10*(1), 1–18. https://doi.org/10.3390/su10010166

Line, N. D., Dogru, T., El-Manstrly, D., Buoye, A., Malthouse, E., & Kandampully, J. (2020). Control, use and ownership of big data: A reciprocal view of customer big data value in the hospitality and tourism industry. *Tourism Management*, *80*, 104106. https://doi.org/10.1016/j.tourman.2020.104106

Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *Journal of Strategic Information Systems*, *24*(3), 149–157. https://doi.org/10.1016/j.jsis.2015.08.002

Lokshina, I. V., Lanting, C. J. M., & Durkin, B. J. (2018). IoT-and big data-driven data analysis services for third parties, strategic implications and business opportunities. *International Journal of Social Ecology and Sustainable Development*, *9*(3), 34–52. https://doi.org/10.4018/IJSESD.2018070103

Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Hung Byers, A. (2011). Big data: The next frontier for innovation, competition, and productivity. McKinsey Global Institute.

Mariani, M., Baggio, R., Fuchs, M., & Hoeepken, W. (2018). Business intelligence and big data in hospitality and tourism: A systematic literature review. *International Journal of Contemporary Hospitality Management*, *30*(12), 3514–3554. https://doi.org/10.1108/IJCHM-07-2017-0461

Martínez-López, F. J., Merigó, J. M., Valenzuela-Fernández, L., & Nicolás, C. (2018). Fifty years of the European Journal of Marketing: A bibliometric analysis. *European Journal of Marketing*, *52*(1–2), 439–468. https://doi.org/10.1108/EJM-11-2017-0853

Matthias, O., Fouweather, I., Gregory, I., & Vernon, A. (2017). Making sense of big data – can it transform operations management? *International Journal of Operations and Production Management*, *37*(1), 37–55. https://doi.org/10.1108/IJOPM-02-2015-0084

Mcafee, A., & Brynjolfsson, E. (2012). Spotlight on big data big data: The management revolution. *Harvard Business Review*, *90*(October), 1–9. http://tarjomefa.com/wp-content/uploads/2017/04/6539-English-TarjomeFa-1.pdf

McColl-Kennedy, J. R., Zaki, M., Lemon, K. N., Urmetzer, F., & Neely, A. (2019). Gaining customer experience insights that matter. *Journal of Service Research*, *22*(1), 8–26. https://doi.org/10.1177/1094670518812182

Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2019). Big data analytics capabilities and innovation: The mediating role of dynamic capabilities and moderating effect of the environment. *British Journal of Management*, *30*(2), 272–298. https://doi.org/10.1111/1467-8551.12343

Mikalef, P., Pappas, I. O., Krogstie, J., & Giannakos, M. (2018). Big data analytics capabilities: A systematic literature review and research agenda. *Information Systems and E-Business Management*, *16*(3), 547–578. https://doi.org/10.1007/s10257-017-0362-y

Mikalef, P., Pappas, I. O., Krogstie, J., & Pavlou, P. A. (2020). Big data and business analytics: A research agenda for realizing business value. *Information and Management*, *57*(1), 103237. https://doi.org/10.1016/j.im.2019.103237

Mishra, D., Luo, Z., Hazen, B., Hassini, E., & Foropon, C. (2019). Organizational capabilities that enable big data and predictive analytics diffusion and organizational performance: A resource-based perspective. *Management Decision*, *57*(8), 1734–1755. https://doi.org/10.1108/MD-03-2018-0324

Mugge, P., Abbu, H., Michaelis, T. L., Kwiatkowski, A., & Gudergan, G. (2020). Patterns of digitization: A practical guide to digital transformation. *Research Technology Management*, *63*(2), 27–35. https://doi.org/10.1080/08956308.2020.1707003

Müller, O., Fay, M., & vom Brocke, J. (2018). The effect of big data and analytics on firm performance: An econometric analysis considering industry characteristics. *Journal of Management Information Systems*, *35*(2), 488–509. https://doi.org/10.1080/07421222.2018.1451955

Müller, S. D., & Jensen, P. (2017). Big data in the Danish industry: Application and value creation. *Business Process Management Journal*, *23*(3), 645–670. https://doi.org/10.1108/BPMJ-01-2016-0017

Nguyen Dang Tuan, M., Nguyen Thanh, N., & Le Tuan, L. (2019). Applying a mindfulness-based reliability strategy to the Internet of Things in healthcare – A business model in the Vietnamese market. *Technological Forecasting and Social Change*, *140*, 54–68. https://doi.org/10.1016/j.techfore.2018.10.024

O'Connor, C., & Kelly, S. (2017). Facilitating knowledge management through filtered big data: SME competitiveness in an agri-food sector. *Journal of Knowledge Management*, *21*(1), 156–179. https://doi.org/10.1108/JKM-08-2016-0357

Ostrom, A. L., Parasuraman, A., Bowen, D. E., Patrício, L., & Voss, C. A. (2015). Service research priorities in a rapidly changing context. *Journal of Service Research*, *18*(2), 127–159. https://doi.org/10.1177/1094670515576315

Paiola, M., & Gebauer, H. (2020). Internet of things technologies, digital servitization and business model innovation in BtoB manufacturing firms. *Industrial Marketing Management*, *89*, 245–264. https://doi.org/10.1016/j.indmarman.2020.03.009

Pauleen, D. J., & Wang, W. Y. C. (2017). Does big data mean big knowledge? KM perspectives on big data and analytics. *Journal of Knowledge Management*, *21*(1, SI), 1–6. https://doi.org/10.1108/JKM-08-2016-0339

Philip Chen, C. L., & Zhang, C. Y. (2014). Data-intensive applications, challenges, techniques and technologies: A survey on Big Data. *Information Sciences*, *275*, 314–347. https://doi.org/10.1016/j.ins.2014.01.015

Reis, C., Ruivo, P., Oliveira, T., & Faroleiro, P. (2020). Assessing the drivers of machine learning business value. *Journal of Business Research*, *117*, 232–243. https://doi.org/10.1016/j.jbusres.2020.05.053

Ren, S. J., Wamba, S. F., Akter, S., Dubey, R., & Childe, S. J. (2017). Modelling quality dynamics, business value and firm performance in a big data analytics environment. *International Journal Of Production Research*, *55*(17), 5011–5026. https://doi.org/10.1080/00207543.2016.1154209

Rialti, R., Marzi, G., Ciappei, C., & Busso, D. (2019). Big data and dynamic capabilities: A bibliometric analysis and systematic literature review. *Management Decision*, *57*(8), 2052–2068. https://doi.org/10.1108/MD-07-2018-0821

Ritter, T., & Pedersen, C. L. (2020). Digitization capability and the digitalization of business models in business-to-business firms: Past, present, and future. *Industrial Marketing Management*, *86*, 180–190. https://doi.org/10.1016/j.indmarman.2019.11.019

Russom, P. (2011). Big data analytics. TDWI best practices report, 19(4), 1-34.

Saggi, M. K., & Jain, S. (2018). A survey towards an integration of big data analytics to big insights for value-creation. *Information Processing and Management*, *54*(5), 758–790. https://doi.org/10.1016/j.ipm.2018.01.010

Smyth, K. B., Croxton, K. L., Franklin, R., & Knemeyer, A. M. (2018). Thirsty in an ocean of data? Pitfalls and practical strategies when partnering with industry on big data supply chain research. *Journal of Business Logistics*, *39*(3), 203–219. https://doi.org/10.1111/jbl.12187

Song, P., Zheng, C., Zhang, C., & Yu, X. (2018). Data analytics and firm performance: An empirical study in an online B2C platform. *Information and Management*, *55*(5), 633–642. https://doi.org/10.1016/j.im.2018.01.004

Sorescu, A. (2017). Data-driven business model innovation. *Journal of Product Innovation Management*, *34*(5), 691–696. https://doi.org/10.1111/jpim.12398

Strawn, G. O. (2012). Scientific research: How many paradigms? *EDUCAUSE Review*, *47*(3), 26-28. https://ucd.idm.oclc.org/login?url=http://search.proquest.com/docview/1018676995?accountid=14507%5Cnhttp://jq6am9xs3s.search.serialssolutions.com/?ctx_ver=Z39.88-2004&ctx_enc=info:ofi/enc:UTF-8&rfr_id=info:sid/ProQ:abiglobal&rft_val_fmt=info:ofi/fmt:kev:m

Sumbal, M. S., Tsui, E., Irfan, I., Shujahat, M., Mosconi, E., & Ali, M. (2019). Value creation through big data application process management: The case of the oil and gas industry. *Journal of Knowledge Management*, *23*(8), 1566–1585. https://doi.org/10.1108/JKM-02-2019-0084

Sun, E. W., Chen, Y. T., & Yu, M. T. (2015). Generalized optimal wavelet decomposing algorithm for big financial data. *International Journal of Production Economics*, *165*, 194–214. https://doi.org/10.1016/j.ijpe.2014.12.033

Surbakti, F. P. S., Wang, W., Indulska, M., & Sadiq, S. (2020). Factors influencing effective use of big data: A research framework. *Information and Management*, *57*(1), 103146. https://doi.org/10.1016/j.im.2019.02.001

Tambe, P. (2014). Big data investment, skills, and firm value. *Management Science*, *60*(6), 1452–1469. https://doi.org/10.1287/mnsc.2014.1899

Tempini, N. (2017). Till data do us part: Understanding data-based value creation in data-intensive infrastructures. *Information and Organization*, *27*(4), 191–210. https://doi.org/10.1016/j.infoandorg.2017.08.001

Trabucchi, D., & Buganza, T. (2020). Fostering digital platform innovation: From two to multi-sided platforms. *Creativity and Innovation Management*, *29*(2), 345–358. https://doi.org/10.1111/caim.12320

Trabucchi, D., Buganza, T., Dell'Era, C., & Pellizzoni, E. (2018). Exploring the inbound and outbound strategies enabled by user generated big data: Evidence from leading smartphone

applications. *Creativity and Innovation Management*, *27*(1), 42–55. https://doi.org/10.1111/caim.12241

Trabucchi, D., Buganza, T., & Pellizzoni, E. (2017). Give away your digital services. *Research-Technology Management*, *60*(2), 43–52. https://doi.org/10.1080/08956308.2017.1276390

Urbinati, A., Bogers, M., Chiesa, V., & Frattini, F. (2019). Creating and capturing value from big data: A multiple-case study analysis of provider companies. *Technovation*, *84–85*, 21–36. https://doi.org/10.1016/j.technovation.2018.07.004

Van Eck, N. J., & Waltman, L. (2014). Visualizing bibliometric networks. In *Measuring scholarly impact*, 285-320. Springer, Cham.

Heck, E. V. (2020). Big Data and disruptions in business models. Revista de Administração de Empresas, 59, 430-432.

Van Raan, A. (2003). The use of bibliometric analysis in research performance assessment and monitoring of interdisciplinary scientific developments. *TATuP - Zeitschrift Für Technikfolgenabschätzung in Theorie Und Praxis*, *12*(1), 20–29. https://doi.org/10.14512/tatup.12.1.20

Vidgen, R., Shaw, S., & Grant, D. B. (2017). Management challenges in creating value from business analytics. *European Journal of Operational Research*, *261*(2), 626–639. https://doi.org/10.1016/j.ejor.2017.02.023

Wamba, S. F., Gunasekaran, A., Akter, S., fan Ren, S. J., Dubey, R., & Childe, S. J. (2017). Big data analytics and firm performance: Effects of dynamic capabilities. *Journal of Business Research*, *70*, 356–365. https://doi.org/10.1016/j.jbusres.2016.08.009

Wamba, S. F., & Mishra, D. (2017). Big data integration with business processes: A literature review. *Business Process Management Journal*, *23*(3, SI), 477–492. https://doi.org/10.1108/BPMJ-02-2017-0047

Wang, Y., & Hajli, N. (2017). Exploring the path to big data analytics success in healthcare. *Journal of Business Research*, *70*, 287–299. https://doi.org/10.1016/j.jbusres.2016.08.002

Wang, Y., Kung, L. A., & Byrd, T. A. (2018). Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technological Forecasting and Social Change*, *126*, 3–13. https://doi.org/10.1016/j.techfore.2015.12.019

Wiener, M., Saunders, C., & Marabelli, M. (2020). Big-data business models: A critical literature review and multiperspective research framework. *Journal of Information Technology*, *35*(1), 66–91. https://doi.org/10.1177/0268396219896811

Wilkin, C., Ferreira, A., Rotaru, K., & Gaerlan, L. R. (2020). Big data prioritization in SCM decision-making: Its role and performance implications. *International Journal of Accounting Information Systems*, *38*. 100470. https://doi.org/10.1016/j.accinf.2020.100470

Xie, K., Wu, Y., Xiao, J., & Hu, Q. (2016). Value co-creation between firms and customers: The role of big data-based cooperative assets. *Information and Management*, *53*(8), 1034–1048. https://doi.org/10.1016/j.im.2016.06.003

Ylijoki, O., & Porras, J. (2019). A recipe for big data value creation. *Business Process Management Journal*, *25*(5), 1085–1100. https://doi.org/10.1108/BPMJ-03-2018-0082

Zeng, J., & Glaister, K. W. (2018). Value creation from big data: Looking inside the black box. *Strategic Organization*, *16*(2), 105–140. https://doi.org/10.1177/1476127017697510

Zeng, J., & Khan, Z. (2019). Value creation through big data in emerging economies: The role of resource orchestration and entrepreneurial orientation. *Management Decision*, *57*(8), 1818–1838. https://doi.org/10.1108/MD-05-2018-0572

Zhang, X., Yu, Y., & Zhang, N. (2020). Sustainable supply chain management under big data: A bibliometric analysis. *Journal of Enterprise Information Management*, 34(1), 427-445. https://doi.org/10.1108/JEIM-12-2019-0381

Appendix 1. Summary of Review Papers Regarding VCC From Big Data

	Authors	Journal	Methodology and field of study	Research contributions
1	Elia et al. (2020)	Industrial Marketing Management	A systematic literature review and case study of the multidisciplinary field of study (Computer Science and other fields)	This study aims to present a framework that outlines the multiple value directions that the Big Data paradigm can generate for adopting organizations. Eleven distinct value directions have been identified and then grouped into five dimensions (Informational, Transactional, Transformational, Strategic, Infrastructural Value), which constitute the pillars of the proposed framework.
2	Wiener et al. (2020)	Journal of Information Technology	A critical literature review of computer science, engineering, IS, and strategy	This study tries to assess the current literature related to big data business model (BDBM) types, dimensions, and deployment, including drivers, challenges, and processes. Moreover, it proposes a research framework for future research on BDBMs.
3	Günther et al. (2017)	Lecture Notes in Business Information Processing	A systematic review of IS literature (the AIS "basket of eight" IS journals)	This study addresses the social and economic value of big data at three levels of work-practice, organization, and supra organizational based on the review of information systems literature (IS).
4	Akter & Wamba (2016)	Electronic Markets	A systematic review of the literature	The study investigates the distinction of value creation for e-commerce companies between traditional data analysis and big data analytics. It also defines the business value of BDA as the transactional, informational, and strategic benefits that e-commerce firms receive.
5	Fosso Wamba et al. (2015)	International Journal of Production Economics	A systematic literature review of leading journals in the IS field	Based on the literature review, different perspectives and application of big data and a framework of value creation and issues from big data is presented.
6	Saggi & Jain (2018)	Information Processing and Management	A systematic review of the multidisciplinary field of study	The existing literature related to big data analytics is reviewed to investigate the characteristics and architecture of BDA. Moreover, the value creation of big data is considered and debated as a tool for decision-making. Finally, different technologies, tools, and challenges of BDA are discussed from the IS perspective.