Extending The Theoretical Understanding of Big Data Analytics Capabilities In Organizations: A Thematic Analysis

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Survey paper

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Abstract

Big Data Analytics (BDA) usage in industry has been increased markedly in recent years. As a data-driven tool to facilitate informed decision making, the need for BDA capability in organizations is recognized, but few studies have communicated an understanding of BDA capabilities in a way that can enhance our theoretical knowledge of using BDA in organizational domain. Big Data has been defined in various ways and , the past literature about classification of BDA and its capabilities is explored in this research . We conduct a literature review using PRISMA methodology, and integrate a thematic analysis using NVIVO12. By adopting five steps of PRISMA framework - , 70 sample articles we generate five themes, which informed through organization development theory, and develop a novel empirical research model which we submit for validity assessment. Our findings improve effectiveness and enhance the usage of BDA applications in various Organizations.

1. Introduction

Organizations today continuously harvest user data [e.g., data collections] to improve their business efficiencies and practices. Significant volumes of stored data, or data regarding electronic transactions are used in support of decision making, with managers, policymakers and executive officers now routinely embracing technology to transform these abundant raw data into useful, informative information. Data analysis is complex, but one data-handling method, “Big Data Analytics” (BDA)—the application of advanced analytic techniques, including data mining, statistical analysis, and predictive modelling on big datasets as new business intelligence practice [1]—is widely applied. BDA uses computational intelligence techniques to to transform raw data into information that can be used to support decision making.

Because decision making in organizations has become increasingly reliant on Big Data, analytical applications have increased in importance for evidence-based decision making [2]. The need for a systematic review of Big Data stream analysis using rigorous and methodical approaches to identify trends in Big Data stream tools, analyze techniques, technologies, and methods is becoming increasingly important [3]. There are organizational factors such as – resource alignment, environmental determinism ang organizational politics that better relate in building its BDA capability and enhance its benefits through BDA technologies [4]. From past literature, it is evident that BDA supports organizational decision-making process through developing suitable theoretical understanding but extending existing theories remains a significant challenge. The improved capability of BDA will ensure that the organizational products and services are continuously optimized to meet the evolving needs of consumers.

Previous systematic reviews have focused on aspects of future BDA adoption challenges [5–7], or technical innovation aspects of Big Data analytics [8, 9]. This signifies those numerous studies have examined Big Data issues in different domains. These different domains are included: quality of Big Data in financial service organization [10]; organizational value creation because of BDA usage [11];

application of Big Data in health organizations [9]; decision improvement using Big Data in health [12]; application of Big Data in transport organizations [13]; relationships between Big Data in financial domains [14]; and quality of Big Data and its impact on government organizations [15].

While there has been a progressive increase in research on BDA, its capabilities and how organizations may exploit them are less-well studied [16]. We apply a PRISMA framework [17]) and qualitative thematic analysis to create the model to define the relationship between BDAC and OD, and present an overview of BDA capabilities and how they can be exploited by organizations, and the implications of this for further empirical research development and implications for further empirical research development. Specifically, we (1) provide an observation into key themes regarding BDAC with respect to state-of-the-art research in BDA, and (2) show an alignment to organizational development theory in terms of a new empirical research model which will be submitted for validity assessment for future research of BDAC in organizations.

According to [20], a systematic literature review first involves description of the key approach and establishment of definitions for key concepts. We use a six-phase process to identify, analyze, and report themes in a sequential manner using NVIVO 12.

1`1

2. Study Background

Many forms of BDA exist to meet specific decision-support demands of different organizations. Three BDA analytical classes exist: 1) *descriptive*, dealing with straightforward questions regarding what is or has happened and why—with 'opportunities and problems' using descriptive statistics such as historical insights; 2) *predictive*, dealing with questions such as what will or is likely to happen, by exploring data patterns with relatively complex statistics, simulation, and machine-learning algorithms (e.g., to identify trends in sales activities, or forecast customer behavior and purchasing patterns); and 3) *prescriptive*, dealing with questions regarding what should be happening and how to influence it, using complex descriptive and predictive analytics with mathematical optimization, simulation, and machine-learning algorithms (e.g., many large-scale companies have adopted prescriptive analytics to optimize production or solve schedule and inventory management issues) [18]. Regardless of the type of BDA analysis performed, its application significantly impacts tangible and intangible resources within an organization.

2.1 Previous studies on BDA

BDA tools or techniques are used to analyze Big Data (such as social media or substantial transactional data) to support strategic decision-making [19] in different domains (e.g., tourism, supply chain, healthcare), and numerous studies have developed and evaluated BDA solutions to improve organization decision support. We categorize previous studies into two main groups based on non-technical aspects:

those which relate to development of new BDA requirements and functionalities in a specific problem domain, and those which focus on more intrinsic aspects such as BDAC development or value-adding because of their impact on particular aspects of business. Examples of reviews focusing on technical or problem-solving aspects are detailed in Table 1.

Table 1: Example studies that focus technical or problem-solving aspects of BDA.

Source	Review method (# articles)	Key Results
[3]	(47) content analysis to discover issues	Importance of designing streaming analytics for big data found scalability, privacy, and load-balancing issues of big data technologies
[20]	(84) systematic literature review	Existing BDA mechanisms lead to competitive performance gains for building theory, aligning to resource-based and dynamic capabilities
[21]	(413) content analysis	A framework identifying supply chain functions with BDA models is developed
[22]	(67) systematic review	Organizations may realize values of Big Data, by analysis of two socio-technical features: portability and interconnectivity influence
[23]	(170) bibliometric analysis and systematic literature review	Created 4 clusters - big data and dynamic capabilities: big data and supply chain management, knowledge management, decision making, business process management and BDA, determined BDAC and organizational objectives to be aligned so organizations should develop new strategies for dynamic BDAC
[24]	(49) bibliometric and network analysis review	Identified clusters of Big Data to improve business processes in an organization
[25]	(109) descriptive review	Revealed how to establish BDAC for business transformation
[18]	(100) content analysis	Addressed Big Data issues, trends and views in Supply Chain Management (SCM) to spread Big Data value-adding perspective

The second literature group examines BDA in an organizational context, such as improving firm performance using big data analytics capability in specific business domains [26]. Studies that supports BDA leading to different aspects of organizational performance [20,25,27-30] (Table 2). Another research

on BDA to improve data utilization and decision-support qualities. For example, [31] explained how BDAC may be developed to improve managerial decision-making processes, and [4] conducted a thematic analysis of 15 firms to identify the factors related to the success of BDA capability development in SCM.

Table 2: Examples of BDAC review studies

Source	Method (# online surveys)	Results
[4]	Thematic analysis: 14 firms,	Identified factors inhibiting organizational BDAC and maximizing its gains with BDA applications
[16]	Quantitative analysis (108) from 108 executive-level technology leaders	BDAC leads to organizational performance
[20]	Quantitative—202 technology leaders in Norwegian firms	Explained the advantages of BDAC to enable and support organization capability
[24]	Quantitative— (297) from Chinese IT managers	Determined BDAC to directly and indirectly impact firm performance
[25]	Quantitative—109 case description analysis	Revealed how to establish BDAC for business transformation
[26]	Quantitative (152)	Advances BDAC conceptualization and the role of Analytics Capability Business Strategy Alignment in enhancing organization's performance
[27]	Quantitative analysis (306)	An organization's intention for BDA and its competence for maintaining the quality of corporate data and decision making
[28]	Quantitative analysis (161)	Organizational level BDA use has significant impacts on two types of supply chain value creation: asset productivity and business growth
[29]	Quantitative (30)	Data and organization domains have a greater impact than technology and support domains
[31]	Qualitative: 3 exploratory case studies	Examined how BDA use enhanced operations, and identified links with operations performance

Potential applications of BDA

Many retail organizations use analytical approaches to gain a commercial advantage and organizational success [32]. Modern organizations increasingly invest in BDA projects to reduce costs, accurate decision making, and for future business planning. For example, Amazon was the first online retailer, and has maintained its position for innovative BDA improvement and use [32]. Examples of successful stories of BDA use in business sectors include.

- *Retail:* business organizations using BDA for dynamic (surge) pricing [33] to adjust product or service prices based on demand and supply. For instance, Amazon uses dynamic pricing to surge price in accordance with product demand.
- *Hospitality:* Marriott hotels—the largest hospitality agent with a rapidly increasing number of hotels and serviced customers—uses BDA to improve sales [34].
- *Entertainment:* Netflix uses BDA to retain clientele, and increase sales and profits [35,36].
- *Transportation*: Uber uses BDA [37] to capture Big Data from various consumers, and to identify the best routes to locations. 'Uber eats,' despite competing with other delivery companies, delivers foods in the shortest possible time.
- *Food service:* McDonalds continuously updates information with BDA, following a recent shift in food quality, now sells healthy food to consumers [38], and has adopted a dynamic menu [39].
- *Finance:* American Express has used BDA for a long time, and was one of the first companies to understand the benefits of using BDA to improve business performance [40]. Big Data are collected on the ways consumers make on- and offline purchases, and predictions are made as to how they will shop in the future.
- *Manufacturing:* General Electric manufactures and distributes products such as wind turbines, locomotives, airplane engines, and ship engines [41]. By dealing with huge amount of data from electricity network, meteorological information system, geographical information system etc., benefits can be brought to the existing power system including improving the customer service as well as the social welfare in the era of big data.
- *Online business:* music streaming websites are increasingly popular and continue to grow in size and scope because consumers want a customized streaming service [42]. Many streaming services (e.g., Apple Music, Spotify, Google Music) use various BDA applications to suggest new songs to consumers.

2.3 Organization value assessment with BDA

Specific performance measure must be established that rely on the number of organizational contextual factors such as - goal of the organization, external environment of the organization and organization itself. When looking at above contexts regarding the use of BDA to strengthen process innovation skills, it is important to note that the approach required to achieve positive results depends on the different combinations along with the area in which BDA deployed [43].

2.3.1 Organizational development and BDA

To assist organization decision making for growth, effective processes are required to perform operations such as continuous diagnosis, action planning, and the implementation and evaluation of BDA. Lewin's Organizational Development (OD) theory regards processes as having a goal to transfer knowledge and

skills to an organization, with the process being mainly to improve problem-solving capacity and to manage future change. Beckhard [44] defined OD as the internal dynamics of organization, which involve a collection of individuals working as a group to improve organizational effectiveness, capability, work performance, and the ability to adjust culture, policies, practices, and procedure requirements.

OD is 'a system-wide application and transfer of behavioral science knowledge to the planned development, improvement, and reinforcement of the strategies, structures, and processes that lead to organization effectiveness' [45], and has three concepts: organizational climate, culture and capability [46]. Organizational climate is 'the mood or unique personality of an organization' [46] which includes shared perceptions of policies, practices, and procedures; climate features also consist of leadership, communication, participative management, and role clarity. Organizational culture involves shared basic assumptions, values, norms, behavioral patterns, and artefacts, defined by [47] as 'a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration' (p. 38). Organizational capacity (OC) implies the function of the organization, such as production of services or products, or maintenance of organizational operations, and has four components: resource acquisition, organization structure, production subsystem, and accomplishment [48]. Organizational culture and climate affect an organization's capacity to operate adequately (Figure 1).

Research Methodology

Our systematic literature review presents a research process for analyzing and examining research, and to gather and evaluate it [49] in accordance with a PRISMA framework [50]. We use keywords to search for articles related to BDA application, following a five stage process.

Stage1: Design Development

We establish a research question to instruct the selection and search strategy, and analysis and synthesis process, defining the aim, scope and specific research goals following guidelines, procedures and policies of the Cochrane Handbook for Systematic Reviews of Intervention [51]. The design review process is directed by the research question: what are the consistent definitions of BDA, unique attributes, objections and business revolution including improve decision making process and organization performance with BDA? The below Table is created using the outcome of the search which performed using Keywords- Organizational BDAC, Big Data, BDA.

Table 3. Design Development stage

Science Direct	Web of Science	IEEE	Springer Link	Total
15,5518	8834	3235	63,000	230,587

Stage 2: Inclusion and elimination criteria

To maintain the nuances of a systematic review, we apply various inclusion and exclusion criteria to our search for research articles in four databases: Science Direct, Web of Science, IEEE (Institute of Electrical and Electronics Engineers), and Springer Link. Inclusion criteria include topics on 'Big Data in Organization' published between 2015 to 2021, in English. We use essential keywords to identify the most relevant articles, using truncation, wildcarding, and appropriate Boolean operators (Table 4).

Table 4. Inclusin and elimination criteria stage

Science Direct	Web of Science	IEEE	Springer Link	Total
107,067	7111	2471	30,000	146,649

Stage 3: Literature sources and search approach

Research articles are excluded on the bases of Keywords and Abstract, after which 8062 are retained (Table 5). The articles only selected which has Keywords such as Big Data, BDA, BDAC, and the Abstract only focused in Organizational domain.

Table 5. Literature sources and search approach stage

Science Direct	Web of Science	IEEE	Springer Link	Total
7735	46	22	259	8062

Stage 4: Assess quality of full papers

At this stage, for each of the 161 research articles that remained after stage 3 presented in Table 6, which was assessed independently by authors in terms of several quality criteria such as credibility, to assess whether the articles were well presented, relevance which was assess based on whether the articles were used in organizational domain.

Table 6. Quality examination stage

Science Direct	Web of Science	IEEE	Springer Link	Total
63	43	20	35	161

Stage 5: Literature extraction and synthesis process

At this stage, only journal articles and conference papers are selected. Articles for which full texts were not open access were excluded, reducing our references to 70 papers[1] (Table 7).

Table 7. Literature extraction and synthesis process stage

Science Direct	Web of Science	IEEE	Springer Link	Total
34	10	17	9	70

3.1 Meta-analysis of selected papers

Of the 70 papers satisfying our selection criteria, publication year and type (journal or conference paper) reveals an increasing trend in big data analytics over a last 6 years (Table 6). Additionally, journals produced more BDA papers than Conference proceedings (Figure 2) which may be effected during year 2020 -2021 because of COVID and would be fewer conference proceedings or publication were cancelled.

Of the 70 research articles, 6% were published in 2015, 13% (2016), 14% (2017), 16% (2018), 20% (2019), 21% (2020), and 10% (untill May 2021).

4. Results

Thematic analysis used to find the results which can identify, analyze and report patterns (themes) within data, and produce an insightful analysis to answer particular research questions [52].

The combination of Nvivo and Thematic analysis improves results. Judger [53] maintained that using computer-assisted data analysis coupled with manual checks improves the trustworthiness, credibility and validity of findings (p. 6).

4.1 Defining Big Data

Of 70 articles, 33 provide a clear replicable definition of Big Data, from which the five representative definitions are presented in Table 8.

Table 8
Big Data definitions

Source	Definition
[54]	'A large volume of digital data found in government organizations which require different speed i.e. velocity based on the requirements of the government application domains with a wide variety of data types and sources, and these government big data must be able to guarantee veracity to extract desired value for the target government organization' (p. 41).
[55]	'Big data in information technology is a set of approaches, tools and methods for processing structured and unstructured data of huge volumes and considerable diversity for obtaining human-perceptible results' (p. 1).
[56]	'Volume: This is the most significant aspect that characterizes Big data – the huge amount / volume. Velocity: Velocity means two things here. The first one is the flow of data – a constant stream of data. The other one is the possibility for making use of real time data. Variety: It indicates varying characteristics of the data (unstructured data, or data in different structures) as well as of sources that present these data' (p. 853).
[57]	'Big data are data sets so complex that cannot be managed or analyzed using traditional data analysis software. These data sets share 7 common characteristics, the 7Vs: V1—Volume, V2—Velocity, V3—Variety, V4—Veracity, V5—Value, V6—Variability & V7—Visualization' (p. 1094).
[58]	'veracity, which refers to data accuracy that relates to quality. After which it became possible to develop more sophisticated data analysis software to fulfil the needs of handling the information explosion according to the way it is accessed, searched, processed and managed' (p. 364).

4.2 Defining BDA

Of 70 sample articles, 21 clearly define BDA. The four representative definitions are presented in Table 9. Some definitions accentuate the tools and processes used to derive new insights from big data.

Table 9
BDA definitions

Source	Definition
[59]	'Big data analytics defined in six components - data generation, data acquisition, data storage, advanced data analytics, data visualization, and decision-making for value-creation), its typical tools, techniques and technologies, and its main domains of application'(p. 755).
[57]	'Big data' has been used to describe datasets so complex that they cannot be managed or analysed using traditional data analysis software' (p. 1095).
[11]	'Big data analytics enables large-scale data sets integration, supporting people management decisions, and cost-effectiveness evaluation of healthcare organizations' (p. 1).
[60]	'Big data analytics is defined as a process to analyze the large data volumes to capture value for the businesses and employees' (p. 229).

4.3 BDA and its definitions of capability

Only 16% of articles focus on Big Data characteristics; one identify challenges and issues with adopting and implementing the acquisition of Big Data in organizations [43]. The above study resulted that BDAC to use the large volumes of data generated through different devices and people to increase efficiency and generate more profits. BDA capability and its potential value could be more than a business expects which has been presented that the professional services, manufacturing, and retail have structural barriers and to overcome these barriers, with the use of Big data [61]. We define BDAC as the combined ability to store, process and analyze large amounts of data so that meaningful information can be provided to users. Four dimensions of BDAC exist: data integration, analytical, predictive, and data interpretation.

Table 10
Big Data analytics capability definitions

Source	Definition
[62]	'The ability of an organization to collect and analyze data to generate insights, by effectively developing its data, technology and talent through organization-wide processes, roles and structures' (p. 2).
[58]	'The ability to acquire, store, process and analyze a large amount of data' (p. 13).
[63]	'An organization's ability to mobilize and deploy data analytics related resources in combination with marketing resources and capabilities' (p. 3).
[16]	'Big data capability is defined as firms need a combination of certain tangible, human and intangible resources to build BDA capability' (p. 1050).

4.4 BDA themes

It is feasible to identify outstanding issues of research that are of excessive relevance which has termed in five themes using NVIVO12 (Fig. 3). Table 11 illustrates four units which are combination of NVIVO with thematic analysis, for analysis: Big data, BDA, BDAC, and BDA themes. We manually classify five BDA themes to ensure accuracy with appropriate perceptionin detail and provides suggestions on how future researchers might approach these problems using a research framework model.

Table 11
BDA themes

Research Theme	Summary
BDA resource concinnity	12% of articles focus on implementing BDAC, but limited information is provided as to how to orchestrate and handle such resources to build BDAC within an organization. The potential to strategically leverage these resources must be increased. Future research must identify how to build proficiency.
BD proficiencies	7% of articles focus on organization proficiency rather than Big Data proficiency; these two must be differentiated. An organization can implement and develop substantial BDA proficiency, but may utilize it only in specific functions such as finance and marketing. Future research should focus on building both BDAC and organization proficiency.
Transforming BD into actionable insights	To comprehend the value of BDAC, data must be transformed into actionable insights to improve organization decisions. 15% of research articles focused on transforming BDAC into action. Organizations may depend upon many factors which can be manipulated experimentally in future studies using BDAC and OD frameworks.
Management attitude towards BD and its impact	18% of studies revealed an organization's management normally decided to implement Big Data, but did not fully support the capability of the decision-making process. Management use prediction technique over BDA result which has been studied and found in only 12% articles presented Management. Investment in BDA is affected by a lack of understanding of its capabilities by high-level management.
Organization value assessment with BDA	Specific performance measures must be established that rely on the number of contextual factors along with the area in which BDA is deployed. 7% of articles considered organizations were ready for BDA implementation, but organization structure must be supportive to enable realization of BDA benefits.

Manyika *et al.* [64] considered BDA could assist an organization to improve its decision making, minimize risks, provide other valuable insights that would otherwise remain hidden, aid creation of innovative business models, and improve performance.

The five themes presented in Table 11 identify limitations of existing literature, which are examined in our research model (Fig. 4) using four hypotheses. This theoretical model identifies both organizational and individual levels as being influenced by organization climate, culture and capacity. This model can assist understanding how BDA can be used to improve organizational and individual performance.

4.5 Process for developing a new research model

We analyze literature using a new research method, driven by the connection between BDAC and resource-based views which included three resources: tangible (financial and physical), human skills (employees' knowledge and skills), and intangible (organizational culture and organizational learning) used in IS capacity literature [66–69]. Seven factors enable firms to create BDAC [16] (Fig. 5).

To develop a robust model, tangible, intangible and human resource types should be implemented in an organization and contribute to emergence of decision making process. This research model recognizes

BDAC to enhance OD, both strengthening organizational strategies and the relationship between BD resources and OD. Figure 6 depicts a theoretical framework illustrating how BDA resources influence innovation sustainability and OD, where Innovation sustainability helps to identify market opportunities, predict customer needs, and analyze customer purchase decisions [70].

Miller [71] considered data to be a strategic business asset, and recommended for business and academia must collaborate to improve knowledge regarding BD skills and capability across an organization; [71] concluded that every profession, whether business or technology, will be impacted by big data and analytics. Gobble [72] proposed that an organization should develop new technologies to provide necessary supplements to enhance growth. Big Data represents a revolution in science and technology, and data-rich smart citty is the expected future which can be developed using Big Data [73]. Galbraith [74] reported how an organization attempting to develop BDAC might experience obstacles and opportunities. We found no literature that combined Big Data analytics capability and Organizational Development, or that discussed an interaction between them.

Because little empirical evidence exists regarding the connection between OD and BDA or their characteristics and features, our model (Fig. 7) fills an important void, directly connecting BDAC and OD, and illustrates how it affects OD in the organizational concepts of capacity, culture, and climate, and their future resources. Because BDAC can assist OD through implementation of new technologies [15, 26, 58] we hypothesize:

H1: A positive relationship exists between Organizational Development and BDAC.

OC relies heavily on OD, with OC representing a resource requiring development in an organization. Because OD can improve OC [45, 46], we hypothesize that:

H2: A positive relationship exists between Organizational Development and Organizational Capability.

With implementation or adoption of BDAC, OC is impacted [47]. Big data enables an organization to improve inefficient practices, whether in marketing, retail, or media. We hypothesize that:

H3: A positive relationship exists between BDAC and Organizational Culture.

Because BDAC adoption can affect OC, the policies, practices and measures associated with an organizational's employee experience [75], and improve both the business climate and an individual's performance, we hypothesize that:

H4: A positive relationship exists between BDAC and Organizational Climate.

Our research is based on a need to develop a framework in relation to OD theory, because modern organizations cannot ignore BDA, or its future learning and association with theoretical understanding. Therefore, we aim to demonstrate current trends in capabilities and a framework to improve understanding of BDAC for future research.

5. Discussion

The number of published papers on Big Data is increasing. Between 2015 and May 2021, the highest proportion of journal articles for any given year (21%) occurred in until May 2020 with the inclusion or exclusion criteria such as the article selecetion only opted using four databases: Science Direct, Web of Science, IEEE (Institute of Electrical and Electronics Engineers), and Springer Link and included only those article which titled as 'Big Data in Organization' published, in English language. We use essential keywords to identify the most relevant articles, using truncation, wildcarding, and appropriate Boolean operators. While BDAC can improve business-related outcomes, including more effective marketing, new revenue opportunities, customer personalization, and improved operational efficiency, existing literature has focused on only one or two aspects of BDAC. Our research model (Fig. 7) represents the relationship between BDAC and OD to better understand their impacts on OC. We explain that the proposed model education will enhance knowledge of BDAC, and that it may better meet organizational requirements, ensuring improved products and services for to optimize consumer outcomes.

Considerable research has been conducted in a many different context such as health sector, education etc. about Big Data but according to past literature, BDAC in an organization is still an open issue, how to utilize BDAC within organization for development purposes. The full potential of BDA and what it can offer must be leveraged to gain commercial advantage. Therefore, we focus on summarizing by creating the themes using past relevant literature and propose a research model based on literature [62] for business.

While we explored Springer Link, IEEE, Science direct, and Web of Science (which index high impact journal and conference papers), the possibility exists that some relevant journals were missed. Our research is constrained by our selection criteria, including year, language (English), and peer-reviewed journal articles (we omitted reports, grey journals, and web articles).

6. Conclusion

We identify five themes to leverage BDA in an organization and gain a competitive advantage. We present a research model, and four hypotheses to bridge gaps in research between BDA and OD. The purpose of this model and these hypotheses is to guide research to improve our understanding of how BDA implementation can affect an organization. The model will go for the next phase of our study in which we will test the model for its validity.

Abbreviations

- IEEE—The Institute of Electrical and Electronics Engineers
- BD—Big Data
- BDA—Big Data Analytics
- BDAC—Big Data Analytics Capabilities

- OD—Organizational Development
- OC—Organizational Capacity

Declarations

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Figures

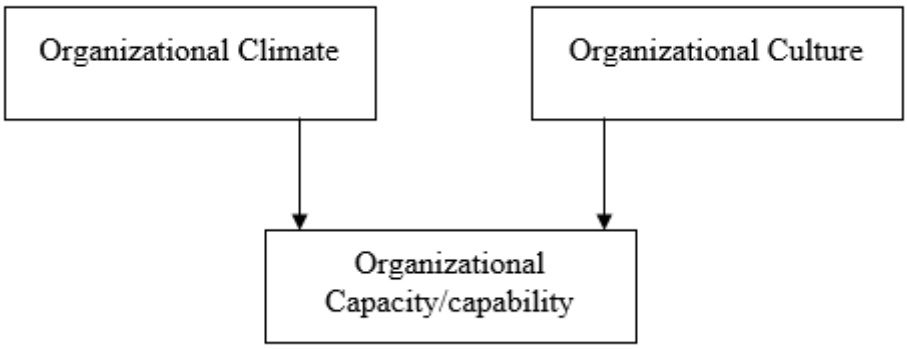

Figure 1

Framework of modified organizational development theory [46]

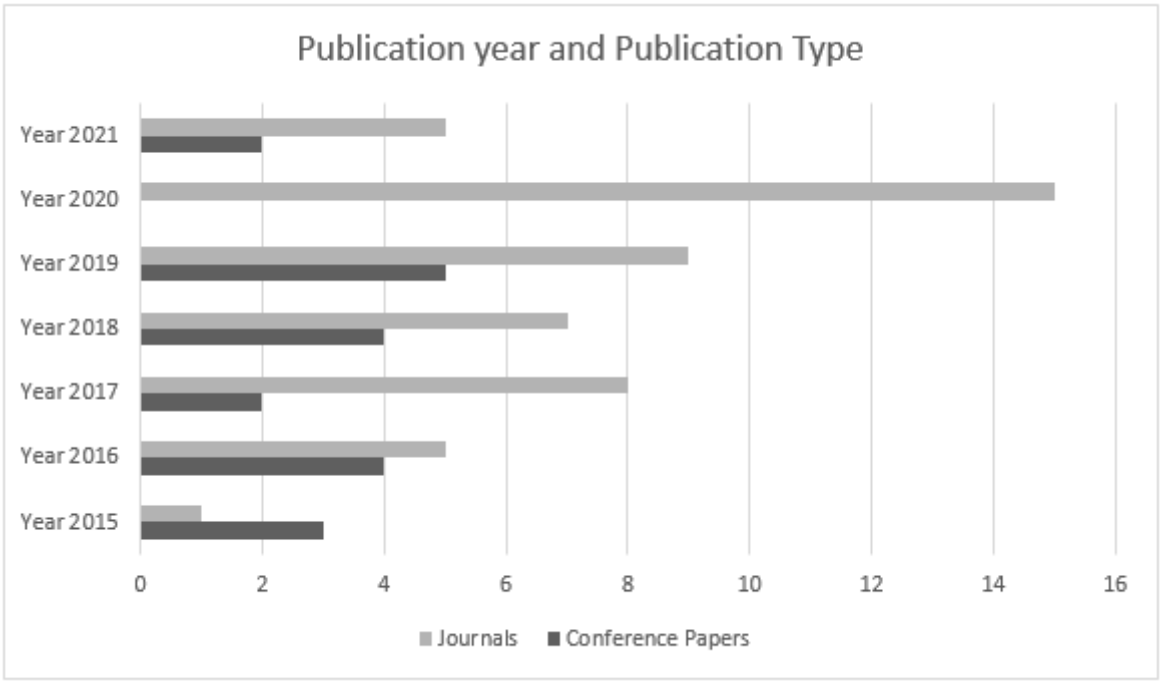

Figure 2

Distribution of publications by year and publication type

Figure 3

Thematic Analysis using Nvivo 12

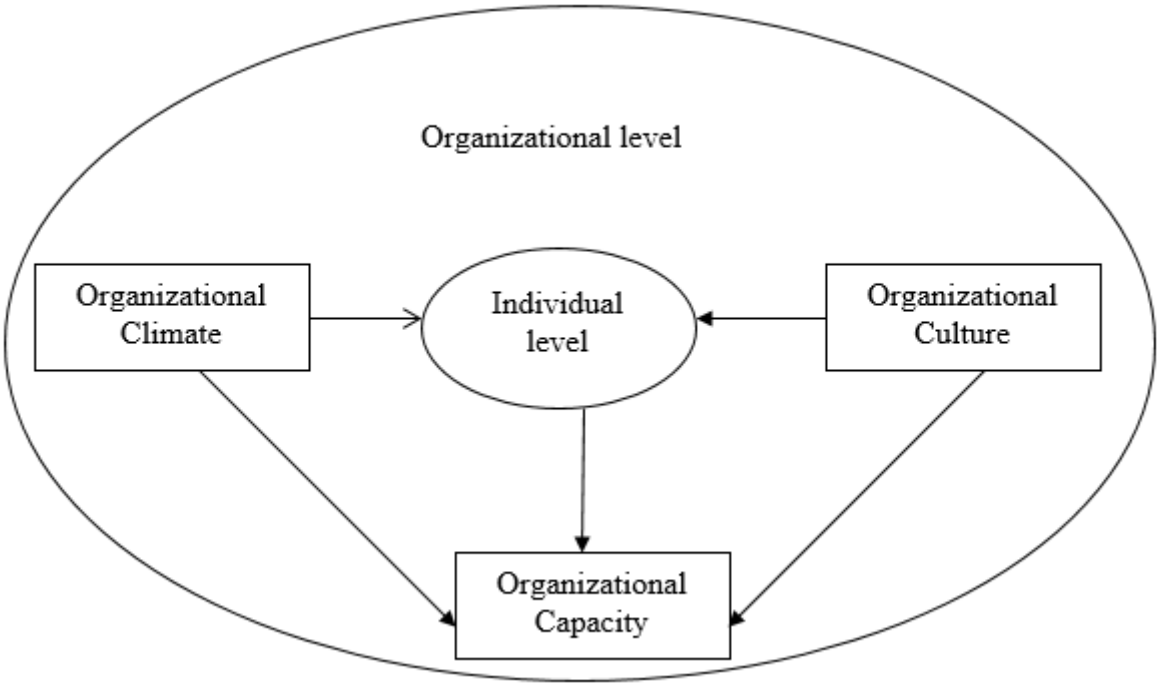

Figure 4

The framework of organizational development theory [65]

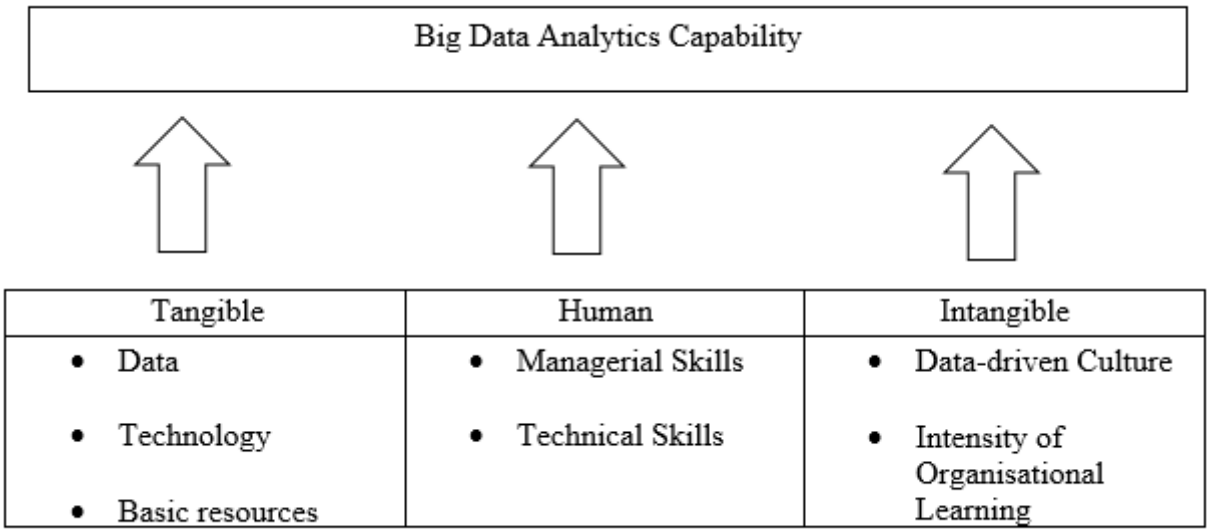

Figure 5

Classification of Big Data resources (adapted from [16])

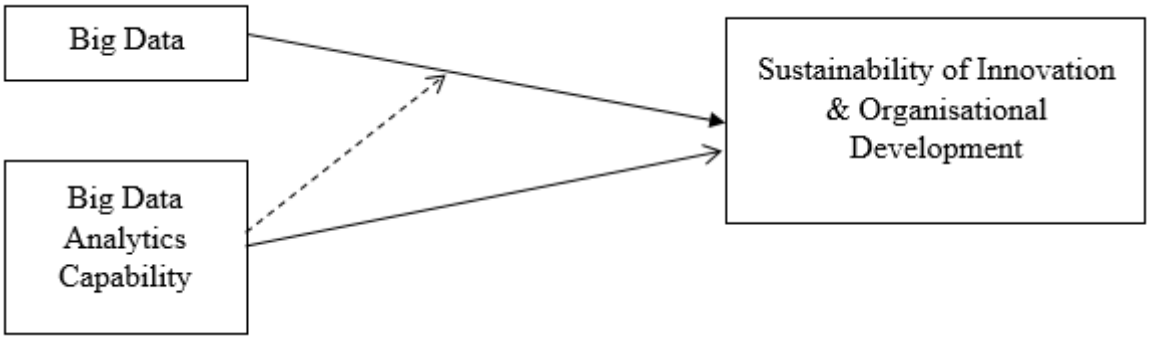

Figure 6

Theoretical framework illustrating how BDA resources influence innovation sustainability and organizational development (adapted from [69])

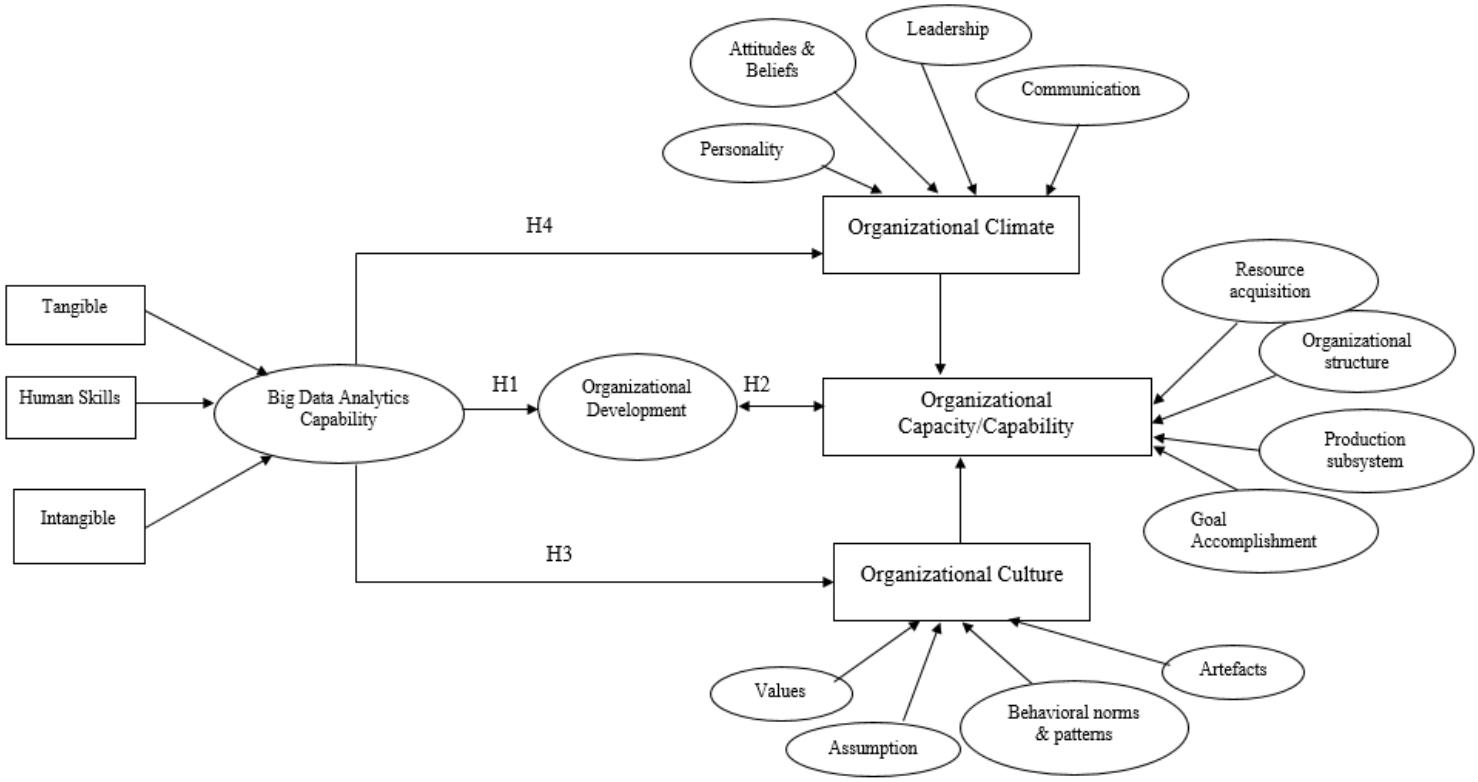

Figure 7

Proposed interpretation in the research model