

FedCSIS_2023_paper_7892.pdf

Big data analytics in telecommunication companies

Introduction

Big data analytics has revolutionized businesses by providing them with the ability to analyse large and complex data sets in ways that were previously not possible. Big Data Analytics (BDA) examine large and complex data sets to uncover hidden patterns, unknown correlations, and other useful information. This has enabled businesses to gain insights and make better decisions based on their data. BDA is "the techniques, technologies, systems, practices, methodologies, and applications that analyse critical business data to help an enterprise better understand its business and market and make timely business decisions" (Jen et al., 2012, p. 1166). In 2020, the global revenues for BDA solutions rise from \$189 billion to \$274.3 billion by 2022, with a compound annual growth rate of 13.2%. (IDC, 2019). In 2021, BDA market size was valued at \$240 billion, which is projected to 655 billion by 2029 (BusinessInsight, 2022). The proportion of prominent businesses that are adopting big data and artificial intelligence is consistently rising, with a rate of 99% in the year 2021; whereas 74% of organisations find its adoption challenging (NVP, 2021)".

Telecommunication companies are routinely handling vast quantities of data, with daily volumes ranging from terabytes to petabytes. Recent systematic literature reviews highlighted several key benefits of BDA applications such as reduced power consumption and improved resource management and network performance, cost reduction and revenue generation, enhanced customer care services, as well as the ability to predict customer churn, target marketing efforts, and detect fraud (Zahid et al., 2019; Kastouni & Lahcen., 2022). BDA can improve performance and operations of organisation, identifying customer trends and improve their experiences, enabling them to make better data-driven decisions, gain a competitive advantage over competitors (Maroufkhani et al., 2020;

Dubey et al., 2020; Mikalef et al., 2019; Raguseo & Vitiello., 2018; Akter, Wamba, and Dewan., 2017). Dubey, Gunasekaran, Childe et al. (2019, p. 2014), "The information derived via BDA capabilities provides firms with real-time information". Therefore, organizations can perform better (Akter et al., 2016; Gupta & George, 2016; Wamba et al., 2017). These capabilities might influence company culture, enhance operations, improve decision-making, and maintain competitive advantage (Kwon, Kwak, & Kim, 2015; Wang & Hajli, 2017).

The implementation of BDA in the telecommunications industry is faced with several challenges, such as the absence of a reference architecture for telecom BDA implementation, inadequate security policies, data quality, performance and storage and skills shortage (Zahid et al., 2019; Kastouni & Lahcen., 2022). Frizzo-Barker, Chow-White, Mozafari, and Ha (2016) conducted a systematic literature review on big data across business scholarship and highlighted that majority of studies are primarily from North America and Europe. There have been a few studies on BDA uptake in emerging economies (Ahmad et al., 2022; Maroufkhani et al., 2020; Abdul Moktadir et al., 2019). It is essential and worthwhile to examine BDA in different contexts (Sun et al., 2018). In addition, to understand the drivers for BDA use, it is important to consider how the potential business and financial performance of an organisation might be impacted by BDA adoption.

To address the gap, this research uses the technological-organizational-environmental (TOE) model to examine the factors that influence BDA adoption at telecommunication companies.

TOE model is effective in explaining the adoption of technology in organisations (Maroufkhani et al., 2020; Chan & Kumar, 2018; Hsu & Lin, 2016; Chen et al., 2015). However, the findings of BDA studies from

developed countries (Frizzo-Barker et al., 2016) cannot be directly generalized because the influence of TOE factors varies; depending on the type of technology, size of a firm and the country of study (Maroufkhani et al., 2020; Ghobakhloo, Arias-Aranda, & Benitez-Amado, 2019; Wang, Jin, & Mao, 2019). To best of our knowledge, this is the first study exploring effect of BDA and telecommunication operators' performance. This study addresses the questions as follows.

- What technological, organizational and environmental factors influence the extent of BDA adoption in telecommunication companies?
- Does BDA adoption influence the financial performance and market performance of telecommunication companies?

The findings of this study contribute to the body of knowledge by showcasing the antecedents and outcomes of BDA adoption from telecommunication operators' perspective. The outcomes of this research will be beneficial for managers in telecommunication companies to understand the factors involved in successfully adopting BDA and offer assistance to BDA vendors to promote BDA among telecommunication-related companies.

Background

The advancement in BDA has created new possibilities for deriving valuable information from large data sets, allowing for the early identification of business opportunities. According to Tassom, (2011) proposed that data can be characterized by three V's (i.e. Volume, Variety, Velocity) and highlighted that big data opens new avenues for businesses. BDA techniques processed and analysed large sets of data that are too complex for traditional data processing tools. Telecommunication

operators are using BDA for a range of purposes i.e. network and price optimisation, performing preventive diagnostics, predictive churn analysis, targeted marketing, attracting new subscribers/users, preventing frauds, enhancing customer experience, improving security, product development and innovation and so on (Zahid et al., 2019; Kastouni & Lahcen., 2022).

Model conceptualisation and hypotheses development

The TOE model has been extensively employed in various research studies to predict the adoption and usage of technology within organizations. This model primarily focuses on identifying the influences exerted by internal factors (i.e., organization and technology) and external environmental factors on the IT adoption. Researchers have applied this framework to uncover the factors influencing IT adoption in several emerging contexts, including cloud computing and e-commerce, CRM, and ERP (Sohaib et al., 2019; Alshamaila et al., 2013; Asiaei & Rahim, 2019; Cruz-Jesus et al., 2019; Ghobakhloo Arias-Aranda et al., 2011, 2011b; Ramdani, Chevers, & Williams, 2013), RFID (Hossain et al., 2017), BDA in SMEs (Maroufkhani et al., 2020), blockchain technology (Kouhizadeh et al., 2020) and BDA in the telecommunication industry (Walker and Brown, 2019). This study examines the different factors of technology and environment that are based on TOE as conceptualised in Figure 1. The rationale of proposed model hypotheses are presented in the following subsection.

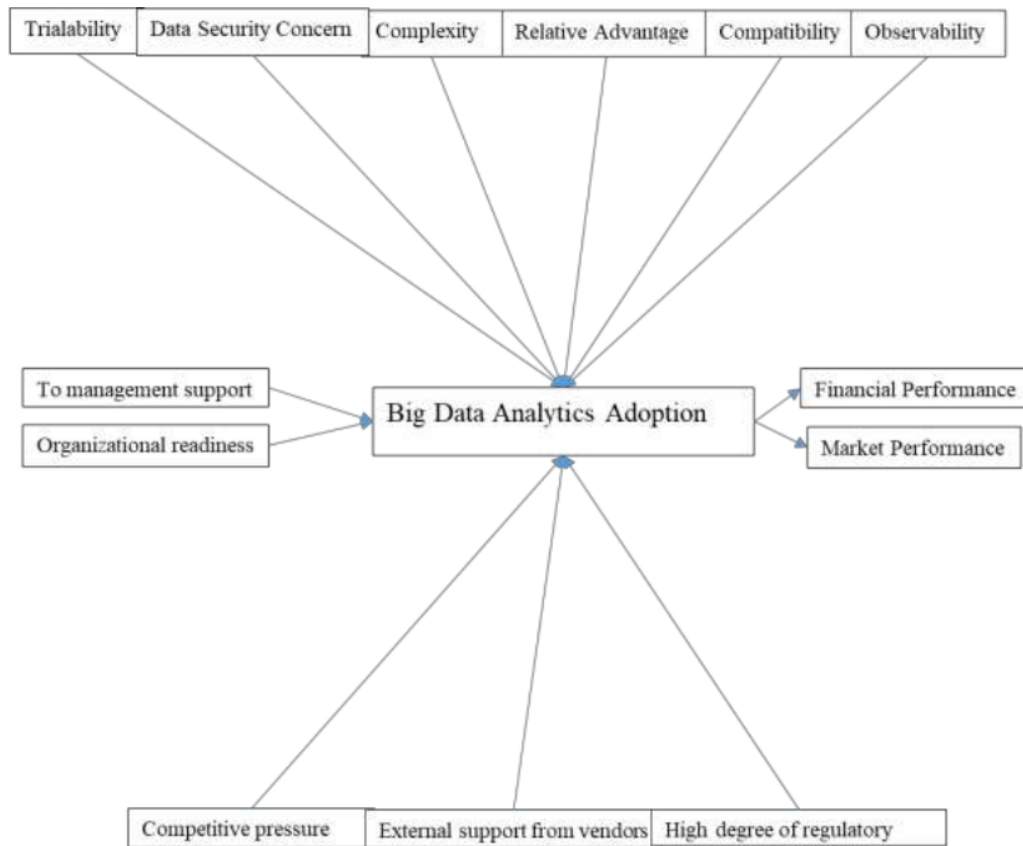


Fig. 1. Empirical Model

Relative advantage → BDA adoption

“Relative advantage is the degree to which an innovation is perceived as being better than the idea it superseded” (Rogers et al., 2014). Relative advantage is an important factor in the intention to adopt new innovative technologies (Ramdani et al. 2013; Jayadarshinee et al. 2017; Lutfi et al., 2023). We hypothesize that relative advantage might have a direct connection with BDA adoption:

H1: The relative advantages of BDA have a positive relationship with its adoption.

Compatibility → BDA adoption

“Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (Rogers et al., 2014). we hypothesize:

H2: There is a positive relationship between Compatibility and BDA adoption.

Complexity → BDA adoption

“Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers et al., 2014). as BDA (Maroufkhani et al., 2021; Gangwar, 2018; Lai, Sun, & Ren, 2018). The following hypothesis is proposed by the researchers.

H3: Companies that perceive a high level of complexity of BDA have a low level of willingness to adopt BDA.

Data Security Concern → BDA

Data security concern is connected with inadequate protection in place to prevent unauthorized, illegitimate, and malicious access to data (Ghasemaghaei, 2020). It is a heightened security concern related to data stored in databases and processing techniques (i.e. cloud computing), as it can increase the risk of unauthorized access (Li et al., 2016; Inukollu et al., 2014). This concern may discourage the use of BDA, as highlighted by Zhu et al. (2006), who suggest that security concerns can limit the adoption of new technologies within firms. Therefore, it can be hypothesized that:

H4: Data security concerns will decrease willingness to adopt BDA.

Trialability → BDA adoption

"Trialability is the degree to which an innovation may be experimented with on a limited basis" (Rogers et al., 2014). Trialability is one of the critical factors for early users of an innovation (Asare, Brashear-Alejandro, Kang, 2016; Alshamaila et al., 2013). Trialability helps to reduce their level of uncertainty (Rogers, 2003) and help faster adoption (Wu and Corbett, 2019). This suggests that if companies are given the opportunity to try BDA innovation, they may be more likely to adopt it. Thus, we hypothesizes the following.

H5: Trialability has a positive impact on the BDA adoption.

Observability → BDA

"Observability is the degree to which the results of an innovation are visible to others" (Rogers et al., 2014). The role of observability in technology adoption is weak or inconclusive (Maroufkhani et al., 2020; Sun et al., 2018) whereas, others found a significant relationship between observability and technology adoption (Bakar, Ahmad, Ahmad, 2019). We propose that if BDA adoption and its benefits are visible

then it is more likely to be adopted, hence the following hypothesis is developed.

H6: The observability of BDA technology has a positive connection with BDA adoption.

Top management support → BDA adoption

Top management is *"the extent to which top managers in the organization provide direction, authority, and resources during and after the acquisitions of IT systems"* (Surbakti, Wang, Indulska, Sadiq, 2020). It's a degree to which managers comprehend and embraces the technological capabilities of a new technology system (Maroufkhani et al., 2020). Top management support is critical for the adoption of an innovation (Chen et al., 2015). Examples of such support reported in various innovation adoption in organisations are cloud computing (Khayer et al., 2020), CRM system (Cruz-Jesus et al., 2019), SaaS (Oliveira et al., 2019) big data (Surbakti, Wang, Indulska, Sadiq, 2020; Talwar et al., 2021) (El-Haddadeh et al., 2021; Maroufkhani et al., 2020) and business analytics adoption (LaValle et al., 2011). Top managers play a critical role in creating a suitable environment for adopting BDA, where sufficient resources are available for technology adoption (Surbakti, Wang, Indulska, Sadiq, 2020; El-Haddadeh et al., 2021; Wan et al., 2016a; Youssef et al., 2022). Therefore, based on the above argument, the following hypothesis is proposed.

H7: Top management support is positively linked with BDA adoption.

Organizational readiness → BDA adoption

Organizational readiness is *"the extent to which organizational resources are available for using BDA"* (Chen et al. 2015, p. 18). It is a prerequisite for BDA implementation (Gangwar, 2018; Ramanathan, Philpott, Duan, Cao, 2017). Organizational readiness involves organization's ability to adapt to the change, as well as the necessary resources, processes, and support systems that are in place to facilitate the transition. Organizational readiness is a significant factor in the adoption of new technology (Asiaei and Rahim, 2019; Ghobakhloo, Arias-Aranda et al., 2011).

We hypothesise that organizational readiness can be a key requirement for BDA adoption.

H8: Organizational readiness positively influences BDA adoption.

Competitive pressure → BDA adoption

Competitive pressure refers to “the influences from the competitive environment for the organization to use BDA maintain or increase competitiveness” (Chen et al. 2015, p. 18). Competitive pressure can come from various factors such as customers, suppliers, and competitors. Competition significantly influences technology adoption including BDA context as it captures business intelligence and analytics to help companies and stay competitive in the market (Chen et al., 2015; Lautenbach, Johnston, Adeniran-Ogundipe, 2017). According to Oliveira and Martins (2011), organizations may feel compelled to adopt new technologies, such as BDA, if their competitors are already using or have adopted them. Additionally, Chen et al. (2015b) found that competitive pressure can increase an organization's tolerance for complexity. Therefore, this study hypothesizes the following.

H9: Competitive pressure positively influences BDA adoption.

External support → BDA adoption

According to Biney (2019), external support refers to assistance provided by external vendors to encourage organizations to adopt and integrate new innovative technologies. One of the key factors that can facilitate BDA adoption is the availability of external support from vendors (Gangwar, 2018). Vendor support influences BDA adoption in telecommunication companies (Walker and Brown, 2019).

H10: External support from vendors is positively associated with BDA adoption.

Government regulation → BDA adoption

Each country has their own government regulations and policies regarding digital technologies. These regulations and policies

can be either prohibitive or encouraging to firms to adopt a new technology or innovation (Stieninger and Nedbal, 2014). We propose the following hypothesis.

H11: Government regulation positively influences BDA adoption.

BDA adoption → financial performance

The existing literature reported showing that BDA adoption can have positive impact on a firm's financial performance (Ren et al., 2017; Gupta et al., 2019; Wamba et al., 2017) and increase return on investment (Aker et al., 2016). It is hypothesized that telecommunications companies that adopt BDA will experience higher levels of financial performance.

H12: BDA adoption positively influences a firm financial performance.

BDA adoption → market performance

Market performance refers to a company's ability to increase its market share, quickly enter new markets, and regularly introduce new products and services with a high rate of success (Vitari and Raguseo, 2019). The following hypothesis is suggested.

H13: BDA adoption positively influences firm market performance.

4. Method

In this study, a questionnaire is adapted that had been previously validated to gather data. The TOE instrument consists of three main factors i.e. technology, organization and environment. The technology factor consists of six constructs (i.e. relative advantage, compatibility, complexity, data security concern, trialability, and observability) adopted from (Maroufkhani et al., 2020; Ghasemaghahi, 2020; Maroufkhani et al., 2019; Chen et al. 2015; Xu et al. 2017). Organisational factor consists of two constructs adopted from (Maroufkhani et al., 2020; Maroufkhani et al., 2019; Lai et al., 2018; Priyadarshinee et al. 2017). The environmental factors consist of three factors (i.e. competitive pressure, external support, and government regulation) adopted from (Maroufkhani et al.,

2020; Maroufkhani et al., 2019; Ghobakhloo, Arias-Aranda et al., 2011; Gupta & George, 2016; Lai et al., 2018). The market and financial performance factors are adopted from (Maroufkhani et al., 2020; Maroufkhani et al., 2019; Raguseo and Vitari 2018; Ren et al. 2017). The BDA adoption consists of four constructs (i.e. strategic value, transactional value, transformational value, and informational value) which were adopted (Maroufkhani et al. 2020; Ghasemaghaei, 2020; Maroufkhani et al., 2019; Raguseo and Vitari., 2018). The research examines the impact of BDA adoption on firm market and financial performance. All constructs that were measured and their sources are listed in Appendix A.

This study utilized a seven-point Likert scale with anchors ranging from 1 (strongly disagree) to 7 (strongly agree). The two construct market performance and financial performance were measured using a seven-point Likert-type scale ranging from 1 ('much worse than major competitors') to 7 ('much better than major competitors'). The survey was piloted with six academics and seven data analytics industry experts to ensure its understandability and evaluate the reliability of the constructs.

4.1. Sampling and data collection

We approach the targeted population directly visiting their offices with the help of references. The key informants in each cellular operator's office help us to distribute the survey to the relevant participants. The managers and other personnel answered the surveys because they were experienced with BDA in their companies and taking part in various IT-related decisions.

The front page of the survey includes a cover letter to elaborate on the purpose of our study and a BDA explanation. The respondents were asked a filter question at the beginning, "Are you using BDA in your company?" respondent who answered "No" to this question was eliminated from the survey.

4.2. Data analysis

The proposed hypotheses were analysed using partial least squares (PLS) method, which is

suitable for the predictive nature of this study (Hair, Risher, Sarstedt, & Ringle, 2019).

6. Results and Discussion

There is an extensive research on the adoption and spread of IT innovation, particularly within the field of organizational IT; however, it is still regarded a fertile ground for exploration (Williams et al., 2009). The prevailing approach to studying IT adoption involves identifying factors that can either facilitate or hinder the decision-making process in organizations (Troshani et al., 2011). As a result, various factors in the technological, organizational, and environmental contexts can depend on the specific innovations (Troshani et al., 2011). BDA is a collection of emerging technologies and models for analysing business data. However, discussions on BDA have not yet reached a level of clarity or shared understanding comparable to more mature areas of business analytics. Therefore, this study aims to examine the adoption of BDA in telecommunication companies. The study utilizes the TOE framework, which helps identify significant factors grouped into the three dimensions of technology, organization, and environment. The adoption of technology is a complex process that is influenced by the specific context. This provides an opportunity to compare how the adoption of BDA is similar to or different from other technologies adopted by organizations, as the TOE framework has been widely employed to investigate various organizational technologies, such as cloud computing (Nedev, 2014), ERP (Oliveira & Martins, 2011), and BDA in small and medium enterprises (Maroufkhani et al., 2020), and so on.

The findings of the study indicate that BDA adoption has a significant impact on both the marketing and financial performance of telecommunication companies. Previous research has consistently shown that BDA adoption generates business value for organizations and enhances their capabilities (Mikalef et al., 2019a; Muller et al., 2018; Raguseo & Vitari, 2018). Muller et al. (2018) found that BDA has a positive influence on marketing performance by enabling firms to

design products and services that offer superior value to customers and differentiate them from competitors. Ren et al. (2017) and Raguseo and Vitari (2018) reported that BDA enhances firms' ability to improve profitability and acquire and retain customers. By leveraging BDA, telecommunication companies can gain valuable insights into the environment through the lens of data, which enables them to make well-informed decisions and achieve optimal outcomes (Popovic, Hackney, Tassabehji, & Castelli, 2018).

1 Implications

In terms of theoretical contribution, this study addresses the underlying factors and potential outcomes associated with the adoption of BDA among telecommunication companies. There are studies on BDA adoption in large firms (Wang & Hajli, 2017; Wang et al., 2018) and SME's (Maroufkhani et al., 2020; Maroufkhani et al., 2019). However, there is a lack of empirical studies in telecommunication and cellular operators' context (Walker and Brown, 2019), especially from developing countries perspective. This is the first study aimed to investigate TOE factors for BDA adoption and examine its impact on cellular operators' performance. The results of our study showed that complexity, trialability, data security, observability, top management support, organizational readiness, external support, relative advantage, compatibility, competitive pressure and government regulation play an important role to adopt BDA.

7. Conclusions

BDA has become crucial for organizations to improve efficiency and decision-making reliability. Despite of BDA's importance and positive claims, there has been a lack of research on the factors driving BDA adoption by telecommunication and cellular operators. Therefore, this study aims to investigate the impact of technological, organizational, and environmental attributes on BDA adoption and its effects on the financial and marketing performance of telecommunication operators. The existing scientific studies highlighted that drivers of technology adoption are subject to

the type of technology, firm size, and country of study. BDA adoption within the telecommunication operator sector is subject to diverse technological factors that have varying effects. Complexity, uncertainty, and insecurity exert a negative influence on BDA adoption, whereas trialability and observability demonstrate a positive impact. Top management support and organizational resources exhibit a positive influence on BDA adoption among telecommunication operators. Notably, external support emerges as environmental factor significantly impacting the decision to adopt BDA, whereas competitive pressure and government regulation lack empirical support. Importantly, the research findings establish a significant positive relationship between BDA adoption and the financial performance and marketing performance of telecommunication operators. Consequently, strategic investment in BDA, while duly considering TOE factors, holds potential to amplify the financial and market performance of telecommunication operators.

3 References

1. Abdul Moktadir, M. A., Ali, S. M., Paul, S. K., & Shukla, N. (2019). Barriers to big data analytics in manufacturing supply chains: A case study from Bangladesh. *Computers & Industrial Engineering*, 128, 103–107.
2. Ahmad, M. O., Ahmad, I., Rana, N. P., & Khan, I. S. (2022). An Empirical Investigation on Business Analytics in Software and Systems Development Projects. *Information Systems Frontiers*, 1–11.
3. Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2016). How to improve firm performance using big data analytics capability and business strategy alignment? *International Journal of Production Economics*, 182, 113–131.
4. Alshamaila, Y., Papagiannidis, S., & Li, F. (2013). Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework. *Journal of Enterprise Information Management*, 26, 250–275.

5. Asare, A. K., Brashear-Alejandro, T. G., & Kang, J. (2016). B2B technology adoption in customer driven supply chains. *Journal of Business and Industrial Marketing*, 31, 2-12.
6. Asiaei, A., & Rahim, N. Z. A. (2019). A multifaceted framework for adoption of cloud computing in Malaysian SMEs. *Journal of Science and Technology Policy Management*, 10, 708-750.
7. Awa, H., Ukoha, O., & Igwe, S. R. (2017). Revisiting technology-organization-environment (T-O-E) theory for enriched applicability. *The Bottom Line Managing Library Finances*, 30, 2-22.
8. Bakar, A. R., Ahmad, S. Z., & Ahmad, N. (2019). SME social media use: A study of predictive factors in the United Arab Emirates. *Global Business and Organization Excellence*, 38, 53-68.
9. Barney, J. B. (2014). How marketing scholars might help address issues in resource-based theory. *Journal of the Academy of Marketing Science*, 42, 24-26.
10. Bawack, R. E., & Ahmad, M. O. (2021). Understanding business analytics continuance in agile information system development projects: an expectation-confirmation perspective. *Information Technology & People*.

50%

SIMILARITY INDEX

PRIMARY SOURCES

- | | | |
|----------|---|-----------------|
| 1 | ro.ecu.edu.au
Internet | 476 words — 13% |
| 2 | Parisa Maroufkhani, Ming-Lang Tseng, Mohammad Iranmanesh, Wan Khairuzzaman Wan Ismail, Haliyana Khalid. "Big data analytics adoption: Determinants and performances among small to medium-sized enterprises", International Journal of Information Management, 2020
Crossref | 452 words — 12% |
| 3 | www.researchgate.net
Internet | 138 words — 4% |
| 4 | lib.dr.iastate.edu
Internet | 63 words — 2% |
| 5 | sajim.co.za
Internet | 55 words — 2% |
| 6 | www.tandfonline.com
Internet | 47 words — 1% |
| 7 | Mohammad Iranmanesh, Kok Hong Lim, Behzad Foroughi, Meen Chee Hong, Morteza Ghobakhloo. "Determinants of intention to adopt big data and outsourcing among SMEs: organisational and technological factors as moderators", Management Decision, 2022 | 42 words — 1% |

8	link.springer.com Internet	38 words — 1%
9	iranarze.ir Internet	37 words — 1%
10	researchmgt.monash.edu Internet	36 words — 1%
11	www.emerald.com Internet	29 words — 1%
12	www.iftikharahmad.info Internet	29 words — 1%
13	Surabhi Verma, Som Sekhar Bhattacharyya. "Perceived strategic value-based adoption of Big Data Analytics in emerging economy", Journal of Enterprise Information Management, 2017 Crossref	27 words — 1%
14	app.oxfordabstracts.com Internet	25 words — 1%
15	iceb.johogo.com Internet	25 words — 1%
16	Suning Zhu, Tianxi Dong, Xin (Robert) Luo. "A longitudinal study of the actual value of big data and analytics: The role of industry environment", International Journal of Information Management, 2021 Crossref	24 words — 1%
17	www.igi-global.com Internet	23 words — 1%

-
- 18 Journal of Enterprise Information Management, Volume 26, Issue 3 (2013-05-27) 21 words — 1 %
Publications
-
- 19 Parisa Maroufkhani, Mohammad Iranmanesh, Morteza Ghobakhloo. "Determinants of big data analytics adoption in small and medium-sized enterprises (SMEs)", Industrial Management & Data Systems, 2022 19 words — 1 %
Crossref
-
- 20 upcommons.upc.edu 15 words — < 1 %
Internet
-
- 21 Ammar A. F. Alalawneh, Saleh F. Alkhatib. "The barriers to big data adoption in developing economies", The Electronic Journal of Information Systems in Developing Countries, 2020 12 words — < 1 %
Crossref
-
- 22 Sikander Ali Qalati, Li Wen Yuan, Muhammad Aamir Shafique Khan, Farooq Anwar. "A mediated model on the adoption of social media and SMEs' performance in developing countries", Technology in Society, 2021 12 words — < 1 %
Crossref
-
- 23 bura.brunel.ac.uk 12 words — < 1 %
Internet
-
- 24 Abdalwali Lutfi, Akif Lutfi Al-Khasawneh, Mohammed Amin Almaiah, Ahmad Farhan Alshira'h et al. "Antecedents of Big Data Analytic Adoption and Impacts on Performance: Contingent Effect", Sustainability, 2022 11 words — < 1 %
Crossref
-
- 25 Selçuk Perçin. "Identifying barriers to big data analytics adoption in circular agri-food supply 11 words — < 1 %

chains: a case study in Turkey", Environmental Science and Pollution Research, 2023

Crossref

-
- | | | |
|----|---|-----------------|
| 26 | www.hrpub.org
<small>Internet</small> | 11 words — < 1% |
|----|---|-----------------|
-
- | | | |
|----|---|-----------------|
| 27 | repository.up.ac.za
<small>Internet</small> | 10 words — < 1% |
|----|---|-----------------|
-
- | | | |
|----|---|-----------------|
| 28 | res.mdpi.com
<small>Internet</small> | 10 words — < 1% |
|----|---|-----------------|
-
- | | | |
|----|---|-----------------|
| 29 | www.anzam.org
<small>Internet</small> | 10 words — < 1% |
|----|---|-----------------|
-
- | | | |
|----|---|----------------|
| 30 | sro.sussex.ac.uk
<small>Internet</small> | 9 words — < 1% |
|----|---|----------------|
-
- | | | |
|----|---|----------------|
| 31 | uobrep.openrepository.com
<small>Internet</small> | 9 words — < 1% |
|----|---|----------------|
-
- | | | |
|----|---|----------------|
| 32 | 1library.net
<small>Internet</small> | 8 words — < 1% |
|----|---|----------------|
-
- | | | |
|----|---|----------------|
| 33 | Anthony K. Asare, Thomas G. Brashear-Alejandro, Jun Kang. "B2B technology adoption in customer driven supply chains", Journal of Business & Industrial Marketing, 2016
<small>Crossref</small> | 8 words — < 1% |
|----|---|----------------|
-
- | | | |
|----|---|----------------|
| 34 | Danping Lin, C.K.M. Lee, Henry Lau, Yang Yang. "Strategic response to Industry 4.0: an empirical investigation on the Chinese automotive industry", Industrial Management & Data Systems, 2018
<small>Crossref</small> | 8 words — < 1% |
|----|---|----------------|

35 Idris Na'umma Abdullahi, Mohd Heikal Husin, Ahmad Suhaimi Baharudin. "Factors Influencing the Adoption of Facebook as a Marketing Channel among SMEs in Nigeria as a Developing Country: A Conceptual Framework", Jurnal Intelek, 2021

Crossref

8 words — < 1%

36 espace.curtin.edu.au

Internet

8 words — < 1%

37 irep.ntu.ac.uk

Internet

8 words — < 1%

38 norma.ncirl.ie

Internet

8 words — < 1%

39 publisher.uthm.edu.my

Internet

8 words — < 1%

40 Daniel Q. Chen, David S. Preston, Morgan Swink. "How the Use of Big Data Analytics Affects Value Creation in Supply Chain Management", Journal of Management Information Systems, 2016

Crossref

6 words — < 1%

41 Hemlata Gangwar. "chapter 7 Big Data Adoption", IGI Global, 2020

Crossref

6 words — < 1%

42 ياسر عبد العاطى, هيثم دراز. "العوامل المؤثرة فى اعتماد تحليلات البيانات الضخمة فى الفنادق", مجلة كلية السياحة والفنادق - جامعة مدينة السادات, 2022

Crossref

6 words — < 1%

EXCLUDE QUOTES OFF
EXCLUDE BIBLIOGRAPHY OFF

EXCLUDE SOURCES OFF
EXCLUDE MATCHES OFF