Technology in Society 76 (2024) 102459

Contents lists available at ScienceDirect

Technology in Society

journal homepage: www.elsevier.com/locate/techsoc

Impact of big data analytics on telecom companies' competitive advantage

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ARTICLE INFO

Keywords:
Big data analytics
e-WOM
e-CRM
Social media
Market performance
Competitive advantage

ABSTRACT

The aim of this study is to explore the potential uses of Big Data for enhancing the competitive position of telecommunication companies based on Resource-Based View Theory. To achieve it, a quantitative approach was employed to collect and analyze primary data from 304 telecommunications companies, which was then utilized to test hypotheses related to the targeted phenomena. A structural equation model was proposed to analyze the effects of Big Data Analytics (BDA) on achieving a competitive advantage. The results indicated that BDA improves electronic word of mouth (e-WOM) and electronic customer relationship management (e-CRM). Furthermore, it was found that BDA improves social media platforms. In addition, e-WOM, e-CRM, and social media were found to improve market performance, ultimately boosting competitive advantage. This research underscores the significance of analyzing BDA to achieve a competitive advantage among competing telecommunication firms.

1. Introduction

The information technology revolution has permeated all fields, becoming integrated into activities worldwide. Companies' data is continuously expanding in size, type, and speed, along with the implementation of smart manufacturing processes [1]. This data assists companies in realizing internal and external changes, facilitating scientific analysis, and making significant contributions to decision-making processes by predicting improvements in production processes for both goods and services, ultimately resulting in cost reduction [2].

Business Analytics (BA) can provide a company with broad and valuable insights to optimize decision-making by generating a deep understanding of business environments and customer behavior patterns [3]. Despite the growing prominence of BA, many companies still maintain some skepticism regarding its intrinsic value. Specifically, the incorporation of BA to address big data issues, such as data integration, manipulation, and integrity, may require a substantial amount of time before its potential benefits are fully realized, despite numerous successful examples in this regard [4]. Min [5] defines BA in relation to the use of various analytical tools, including statistical techniques, data extraction, optimization tools, and simulation supported by a query and reporting mechanism that facilitates decision-making for business leaders.

Simultaneously, Big Data (BD) plays an essential role in creating new business patterns, such as accurate marketing and targeted service allocation, leading to economic growth. Recent advancements in artificial intelligence and business intelligence have significantly improved Big Data Analytics, effectively mining both kinds of industrial data into intelligent manufacturing [6]. This has become a new research milestone [7], and continuous learning from Big Data in manufacturing systems enables systems to self-learn, self-improve, and self-regulate [8]. Further development of Big Data Analytics will significantly impact systems for providing services and goods [9].

Big Data has been a popular research topic since the beginning of this century, and researchers consider it an attractive topic due to the revolution in technology that allows for analyzing all available data. However, Big Data is both an opportunity and a challenge since its value lies not in its variability or size, but rather in how it is analyzed and utilized to make better decisions, thus transforming it into valuable information [10].

With the evolution of new tools, the term Big Data Analytics (BDA) has emerged, combining two primary dimensions: big data and business analytics [11]. Through the application of BDA, valuable information

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https://doi.org/10.1016/j.techsoc.2024.102459
Received 18 July 2023; Received in revised form 13 November 2023; Accepted 3 January 2024
Available online 4 January 2024

will be uncovered to help improve business process decisions, providing a competitive advantage to companies that employ it [12].

According to a recent report by Fortune Business Insights [13], the global BDA market size was valued at $271.83 billion in 2022. The market is projected to grow from $307.52 billion in 2023 to $745.15 billion by 2030, exhibiting a CAGR of 13.5 % during the forecast period.

Given the importance of this term, it is essential to determine the factors that lead to a competitive advantage in organizations. Therefore, this research proposal poses the following research questions:

RQ1. What role does BDA play in the strategy for creating competitive advantages in companies?

RQ2. What are the antecedents that condition competitive advantages through the use of BDA?

BDA analysis plays an essential role in promoting e-WOM, as the vast amount of data collected from customer opinions, observations, and recommendations has a positive impact. This, in turn, feeds into the data warehouse, generating predictions and future visions for providing services and goods to customers.

To manage electronic customer relationships, it is crucial to use data analysis to communicate with customers and understand their expectations [14]. There is a reciprocal relationship between customers and CRM, where CRM provides data to the data store in the company and vice versa, providing performance forecasts in the markets and information about customer needs and market performance [15,16]. Companies, especially telecommunications ones, should provide high-quality electronic services as BDA reduces service-related problems and enables customized services for each customer based on the company's owned data analysis [17].

Currently, BDA is mainly linked to social media, which is the largest feeder of data warehouses in companies [18]. BDA is also linked to the type of electronic services collected by social media, which is one of the most important pillars of electronic word of mouth [19]. Few studies have addressed these aspects, and this research aims to bridge the gap between social media and BDA, as recommended by Kasztelnik and Delanoy [20]. Analyzing BDA in conjunction with social media can shape a creative automated business pattern in real business cases and provide a competitive advantage among companies [21].

The purpose of this research is threefold. First, it addresses a gap in the current literature regarding the application of BDA in the telecommunications sector [22]. While BDA has been analyzed in other sectors such as the tourism sector [23,24], the logistics sector [25,26], the healthcare sector [27,28], and the banking sector [29,30], we are not aware of any research proposing an analysis in this specific sector. Secondly, the study proposes the application of a holistic model based on the principles of the Resource-Based View Theory [31], which includes BDA, e-WOM, e-CRM, social media, and market performance to determine organizational competitive advantage. Finally, a series of recommendations are proposed for companies in the telecommunications sector with the aim of improving their management in the use of BDA and the attainment of competitive advantages.

The remainder of the paper is organized as follows. First, a theoretical framework is presented to establish the theoretical underpinnings of the research, followed by a series of hypotheses articulating that expected outcomes of the study. The subsequent section provides a detailed description of the research methodology employed. Next, a summary of the results is presented. Finally, the study concludes with a discussion of the findings, implications, limitations of the study, and recommendations for future research.

2. Theoretical framework

2.1. Resource-Based View Theory

The Resource-Based View (RBV) Theory is a widely used theoretical framework for understanding competitive advantages, which posits that a company's competitive advantage results from its unique and valuable resources and capabilities [31,32]. Organizations today are striving to be more responsive to technological instability by incorporating various technologies to address unforeseen circumstances [33]. Typically, technologies provide sustainable competitive advantages to organizations, improving their market position in various sectors and countries [34–36].

Specifically, within our study's variables, Big Data Analytics (BDA) is considered a unique resource that enables companies to collect, process, and analyze extensive data, empowering them to gain insights and make informed decisions. e-WOM is viewed as a source of valuable information generated by consumers, enhancing products or services, building customer trust, and improving competitive advantage. e-CRM systems provide companies with the ability to manage and analyze customer data, strengthening customer relationships and tailoring marketing efforts. Social media serves as a channel for communication and interaction with customers.

Finally, market performance is a direct outcome of the effective utilization of resources such as BDA, e-WOM, e-CRM, and social media, contributing to a competitive advantage.

2.2. Big data and big data analytics

The concept of Big Data (BD) entails a massive amount of information that requires novel developments and paradigms to efficiently extract and analyze data. This form of data implies that data sets are constantly evolving and often become challenging to manage using conventional database tools and concepts [37]. Fonseca and Marcinkowski [38] indicate that BD refers to the organization, assurance, and processing of inputs to enable accurate prediction of the future in terms of time and precision. However, Bhadani and Jothimani [39] argue that the definition of BD is not mainly based on the size of the data but rather the aggregation of data and the speed of data analysis [40].

BD defines the basic concepts, principles, and guidelines that underpin the analysis, management, and use of large and complex datasets [41]. It is characterized by its volume, velocity, diversity, and veracity [42–44].

The theoretical framework of BD provides an organized approach to address the challenges and opportunities it presents [16]. Albahri et al. [45] emphasize the importance of ensuring data quality and reliability since information sources may contain errors, inconsistencies, or biases. The identification of data sources, including social networks, sensors, Internet of Things devices, websites, and customer relationship management feedback, is crucial [27].

On the other hand, Big Data Analytics (BDA) is a field of study that has gained significant attention in recent years due to its potential to transform decision-making processes and create competitive advantages for various industries [23]. BDA captures any type of data in real-time, enabling companies to make efficient decisions [46]. Companies will use these tools to process and analyze data resources, make decisions, and gain a competitive advantage [47].

The use of BDA requires aligning big data storage technologies, analytical talent, and management knowledge, which could pose a technical challenge for companies lacking the ability to extract valuable insights from data [48].

It is worth noting that the adoption of BDA in a company may also pose challenges in managing personal and confidential data, which can have negative implications from privacy and security perspectives [49]. Recent studies have highlighted that BDA, combined with the dynamic capability enabled by artificial intelligence (AI), can ensure better operational performance to improve service quality, reduce costs, produce new products at lower costs, and mitigate market risks [50], further enhancing the importance of this tool for businesses.

In summary, BD refers to both the infrastructure and the data itself, while BDA concentrates on the process of analyzing that data to extract valuable information. BDA will be essential for maximizing the potential

of large datasets and making evidence-based decisions in various disciplines, as in our case, determining the importance of the competitive advantage that its implementation will bring to companies.

2.3. Electronic customer relationship management

Electronic Customer Relationship Management (e-CRM) is currently undergoing significant growth as it empowers companies to engage with customers and address concerns related to products and services, ultimately enhancing customer satisfaction.

e-CRM facilitates the collection of customer data, and with recent advancements, companies have amassed substantial data repositories. Kumar et al. [51] highlight a positive relationship between Big Data analysis in companies and consumer relationship management. Efficient management of e-CRM through BDA and predictive solutions substantially contributes to a company's growth and sustainability in delivering products and managing customer relationships [16].

BDA technologies enable companies to analyze data and respond to customers swiftly and on a larger scale, potentially allowing for personalized services at a low cost. This transformative capability has the potential to enhance the overall customer service experience [52,53].

2.4. Social media

Social media facilitates easy access and searchability of views and interactions among individuals in society, while also enabling companies to collect and utilize user-generated data for decision-making purposes [54]. The vast amounts of data collected through social media platforms, such as Facebook, Twitter, and LinkedIn, are traceable and can be transformed into behavioral models that capture users' actions, connections, and preferences, thus providing valuable insights for analysis [55].

Telecom companies are leveraging these data to forecast future services and products for their customers based on insights gleaned from the analysis of this information [56]. This trend has been dubbed the "gold data rush" due to the significant amount of data available to companies about their customers [57].

2.5. Electronic word of mouth

The emergence of new communication channels in recent years has provided opportunities for electronic word of mouth (e-WOM) communication. Several research studies have confirmed that when making purchasing decisions, users place more trust in online reviews posted by unknown consumers than in traditional media [58]. e-WOM has proven to be an effective way to create a competitive advantage for companies, according to Kitsios et al. [59] and Mariani and Borghi [60], who highlight how the analysis of BDA can help organizations better understand their customers, thereby enhancing their market performance through differentiation from competitors. In particular, the analysis of BDA has been found to have a positive impact on e-WOM, as noted by Mukhopadhyay et al. [61] in a bibliometric analysis of the fields of management and business.

3. Research model and hypotheses development

3.1. Big data analytics and electronic word of mouth

The use of BDA in the telecommunications industry has the potential to positively impact on e-WOM by providing companies with valuable insights into consumer behavior and preferences. By analyzing data collected from customer feedback and opinions, companies can gain a better understanding of what consumers are saying about their products and services online, and use this information to enhance their offerings and increase customer satisfaction [60].

BDA can also identify new information and unique patterns that may not be detected by normal data, thus enhancing customer preferences and improving e-WOM [62]. Recent research has shown that BDA can be effectively used to track and analyze e-WOM. Studies have found that BDA can identify key opinion leaders, analyze sentiment and spread of e-WOM, and develop targeted marketing strategies that resonate with customers [63,64]. Overall, BDA has the potential to positively impact e-WOM by providing companies with insights into consumer behavior and preferences. Based on this evidence, it is reasonable to hypothesize that BDA has a positive impact on e-WOM. Therefore, the following hypothesis is proposed:

H1. Big Data Analytics has a positive effect on electronic word of mouth.

3.2. Big data analytics and electronic customer relationship management

e-CRM is considered a critical aspect of organizational market performance and customer satisfaction, with electronic customer relationship management playing a pivotal role in understanding customer needs to achieve satisfaction [15].

In this sense, BDA has become a popular tool for businesses to gain valuable insights into customer behavior and preferences, enabling them to better understand their customers and improve their e-CRM strategies through data analysis.

Research shows that businesses using BDA are more likely to improve customer retention and satisfaction compared to those that do not [65]. BDA enables businesses to identify customer needs and preferences, allowing them to tailor their e-CRM strategies to better meet those needs. Furthermore, BDA can also help businesses improve their customer segmentation and targeting strategies by identifying patterns and trends in customer data, resulting in more effective e-CRM strategies [66].

Additionally, BDA can help businesses improve their customer service and support strategies by identifying common customer issues and providing more accurate and efficient responses [66,67]. Overall, the evidence suggests that BDA has a positive impact on e-CRM. It enables businesses to better understand their customers, tailor their e-CRM strategies to meet their needs, and ultimately improve customer retention, satisfaction, and service. Therefore, we propose the following hypothesis:

H2. Big Data Analytics has a positive effect on electronic customer relationship management.

3.3. Big data analytics and social media

Social networks are Internet interaction platforms that enable people to share and consume information with each other [68]. In this regard, social media has become a significant source of data due to the growing use of platforms for exchanging information and data among users, resulting in a massive increase in data volume [69]. The application of BDA to the information obtained from social networks will be crucial in subsequent decision-making based on customer insights [70].

BDA can assist companies in identifying key influencers and targeting specific customer segments by analyzing social media data. Companies can also use insights gained from analyzing social media data to improve their social media marketing efforts and identify and address customer complaints and concerns in a timely manner, which can increase customer satisfaction and loyalty [71].

In conclusion, using BDA in telecommunication companies can improve their social media marketing efforts by providing insights into customer behavior and preferences and allowing them to quickly respond to customer complaints and concerns. Therefore, we propose the following hypothesis:

H3. Big Data Analytics has a positive effect on social media.

3.4. Electronic word of mouth and market performance

Positive electronic word of mouth (e-WOM) is a key determinant of marketing success for companies. e-WOM is related to increased customer satisfaction with the products or services provided by a company [72]. Several studies have confirmed the positive relationship between e-WOM and market achievements, as customers' opinions about products or services can lead to new market shares and increased sales volumes [73].

A growing body of research suggests that e-WOM has a positive impact on market performance in the telecommunication industry. e-WOM involves the sharing of experiences and ideas about products or services through digital channels such as social media and review sites [74].

In the telecommunication industry, e-WOM can play an important role in the consumer purchase process and overall market performance. A study by Lee and Cheung [75] found that positive e-WOM had a significant positive influence on consumer purchase intentions in the telecommunication industry. Park et al. [76] stated that e-WOM can also influence brand loyalty in the telecommunication industry. Kim et al. [63] found that e-WOM has a significant impact on customer satisfaction in the telecommunication industry.

In conclusion, the hypothesis that e-WOM has a positive effect on market performance in the telecommunication industry is supported by a growing body of research. Studies have found that positive e-WOM can lead to increased sales, brand loyalty, and customer satisfaction, which can ultimately improve market performance for telecommunication companies. Based on the above, the following hypothesis is proposed:

H4. Electronic word of mouth has a positive impact on market performance.

3.5. Customer relationship management and market performance

Various studies have found that companies focusing on building strong relationships with customers through the development of organizational capabilities can enhance their market performance, and that e-CRM can be particularly effective in this regard [77,78]. By engaging customers in operational activities while taking individual privacy into account and building strategic relationships, companies can increase customer loyalty [79] and ultimately achieve higher market share and improved market performance [80].

The hypothesis that e-CRM has a positive impact on market performance in the telecommunication industry is supported by a growing body of research. For instance, Kavitha and Duraisamy [81] found that e-CRM practices in telecommunication companies led to higher customer satisfaction and loyalty, resulting in improved market performance. Similarly, Al-Khatib and Al-Khatib [82] observed that e-CRM strategies in telecommunication companies led to reduced customer churn and increased customer retention. Thus, e-CRM practices in telecommunication companies have been found to result in improved customer satisfaction and increased market share [83].

By improving customer satisfaction, loyalty, and retention, companies with strong e-CRM practices can enhance their competitive position and achieve higher market share and revenue growth. Thus, we propose the following hypothesis:

H5. Electronic customer relationship management has a positive effect on market performance.

3.6. Social media and market performance

In today's commercial landscape, social media has become one of the most effective aspects for companies and managers to focus on [84], having transformed the e-commerce industry globally [85]. The use of social media in marketing operations can enhance a company's ability to enter new markets, thereby improving its market performance [86].

Several studies have supported the hypothesis that social media positively affects market performance in telecommunication companies. Jibril et al. [87] found that social media engagement was positively associated with increased brand awareness and customer loyalty. They suggest that social media provides an efficient platform for companies to engage with customers, share information, and build trust. Liao and Lee [88] reported a positive relationship between social media usage and increased market share and revenue growth. The authors propose that using social media platforms can be a beneficial way for businesses to increase their visibility and attract potential customers. Similarly, Schniederjans [89] found that social media usage was positively related to increased market performance, specifically in terms of stock price and return on investment. It is also suggested that social media can be a valuable tool for companies to communicate with stakeholders and enhance their reputation. Thus, as a company obtains valuable information from social networks, it will enhance its market performance, as these platforms are widely used by users to express their opinions and convey certain intentions. Therefore, we propose the following hypothesis:

H6. Social media has a positive impact on market performance.

3.7. Market performance and competitive advantage

Market performance is crucial for creating unique competitive advantages that did not exist before, as it leads to improved levels of sales, growth, and product development, thereby creating new opportunities in the markets. This can help companies and organizations gain a new competitive edge that was previously absent [90].

In the dynamic and competitive telecommunication industry, firms are constantly seeking ways to gain an advantage over their rivals. One key factor that has a significant impact on a company's ability to achieve competitive advantage is its market performance. Research has shown that companies with strong market performance are more likely to achieve a competitive advantage [91]. This is because such firms are better positioned to generate higher revenues and profits, which can then be reinvested in new technologies, improved customer service, and expansion into new markets. Moreover, firms with strong market performance are more likely to be perceived as industry leaders by customers, investors, and other stakeholders, which can enhance customer loyalty and trust and provide a significant competitive advantage [92].

Overall, the literature suggests that market performance is a critical factor in achieving competitive advantage in the telecommunication industry. Companies with strong market performance are better placed to generate higher revenues and profits, attract and retain talented employees, and be perceived as industry leaders. Based on the above, we propose the following hypothesis:

H7. Market performance has a positive effect on competitive advantage.

3.8. Big data analytics and competitive advantage

The use of BDA technologies allows companies to enhance their existing applications by offering business-centric practices and methodologies that provide a competitive advantage [93,94]. By using data to make informed strategic decisions, companies can make more accurate and timely choices regarding market strategies, product development, and resource allocation, which can positively impact market performance [95].

Companies that effectively utilize BDA are often better positioned to outperform their competitors. Furthermore, they can identify market trends, understand customer preferences, and optimize their offerings, giving them a competitive advantage that can lead to improved market performance [96].

BDA also provides valuable insights into customer behaviors and preferences. A more detailed understanding of the target market allows

companies to tailor their products and services, leading to increased customer satisfaction and loyalty, which ultimately affects market performance [97]. BDA offers insights into customer behaviors, market dynamics, and emerging trends, enabling companies to adapt, innovate, and excel in the market.

The impact of BDA on market performance is supported by practical applications and empirical evidence, demonstrating its significance in modern business strategy and performance enhancement. Therefore, the following hypothesis is proposed:

H8. Big Data Analytics has a positive effect on competitive advantage.

3.9. Mediating effect of electronic customer relationship management

The implementation of BDA provides companies with an abundance of valuable data. However, mere access to data does not guarantee improvements in market performance [48]. This is where e-CRM plays a crucial role in effectively channeling and managing this data, enabling the analysis and application of relevant information for strategic decision-making [98]. Furthermore, e-CRM also facilitates the personalization of customer interactions through precise customer segmentation using data collected through BDA. This personalization can enhance customer satisfaction and ultimately increase customer retention, an essential factor in market performance [99].

Effective customer relationship management, driven by e-CRM, is intrinsically linked to customer retention and loyalty. The retention of loyal customers significantly contributes to increased sales and word-of-mouth brand promotion, positively influencing market performance [100]. Moreover, e-CRM enables more informed decision-making by providing a structured framework for data analysis derived from BDA.

Strategic decisions based on data insights through e-CRM can impact the effectiveness of marketing strategies and resource optimization, affecting market performance [101]. Additionally, e-CRM provides tools to measure and track the impact of marketing strategies and customer retention, facilitating the assessment of how data-driven initiatives, such as those derived from BDA, are influencing the market and allowing adjustments as needed [102]. Based on the above, we propose the following hypothesis:

H9. Electronic Customer relationship management mediates the effect of BDA on market performance.

Fig. 1 shows the conceptual model and the research hypotheses.

4. Research methodology

The aim of this study is to explore the potential of BDA for enhancing the competitive advantage of telecommunication companies. To achieve this goal, a quantitative research approach was employed to gather and analyze primary data, which enabled the testing of hypotheses related to the research questions.

The use of a quantitative method was deemed appropriate since it allowed for a large sample size to be surveyed. The estimation of a structural equation model (SEM) was carried out using AMOS software. The coefficients and the level of statistical significance allowed us to analyze the relationships between the constructs. As a final step, a mediation analysis was performed using the PROCESS macro for SPSS [103]. Bootstrapping was used to determine the significance of the indirect associations in the model, employing 10000 replications and a 95 % confidence range.

4.1. Measurements

The research instrument used in this study consisted of a questionnaire divided into two parts. The first part collected information regarding the sample's characteristics, while the second part included items that measured the variables of interest. These variables included Big Data Analytics, e-WOM, e-CRM, social media, market performance, and competitive advantage. The present study employed a seven-point Likert scale with answer choices ranging from "strongly disagree" to "strongly agree".

The questionnaire was developed by adapting scales from previous studies, ensuring that the items were relevant and appropriate for the variables being measured in this study. For example, for the Big Data Analytics variable, we adapted items from the scales developed by Al-Khatib [104] and Shamim et al. [105].

The items for the e-WOM variable were based on the research of Sun et al. [106] and Yoo et al. [107], while those for e-CRM were adapted from Moreno and Melendez [108]. The items for Social Media were based on Pop et al. [109]. The scale for Market Performance was developed based on the studies of Chowdhury and Quaddus [90] and Olabode et al. [101]. Finally, the items for Competitive Advantage were adapted from Al-Khatib [104] and Tu and Wu [110].

This study also included firm size and firm type as control variables to mitigate influences from firms' characteristics. Firm size included three categories: companies with fewer than 50 employees are categorized as small businesses, those with 50–250 employees are classified as medium-sized enterprises, whereas large companies have more than 250 employees [111–113]. Firm type was a dummy variable coded as 0 if the level of technological innovation in the firm was low, and 1 if the level of technological innovation was high [114].

4.2. Data collection

For the empirical testing of the hypotheses, a cross-sectional data collection system was adopted through the administration of an online

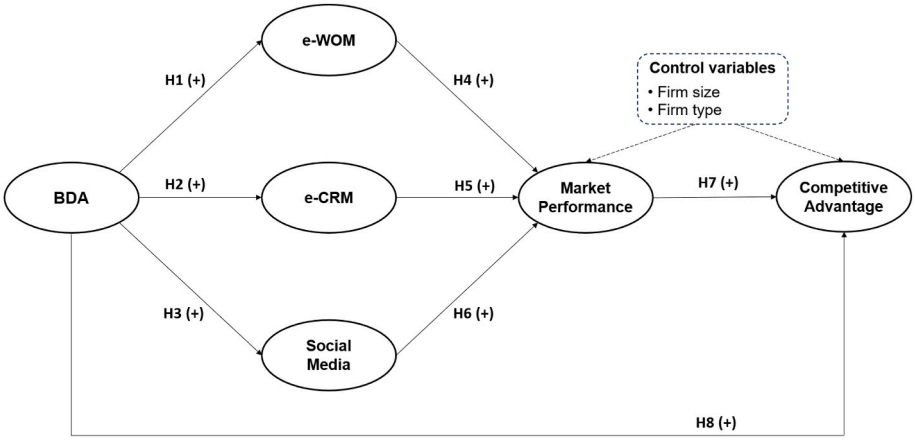

Fig. 1. Research model.

questionnaire among managers and directors of Jordanian telecommunications firms. Only managers of the sample companies were included in the data collection, assuming that these subjects have a more global view of the business processes and, consequently, are able to assess the overall impact of Big Data Analytics on competitive advantage.

After a validation process, the sample used for the analysis yielded 304 completed surveys out of a pool of 384 Jordanian telecommunications companies, with a response rate of 79.16 %. This randomly selected sample included large (63.8 %), medium (30.3 %), and small (5.9 %) firms from different regions of the country. Most of the companies analyzed are Internet service providers (34.9 %), followed by telephone operators (30.9 %), cable companies (20.1 %) and satellite companies (14.1 %).

4.3. Common method and non-response bias

As self-report is the only data source for this study, a common method bias test was conducted to determine the significance of common method variance [115]. We used Harman's single factor test. The single factor contribution was well below the 50 % threshold, indicating that common method bias was not a problem.

Similarly, in the present study, the potential concern of non-response bias was tested by comparing late and early participant responses [116]. The *t*-test reported a non-significant association between both groups, demonstrating that non-response bias did not affect the results of this research.

5. Results

5.1. Measurement assessment

To ensure the reliability and validity of the measures used in this study, we followed the guidelines provided in the classic literature [117]. We began by establishing one-dimensionality in all constructs, which was assessed by examining the pattern of standardized residuals and modification indices generated from the confirmatory factor analysis (CFA) using the maximum likelihood method with AMOS. The CFA consisted of six latent variables, and the results were found to be adequate according to previous literature. All the confirmatory factor loadings were higher than 0.7 and significant at a 0.001 level.

To assess the internal consistency of multiple measures, we used composite reliability (CR) and average variance extracted (AVE) after removing items from the scales that did not reach adequate values. For an exploratory study, researchers generally recommend 0.70 and 0.50 for CR and AVE, respectively, as adequate reliability. As shown in Table 1, all values for both indicators complied with the established requirements [117]. Also, the Cronbach alpha values for each scale were above 0.8. Therefore, the reliability of the construct can be considered satisfactory.

Discriminant validity was examined to ensure that each construct is distinct from its neighboring constructs [117]. To conduct this analysis, we evaluated the correlation matrix of latent constructs, with the diagonal elements representing the square roots of the average variance extracted (AVE). The correlations between constructs are presented in the cells outside the lower left diagonal of the matrix. In this analysis, the shared variance between a construct and its measures must be greater than the variance shared between the constructs and other constructs in the model. Hence, discriminant validity is achieved when the diagonal elements (square root of AVE) are greater than the off-diagonal elements in the same row and column, as demonstrated in Table 2.

As the sample did not present a multivariate normal distribution, the bootstrapping technique was applied for 500 consecutive steps or samples, and a significance level of 5 %. Specifically, the Bollen-Stine's corrected *p*-value was used, testing the null hypothesis that the model is correct. The model presented a good overall fit (GFI = 0.909; NFI = 0.949; TLI = 0,965; CFI = 0.973; AGFI = 0.871; RMSEA = 0.031) according to the recommended thresholds [118,119].

Table 1
Confirmatory factor analysis.

Constructs and items	Loading
Big Data Analytics – BDA ($\alpha = 0.938$, CR = 0.938, AVE = 0.836)	
The firm holds strategic partnerships with companies operating in the big data sector to exchange experiences and knowledge in this field.	0.890
The firm has long experience in data processing and eliciting decisions from it.	0.922
The firm has teams working to take advantage of big data analytics to gain new insights through unstructured data.	0.930
Electronic Word of Mouth – EWOM ($\alpha = 0.889$, CR = 0.891, AVE = 0.732)	
Customers get information about the brand they want through social media and the internet.	0.895
Our customers obtain information about the brand they want to buy via social media and the internet.	0.847
Our customers write their opinion about the products presented in the designated places on the site.	0.823
Electronic Customer Relationship Management – ECRM ($\alpha = 0.894$, CR = 0.893, AVE = 0.736)	
The company closely monitors and evaluates the level of commitment to providing electronic services to customers.	0.868
The firm provides electronically after-sales services to a large extent.	0.834
The firm develops strategies to increase customer value.	0.871
Social Media – SM ($\alpha = 0.878$, CR = 0.882, AVE = 0.714)	
Information obtained from social networks is trustworthy.	0.880
Information obtained from social networks is reliable.	0.873
Information obtained from social networks is honest.	0.779
Market Performance – MP ($\alpha = 0.917$, CR = 0.922, AVE = 0.798)	
Compared to competitors, the firm market share has increased during the last period.	0.922
Compared to competitors, the firm has seized opportunities in foreign markets and expanded in these markets.	0.918
Compared to competitors, sales volume has increased over the past period.	0.838
Competitive Advantage – CA ($\alpha = 0.884$, CR = 0.884, AVE = 0.719)	
The firm has fine and excellent reputation in the market.	0.848
The firm is interested in building long-term strategic relationships with its partners.	0.897
The firm responds to changes in supply and demand.	0.795

Table 2
Discriminant validity.

	BDA	EWOM	ECRM	SM	MP	CA
BDA	0.914					
EWOM	0.553	0.856				
ECRM	0.675	0.769	0.858			
SM	0.729	0.489	0.604	0.845		
MP	0.835	0.525	0.608	0.707	0.894	
CA	0.825	0.555	0.714	0.730	0.735	0.848

5.2. Structural model and hypotheses testing

To evaluate the SEM, the statistical significance of its structural loads was analyzed. Table 3 shows the results of the applied structural equation analysis and the results of the research hypotheses regarding direct effects. In this research all relationships are significant since the *p*-value associated to each of them is less than the significance level.

Hypothesis 1 proposed a positive relationship between BDA and e-WOM, which was confirmed by the literature and supported by the statistical results ($\beta = 0.598$; $p \leq 0.001$). Similarly, the results obtained supported the relationship between BDA and e-CRM that Hypothesis 2 suggested ($\beta = 0.724$; $p \leq 0.001$), validating other recent studies in the literature. With regard to the relationship between BDA and social media put forward by Hypothesis 3, the results from this study were strongly supported ($\beta = 0.792$; $p \leq 0.001$), as already suggested in the literature. Hypothesis 4 proposed a positive relationship between e-WOM and market performance, which was confirmed by the literature

Table 3
Hypothesized relationships.

Hypotheses		β	S.E.	C.R.	Result
H1:	Big Data Analytics → e-WOM	0.598***	0.061	10.618	Supported
H2:	Big Data Analytics → e-CRM	0.724***	0.058	13.094	Supported
H3:	Big Data Analytics → Social media	0.792***	0.056	14.612	Supported
H4:	e-WOM → Market performance	0.110*	0.057	2.144	Supported
H5:	e-CRM → Market performance	0.215***	0.065	3.758	Supported
H6:	Social media → Market performance	0.584***	0.074	9.235	Supported
H7:	Market performance → Competitive advantage	0.177**	0.047	3.060	Supported
H8:	Big Data Analytics → Competitive advantage	0.715***	0.064	10.952	Supported

Note: ***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$.

and supported by the statistical results ($\beta = 0.110$; $p \leq 0.05$). In the case of Hypothesis 5, the results also supported the relationship between e-CRM and market performance ($\beta = 0.215$; $p \leq 0.001$), as previous research revealed. Furthermore, Hypothesis 6 proposed a positive impact of social media on market performance, which was supported by the statistical results ($\beta = 0.584$; $p \leq 0.001$) and consistent with prior research. Also, the results obtained confirmed the positive impact of market performance on competitive advantage that Hypothesis 7 proposed ($\beta = 0.177$; $p \leq 0.01$), being in line with recent previous studies. Another important finding was the positive and significant relationship between BDA and competitive advantage ($\beta = 0.715$; $p \leq 0.001$); therefore, Hypothesis 8 is supported.

Furthermore, the BDA → e-CRM → MP path was found positive ($\beta = 0.071$) and significant since the bias-corrected confidence intervals did not include zero (0.007, 0.139); then, Hypothesis 9 is confirmed. Thus, results of mediation analysis confirmed e-CRM as a mediator of the relationship of BDA and market performance.

Finally, the effects of firm size and firm type were analyzed as control variables. The results indicate that firm size has a significant effect on market performance ($\beta = 0.294$; $p \leq 0.001$) and competitive advantage ($\beta = 0.131$; $p \leq 0.05$). The effects of firm type on market performance ($\beta = 0.527$; $p \leq 0.001$) and competitive advantage ($\beta = 0.161$; $p \leq 0.01$) are also significant.

6. Discussion

6.1. Theoretical implications

The primary objective of this study was to explore the potential of BDA in enhancing the competitiveness of telecom companies. A quantitative survey was administered online, resulting in 304 completed responses. Overall, respondents exhibited a positive outlook on the factors under investigation, with BDA garnering the highest proportion of affirmative responses.

The utilization of BDA demonstrated a favorable impact on electronic word of mouth (e-WOM) and electronic customer relationship management (e-CRM), concurrently influencing social media platforms positively. Notably, e-WOM was identified as contributing to sales, while e-CRM exhibited a positive effect on market performance. The study further uncovered a positive correlation between social media usage and enhanced market performance. Importantly, robust market performance was identified as a significant driver of competitive advantage.

Specifically, the study demonstrates the potential of BDA to establish a more cohesive strategy for enhancing a company's competitive advantage. The results are consistent with previous studies, such as Akbari et al. [62], which suggested that BDA can improve consumer preferences and e-WOM by providing new information and unique patterns not found in traditional data sources. The findings are also in line with Libai et al. [120] and Muharam et al. [17], who emphasized the importance of BDA in evaluating customer data in novel ways and guiding the development of tailored services.

The study found that a positive relationship exists among e-WOM, e-CRM and social media, and market performance. This information can be leveraged by telecom firms to improve their market standing. These findings align with previous research by Ardyan and Sugiyarti [77], Harliyanto and Soediantono [78], and Purwanto [121], which demonstrated the importance of organizational capabilities in building strong customer relationships and increasing market share. Khamaludin et al. [86] also found that social media can increase businesses' capacity to expand into new markets, improving their market performance.

The study also confirmed that market performance has a positive influence on competitive advantage. This finding aligns with Chowdhury and Quaddus [90], who argued that improved market performance can lead to unique competitive advantages and new opportunities in the market. As a result, businesses can acquire a new competitive edge that was previously lacking.

The findings of our study also confirmed the positive impact of BDA on competitive advantage. This is in line with Bag et al. [122], who stated that BDA adoption can help managers to focus management attention upon resources, capabilities and competencies to achieve competitive advantage.

Additionally, this study gives a contribution to the literature by demonstrating the mediating role exerted by e-CRM in the BDA-MP relationship. Thus, BDA can help businesses improve their electronic customer relationship management actions, then allowing firms to develop more effective marketing strategies, which benefit market performance [66,123].

6.2. Practical implications

The fundamental conclusion of our study is that the strategic use of BDA has a significant impact on the competitive advantage of telecommunications companies. The ability to effectively collect, analyze, and apply large volumes of data, including aspects like e-WOM, e-CRM, and social media, has become a critical differentiator in this highly competitive sector. By adopting a well-planned Big Data strategy, companies can gain valuable insights to enhance their market performance.

In this context, effective BDA allows telecommunications companies to optimize their internal operations. This includes identifying inefficiencies, optimally allocating resources, and improving processes. By eliminating inefficiencies and reducing operational costs, companies can provide high-quality services at competitive prices, giving them a significant advantage in the market.

The use of BDA translates into a tangible improvement in the customer experience. By analyzing and understanding customer preferences and behavior, companies can personalize their offerings and services. This leads to increased customer satisfaction and long-term retention, which is crucial in a market where customer loyalty plays a fundamental role in success.

Furthermore, in a highly competitive market, differentiation is essential. Companies that effectively adopt BDA can stand out by offering innovative services tailored to the changing needs of customers. This provides them with a sustainable competitive advantage and the ability to lead the market rather than simply following the competition.

A critical element highlighted in our conclusions is the importance of ensuring data quality. Companies must implement robust methods to distinguish between authentic data and false or low-quality data. Data integrity and accuracy are essential for informed decision-making and for avoiding decisions based on incorrect information.

In summary, the strategic use of BDA has become an invaluable asset for telecommunications companies in their pursuit of sustainable competitive advantage. By optimizing operations, improving the

customer experience, differentiating themselves in the market, and ensuring data quality, these companies can not only survive but thrive in a highly competitive environment. The conclusions emphasize the importance of continued investment in BDA capabilities to maintain and strengthen the position in the telecommunications industry.

6.3. Limitations and future research

As any research, this study has several limitations that may have influenced the findings and suggest future research. First, the scope of this research focuses exclusively on the telecommunications industry in Jordan, which makes it somewhat difficult to generalize the results. Future research could consider conducting comparative analyses across different sectors or countries. Furthermore, the participants in this study were selected from various managerial levels within the telecommunications industry, without focusing on any specific level. Future studies could include the moderating effect of the user experience of these BDA tools and their relationship with the other variables studied.

The research design employed in this study is cross-sectional, which limits the findings to a specific moment in time. Therefore, future research could adopt a longitudinal approach to examine the proposed relationships between variables over an extended period.

Finally, to achieve a more complete understanding of the findings, it would be valuable to explore the moderating effect of variables related to the intensity of use of the technologies considered in the study, the perceived risk or even the level of usefulness of these technologies among companies to improve BDA awareness.

CRediT authorship contribution statement

Ali Ra'Ed Alshawawreh: Data collection, Formal analysis, Writing - original draft. **Francisco Liébana-Cabanillas:** Conceptualization, Methodology, Writing - review & editing, Supervision. **Francisco Javier Blanco-Encomienda:** Conceptualization, Methodology, Writing - review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that there is no conflict of interest.

Data availability

Data will be made available on request.

Acknowledgments

This work was supported by the Research Program from the Faculty of Education, Economy and Technology of Ceuta. Funding for open access charge: Universidad de Granada / CBUA.

References

[1] R.X. Gao, L. Wang, M. Helu, R. Teti, Big data analytics for smart factories of the future, CIRP Ann-Manuf. Technol. 69 (2) (2020) 668–692.
[2] S.P. Klein, P. Spieth, S. Heidenreich, Facilitating business model innovation: the influence of sustainability and the mediating role of strategic orientations, J. Prod. Innov. Manage. 38 (2) (2021) 271–288.
[3] H. Min, H.Y. Joo, S.B. Choi, Success factors affecting the intention to use business analytics: an empirical study, J. Bus. Anal. 4 (2) (2021) 77–90.
[4] V. Ahmed, A. Tezel, Z. Aziz, M. Sibley, The future of big data in facilities management: opportunities and challenges, Facilities 35 (13/14) (2017) 725–745.
[5] H. Min, Global Business Analytics Models: Concepts and Applications in Predictive, Healthcare, Supply Chain, and Finance Analytics, Pearson Education, 2016.
[6] M. Johnson, R. Jain, P. Brennan-Tonetta, E. Swartz, D. Silver, J. Paolini, S. Mamonov, C. Hill, Impact of big data and artificial intelligence on industry: developing a workforce roadmap for a data driven economy, Glob. J. Flex. Syst. Manage. 22 (3) (2021) 197–217.
[7] J.A. Mena, G.T.M. Hult, O.C. Ferrell, Y. Zhang, Competing assessments of market-driven, sustainability-centered, and stakeholder-focused approaches to the customer-brand relationships and performance, J. Bus. Res. 95 (2019) 531–543.
[8] G.I. Parisi, R. Kemker, J.L. Part, C. Kanan, S. Wermter, Continual lifelong learning with neural networks: a review, Neural Netw 113 (2019) 54–71.
[9] R.Y. Zhong, S.T. Newman, G.Q. Huang, S. Lan, Big Data for supply chain management in the service and manufacturing sectors: challenges, opportunities, and future perspectives, Comput. Ind. Eng. 101 (2016) 572–591.
[10] V. Charles, T. Gherman, Achieving competitive advantage through big data. Strategic implications, Middle East, J. Sci. Res. 16 (8) (2013) 1069–1074.
[11] J. Waqar, O.S. Paracha, Antecedents of big data analytics (BDA) adoption in private firms: a sequential explanatory approach, Foresight (2023), https://doi.org/10.1108/FS-10-2022-0114.
[12] R. Dahiya, S. Le, J.K. Ring, K. Watson, Big data analytics and competitive advantage: the strategic role of firm-specific knowledge, J. Strategy Manag. 15 (2) (2022) 175–193.
[13] Fortune Business Insights, Big Data Analytics Market, 2023. https://www.fortunebusinessinsights.com/big-data-analytics-market-106179. (Accessed 25 October 2023).
[14] M. Lubis, A.R. Lubis, S.H. Pratiwi, D.P. Yuherisna, Customer satisfaction assessment coffee roaster restaurant using SERVQUAL: utilization of customer relationship management (CRM) application, in: Proceedings of the 4th International Conference on Data Storage and Data Engineering, Association for Computing Machinery, 2021, pp. 85–92.
[15] M. Bahrami, M. Ghorbani, S.M. Arabzad, Information technology (IT) as an improvement tool for customer relationship management (CRM), Procedia Soc. Behav. Sci. 41 (2012) 59–64.
[16] S. Gupta, A. Leszkiewicz, V. Kumar, T. Bijmolt, D. Potapov, Digital analytics: modeling for insights and new methods, J. Interact. Mark. 51 (1) (2020) 26–43.
[17] H. Muharam, H. Chaniago, E. Endraria, A.B. Harun, E-service quality, customer trust and satisfaction: market place consumer loyalty analysis, Jurnal Minds: Manajemen Ide dan Inspirasi. 8 (2) (2021) 237–254.
[18] J. Ferdaous, M.S. Gouider, Large-scale system for social media data warehousing: the case of twitter-related drug abuse events integration, Int. J. Data Warehous. Min. 18 (1) (2022) 1–18.
[19] A.M. Barreto, The word-of-mouth phenomenon in the social media era, Int. J. Market Res. 56 (5) (2014) 631–654.
[20] K. Kasztelnik, N. Delanoy, Data analytics and social media as the innovative business decision model with natural language processing, J. Bus. Account. 13 (1) (2020) 136–153.
[21] S. Gupta, T. Justy, S. Kamboj, A. Kumar, E. Kristoffersen, Big data and firm marketing performance: findings from knowledge-based view, Technol. Forecast. Soc. Chang. 171 (2021) 120986.
[22] J. Ranjan, C. Foropon, Big data analytics in building the competitive intelligence of organizations, Int. J. Inf. Manage. 56 (2021) 102231.
[23] R. Agrawal, V.A. Wankhede, A. Kumar, S. Luthra, D. Huisingh, Big data analytics and sustainable tourism: a comprehensive review and network based analysis for potential future research, Int. J. Inf. Manage. Data Insights. 2 (2) (2022) 100122.
[24] F. Kitsios, E. Mitsopoulou, E. Moustaka, M. Kamariotou, User-Generated Content behavior and digital tourism services: a SEM-neural network model for information trust in social networking sites, Int. J. Inf. Manage. Data Insights. 2 (1) (2022) 100056.
[25] H. Jahani, R. Jain, D. Ivanov, Data science and big data analytics: a systematic review of methodologies used in the supply chain and logistics research, Ann. Oper. Res. (2023), https://doi.org/10.1007/s10479-023-05390-7.
[26] E.D. Zamani, C. Smyth, S. Gupta, D. Dennehy, Artificial intelligence and big data analytics for supply chain resilience: a systematic literature review, Ann. Oper. Res. 327 (2) (2023) 605–632.
[27] J. Kumari, E. Kumar, D. Kumar, A Structured Analysis to study the role of machine learning and deep learning in the healthcare sector with Big Data Analytics, Arch. Comput. Methods Eng. (2023), https://doi.org/10.1007/s11831-023-09915-y.
[28] R.K. Singh, S. Agrawal, A. Sahu, Y. Kazancoglu, Strategic issues of big data analytics applications for managing health-care sector: a systematic literature review and future research agenda, The TQM J. 35 (1) (2023) 262–291.
[29] A. Alexopoulos, Y. Becerra, O. Boehm, G. Bravos, V. Chatzigiannakis, C. Cugnasco, G. Demetriou, I. Eleftheriou, L. Fodor, S. Fotis, S. Ioannidis, D. Jakovetic, L. Kallipolitis, V. Katusic, E. Kavakli, D. Kopanaki, C. Leventis, M. Maawad, R. Martin de Pozuelo, M. Vinov, Big data analytics in the banking sector: guidelines and lessons learned from the CaixaBank case, in: E. Curry, S. Auer, A.J. Berre, A. Metzger, M.S. Perez, S. Zillner (Eds.), Technologies and Applications for Big Data Value, Springer International Publishing, 2022, pp. 273–297.
[30] A. Hussain, Q.A. Nisar, W. Khan, U.I. Niazi, M. Malik, When and How Big Data Analytics and Work Practices Impact on Financial Performance: an Intellectual Capital Perspective from Banking Industry, Kybernetes, 2023.
[31] J.B. Barney, Strategic factor markets: expectations, luck, and business strategy, Manag. Sci. 32 (10) (1986) 1231–1241.
[32] G. Hamel, C. Prahalad, Competing for the Future, Harvard Business School Press, 1996.
[33] K. Mehmood, A. Zia, H.B. Alkatheeri, F. Jabeen, H. Zhang, Resource-based view theory perspective of information technology capabilities on organizational performance in hospitality firms: a time-lagged investigation, J. Hosp. Tour. Technol. (2023), https://doi.org/10.1108/JHTT-05-2021-0149.
[34] I. Khan, I. Khan, I.U. Khan, S. Suleman, S. Ali, Board diversity on firm performance from resource-based view perspective: new evidence from Pakistan,

Int. J. Product Perform. Manag. (2023), https://doi.org/10.1108/IJPPM-01-2022-0055.
[35] A. Razzaque, I. Lee, G. Mangalaraj, The effect of entrepreneurial leadership traits on corporate sustainable development and firm performance: a resource-based view, Eur. Bus. Rev. (2023), https://doi.org/10.1108/EBR-03-2023-0076.
[36] M. Schreieck, M. Wiesche, H. Krcmar, Governing innovation platforms in multi-business organisations, Eur. J. Inform. Syst. 32 (4) (2023) 695–716.
[37] L.V. Satyanarayana, A survey on challenges and advantages in big data, Int. J. Comput. Sci. Technol. 6 (2) (2015) 115–119.
[38] F. Fonseca, M. Marcinkowski, Who is the big data student, in: J.E. Lane (Ed.), Building a Smarter University: Big Data, Innovation, and Analytics, State University of New York Press, 2014, pp. 121–142.
[39] A.K. Bhadani, D. Jothimani, Big data: challenges, opportunities, and realities, in: M.K. Singh, D.G. Kumar (Eds.), Effective Big Data Management and Opportunities for Implementation, IGI Global, 2016, pp. 1–24.
[40] U. Sivarajah, M.M. Kamal, Z. Irani, V. Weerakkody, Critical analysis of Big Data challenges and analytical methods, J. Bus. Res. 70 (2017) 263–286.
[41] D. Arunachalam, N. Kumar, J.P. Kawalek, Understanding big data analytics capabilities in supply chain management: unravelling the issues, challenges and implications for practice, Transp. Res. Pt. e-Logist. Transp. Rev. 114 (2018) 416–436.
[42] R.H. Hariri, E.M. Fredericks, K.M. Bowers, Uncertainty in big data analytics: survey, opportunities, and challenges, J. Big Data. 6 (1) (2019) 1–16.
[43] A. Jabbar, P. Akhtar, S. Dani, Real-time big data processing for instantaneous marketing decisions: a problematization approach, Ind. Mark. Manage. 90 (2020) 558–569.
[44] K. Adnan, R. Akbar, An analytical study of information extraction from unstructured and multidimensional big data, J. Big Data. 6 (1) (2019) 1–38.
[45] A.S. Albahri, A.M. Duhaim, M.A. Fadhel, A. Alnoor, N.S. Baqer, L. Alzubaidi, O. S. Albahri, A.H. Alamoodi, J. Bai, A. Salhi, J. Santamaría, C. Ouyang, A. Gupta, Y. Gu, M. Deveci, A systematic review of trustworthy and explainable artificial intelligence in healthcare: assessment of quality, bias risk, and data fusion, Inf. Fusion.156–191 (2023) 96 .
[46] X. Pham, M. Stack, How data analytics is transforming agriculture, Bus. Horiz. 61 (1) (2018) 125–133.
[47] J.Q. Dong, C.H. Yang, Business value of big data analytics: a systems-theoretic approach and empirical test, Inf. Manage. 57 (2020) 103124.
[48] L. Li, J. Lin, Y. Ouyang, X.R. Luo, Evaluating the impact of big data analytics usage on the decision-making quality of organizations, Technol. Forecast. Soc. Chang. 175 (2022) 121355.
[49] S. Chatterjee, R. Chaudhuri, S. Gupta, U. Sivarajah, S. Bag, Assessing the impact of big data analytics on decision-making processes, forecasting, and performance of a firm, Technol. Forecast. Soc. Chang. 196 (2023) 122824.
[50] R. Dubey, A. Gunasekaran, S.J. Childe, D.J. Bryde, M. Giannakis, C. Foropon, D. Roubaud, B.T. Hazen, Big data analytics and artificial intelligence pathway to operational performance under the effects of entrepreneurial orientation and environmental dynamism: a study of manufacturing organisations, Int. J. Prod. Econ. 226 (2020) 107599.
[51] V. Kumar, B. Rajan, R. Venkatesan, J. Lecinski, Understanding the role of artificial intelligence in personalized engagement marketing, Calif. Manag. Rev. 61 (4) (2019) 135–155.
[52] W.D. Hoyer, M. Kroschke, B. Schmitt, K. Kraume, V. Shankar, Transforming the customer experience through new technologies, J. Interact. Mark. 51 (1) (2020) 57–71.
[53] A. Kaplan, M. Haenlein, Siri Siri, My hand: who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence, Bus. Horiz. 62 (1) (2019) 15–25.
[54] H. Susanto, L. Fang Yie, F. Mohiddin, A.A. Rahman Setiawan, P.K. Haghi, D. Setiana, Revealing social media phenomenon in time of COVID-19 pandemic for boosting start-up businesses through digital ecosystem, Appl. Syst. Innov. 4 (2021) 6.
[55] W. Tan, M.B. Blake, I. Saleh, S. Dustdar, Social-network-sourced big data analytics, IEEE Internet Comput. 17 (5) (2013) 62–69.
[56] M. Felt, Social media and the social sciences: how researchers employ Big Data analytics, Big Data Soc. 3 (1) (2016), https://doi.org/10.1177/2053951716645828.
[57] H. Kennedy, G. Moss, C. Birchall, S. Moshonas, Balancing the potential and problems of digital methods through action research: methodological reflections, Inf. Commun. Soc. 18 (2) (2015) 172–186.
[58] C.M. Cheung, D.R. Thadani, The impact of electronic word-of-mouth communication: a literature analysis and integrative model, Decis. Support Syst. 54 (1) (2012) 461–470.
[59] F. Kitsios, M. Kamariotou, P. Karanikolas, E. Grigoroudis, Digital marketing platforms and customer satisfaction: identifying eWOM using big data and text mining, Appl. Sci. 11 (2021) 8032.
[60] M. Mariani, M. Borghi, Are environmental-related online reviews more helpful? A big data analytics approach, Int. J. Contemp. Hospit. Manag. 33 (6) (2021) 2065–2090.
[61] S. Mukhopadhyay, R. Pandey, B. Rishi, Electronic word of mouth (eWOM) research–A comparative bibliometric analysis and future research insight, J. Hospit. Tour. Insights 6 (2) (2022) 404–424.
[62] M. Akbari, P. Foroudi, R.Z. Fashami, N. Mahavarpour, M. Khodayari, Let us talk about something: the evolution of e-WOM from the past to the future, J. Bus. Res. 149 (2022) 663–689.
[63] J. Kim, J. Lee, J. Lee, The impact of electronic word of mouth on customer satisfaction in the telecommunication industry, J. Serv. Sci. Manag. 12 (4) (2019) 394–404.
[64] Y. Xing, X. Wang, C. Qiu, Y. Li, W. He, Research on opinion polarization by big data analytics capabilities in online social networks, Technol. Soc. 68 (2022) 101902.
[65] Y. Zhang, Y. Li, H. Chen, Big data analytics and customer relationship management: a review and future research directions, J. Bus. Res. 82 (2018) 256–268.
[66] G. Kou, Y. Li, L. Wang, Big data analytics in customer relationship management: a literature review and research agenda, J. Bus. Res. 70 (2017) 360–370.
[67] Z. Xiang, Z. Schwartz, J.H. Gerdes, M. Uysal, What can big data and text analytics tell us about hotel guest experience and satisfaction? Int. J. Hospit. Manag. 44 (2015) 120–130.
[68] M.S. Rahman, H. Reza, A systematic review towards big data analytics in social media, Big Data Min. Anal. 5 (3) (2022) 228–244.
[69] J.K. Joseph, K.A. Dev, A.P. Pradeepkumar, M. Mohan, Big data analytics and social media in disaster management, in: P. Samui, D. Kim, C. Ghosh (Eds.), Integrating Disaster Science and Management, Elsevier, 2018, pp. 287–294.
[70] M. Ghasemaghaei, G. Calic, Does big data enhance firm innovation competency? The mediating role of data-driven insights, J. Bus. Res. 104 (2019) 69–84.
[71] J. Kaufman, How big data analytics is revolutionizing customer service, Harv. Bus. Rev. 96 (1) (2018) 16–18.
[72] E. Raguseo, C. Vitari, The effect of brand on the impact of e-WOM on hotels' financial performance, Int. J. Electron. Commer. 21 (2) (2017) 249–269.
[73] W. Napawut, S. Siripipatthanakul, B. Phayaphrom, S. Siripipattanakul, P. Limna, The Mediating effect of E-WOM on the relationship between digital marketing activities and intention to buy via shopee, Int. J. Behav. Anal. 2 (2) (2022) 1–13.
[74] S. Teng, K.W. Khong, A.Y.L. Chong, B. Lin, Persuasive electronic word-of-mouth messages in social media, J. Comput. Inf. Syst. 57 (1) (2017) 76–88.
[75] J. Lee, C.M.K. Cheung, The impact of electronic word of mouth on consumer purchase intentions: an empirical study in the telecommunication industry, J. Travel Tour, Mark 33 (4) (2016) 399–417.
[76] J. Park, J. Lee, H. Han, The impact of electronic word of mouth on brand loyalty in the telecommunication industry, J. Serv. Sci. Manag. 11 (5) (2018) 230–241.
[77] E. Ardyan, G. Sugiyarti, The influence of e-CRM capability and co-information sharing activity on product competitiveness and marketing performance of small and medium-sized enterprises, Int. J. Electron. Customer Relatsh. Manage. 11 (2) (2018) 158–178.
[78] D. Harliyanto, D. Soediantono, The effect of e-crm, e-marketing and e-loyalty and company performance of defense industries, J. Ind. Eng. Manag. Res. 3 (3) (2022) 85–97.
[79] H. Haudi, E.R. Rahadjeng, R. Santamoko, R.S. Putra, D. Purwoko, D. Nurjannah, R.I. Koho, H. Wijoyo, A.O. Siagian, Y. Cahyono, A. Purwanto, The role of e-marketing and e-CRM on e-loyalty of Indonesian companies during Covid pandemic and digital era, Uncertain Supply Chain Manag. 10 (1) (2022) 217–224.
[80] A.K. Mokha, P. Kumar, Electronic customer relationship management (E-CRM) and customer loyalty: the mediating role of customer satisfaction in the banking industry, Int. J. E-Bus. Res. 18 (1) (2022) 1–22.
[81] J. Kavitha, V. Duraisamy, Impact of e-CRM practices on customer satisfaction and loyalty in Indian telecommunications industry, Int. J. Bus. Manag. 13 (7) (2018) 63–71.
[82] A. Al-Khatib, A. Al-Khatib, The impact of e-CRM on customer retention and loyalty in the telecommunications sector: a study of Jordan, Int. J. Bus. Manag. 14 (1) (2019) 120–127.
[83] A. Al-Khatib, A. Al-Khatib, A. Al-Khatib, The impact of e-CRM on customer satisfaction and market share in the telecommunications sector: a study of Saudi Arabia, J. Bus. Tech. Commun. 34 (4) (2020) 546–564.
[84] N. Obermayer, E. Kővári, J. Leinonen, G. Bak, M. Valeri, How social media practices shape family business performance: the wine industry case study, Eur. Manag. J. 40 (3) (2022) 360–371.
[85] C. Guan, W. Liu, J.Y.C. Cheng, Using social media to predict the stock market crash and rebound amid the pandemic: the digital 'haves' and 'have-mores', Ann. Data Sci. 9 (1) (2022) 5–31.
[86] K. Khamaludin, S. Syam, F. Rismaningsih, L. Lusiani, L. Arlianti, A.F. Herlani, M. Fahlevi, R. Rahmadi, V.S. Windyasari, F. Widiyatun, The influence of social media marketing, product innovation and market orientation on Indonesian SMEs marketing performance, Int. J. Data Netw. Sci. 6 (1) (2022) 9–16.
[87] A.B. Jibril, M.A. Kwarteng, M. Chovancova, M. Pilik, The impact of social media on consumer-brand loyalty: a mediating role of online based-brand community, Cogent Bus. Manag. 6 (2019) 1673640.
[88] C. Liao, C. Lee, The impact of social media usage on market performance in the telecommunications industry, J. Mark. Res. 56 (1) (2019) 1–10.
[89] D. Schniederjans, Enhancing financial performance with social media: an impression management perspective, Decis. Support Syst. 55 (4) (2013) 911–918.
[90] M.M.H. Chowdhury, M.A. Quaddus, Supply chain sustainability practices and governance for mitigating sustainability risk and improving market performance: a dynamic capability perspective, J. Clean. Prod. 278 (2021) 123521.
[91] C.J. Chen, Developing a model for supply chain agility and innovativeness to enhance firms' competitive advantage, Manag. Decis. 57 (7) (2019) 1511–1534.
[92] Y. Zhang, The impact of market performance on competitive advantage: a study of telecommunications industry, J. Bus. Econ. Res. 17 (2) (2019) 1–15.
[93] H. Chen, R.H. Chiang, V.C. Storey, Business intelligence and analytics: from big data to big impact, MIS Q. 36 (4) (2012) 1165–1188.

[94] N. Côrte-Real, T. Oliveira, P. Ruivo, Assessing business value of big data analytics in European firms, J. Bus. Res. 70 (2017) 379–390.
[95] J.P. Bharadiya, Machine learning and AI in business intelligence: trends and opportunities, Int. J. Comput. 48 (1) (2023) 123–134.
[96] D. Grimaldi, J.M. Sallan, H. Arboleda, S. Sehgal, Rethinking the role of uncertainty and risk in Marketing, J. Decis. Syst. (2023), https://doi.org/10.1080/12460125.2023.2232570.
[97] W.K. Chong, N. Patwa, The value of integrity: empowering SMEs with ethical marketing communication, Sustainability 15 (2023) 11673.
[98] L. Chen, H. Liu, Z. Zhou, M. Chen, Y. Chen, IT-business alignment, big data analytics capability, and strategic decision-making: moderating roles of event criticality and disruption of COVID-19, Decis. Support Syst. 161 (2022) 113745.
[99] P. Singh, V. Kumar, S. Kataria, A serial mediation model for investigating the impact of e-CRM services on customer loyalty in the Indian healthcare industry, J. Relatsh. Mark. 22 (1) (2023) 62–86.
[100] H. Hallikainen, E. Savimäki, T. Laukkanen, Fostering B2B sales with customer big data analytics, Ind. Mark. Manage. 86 (2020) 90–98.
[101] O. Olabode, N. Boso, M. Hultman, C.N. Leonidou, Big data analytics capability and market performance: the roles of disruptive business models and competitive intensity, J. Bus. Res. 139 (2022) 1218–1230.
[102] A.I. Aljumah, M.T. Nuseir, M.M. Alam, Traditional marketing analytics, big data analytics and big data system quality and the success of new product development, Bus. Process Manag. J. 27 (4) (2021) 1108–1125.
[103] A.F. Hayes, Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach, The Guilford Press, 2013.
[104] A.W. Al-Khatib, Can big data analytics capabilities promote a competitive advantage? Green radical innovation, green incremental innovation and data-driven culture in a moderated mediation model, Bus. Process Manag. J. 28 (4) (2022) 1025–1046.
[105] S. Shamim, J. Zeng, Z. Khan, N.U. Zia, Big data analytics capability and decision making performance in emerging market firms: the role of contractual and relational governance mechanisms, Technol. Forecast. Soc. Chang. 161 (2020) 120315.
[106] Y. Sun, H. Gonzalez-Jimenez, S. Wang, Examining the relationships between e-WOM, consumer ethnocentrism and brand equity, J. Bus. Res. 130 (2021) 564–573.
[107] C.W. Yoo, G.L. Sanders, J. Moon, Exploring the effect of e-WOM participation on e-Loyalty in e-commerce, Decis, Support Syst. 55 (3) (2013) 669–678.
[108] G.A. Moreno, P.A. Melendez, Analyzing the impact of knowledge management on CRM success: the mediating effects of organizational factors, Int. J. Inf. Manage. 31 (5) (2011) 437–444.
[109] R.A. Pop, Z. Săplăcan, D.C. Dabija, M.A. Alt, The impact of social media influencers on travel decisions: the role of trust in consumer decision journey, Curr. Issues Tour 25 (5) (2022) 823–843.
[110] Y. Tu, W. Wu, How does green innovation improve enterprises' competitive advantage? The role of organizational learning, Sustain. Prod. Consum. 26 (2021) 504–516.
[111] J.A.M. Hayajneh, M.B.H. Elayan, M.A.M. Abdellatif, A.M. Abubakar, Impact of business analytics and π-shaped skills on innovative performance: findings from PLS-SEM and fsQCA, Technol. Soc. 68 (2022) 101914.
[112] D. Ozdemir, M. Sharma, A. Dhir, T. Daim, Supply chain resilience during the COVID-19 pandemic, Technol. Soc. 68 (2022) 101847.
[113] S. Zapletalová, The business excellence models and business strategy, Total Qual. Manag. Bus. Excel. 34 (1–2) (2023) 131–147.
[114] S. Adomako, M.D. Tran, Environmental collaboration, responsible innovation, and firm performance: the moderating role of stakeholder pressure, Bus. Strateg. Environ. 31 (4) (2022) 1695–1704.
[115] P.M. Podsakoff, S.B. MacKenzie, J.Y. Lee, N.P. Podsakoff, Common method biases in behavioural research: a critical review of the literature and recommended remedies, J. Appl. Psychol. 88 (5) (2003) 879–903.
[116] S.G. Rogelberg, J.M. Stanton, Introduction understanding and dealing with organizational survey nonresponse, Organ. Res. Methods 10 (2) (2007) 195–209.
[117] J.F. Hair, W.C. Black, B.J. Babin, R.E. Anderson, R.L. Tatham, Multivariate Data Analysis, Pearson Prentice Hall, 2006.
[118] K.A. Bollen, Structural Equations with Latent Variables, Wiley, 1989.
[119] V.S. Lai, H. Li, Technology acceptance model for internet banking: an invariance analysis, Inf. Manage. 42 (2) (2005) 373–386.
[120] B. Libai, Y. Bart, S. Gensler, C.F. Hofacker, A. Kaplan, K. Kötterheinrich, E. B. Kroll, Brave new world? On AI and the management of customer relationships, J. Interact. Mark. 51 (1) (2020) 44–56.
[121] A. Purwanto, The role of digital leadership, e-loyalty, e-service quality and e-satisfaction of Indonesian e-commerce online shop, Int. J. Soc. Manag. Stud. 3 (5) (2022) 51–57.
[122] S. Bag, P. Dhamija, S. Luthra, D. Huisingh, How big data analytics can help manufacturing companies strengthen supply chain resilience in the context of the COVID-19 pandemic, Int. J. Logist. Manag. 34 (4) (2023) 1141–1164.
[123] Y. Liu, Z. Chen, A new model to evaluate the success of electronic customer relationship management systems in industrial marketing: the mediating role of customer feedback management, Total Qual. Manag. Bus. Excel. 34 (5–6) (2023) 515–537.