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The impact of artificial intelligence, big data analytics and business intelligence on transforming capability and digital transformation in Jordanian telecommunication firms

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A B S T R A C T

The major purpose of this research is studying the impact of artificial intelligence, big data analytics and business intelligence on transforming capability and digital transformation in Jordanian telecommunication firms. 303 samples were gathered after the sample checking process was completed. The PLS program was utilized in the research study to process all the collected data. The findings of the research demonstrate a set of relationships and linkages that can enhance transforming capability and digital transformation. Finally, this study found that artificial intelligence, big data analytics and business intelligence have good effects on developing and enhancing the transforming capability and digital transformation.

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1. Introduction

Currently, the concept of digital transformation has emerged as a phenomenon in strategic information systems research (Bharadwaj et al., 2013; Piccinini et al., 2015a). The researchers defined digital transformation as the application of digital technology and its deep impact on society and industries (Fitzgerald et al., 2014; Westerman et al., 2011; Agarwal et al., 2010; Majchrzak et al., 2016). At the organizational level, organizations have tried to find innovative solutions using digital technology to build a strategy capable of driving operational performance with high efficiency (Hess et al., 2016). The phenomenon of digital transformation is a new phenomenon with multiple levels and characteristics that need several new studies capable of defining the capabilities and characteristics of digital transformation and its ability to help organizations improve their work performance and compete in the digital market at the lowest costs and the best quality offered to customers (Gray & Rumpe, 2017; Kane, 2017c; Matt et al., 2015). The process of digital transformation is defined as the process of change, improvement and development that occurs in the characteristics of the organization through the application of systems, tools, and technological methods of communication, which contribute to finding new ideas and products, finding innovative solutions, managing operations through technological systems, increasing the efficiency and effectiveness of organizations' performance in a way general (Wolfswinkel et al., 2013). Based in our studies of the literature reviews and previous studies, we present an inductive framework that describes the impact of artificial intelligence tools, big data analytics, and business intelligence systems in increasing organizations' capabilities in typical digital transformation. Studying the impact of the previous variables and their impact on the digital transformation process stems from the organizations need to understand the phenomenon of digital transformation more and identify the factors that help or prevent the digital transformation process. The research studies the impact of managing artificial intelligence tools, big data analytics, and business intelligence systems as variables capable of improving the transformation capabilities of organizations to reach digital paradigm transformation, and this is done by helping organizations define transformation metrics, transformation scope, and transformation speed. During

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the following sections we will discuss the means of review, discuss research findings, and give concluding suggestions for future research.

2. Literature review

2.1 Artificial Intelligence (AI)

Artificial intelligence is defined as a department of applied computer science that uses computer algorithms to help organizations perform tasks and is usually linked to the science of human intelligence (Jianxing et al., 2019). Studies indicate the importance of customers' participation in product making and determining its specifications (Nambisan et al., 2017). Thus, in the process of creativity and innovation, it depends on making use of digital technologies as an effective means capable of connecting customers with companies (Yoo, 2013; Wieland & Vargo, 2017; Jianxing et al., 2019). Most researchers acknowledged the importance of applying technological tools and systems to develop the administrative, operational, and industrial fields through building strategic plans capable of building specific product development maps (Urbinati et al., 2018). Artificial intelligence tools are used as one of the technological techniques used to support managers and decision makers in reading, absorbing, and using all the information available within online repositories and accessing databases quickly and efficiently (Knippenberg et al., 2015). This gives companies the ability to use and implement new business models capable of changing the current situation of companies, producing innovative products capable of increasing customer loyalty, enhancing the capabilities of transforming and developing, and possessing market share and greater competitive advantages (Nenonen & Storbacka, 2018).

2.2 Big Data Analysis

Big data is defined as large and complex data sets collected from different sources. Big data sources include data collected through data mining techniques, artificial intelligence tools, learning systems, and social networking sites (Chen, 2016; Lu, 2015). Big data has been used as an effective means that organizations benefit from to understand consumer behavior, reduce operational costs, product costs, and operating fees (Toole, 2015). The use of big data technologies in the field of social networking sites has been proven to understand consumer behavior by reducing messages and comments sent on sites such as Facebook which allows organizations to produce and supply products to end customers based on their requests (Jiang, 2016).

2.3 Business Intelligence

Organizations faced the problems of owning and managing big data, and the problems were summarized in the size, quality, accuracy, and validity of the data. Hence, the business intelligence approach emerged as an effective creative method in extracting new values capable of giving organizations the ability to be different and unique (Wamba et al., 2015; Biswas & Sen, 2016; Fatorachian & Kazemi, 2018). Business Intelligence Systems (BIS) are a set of software which help firms in saving, managing, processing, and weaving their data in order for having new knowledge and innovative products and services (Bordeleau F. et al., 2018). The process of organizations reaching digital transformation is a complex but necessary process, due to the difficulty of working at the present time without the extensive use of technological systems, the ability of organizations to deal with and analyze big data and try to extract new values, a complex process that forced organizations to use analytical business intelligence tools (Bordeleau et al., 2018; Raffoni et al. 2018). The process is summarized by storing data in data warehouses, then classifying and ensuring its accuracy, and then trying to find new relationships between data in order to build new knowledge that gives organizations the ability to extract new ideas, support the decision-making process, solve complex and intractable problems, and finally provide new services and products to customers (Lamba & Singh 2017).

2.4 Transforming capability and digital transformation

The emergence of the digital economy was considered for most organizations at the present time as a challenge and an opportunity ready to be exploited at the same time. Some organizations faced the digital economy as an obstacle and a challenge due to their lack of technological infrastructure and competitive individuals. On the other hand, the organizations dealt with the digital economy as an opportunity to develop their own capabilities, infrastructure, and competitiveness, which will make the organization present and strongly within the competition market (Hess et al., 2016; Sebastian et al., 2017; Lanzolla et al., 2018; Frank et al., 2019). Organizations which are searching for stability and remaining in a stable position in front of competitors understood the difficulty and the need to possess diverse capabilities in order to reach the customer and provide distinguished and innovative products ahead of competitors at an acceptable price (Dalenogare et al., 2018; Vial, 2019; Tortorella et al., 2020). Therefore, most organizations resorted to increasing their technological capabilities as one of the solutions to reach full digital transformation as an effective means of possessing various competitive advantages, and reducing the costs of commercial, operational transactions, and transportation costs, and total reliance on technological systems to deal with big data analytics, and customers' demands (Warner and Wager, 2019).

Based on previous studies and reviews, the following research hypotheses are proposed:

H_1: *Artificial Intelligence has a positive effect on transforming Capability.*

H2: *Artificial Intelligence has a positive effect on Digital Transformation.*

H3: *Big Data Analytics has a positive effect on transforming Capability.*

H4: *Big Data Analytics has a positive effect on Digital Transformation.*

H5: *Business Intelligence has a positive effect on transforming Capability*.

H6: *Business Intelligence has a positive effect on Digital Transformation*.

H7: *Transforming Capability has a positive effect on Digital Transformation.*

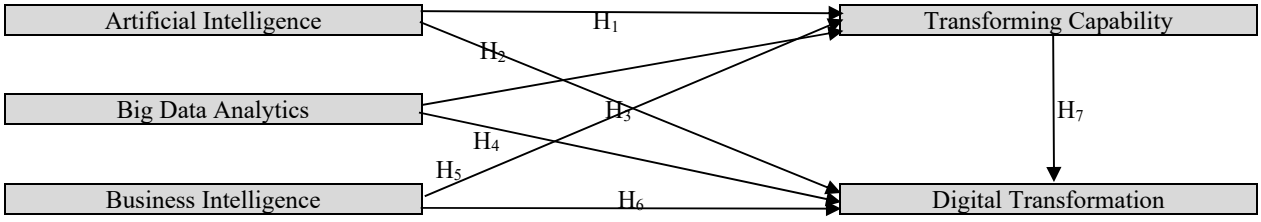

Fig. 1. Conceptual of the proposed method

3. Research methodology

In the aim of gauging the research main constructs, Google drive has been used to design, create and distribute online research survey, depending on the use of five-point Likert scale (1 = Strongly Disagree; 2 = Disagree; 3 = neutral; 4 = Agree; and 5 = Strongly Agree). Additionally, the researcher discusses research hypotheses statistically by using eth PLS approach. 372 respondents had been received, and after completing the process of checking and filtering all the data received 303 respondents' answers were accepted to be used in the analysis process to discuss the research hypotheses. Finally, all the collected samples were 10 times larger than the predictors' number (Gefen et al., 2011).

4. Research results

In Table 1, the reliability test conducted over and done with using the values of composite reliability, average variable extracted, and Cronbach alpha which should be more or equal to 0.50 (Hair et al., 2014). Moreover, the table below shows clearly that the model of this research based on the assessment is well enough in order to be ready for moving to the research hypotheses' discussing.

Table 1
The summary of the reliability and validity measures

Code	Variable	Factor's Loading	VIF
Artificial Intelligence (AI)	(Cronbach's Alpha: 0.739 , CR: 0.788:, AVE: 0.532)		
AI1	Deep learning	0.886	1.372
AI2	Digital Data	0.878	1.223
AI3	Graphical Processing Unit (GPU)	0.834	1.399
AI4	Data Safety and Security	0.892	1.235
Big Data Analytics (BDA)	(Cronbach's Alpha: 0.567 , CR: 0.984, AVE: 0.618)		
BDA1	Big Data Sources	0.758	1.619
BDA2	Hashing	0.761	1.538
BDA3	Indexing	0.726	1.581
BDA4	Bloom Filtering	0.749	1.724
BDA5	Parallel computing	0.614	1.713
Business Intelligence (BI)	(Cronbach's Alpha: 0.611, CR: 0.867, AVE: 0.819)		
BI1	Data Warehouse	0.664	1.399
BI2	Data Mining	0.559	1.469
BI3	Business Process Management	0.613	1.579
BI4	Competitive Intelligence		
Transforming Capability (TC)	(Cronbach's Alpha:0.562 , CR: 0.743, AVE: 0.722)		
TC1	digital savvy skills	0.724	1.234
TC2	digital actions and interaction	0.561	1.684
TC3	digital intensity	0.660	1.589
Digital Transformation (DT)	(Cronbach's Alpha: 0.884 , CR: 0.769, AVE: 0.857)		
DT1	Digital Technology	0.829	1.878
DT2	Digital Competition	0.807	1.499
DT3	Digital Customer Behavior	0.841	1.984

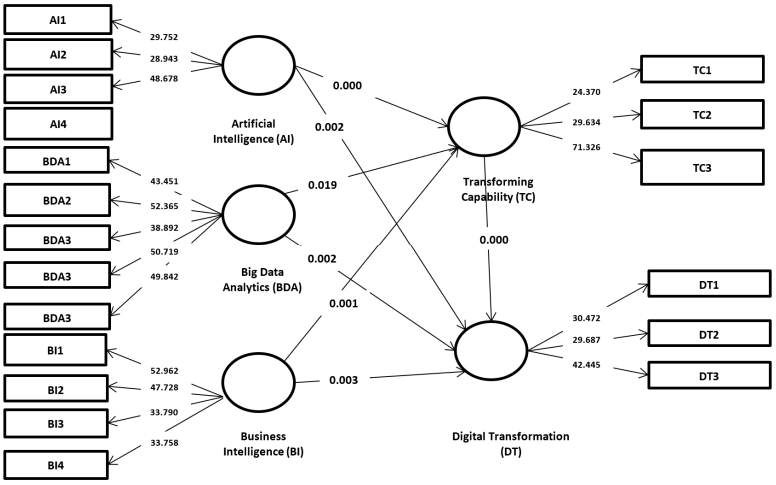

Fig. 2. Research Bootstrapping Results

Table 2 displays the direct impact and relationships between the variables of research; all the search hypotheses have been fully accepted.

Table 2
Path Coefficient Test Results

	Research Hypotheses Test	P-Value	Results
H1	AI ⟶ Transforming Capability	0.000	Supported
H2	AI ⟶ Digital Transformation	0.002	Supported
H3	Big Data Analytics ⟶ Transforming Capability	0.019	Supported
H4	Big Data Analytics ⟶ Digital Transformation	0.002	Supported
H5	Business Intelligence ⟶ Transforming Capability	0.001	Supported
H6	Business Intelligence ⟶ Digital Transformation	0.003	Supported
H7	Transforming Capability ⟶ Digital Transformation	0.000	Supported

5. Conclusion and implications

The research results indicate that Artificial Intelligence has a positive direct impact on the digital transformation, including deep learning, Digital Data, Graphical Processing Unit, and data safety and security. The result is compatible with previous studies' results. Furthermore, this research shows that big data analytics positively affects the digital transformation, including big data sources, hashing, indexing, and bloom filtering, parallel computing. This result is compatible with previous studies' results. Also, the research results show that business intelligence has a direct and positive impact on the digital transformation, including data warehouse, data mining, business process management, and competitive intelligence. This result is compatible with the results of previous research studies. Last but not least, the research results show inconsistent between the research results and the previous studies that showed no effect of the variables on transforming capability and digital transformation. Finally, the results of this research show that, it is necessary and urgent for organizations, firms, and companies to start the process of digital transformation for all business transactional processes, documents, and orders, and start relying entirely on artificial intelligence tools and business intelligence systems to deal effectively with big data, keep pace with development and competition, have more competitive advantages and new knowledge, support and develop the decision-making process, and give customers more services and new products Able to increase customer satisfaction.

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