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The digital transformation of business. Towards the datafication of the relationship with customers

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ABSTRACT

Research presents an analysis of the most recent literature focused on digital transformation in business with special emphasis on the area of marketing. Within the framework of the changes that characterize the digital revolution in the Information Society, the use of Big Data is presented as the most important challenge and innovation of recent years. The use of massive data, only accessible to the largest companies, is seen as an effective tool for building customer loyalty by using data generated by the customers themselves to predict their behavior as consumers. However, this same use of data also raises ethical questions which should be explored.

1. INTRODUCTION

Artificial intelligence (AI) is the greatest technological transformation of the Information Society and which places society at the gates of the Fourth Industrial Revolution. The datafication of business, the use of Big Data to build customer loyalty and especially the use of user-generated data to predict customer behavior is a growing trend in the business world.

The economic transformation that accompanies the beginning of the 21st century, which is demonstrated by the rapid transition from a classical industrial model of production to a new scenario defined by the development of the digital or information society (Castells, 2003; Masuda, 1984; Musik and Bogner, 2019; Eriksson, 2019; Paraviainen, Tihinen, Kääriäinen, and Teppola, 2017; Dobrinskaya, 2020), has led to fundamental changes in companies and in the way they relate to their customers, or even to their users (Ritter and Pedersen, 2020; Trașcă et al., 2019; Cagle et al., 2020).

This article presents a systematic analysis, using bibliographical research, of how academic literature analyses the digital transformation of business and especially the developments of Big Data. This represents a challenge and an opportunity that shapes the relationship between companies and their clients and how the former have had to adapt to the rapid technological changes produced by digitalization. Therefore, this research reinforces the comprehension of the digital transformations that businesses are undergoing and systematizes the latest scientific knowledge on the subject.

The new relationship between the company and the client is determined by digitalization (the introduction of the Internet in all areas of life), which since the dotcom crisis in the early 2000s (Giraldo-Luque and Fernández-Rovira, 2020) has shifted towards the use of data as a source of income from the unpaid work of users. This represents a great transformation that is just now beginning to be studied scientifically, so it is well worth compiling what is already known about these new trends.

The general objective of the article is to characterize how academic literature explains the transformations and adaptation of businesses to the new technologies. It especially highlights how the most recent scientific production explains the way businesses have had to adapt to digital transformation and how the main recent technological transformation, the use of massive user-generated data that leads to new forms of relationships between the client and company, is being discussed.

The specific objectives of the paper are: 1) to systematize the most recent scientific knowledge regarding digitization in companies; 2) to characterize the most outstanding trends of digital transformation of businesses found in the literature during the period studied and in the context of the beginning of the Fourth Industrial Revolution, and 3) to discuss how the trends found are explained and the challenges which are raised.

Based on bibliographical research, carried out on the principal academic databases, the article collects, analyses and classifies forty-eight studies undertaken, mainly, over the last ten years (2008–2019). So, the period of analysis is the last ten years as it is the period in which we have seen the most recent technological transformations. This

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period of time is justified because it is the most contemporary and represents the beginning of the Fourth Industrial Revolution, with digitalization consolidated and a phase of expansion in the development of Artificial Intelligence and massive data underway.

The status of the proposed presents a broad panorama of studies associated with digital transformation and the business world, focusing on the opportunities and challenges supposed by the introduction of Big Data into companies in terms of its power to build loyalty and predict customer behavior. In addition, from an exploratory and descriptive point of view, the growing trend towards the datafication of commercial relations is typified.

The research also takes a critical look at the use of user-generated mass data. In fact, the discussion on the use of client data as technological property that can be exploited for other purposes is one of the main ethical discussions stemming from the introduction of social datafication (O'Neil, 2017) into companies as a tool for improving productive processes.

The study therefore throws light on the issue regarding the introduction of Big Data into companies and presents the positive and negative factors of this technological transformation applied to customer relations in terms of loyalty and behavior prediction. The social implication justly warns of the ethical limits of the use of certain technological processes (datafication at zero cost for companies, which is nourished by the unpaid contributions of the users) in the business world, while presenting the possibilities of productive improvement mediated by digitalization.

2. THEORETICAL framework

The technological transformation is a fact that accompanies the advent of the digital society or the network society, in short, the type of society in which information and communication technologies play a fundamental role (Castells, 2003; Masuda, 1984; Musik and Bogner, 2019; Eriksson, 2019; Paraviainen et al., 2017; Dobrinskaya, 2020). Today's society is undergoing a constant technological transformation that involves changes in all areas, but especially in terms of labor and in the business world. According to several authors we are in fact at the beginning of the Fourth Industrial Revolution (Kumar et al., 2019; Morgan, 2019; Sae-Lim and Jermsittiparsert, 2019).

The tertiary sector, dedicated to services, is the undisputed protagonist of the information society (Masuda, 1984). Thus, service sector workers have grown in recent decades in all countries with advanced capitalist democracies, but their role is also changing. In the 2000s, as service marketing theory was transformed from a supplier perspective to a consumer perspective, and technology was growing, research stagnated. However, different service contexts can be seen to be evolving, such as the roles of employees who are expected to be able to innovative, differentiate and coordinate (Bowen, 2015). The impact on employment and workers of the digital transformation is remarkable. However, according to Cascio and Montealegre (2016), the critical issue is not the technology itself, but how to create and use the technology to manage the impact and maximize the positive effects.

According to Quinn et al. (2016), the evolving digital landscape has precipitated a sense of crisis for marketers and the role of marketing within the company. In particular, Big Data analysis and business intelligence have attracted increasing attention, but there remains a lack of clarity about how that analysis has been applied in the domains of business and management (Shenga et al., 2019). In the Information Society, the digitization of business becomes inevitable as information becomes the most valued commodity. However, at the beginning of the Fourth Industrial Revolution, the use of user-generated mass data represents the great transformation about which the ethical aspects should be considered. Therefore, it is necessary to look at these two points (digitalization and massive data use) in more detail.

2.1. The inevitable digitalization of business models

The digitalization of business is a task that began with the democratization of technology and the implementation of the Internet as a tool for everyday use. Carlsson (2004) notes that there are several signs that indicate that the digital economy is transforming traditional economy.

In addition to the pro-growth economic indicators observed in the late 1990s in the United States, Carlsson (2004) explains that there are less cyclical signs that persist in what is called the digital economy. This new economy of the 21st century is based more on new activities and products than on high productivity. According to the author, what is really new is the proliferation of Internet use, which leads to a new form of connectivity between heterogeneous actors and different ideas. For Carlsson (2004), there are measurable effects on productivity and efficiency, but what really matters are the long-term effects. Since the 1990s, companies that have had the necessary funds have made large investments in technology (Andal-Ancion, Cartwright, and Yip, 2013).

The impact of the digital in the early 2000s, when the second phase of the Internet revolution was taking place, focused on online companies prioritizing customer relationships and their ability to interact and generate value-added information, and at that time, online payment and shopping was also growing significantly (Duta and Biren, 2001). However, the digital transformation in business continues to this day and is still related to the widespread use of the Internet and the data it generates. Since then, companies around the world are being redesigned, and in many cases improved, by the transformative power of the new technologies and digitalization (Berman and Dalzell-Payne, 2018; Andal-Ancion et al., 2003).

The digital transformation has recently become a way of achieving competitive advantage and making your company stand out for being different (Ibarra et al., 2019). However, what the implications of digitalization of processes are for the capacity and innovative performance of companies is still not clear (Ferreira et al., 2019). Galindo-Martín et al. (2019) debate whether digital transformation really brings added value to companies, but they also add that there are benefits for society as a whole, namely: more employment, economic growth and greater well-being. As Fjeldstad and Snow (2017) point out, companies' business models and organizational design must evolve to be digitally transformed and virtually competent (Jansen et al., 2007). Important factors in this are globalization (Tallman, Luo and Buckley, 2017) and innovation in sustainability (Bocken and Short, 2016; Bashir and Verma, 2019; Geissdoerfer et al., 2018).

According to Berman (2012), companies that are taking a proactive stance in the digital revolution are taking advantage of new technologies to restructure customer value propositions and reshape their business operations to be more innovative. However, every industry is under pressure to change and every organization needs to have a plan in place. Businesses that are able to meet this challenge optimize physical and digital elements by implementing new business based on customer demand, so it is important to align organizational goals with digital maturity (Kane et al., 2015).

Customer relations in a digital world offer great opportunities to grow, as Mulhern (2009) states, as more aspects of daily life converge towards the digital, the opportunities for organizations to interact with consumers expand dramatically. In fact, the meeting points in the services are the ones that suffer the most from the digital transformation (Larivière et al., 2017).

2.2. Mass data: a source of change with ethical limitations

The phenomenon of Big Data, the use of mass data for various purposes, but above all, for commercial purposes, has generated increasing interest in companies in recent years. As Akter et al. (2016) point out, interest in Big Data has led many companies to develop their own massive data analysis capacity, but the authors note that very few

companies actually achieve major impacts through Big Data. The uneven results in the introduction of new information and communication technologies in business have to do with organizational factors, such as the size of the company, the level of human capital or the international projection, as well as the company's profit expectations (Rothberg and Erickson, 2017); but also with factors that are specifically linked to the technological characteristics of the firm and organizational attitudes towards digital transformation (García-Moreno et al., 2016). Big Data has been defined by volume, speed, variety and truthfulness (Baesens et al., 2016). In this sense, De Mauro, Greco, and Grimaldi (2016) define Big Data as follows: Big Data is the information asset characterized by such a high volume, speed and variety that it requires specific technology and analytical methods for its transformation into value. Its analysis is understood as a disruptive technology that will change the shape of business intelligence, which is a domain that relies on data analysis to obtain business information for better decision making (Fan et al., 2015).

Digital changes, however, present technical challenges to business. The impact of disruptive technology on the development of business software and the exploitation of mass data (Nieuwenhuis et al., 2018; Yu et al., 2016) are the most notable. The development of cloud computing entails innovations in the business models each company experiences, but as Yu et al. (2016) state, building a 'cloud' for your enterprise must be for service-oriented purposes. As Nieuwenhuis et al. (2018) explain, the value network of business software solutions changes with the shift from local to cloud-based technology. Even so, according to the authors, technical consulting remains important because of the need to control security, data migration, personalization and the development of mobile applications, but they also highlight a fundamental point. The idea is that the vendor becomes a service provider and fulfills various roles (Nieuwenhuis et al., 2018).

The adoption of Internet-dependent technologies by companies is a process that has been based on three types of digitalization, according to Pagani and Pardo (2017). The authors' typology highlights an activity-link-centered digitization, in which the digital tool is used to optimize existing activities; a resource-link-centered digitization, which is characterized by using the digital to create new activities carried out by existing actors; and, actor-link-centered digitization, which is characterized by using the digital tool to create new links between actors.

For Westerman and Bonnet (2015), what is really essential for fully exploiting the digital transformation in business and obtaining the maximum benefit is to forget about pre-digital management assumptions and to adapt to the digital world. Now, they point out that:

“Not everything will be different in the digital world. Our research indicates that large traditional companies can outcompete fast-moving digital startups if they embrace the digital environment and find ways to make it theirs”.

According to Mikalef and Pateli (2017), the adoption of new technologies facilitates the agility of market capitalization and the agility of adjustment, which improves competitive performance. Thus, digitization in combination with the Internet seems to have greater applicability than previous mainstream technologies as it reaches more people quickly and affects service industries even more deeply than goods-producing industries (Carlsson, 2004).

The use of mass data is now a reality in business, as Cheung, Kwok, Law, and Tsui (2001) point out. With recent advances in the World Wide Web and e-commerce on the rise, online businesses can now acquire individual customer information via the Internet in real time and at a much lower cost. Based on this acquired information, detailed customer profiles can be acquired in order to offer personalized and person-to-person services. In fact, Big Data Analysis (BDA) ensures that data can be analyzed and classified into useful information for companies and transformed into knowledge related to Big Data and efficient process decision making, thus improving performance. However, the management of knowledge generated from BDA, as well as its integration and combination with sound knowledge, has hardly been researched, despite the emerging need for a structured and integrated approach (Ferraris et al., 2018).

Many global companies are talking about the potential of Big Data in the belief that analyzing data sets can help companies gain competitive insight and shape the marketing strategy decisions of their organizations. However, the interaction between digital technology and organizations is complex and there are many barriers are presented by Big Data to effective digital exchange. The changes brought about by technology challenge researchers and practitioners alike. Various global business and digital trends have highlighted the emerging need for collaboration between academics and market professionals (Grishikashvili et al., 2014).

As Martínez-López and Casillas (2013) asserts, artificial intelligence, which is fed by Big Data, presents particular potentialities and strengths to support decisive situations faced by companies, especially those of a strategic nature, where good strategic intelligence is necessary. In the world of marketing, knowledge- based information systems are advanced tools in the hands of the sales staff and allow for evidence-based decisions in complex situations to be made, relying on artificial intelligence (Stalidis et al., 2015). As Wierenga (2010) points out, potentially, artificial intelligence can make an important contribution to marketing decisions. However, to date, this potential has only been realized to a very limited extent.

Fernandez-Manzano and Gonzalez-Vasco (2018) highlight that "the management and analysis of massive data is the basis of many technological business models. Some of them offer detailed recommendations that help companies to identify consumption forecasts, which translates into a highly personalized service offer to customers. In this process, it is vital to take extreme care in both the storage and management of personal data (sometimes highly sensitive information)". The authors assure that with Big Data, we are facing continuous surveillance of the user's consumption habits. For Anshari et al. (2019), the emergence of Big Data brings new strategies to support sales and customer service customization. On the other hand, Wang et al. (2017), point out limitations to customization, as only designers determine options and not clients.

From critical perspectives, Akter et al. (2016) highlight that the application of Big Data is useful for some companies, but not for others, since it seems that very few companies have achieved a significant impact through mass data.

Schroeder (2016) notes that the value of data is increasingly recognized as an asset, whether the data is proprietary or public (in which case it is likely to require cleaning or putting into suitable formats for analysis). This value also raises new issues for companies: among the principal identified so far are the quality of the analyses or the black box nature that implies that decision-making analysis is not as transparent as it could be and which can therefore negatively affect clients and decision makers.

The use of mass data by large technology corporations, in particular, is also prompting calls for a more ethical and transparent use of user data. O'Neil (2017), who states that we live in the age of the algorithm, warns about the biases that mathematical models of decision making can bring, which, moreover, are opaque to citizens (or clients). As LaBriea et al. (2018) point out, Big Data initiatives are necessary to obtain more benefits for business and society, but the misuse of this data is also a real possibility. That is why some voices are calling for regulation. For Schroeder (2016), if public data or data collected from the public are used, there is a need for regulatory environments in which these uses can take place so that the benefits are seen to be beneficial to those to whom they provide the data. These can be states, whose taxpayers provide open data, or companies that provide free services in exchange for customers who provide data, or states and service providers (welfare states or insurance companies) that need data to provide services. In all these cases, more actors are involved in more complex cost- benefit analyses, which require institutional environments that make these analyses predictable and transparent. This

idea is supported by Stewart (2018), who argues that the United States Congress should implement a law regulating the collection, use and disclosure of biometric data from companies.

3. METHODOLOGY

The methodology used in the study is the review of literature with the snowball technique (Etikan et al., 2016) which allows systematizing the knowledge about the digital transformation in the business field over the last ten years until reaching saturation point and this is a method highly used in literature review (Calderón and Ruiz, 2015; Wnuk and Garrepalli, 2018; Bailey, 2019). Thus, following previous studies (Sweeney et al., 2019), the search for concepts by keyword in principal scientific databases (Web of Science and Scopus) has been systematized.

The keyword searches have been carried out in two stages. At first, the search was carried out with the terms "digital transformation" and "digitalization", and then refined with the terms "artificial intelligence", "Big Data" and "mass data". At all times, searches were restricted to the area of marketing and business, with the key words: "customers", "loyalty" and "prediction". This yielded a body of analysis of around fifty academic articles, since the search was also restricted to the last ten years. Therefore, the period of analysis extends from 2010 to 2020 because this is the most recent period of technological transformation. Moreover, this is a period in which the systematization of the knowledge produced becomes necessary in order to deepen the debate on the future of the digital societies that are now being built, as well as to clarify the knowledge that can be useful to business transformations.

The analysis of the literature and the classifications was undertaken by three coders, who agreed on the series of categories in which to classify the articles (authors, center, objectives, results, main concepts, method, year, journal of publication, quartile and country) as it can be seen in Table 1. This allowed the systematization of the content and the qualitative review, too.

4. RESULTS

The review of the proposed literature allows us to observe two major thematic trends on the digital transformation. Firstly, the digitalization of business is presented as an unavoidable factor in the information society. In this sense, digital transformation is inevitable for all businesses. The second major theme addressed by the literature is specifically focused on the use of Big Data and artificial intelligence which is understood as a change that takes digital transformation to a higher level and more efficient use of user-generated data. In addition, a third section leading to the second, the ethical aspects of the implementation of these Big Data and the use of this information by companies.

Table 1 shows the characteristics of the 47 high-level articles documented in the research (almost 80% of the total are items considered Q1). First, we highlight the keywords. In methodology, it was indicated that the two most important were Digital and Big Data. In Graphic 1, we see that one or the other are important along with Technologies and Innovation which are linked. However, there are two aspects to note. First, the secondary concepts: business and marketing, are an important group analyzed in various articles. And secondly, there are three important concepts that were not sought, but, due to their high incidence in the total, are revealing of the lines of work: the ethical aspect of the use of technologies, business or collaborative activities and, thirdly, the sustainability or interest in impact on the environment.

4.1. About digitization

About the first section, digitization in companies, the pioneers of the digital transformation began to adapt their companies in the 1990s, but it is from the 2000s onwards that the phenomenon becomes massive and reaches both large and small companies (Martínez-López and Casillas, 2013). The most recent research highlights how digitalization positively affects the company's relationship with the customer, since, above all, it favors product customization and permits the creation of added value and consumer loyalty (Ferreira et al., 2019; Cascio and Montealegre, 2016; Singh and Hess, 2017; Cheung et al., 2003). Even so, the digitization of business is not finished and continues to evolve.

In reference to digitization, we realize from the table that this is a question dealt with by most of the articles. In reality, digitization and Big Data are related and are the basic nucleus on which the objectives of the referenced articles revolve. Digitization can refer both to the use of data and to the changes generated in marketing companies (Anshari et al., 2019; Westerman et al., 2014). To obtain digitization, it is necessary to have data series. Not all have databases, so they require services from specialized digital companies. This indicates that in less than ten years, a new type of company has appeared: those that obtain Big Data manage this Big Data and offer the results to the company that has hired them (Nieuwenhuis et al., 2018; Pagani and Pardo, 2017; Singh and Hess, 2017). And it also indicates that companies differentiate between those that have a department within the company or those that require services from other companies, therefore, the most digital and the least.

Systematic analysis of documentation shows that the potential of digital transformation began being scientifically analyzed as of the first decade of the 21st century, although the digitalization of the business world, and specifically of marketing, began in the 1990s (Schmid, 2001; Castells, 2003).

The study presents the positive and negative aspects that 21st century literature tells us of the digital transformation in the business world. This has allowed us to observe how the advent of the Internet has been the main driving force for change in companies (Carlsson, 2004). There are only six articles earlier than 2010 (they are referenced articles, which justifies the existence of subsequent articles), while 41 are later (83% from 2016 to 2020). This is important as it indicates that the articles are very recent (there are three from 2020) and they include the latest topics of interest: sustainability, ethical aspects and circular economy. Therefore, they include the concerns of users and consumers, which in some way affect the business of companies. If consumers begin to have certain concerns, for example, towards the conservation of the environment, and Big Data reflects this in the studies, it will imply that companies consider this social aspect as a phenomenon to promote in their marketing campaigns, making investments in ecological products or promoting good practices (Büchi et al., 2020; Siau and Yang, 2017). Thus, with the documents analysed, we also become aware of the recent social and cultural processes that are taking place around the world.

In reference to the articles used as a reference, we highlight the nationality of both the authors and the journals in order to have a geographical vision of research on digitization and Big Data. We can see it in Graphic 2 and link it to the previous paragraph because from the data reflected in Graphic 2, it is perceived that this digitization process is worldwide (Mikalef and Pateli, 2017; Fjeldstad and Snow, 2018). Something that is characteristic of digitization is that it is an international process, without borders, that has originated worldwide and not only in related regions (politically, socially, or culturally) as it had previously happened.

There are articles presented by researchers in Europe, but also in America and Asia. It stands out that this is an academic, university or business school center area of study. But also, what is surprising is that the journals are basically occidental (The Netherlands, The United Kingdom and The United States) although they are open to researchers from any country (China, Brunei). In fact, the large number of publications from the Netherlands is surprising with considerable divergence among researchers of that nationality. In contrast, journals from the United States and the United Kingdom show parity among

Table 1
Analysis grid of the articles studied.
Source: Own Elaboration.

Article Information Authors	Center	Concepts	Method	Year	Journal Information Title	Country	Quartile
Akter, S.; Wamba, S.F.; Gunasekaran, A.; Dubey, R.; Childe, S.J.	University (Australia, France, United States)	Big Data	Delphi study	2016	International Journal of Production Economics	Netherlands	Q1
Andal-Ancion, A.; Cartwright, P. A.; Yip, G. S.	Consultant (United Kingdom)	NIT Digital business Marketing	Research of 20 large companies in North America and Europe	2003	MIT Sloan Management Review	United States	Q1
Anshari, M.; Nabil Almunawar, M.; Ariff Lim, S.; Al-mudimigh, A.	University (Brunei)	CRM Big Data Marketing	Bibliographic revision Case study	2019	Applied Computing and Informatics	Netherlands	Q2
Baesens, B.; Bapna, R.; Marsden, J. R.; Vanthienen, J.	University (United States, Belgique)	NIT Big Data	Bibliographic revision	2016	MIS Quarterly	United States	Q1
Bashir, M.; Verma, R.	Business School (India)	BMI Big Data	Bibliographic revision of 104 conceptual and empirical articles on BMI (2000 to 2017)	2019	Management Decision	United Kingdom	Q1
Berman, S. J.	PhD (United States)	Big Data Digital	Bibliographic revision Theory model	2012	Strategy and Leadership	United Kingdom	Q3
Berman, S.; Dalzell-Payne, P.	Private Institution (United States)	Digital	Theory research	2018	Strategy and Leadership	United Kingdom	Q3
Bocken, N.M.P.; Short, S.W.	Technology University (United Kingdom, Netherlands)	Sustainability Innovation	Theory research Case study	2016	Environmental Innovation and Societal Transitions	Netherlands	Q1
Bowen, D. E.	University (United States)	Business Management	Bibliographic revision Theory research	2015	Human Resource Management Review	United Kingdom	Q1
Bressanellia, G.; Adrodegaria, F.; Peronaa, M.; Saccania, N.	University (Italy)	Sustainability Digital technology Circular economy	Empirical investigation	2018	Procedia CIRP	Netherlands	Q1
Büchi, G.; Cugno, M.; Castagnoli, R.	University (Italy)	Industry 4.0. Innovation Enabling technologies	Empirical analysis	2020	Technological Forecasting and Social Change	Netherlands	Q1
Carlsson, B.	University (United States)	Digital economy Sustainability	Case study	2004	Structural change and economic dynamics	Netherlands	Q2
Cascio, W.F.; Montealegre, R.	University (United States)	Technology	Bibliographic revision	2016	Annual Review of Organizational Psychology and Organizational Behaviour	United States	Q1
Cheung, K.; Kwok, J. T.; Law, M. H.; Tsui, K.	University (China)	Customers' preference ratings Internet	Empirical analysis Algorithmic applies	2001	Decision Support Systems	Netherlands	Q1
De Mauro, A.; Greco, M.; Grimaldi, M.	University (Italy)	Big Data	Bibliographic revision	2016	Library Review	United Kingdom	Q3
Fan, S.; Lau, R.; Zhao, J.	University (United States)	Big Data Marketing	Bibliographic revision Theory model	2015	Big Data Research	United States	Q1
Fernández-Manzano, E.; González-Vasco, M.	University (Spain)	OTT Big data Social networks Security Privacy	Bibliographic revision	2018	*El profesional de la información*	Spain	Q3
Ferraris, A.; Mazzoleni, A.; Devalle, A.; Couturier, J.	University (Italy)	Big Data Business	Empirical analysis	2018	Management Decision	United Kingdom	Q1
Ferreira, J.M.; Fernandes, C. I.; Ferreira, F.A.F.	University (Portugal)	Digital business	Multivariate statistical analysis with 938 companies	2019	Journal of Business Research	Netherlands	Q1
Fjeldstad, Ø.D., Snow, C.C.	University (Norway) Business School (United States)	Business models Innovation	Bibliographic revision Theory model	2018	Long Range Planning	United Kingdom	Q1
Galindo-Martín, M.; Castaño-Martínez, M.; Méndez-Picazo, M.	University (Spain)	Digital transformation	Empirical estimation for the case of 29 European countries	2018	Journal of Business Research	Netherlands	Q1
García-Moreno, M.B.; García-Moreno, S.; Nájera-Sánchez, J.J.; de Pablos Heredero, C.	University Industrial University (Spain)	E-business, Technology Environment	Bibliographic revision	2016	Journal of Industrial Engineering and Management	Spain	Q2
Geissdoerfer, M.; Vladirimova, D.; Evans, S.	University, (United Kingdom)	Business model innovation Sustainable business model Circular business model	Bibliographic revision Systematic database search and cross-reference snowballing	2018	Journal of cleaner production	Netherlands	Q1

(*continued on next page*)

Table 1 (*continued*)

Article Information Authors	Center	Concepts	Method	Year	Journal Information Title	Country	Quartile
Kathan, K.; Matzler, K.; Veider, V.	University (Austria)	Collaborative consumption Business model adaption digital transformation Sustainability	A renowned business model framework and a variety of current illustrative examples		Business Horizons	Netherlands	Q1
LaBriea, R.C.; Steinkea, G.H.; Lib, X.; Cazierc, J.A.	University (United States)	Big data ethics Business data usage Technology ethics	Empirical research	2018	Technological Forecasting and Social Change	Netherlands	Q1
Larivière, B.; Bowen, D.; Andreassen, T.W.; Kunz, W.; Sirianni, N.J.; Voss, C.; Wünderlich, N.V.; Keyser, A.D.	University (United States, France, Belgium, Germany, Norway, United Kingdom)	Service encounter Technology roles Customer roles	Bibliographic revision Theory model	2017	Journal of Business Research	Netherlands	Q1
Manita, R.; Elommal, N.; Baudier, P; Hikkerova, L.	Business School Management School (France)	Digitalization Big Data Artificial intelligence Audit process	A qualitative approach: interviewing auditors from the 5 largest auditing firms in France	2020	Technological Forecasting and Social Change	Netherlands	Q1
Martínez-López, F. J.; Casillas, J.	University (Spain)	Intelligent systems Marketing Industrial Literature review	An historical literature review (1970 to 2013)	2013	Industrial Marketing Management	Netherlands	Q1
Masa'deh, R.; Al-Henzab, J.; Tarhini, A.; Obeidat, B.	University (Jordan)	Pharmaceutical sector Market orientation Technology	A quantitative research design with 252 questionnaires from pharmaceutical companies in Jordan	2018	Benchmarking: An International Journal	United Kingdom	Q1
Mikalef, P.; Pateli, A.	University (Greece, Norway)	Information Technology	Empirical research (Big data of 274 international firms) Theory model	2017	Journal of Business Research	Netherlands	Q1
Mulhern, F.	University (United States)	Media Advertising Internet Communities	Bibliographic revision	2009	Journal of Marketing Communications	United Kingdom	Q1
Nieuwenhuis, L.J.M.; Ehrenhard, M.L.; Prause, L.	University (Netherlands)	Cloud Computing Business ecosystem Cloud-based enterprise software Value network	A literature study and fifteen expert interviews in three case studies	2018	Technological Forecasting and Social Change	Netherlands	Q1
Pagani, M.; Pardo, C.	Business School (France)	Digitalization Business network Big Data	Empirical research (5 cases of digitization in different industrial sectors and 5 companies providing digital solutions for Businesses)	2017	Industrial Marketing Management	Netherlands	Q1
Quinn, L.; Dibb, S.; Simkin, L.; Canhoto, A.; Analogbei, M.	University Business School (United Kingdom)	Big Data Digitalization Target-Market strategy	Qualitative methods (interviews)	2016	European Journal of Marketing	United Kingdom	Q1
Rothberg, H.N.; Erickson, G.S.	School (United States)	Knowledge management Intelligence Big Data	Conceptual, combining theory with practical applications	2017	Journal of Knowledge Management	United Kingdom	Q1
Schmid, B. F.	University (Switzerland)	Value chain Environment Industry Information	Revision	2001	Electronic Markets	Germany	Q1
Schroeder, R.	University (United Kingdom)	Big Data Digital media Business	Empirical study (28 interviews to business leaders and practitioners)	2016	Cogent Social Sciences	United Kingdom	N.A.
Shenga, J.; Amankwah-Amoahb, J.; Wanga, X.	University (United Kingdom)	Business intelligence Big data Technology Decision-making	Revision (Professor Ayre's contributions)	2019	Technological Forecasting and Social Change	Netherlands	Q1
Siau, K.L.; Yang, Y.	University (United States)	Artificial intelligence Robotics Marketing	Case study	2017	MWAIS 2017 Proceedings	United States	N.A.
Stewart, L.	University (United States)	Biometric identification technology Technologic regulation	Bibliographic revision	2018	Boston College/ University Law Review	United States	Q1
Singh, A.; Hess, T.	Management University (Germany)	Digital Management Big Data Business	Empirical research (6 case studies of Chief Digital Officers)	2017	MIS Quarterly Executive	United States	Q1
Stalidis, G.; Karapistolis, D.; Vafeiadis, A.	University (Greece)	Tourist destination marketing Neural networks Intelligent systems Big Data	Statistical analysis Big Data Model	2015	Procedia - Social and Behavioural Sciences	Netherlands	Q1

(*continued on next page*)

Table 1 (*continued*)

Article Information Authors	Center	Concepts	Method	Year	Journal Information Title	Country	Quartile
Sweeney, A; Clarke, N.; Higgs, M.	Business School (Ireland, Spain, United Kingdom)	Business Leadership	Empirical research Revision	2019	International Journal of Management Reviews	United Kingdom	Q1
Wang, Y.; Ma, H.; Yang, J.; Wang, K.	University (United States, China, Norway)	Industry 4.0 Value chain Big Data	Concepts revision Study cases Lab demonstration	2017	Advances in Manufacturing	United States	Q1
Westerman, G.; Bonnet, D.; McAfee, A.	MIT Center for Digital Business (United States)	Digital transformation	Empirical research (interviews 157 executives in 50 companies)	2014	MIT Sloan Management Review	United States	Q1
Westerman, G.; Bonnet, D.	MIT Center for Digital Business (United States)	Digital business Business model innovation Strategy	Revision Case study (400 large companies)	2015	MIT Sloan Management Review	United States	Q1
Yu, Y.; Cheng, G.; Qiang, X.	University (China)	Cloud computing Big Data Business	Analysis Discussion	2016	IEEE	United States	Q1

researchers of the same nationality. It should also be noted that some articles have been written by various authors, sometimes, not only from different universities, but also from different countries. On this aspect, it is worth commenting that these articles are very enriching in that they allow us to assess the internationalization of digitization and the use of Big Data by companies, providing their different characteristics by geographical area (Akter et al., 2016; Larivière et al., 2017). So it is typical that when reading these articles, you have a fairly broad vision on a global scale, with unique regional aspects, as we will see later in the case of digital ethics.

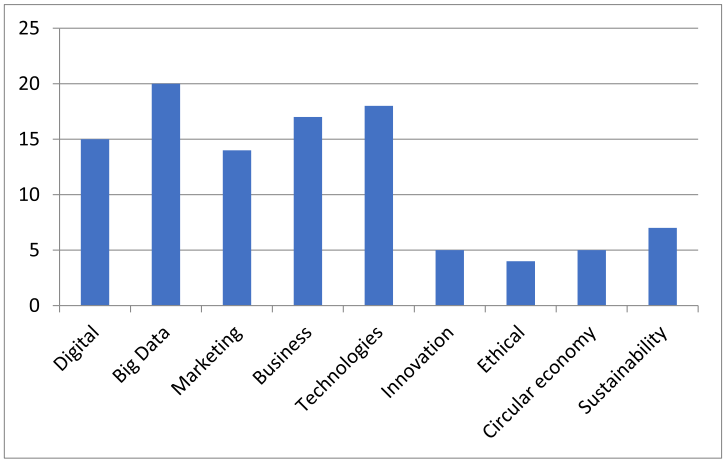
4.2. About big data

From the definition of Big Data provided by De Mauro et al. (2016) as an information asset characterized by such high volume, speed and variety that it requires specific technology and analytical methods for its transformation into value, many aspects analyzed in the referenced works can be understood. First of all, this type of data requires specific knowledge to which large companies have access, and therefore with high analytical, descriptive and usage capabilities. Therefore, in studies on companies using Big Data, it is perceived that large companies have applied in their own basic business constitution the collection of computer data from which they establish their commercial and operational strategy (Westerman and Bonnet, 2015). But these would be large companies with great economic and human capacity (highly qualified workers), but far from the small companies that have difficulty obtaining information and adapting to new technologies, either because of lack of knowledge or because of lack of tools.

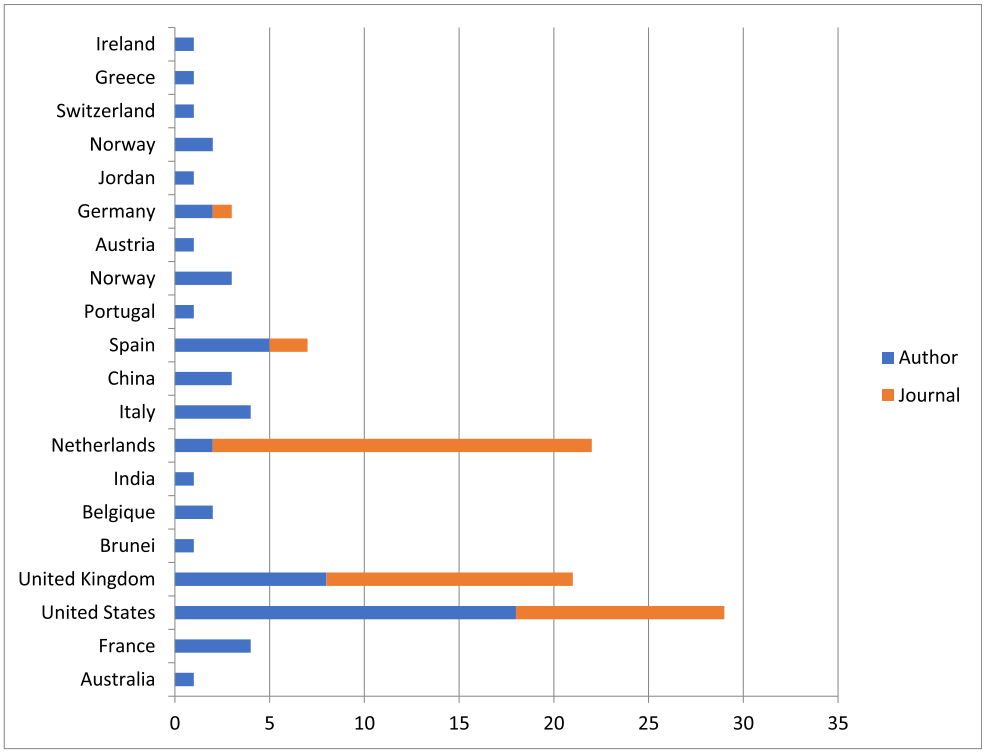
In the Graphic 3, we can observe the methodology used by the researchers, and this is interesting because this is simple, continuous and a little digital, in a way. It is true that surveys are now carried out over a large territorial area, but not all inhabitants have access to such information and the possibility of participation (non-digital education, no computer resources), either for economic, social or even age-related reasons (low participation of people over 50 years old and high participation of young people between 20 and 40 years old) (Galindo-Martín et al., 2019).

Articles based on literature review and empirical studies stand out. However, those using Big Data technology, Artificial Intelligence and digital databases are becoming important (Rothberg and Erickson, 2017). Likewise, real case studies, field work and revision of theoretical models continue to be carried out, although they are usually more geographically delimited studies, of a country (France in Manita et al., 2020; United States in Stewart, 2018) or region, or thematically, of specific economic sectors (marketing and tourism in Stalidis et al., 2015) or by type of companies (pharmaceutical in Masa'deh et al., 2018).

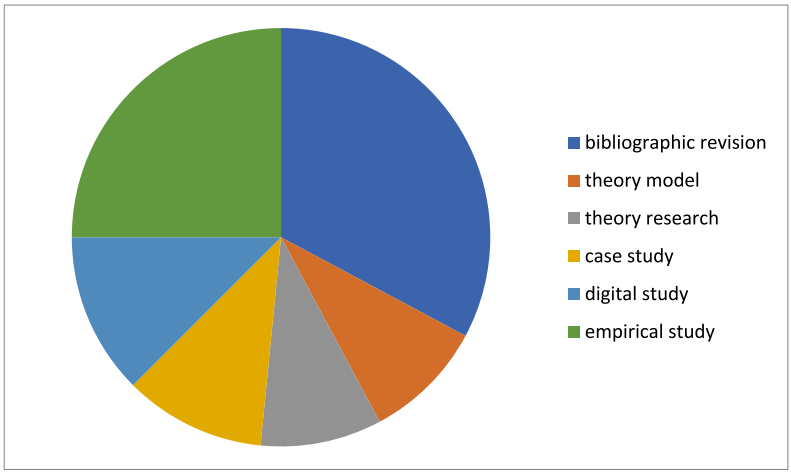
For large entities, the biggest obstacle lies in the legal section, which is either non-existent or far behind current needs (Stewart, 2018; Fernández-Manzano and González-Vasco, 2018). Then, it is linked with the third section of our research, with regard to the use of mass data there are two complementary visions. On the one hand, there is an



Graphic 1. Citation number of the keywords
Source: Own elaboration from the Table 1.



Graphic 2. Number of group of authors and journals per country
Source: Own elaboration from the Table 1.



Graphic 3. Methodology of the revised articles
Source: Own elaboration from the Table 1.

enthusiastic vision about the potential for improvement that the use of Big Data can bring to companies, but the limitations in the handling of the algorithms by the companies that are not big technological entities are also pointed out (Rothberg and Erickson, 2017). On the other hand, there is a more critical view about the use of Big Data, which highlights the opacity and lack of understanding by the user about how their data is used, and how this should generate ethical commitments by those who market user data or use it for the benefit of the company, but not the citizen (Schroeder, 2016).

4.3. About ethical use of big data

Companies and citizens describe the information obtained through Big Data as positive, but they are beginning to question aspects of security and privacy (Stewart, 2018; Fernández-Manzano and González-Vasco, 2018) especially in the western world. In this case, it is considered that companies can get a lot of information about the tastes, experiences, locations of customers and the ethical dilemma that this poses is what may be concerned a correct use of this information and more particularly, what would be an incorrect use of Big Data as these data can be sold to third parties or used for purposes other than that for which they were originally obtained. For example, it has been suggested that this information is collected for more than commercial reasons, that political ideologies are sought in individuals with the intention of being able to manipulate citizens through the media in elections (Mulhern, 2009). In this way, the revolution of the mass media causes the citizens to no longer only receive news and information in physical support (daily press, magazines) but also that news that the citizen prioritizes in his or her searches or by the friendships that he or she has on his or her social networks which are

often delimited by economic or ideological/political variables. Thus, a citizen ends up receiving related information and not all the information available, sectioned by the computer program and that he or she values to be of little interest (Mulhern, 2009). In a way, the choice of news is not made by the person him or herself, but in the end it is made by a computer program. This can be very dangerous for society in the long run (LaBriea et al., 2018). This feeling is greater if it is not a company that manages the data, but a government entity or public administration. The knowledge that this administration may acquire about citizens is as important as its ability to use the data for the service of citizens or for its own use (Shenga et al., 2019).

On the other hand, citizens do not seem to have many objections about companies possessing a great deal of information about them, at times, even more than have themselves as many products and services are digitally connected. As more aspects of daily life converge towards the digital, opportunities for organizations to interact with consumers are expanding dramatically. And what would seem to be a positive aspect because it allows for faster purchasing by presenting only what you want becomes a situation of loss of identity, and even freedom, at a time when all our instruments are interconnected: the refrigerator, vacuum cleaner, telephone, alarms, microwave, games and so on (Mulhern, 2009).

The positive aspects of data are perceived by the specificity and ease of obtaining data in large quantities and the ability to find large variables and, at the same time, specificities. This means that companies can, on the one hand, thanks to Artificial Intelligence, capture Big Data, programming and new technologies, large social groups interested in a product and, on the other hand, particular specificities in their regular customers. This allows marketing to be promoted from its most creative and imaginative side, insofar as it can seek to obtain great benefits from those elements that encompass a large market at a lower price and those other specific elements, of great value and price, based on their specificity and uniqueness (Wierenga, 2010). In this section, we will find the most positive aspects of the new technologies applied to marketing and sales departments and the provision of tools and solutions to boost business.

In relation to the last section, it is very important, at a pedagogical level, to promote the use of Big Data and Artificial Intelligence among students in marketing studies to prepare them for the challenge of the new times of business and commerce. The idea is that students find: volume, speed, variety, truthfulness and value in the definition of Big Data and those processes that combine these five dimensions (Baesens et al., 2016). Up until now, they have been worked with individually and the challenge for the new generations of marketing students who will be joining the innovative companies of the future is to work using all of them and to combine them, to adapt to the new realities: to analyze the data to obtain business information in order to make the best decisions. (Fan et al., 2015). Until now, marketing has traditionally relied on market surveys to understand consumer behavior and improve product design. With Big Data analytical technologies, key factors for strategic marketing decisions, such as customer feedback on a product, service or company, can be automatically monitored by extracting data from social networks in addition to traditional ways. More and more data can be obtained, the question is to know how to analyze it and make the right decisions so that its use brings benefits to companies.

There is a hype in the media on the subject of Big Data, the application of artificial intelligence in its processing and the improvement of consumer knowledge which results in more efficient and effective marketing actions. However, there is little scientific literature on the treatment of the subject, which makes analysis difficult. The analysis presented here seeks to resolve this gap: it is necessary on the one hand to review the scientific literature to find trends in analysis and on the other hand to set the lines for future research projects.

The results show a strong emphasis on the uneven adoption of the digital transformation in business. Only large companies have adopted digitalization strategies as the focus of their business model. This trend is apparently marked by problems of scarcity of resources, in reality a cultural problem as various authors point out. Understanding digital transformation as a process that first impacts people and the culture of companies and which continues with the necessary modifications to the structure and organization of these to reach the adaptation of processes and systems is the necessary advance for the adoption of new technologies and not vice versa as the articles reviewed well focus on.

As previously mentioned, the thematic and geographical contribution of the studies is also valued for their global, but zonal, aspect. In other words, what is correct for some companies will not have the same valuation for others. For example, the Chinese population accepts that the State can use Big Data, Artificial Intelligence and Digitization, even if that means seeing their individual liberties limited, something unimaginable for American society (LaBriea et al., 2018). However, in both countries it is agreed to limit companies so that they cannot misuse new technologies. That is, what is questioned is rather whether the information is in the hands of a public or private entity. On the other hand, the same type of information is not needed for a company in the pharmaceutical sector as for a marketing department of a company dedicated to tourism. For this reason, the contribution of all these investigations is enriching for its global vision, with its sectoral individualizations, which must be taken into account when studying and applying Big Data and Digitalization in companies.

Another trend in the literature reviewed refers to as to where companies are focusing their digital transformation. Three main methodological approaches are identified in which the digital tool is used to optimize existing activities; a digitization focused on resource links, which is characterized by using the digital to create new activities carried out by existing actors; and, a digitization based on links with actors, which is characterized by using the digital tool to create new links between actors. It is this latter approach that is generating the most impact in marketing, especially at the level of adding value to customer-business interactions.

The possibilities of Big Data and the use of artificial intelligence in its processing generate a great impact on the degree of personalization of the supply and its adaptation to a hyper-segmented demand. The use of these technologies undoubtedly means a revolution in marketing due to the infinite possibilities of personalization, which results in greater consumer loyalty. With the use of Big Data, companies can personalize their offer to the smallest detail, which notably increases the satisfaction of their customers and therefore their loyalty

Finally, there are the ethical problems arising from the massification of data capture and its use generated by the digital transformation process itself. The economy of data, as several authors call it, gives infinite power to companies, which, if poorly applied, can have negative consequences, as has already happened, and which requires that the increasing capture and processing of all this information be accompanied by security protocols on its storage and use together with perfectly controlled and controllable ethical rules which guarantee the good use of this information for the benefit of consumers and companies. In this sense, the literature reviewed aims more at exposing the problem than towards its solution, which is an interesting line of analysis for future research work.

4.4. Future research proposals

To conclude, we highlight two aspects that were mentioned at the beginning of the results: the circular or community economy and sustainability (Bressanellia et al., 2018). These concepts are important as they appear in the most recent articles, fruit of the growing interest of the new generations in the problem of climate change and the impact of Humanity on Earth. It is considered that digitization and the creation of databases to be used by companies will have to assess the social changes that are taking place: the loss of interest in the ownership of objects and favor the community use of goods and the awareness of that it is not

possible to continue with the same rate of consumption of natural resources as they are limited (Bocken and Short, 2016). Regarding the circular economy, digitization has been an essential factor, as it allows users to be contacted easily with a mobile phone; the various applications that can be downloaded facilitate the market between individuals (Kathan et al., 2016). Regarding sustainability, promoting telework thanks to new technologies and improving the sustainable use of natural resources can favor the introduction of digitization in its friendliest aspect. The effect of both social and cultural changes on digitization, the use of Big Data in companies and the implementation of new technologies (5 G, facial recognition, robotization, etc.) will have to be closely followed. Likewise, in ethical and legal aspects both at private company level and in public administration, although with different scales.

5. CONCLUSION

The main conclusions of the article point to three basic aspects which are all linked to the initial objectives.

1) To systematize the most recent scientific knowledge regarding the digitization in companies:

With this article we wanted to characterize how the scientific literature is reflecting the way in which businesses have adapted to the digital transformation as well as the use of the massive data generated by their clients which generates new forms of relationships between the different actors in the value contribution chain. It has been appreciated that there is not an extensive bibliography on the subject because the adoption of digital transformation is a topic that has not yet been sufficiently studied.

However, the literature published on the subject has made it possible to describe the main consequences of digitization on companies based fundamentally on the use of Big Data as one of the main technological changes and how the use of the massive data generated by customer relations is becoming a source of income as a result of greater personalization of the offer, a higher level of user satisfaction and which in turn generates a virtuous circle of income through the recurrence of purchases by loyal customers.

2) To characterize the most outstanding trends of digital transformation of businesses found in the literature during the period studied and in the context of the beginning of the Fourth Industrial Revolution:

On the one hand, the digital transformation opens up the possibility of improved customer loyalty by being able to predict - thanks to the use of Big Data - user behavior; but, on the other hand, the intensive use of massive data is only possible for large companies. Also, the use of large amounts of customer-generated data at zero cost leads to ethical debates that are still at an early stage in society.

Big Data and Artificial Intelligence allow us to increase the amount and variety of customer data which allows us to offer general products and services at a lower cost or specific products and services of higher value.

For both citizens and businesses, the biggest problem that currently exists with obtaining and using Big Data is the lack of regulations and standards that can violate the privacy of customers or companies to whom they may offer their services. Also, the use that could be made by public administrations and governments has not yet been openly discussed.

The new technologies are a major challenge for large companies as they can obtain a lot of information from their potential customers, but on the other hand, this can generate an increase in the differences between companies that can afford to do this and those that cannot, especially smaller ones.

3) To discuss how the trends found are explained and the challenges which are raised:

Digital transformation brings into play the intensive use of data generated by consumers themselves and the responsible use of this data to create more personalized offers, as well as resulting in greater benefits and levels of satisfaction for the different actors. The subject has an ethical edge to it. The use of data generated massively by customers, in addition to providing efficiency and effectiveness in marketing strategies adopted by companies should result in ethical practices on the storage and use of this information which is a theme that should be subject to regulation. It must therefore be backed up by the responsible use of information, a subject that points to new areas for future research. To this will be added more social and cultural aspects contributed by the new generations. The impact of new technologies on the circular economy and on the conservation of the environment are sufficiently interesting subjects to deal with individually in future research.

The study that is presented here values the methodology followed by the bibliographic review and summarizes the main research methodologies that in the last decade have predominated in scientific research on the subject, which facilitates the analysis for new studies especially to cover those aspects that reflect less development.

This article shows the possibilities of other lines of research especially important in the transformation of the companies' business models, the optimization of their relations with their clients and their search for greater satisfaction and loyalty.

The study finally emphasizes the need for the advance of the digitalization of companies and the massive use of data from interactions with customers which must be accompanied by the application of ethical principles, defense of individual freedoms and a greater focus on environmental, economic and social sustainability, aspects that have not yet been sufficiently studied by the scientific community and will be vital for the future development of these technologies.

REFERENCES

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? Int. J. Production Economics 182, 113–131. https://doi.org/10.1016/j.ijpe.2016.08.018.

Andal-Ancion, A., Cartwright, P.A., Yip, G.S., 2003. The digital transformation of traditional business. MIT Sloan Management Review 44 (4), 34.

Anshari, M., Nabil Almunawar, M., Ariff Lim, S., Al-mudimigh, A., 2019. Customer Relationship Management and Big Data Enabled: personalization & Customization of Services. Applied Computing and Informatics 15, 94–101. https://doi.org/10.1016/j.aci.2018.05.004.

Baesens, B., Bapna, R., Marsden, J.R., Vanthienen, J., 2016. Transformational Issues of Big Data and Analytics in Networked Business. MIS Quarterly 40 (4), 807–818.

Bailey, M., 2019. Snowball Sampling in Business Oral History: accessing and Analyzing Professional Networks in the Australian Property Industry. Enterp Soc 20 (1), 74–88.

Bashir, M., Verma, R., 2019. Internal factors & consequences of business model innovation. Management Decision 57 (1), 262–290. https://doi.org/10.1108/MD-11-2016-0784.

Berman, S.J., 2012. Digital transformation: opportunities to create new business models. Strategy and Leadership 40 (2), 16–24. http://dx.doi.org/10.1108/10878571211209314.

Berman, S., Dalzell-Payne, P., 2018. The interaction of strategy and technology in an era of business re-invention. Strategy & Leadership 46 (1), 10–15. https://doi.org/10.1108/SL-10-2017-0096.

Bocken, N.M.P., Short, S.W., 2016. Towards a sufficiency-driven business model: experiences and opportunities. Environmental Innovation and Societal Transitions 18, 41–61. https://doi.org/10.1016/j.eist.2015.07.010.

Bowen, D.E., 2015. The changing role of employees in service theory and practice: an interdisciplinary view. Human Resource Management Review 26 (1), 4–13. https://doi.org/10.1016/j.hrmr.2015.09.002.

Bressanellia, G., Adrodegaria, F., Peronaa, M., Saccania, N., 2018. The role of digital technologies to overcome Circular Economy challenges in PSS Business Models: an exploratory case study. Procedia CIRP 73, 216–221. https://doi.org/10.1016/j.procir.2018.03.322.

Büchi, G., Cugno, M., Castagnoli, R., 2020. Smart factory and Industry 4.0. Technol Forecast Soc Change 150. https://doi.org/10.1016/j.techfore.2019.119790.

Cagle, M.N., Yilmaz, K., Doğru, H., 2020. Digitalization of Business Functions under Industry 4.0. Digital Business Strategies in Blockchain Ecosystems. Springer, Cham, pp. 105–132.

Calderón, A., Ruiz, M., 2015. A systematic literature review on serious games evaluation: an application to software project management. Comput Educ 87, 396–422.

Carlsson, B., 2004. The Digital Economy: what is new and what is not? Structural change and economic dynamics 15 (3), 245–264.

Cascio, W.F., Montealegre, R., 2016. How Technology Is Changing Work and Organizations. Annual Review of Organizational Psychology and Organizational Behavior 3, 349–375. https://doi.org/10.1146/annurev-orgpsych-041015-062352.

Castells, M., 2003. La Era De La información: economía, Sociedad y cultura. 2. El poder De La Identidad, 2ª ed. Alianza Editorial, Madrid.
Cheung, K., Kwok, J.T., Law, M.H., Tsui, K., 2003. Mining customer product ratings for personalized marketing. Decis Support Syst 35 (2), 231–243.
De Mauro, A., Greco, M., Grimaldi, M., 2016. A Formal Definition of Big Data Based on its Essential Features. Library Review 65 (3), 122–135.
Dobrinskaya, D.E., 2020. Digital society: sociological perspective. Moscow State University Bulletin. Series 18. Sociology and Political Science 25 (4), 175–192.
Dutta, S., Biren, B., 2001. Business Transformation on the Internet: results from the 2000 Study. European Management Journal 19 (5), 449–462.
Eriksson, Y., 2019. Digitalization of society: what challenges will users meet? HBiD 125.
Etikan, I., Alkassim, R., Abubakar, S., 2016. Comparison of snowball sampling and sequential sampling technique. Biometrics and Biostatistics International Journal 3 (1), 55.
Fan, S., Lau, R., Zhao, J., 2015. Demystifying Big Data Analytic for Business Intelligence Through the Lens of Marketing Mix. Big Data Research 2 (1), 28–32. https://doi.org/10.1016/j.bdr.2015.02.006.
Fernández-Manzano, E., González-Vasco, M., 2018. Analytic surveillance: big Data business models in the time of privacy awareness. El profesional de la información 27 (2), 402–409. https://doi.org/10.3145/epi.2018.mar.19.
Ferraris, A., Mazzoleni, A., Devalle, A., Couturier, J., 2018. Big Data analytics capabilities and knowledge management: impact on firm performance. Management Decision. https://doi.org/10.1108/MD-07-2018-0825.
Ferreira, J.M., Fernandes, C.I., Ferreira, F.A.F., 2019. To be or not to be digital, that is the question: firm innovation and performance. J Bus Res 101, 583–590. https://doi.org/10.1016/j.jbusres.2018.11.013.
Fjeldstad, Ø.D., Snow, C.C., 2018. Business models and organization design. Long Range Plann 51 (1), 32–39. https://doi.org/10.1016/j.lrp.2017.07.008.
Galindo-Martín, M., Castaño-Martínez, M., Méndez-Picazo, M., 2019. Digital transformation, digital dividends and entrepreneurship: a quantitative analysis. J Bus Res 101 (C), 522–527. https://doi.org/10.1016/j.jbusres.2018.12.014.
García-Moreno, M.B., García-Moreno, S., Nájera-Sánchez, J.J., de Pablos Heredero, C., 2016. An explanatory model of the organisational factors that explain the adoption of e-business. J. Industrial Engineering and Management 9 (2), 547–581.
Geissdoerfer, M., Vladirimova, D., Evans, S., 2018. Sustainable business model innovation: a review. J Clean Prod 198, 401–416. https://doi.org/10.1016/j.jclepro.2018.06.240.
Giraldo-Luque, S., Fernández-Rovira, C., 2020. Economy of attention: definition and challenges for the 21st century. In: Park, Seung Ho Sam, Gonzalez-Perez, Maria Alejandra, Floriani, Dinorá Eliete (Eds.), Handbook of Corporate Sustainability in the Digital Era. Palgrave Macmillan, Switzerland. https://doi.org/10.1007/978-3-030-42412-1.
Grishikashvili, K., Dibb, S., Meadows, M., 2014. Investigation into Big Data Impact on Digital Marketing. Online J Commun Media Technol 4 (Special Issue), 26–37. https://www.ojcmt.net/article/investigation-into-big-data-impact-on-digital-marketing-5702.
Ibarra, D., Igartua, J.I., Ganzarain, J., 2019. Business Model Innovation from a Technology Perspective: a Review. In: Ortiz, Á., Andrés Romano, C., Poler, R., García-Sabater, J.P. (Eds.), Engineering Digital Transformation. Lecture Notes in Management and Industrial Engineering. Springer, Germany. https://doi.org/10.1007/978-3-319-96005-0_5.
Jansen, W., Steenbakkers, W., Jagers, H., 2007. (Reissued 2018). New Business Models For the Knowledge Economy. Routledge, New York.
Kane, G.C., Palmer, D., Phillips, A.N., Kiron, D., Buckley, N., 2015. Strategy, not technology, drives digital transformation. MIT Sloan Management Review 14 (1–25).
Kathan, K., Matzler, K., Veider, V., 2016. The sharing economy: your business model's friend or foe? Bus Horiz 59 (6), 663–672. https://doi.org/10.1016/j.bushor.2016.06.006.
Kumar, K., Zindani, D., Davim, J.P., 2019. Industry 4.0: Developments Towards the Fourth Industrial Revolution. Springer.
LaBriea, R.C., Steinkea, G.H., Lib, X., Cazierc, J.A., 2018. Big Data analytics sentiment: uS-China reaction to data collection by business and government. Technol Forecast Soc Change 130, 45–55. https://doi.org/10.1016/j.techfore.2017.06.029.
Larivière, B., Bowen, D., Andreassen, T.W., Kunz, W., Sirianni, N.J., Voss, C., Wünderlich, N.V., Keyser, A.D., 2017. "Service Encounter 2.0": an investigation into the roles of technology, employees and customers. J Bus Res 79, 238–246. https://doi.org/10.1016/j.jbusres.2017.03.008.
Manita, R., Elommal, N., Baudier, P., Hikkerova, L., 2020. The digital transformation of external audit and its impact on corporate governance. Technol Forecast Soc Change 150 (C). https://doi.org/10.1016/j.techfore.2019.119751.
Martínez-López, F.J., Casillas, J., 2013. Artificial intelligence-based systems applied in industrial marketing: an historical overview, current and future insights. Industrial Marketing Management 42 (4), 489–495. https://doi.org/10.1016/j.indmarman.2013.03.001.
Masa'deh, R., Al-Henzab, J., Tarhini, A., Obeidat, B., 2018. The associations among market orientation, technology orientation, entrepreneurial orientation and organizational performance. Benchmarking: An International Journal 25 (8), 3117–3142. https://doi.org/10.1108/BIJ-02-2017-0024.
Masuda, Y., 1984. La Sociedad informatizada Como Sociedad Post-Industrial. Tecnos, Madrid.
Mikalef, P., Pateli, A., 2017. Information technology-enabled dynamic capabilities and their indirect effect on competitive performance: findings from PLS-SEM and fsQCA. J Bus Res 70, 1–16. https://doi.org/10.1016/j.jbusres.2016.09.004.
Morgan, J., 2019. Will we work in twenty-first century capitalism? A critique of the fourth industrial revolution literature. Econ Soc 48 (3), 371–398.
Mulhern, Frank, 2009. Integrated marketing communications: from media channels to digital connectivity. J. Marketing Communications 15 (2–3), 85–101. http://dx.doi.org/10.1080/13527260902757506.
Musik, C., Bogner, A., 2019. Digitalization & Society. Springer.
Nieuwenhuis, L.J.M., Ehrenhard, M.L., Prause, L., 2018. The shift to Cloud Computing: the impact of disruptive technology on the enterprise software business ecosystem. Technol Forecast Soc Change 129, 308–313. https://doi.org/10.1016/j.techfore.2017.09.037.
O'Neil, C., 2017. Armas De Destrucción matemática. Cómo el Big Data Aumenta La Desigualdad y Amenaza La Democracia. Capitán Swing, Madrid.
Pagani, M., Pardo, C., 2017. The impact of digital technology on relationships in a business network. Industrial Marketing Management 67, 185–192. https://doi.org/10.1016/j.indmarman.2017.08.009.
Parviainen, P., Tihinen, M., Kääriäinen, J., Teppola, S., 2017. Tackling the digitalization challenge: how to benefit from digitalization in practice. International journal of information systems and project management 5 (1), 63–77.
Quinn, L., Dibb, S., Simkin, L., Canhoto, A., Analogbei, M., 2016. Troubled waters: the transformation of marketing in a digital world" Eur J Mark 50 (12), 2103–2133. https://doi.org/10.1108/EJM-08-2015-0537.
Ritter, T., Pedersen, C.L., 2020. Digitization capability and the digitalization of business models in business-to-business firms: past, present, and future. Industrial Marketing Management 86, 180–190.
Rothberg, H.N., Erickson, G.S., 2017. Big Data systems: knowledge transfer or intelligence insights? J. Knowledge Management 21, 1. http://dx.doi.org/10.1108/JKM-07-2015-0300.
Sae-Lim, P., Jermsittiparsert, K., 2019. Is the fourth industrial revolution a panacea? Risks toward the fourth industrial revolution: evidence in the Thai economy. Int. J. Innovation, Creativity and Change 5 (2), 732–752.
Schmid, B.F., 2001. What is new about the digital economy? Electronic Markets 11 (1), 44–51. https://www.tandfonline.com/doi/abs/10.1080/10196780122367.
Schroeder, R., 2016. Big Data business models: challenges and opportunities. Cogent Social Sciences 2, 1166924. https://doi.org/10.1080/23311886.2016.1166924.
Shenga, J., Amankwah-Amoahb, J., Wanga, X., 2019. Technology in the 21st century: new challenges and opportunities. Technol Forecast Soc Change 143, 321–335. https://doi.org/10.1016/j.techfore.2018.06.009.
Siau, K.L., Yang, Y., 2017. Impact of Artificial Intelligence, Robotics, and Machine Learning on Sales and Marketing. In: MWAIS 2017 Proceedings. 48. http://aisel.aisnet.org/mwais2017/48.
Singh, A., Hess, T., 2017. How Chief Digital Officers Promote the Digital Transformation of their Companies. MIS Quarterly Executive 16, 1. https://aisel.aisnet.org/misqe/vol16/iss1/5.
Stalidis, G., Karapistolis, D., Vafeiadis, A., 2015. Marketing decision support using Artificial Intelligence and Knowledge Modeling: application to tourist destination management. Procedia - Social and Behavioral Sciences 175, 106–113. https://doi.org/10.1016/j.sbspro.2015.01.1180.
Stewart, L., 2018. Big Data Discrimination: maintaining Protection of Individual Privacy without Disincentivizing Businesses' Use of Biometric Data to Enhance Security. Boston College Law Review 60, 349–386. https://lawdigitalcommons.bc.edu/bclr/vol60/iss1/8/.
Sweeney, A., Clarke, N., Higgs, M., 2019. Shared Leadership in Commercial Organizations: a systematic review of Definitions, Theoretical Frameworks and Organizational Outcomes. Int. J. Management Reviews 21, 115–136. https://doi.org/10.1111/ijmr.12181.
Trașcă, D.L., Ștefan, G.M., Sahlian, D.N., Hoinaru, R., Șerban-Oprescu, G.L., 2019. Digitalization and Business Activity. The Struggle to Catch Up in CEE Countries. Sustainability 11 (8), 2204.
Wang, Y., Ma, H., Yang, J., Wang, K., 2017. Industry 4.0: a way from mass customization to mass personalization production. Advances in Manufacturing 5, 311–320. https://doi.org/10.1007/s40436-017-0204-7.
Westerman, G., Bonnet, D., McAfee, A., 2014. The nine elements of digital transformation. MIT Sloan Management Review 55 (3), 1–6.
Westerman, G., Bonnet, D., 2015. Revamping your business through digital transformation. MIT Sloan Management Review 56 (3), 2–5.
Wierenga, B., 2010. Marketing and Artificial Intelligence: great Opportunities, Reluctant Partners. In: Casillas, J., Martínez-López, F.J. (Eds.), Marketing Intelligence Systems Using Soft Computing 258. Springer, Berlín, pp. 1–8.
Wnuk, K., Garrepalli, T., 2018. Knowledge management in software testing: a systematic snowball literature review. e-Informatica Software Engineering Journal 12 (1).
Yu, Y., Cheng, G., Qiang, X., 2016. Data centre transformation: integrated business model framework of cloud computing-oriented data centre. In: 2016 IEEE Advanced Information Management, Communicates, Electronic and Automation Control Conference (IMCEC), . http://doi.org/10.1109/IMCEC.2016.7867538.

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