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# FACTORS CONTRIBUTING TO THE BUSINESS DIGITAL DIVIDE: A SYSTEMATIC LITERATURE REVIEW

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**Abstract** The main aim of this study is to review the literature relating to the factors that contribute to the business digital divide. A systematic literature review was conducted using two databases (Scopus and Web of Science). A total of 28 articles were selected and analyzed. The selected studies are conducted in various developing and developed countries, including all firm sizes and different sectors, and cover several different digital technologies. Identified factors determining the business digital divide are categorized as technological, organizational, and environmental factors. The discussion and the potentials for further research are also presented.

**Keywords:**

business  
digital  
divide,  
digital  
divide,  
systematic  
literature  
review

## 1 Introduction

The rapid and continuous developments of ICTs facilitate access and process data and improve the inter and intra-organizational integration of companies, but at the same time, these technological developments bring a new type of exclusion, the digital divide (Souza, Siqueira, & Reinhard, 2017). A significant number of businesses, especially SMEs, tend to be on the wrong side of the digital divide, and therefore do not benefit from the potential advantages of ICTs. Even though digitalization provides new opportunities for SMEs to benefit from the global economy, significant numbers of SMEs lag behind in the digital transition (North, Aramburu, & Lorenzo, 2019; OECD, 2017).

The digital divide can be defined as “the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICTs and to their use of the Internet for a wide variety of activities” (OECD, 2001, p. 5). The digital divide can emerge from individual, organizational, and global levels (Dewan & Riggins, 2005). Unequal access and use of ICT are the main issues of the digital divide. Castells (2002, p. 270) describes the digital divide as “the divide created between those individuals, firms, institutions, regions, and societies that have the material and cultural conditions to operate in the digital world, and those who cannot, or cannot adapt to the speed of change.” As among people, the digital divide also exists among businesses and refers to ICT access and the ability of appropriate use of the technology (Wielicki & Arendt, 2010). In addition to preventing access to ICT, the digital divide prevents commercial applications of these technologies, such as e-business (Di. Gregorio, Kassiech, & De Gouvea Neto, 2005).

Several academic disciplines, from sociology and political science to business and information systems, have been involved in research about the digital divide; and most of these research studies focus on the individual or societal level (Wielicki & Arendt, 2010). The business digital divide is not discussed in the literature as much as the digital divide among people or organizations (Souza et al., 2017). We focus on the digital divide among businesses in this study. It is important to understand the business digital divide since it significantly affects how firms compete in the global market, how they communicate with their customers and business partners, and how they formulate their strategies for e-commerce (Dewan & Riggins, 2005; Wielicki &

Arendt, 2010). This study systematically reviews the literature with the aim of understanding the factors contributing to the digital divide among businesses. The literature review was driven by the following research question:

What are the determinant factors of the digital divide among businesses?

## **2 Methodology**

In this study, a systematic literature review was conducted. The systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) approach (Moher, Liberati, Tetzlaff, Altman, & Group, 2009). PRISMA is well accepted and used in a broad range of academic disciplines in the literature.

### **2.1 Inclusion and Exclusion Criteria**

The search process was conducted using two scientific databases: Scopus and Web of Science. These two databases are “two world-leading and competing citation databases” (Zhu & Liu, 2020). We conducted the search with the following keywords: ("digital divide" OR "digital gap") AND (busines\* OR firm\* OR compan\* OR corporate OR corporation\* OR "small and medium size\* enterpris\*" OR SME\* OR enterpris\*) in “title, abstract, keywords” search fields. After the initial search, search results were restricted to journal articles from 2000 to 2019 in the English language for both databases. Only journal articles were included in this literature review.

### **2.2 Data Collection**

The searches of the two databases resulted in 712 records. After 155 duplicate articles were removed, 557 articles remained for further screening. At this stage of the study, articles were excluded on the basis of irrelevant titles or abstracts. After the title and abstract screening process, 71 articles were selected for further full-text analysis. Nine articles could not be obtained from the databases. A total of 62 articles were accessed for full-text screening. Among them, two articles were excluded because they were written in Spanish. Even though database searches were limited based on language, these articles were listed by databases. Twenty-eight articles were

selected after the full-text screening. In order to code the selected articles, a spreadsheet was created. Full-text articles were excluded, with the following reasons: theoretical, not empirical, data collection methods, and out of focus of this study. The selected articles were coded with the following data: authors' names, article title, publication year, source title, technology, sample country, data source, data collection method, sample size, firm size, sector, methodology, and determinant factors. The steps of the systematic literature review are shown in Figure 1.

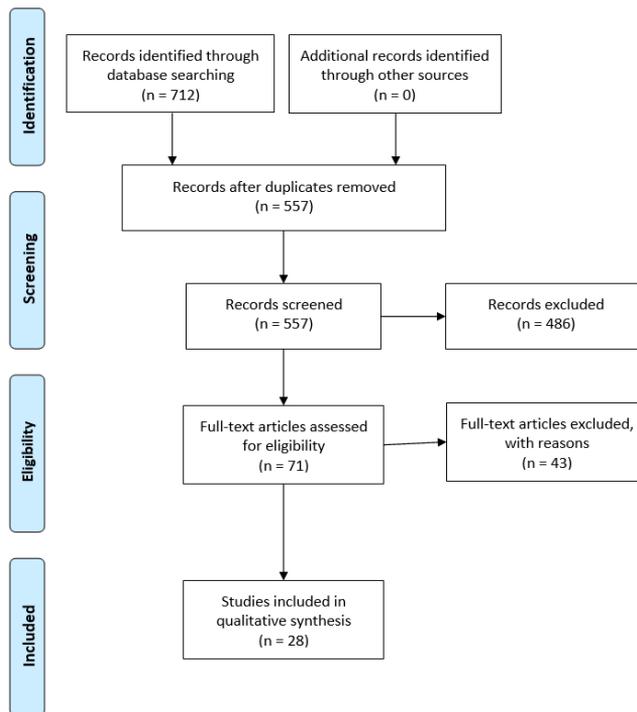


Figure 1: Flow diagram for selection of articles, based on PRISMA.

### 2.3 Systematic Literature Review Results

The selected studies in this literature review have been published using samples from countries around the world, including six continents, but mainly from Europe (17 studies) (Table 1).

**Table 1: Selected articles, country of sample, technology**

Article	no.	Country of sample	Technology
Duncombe and Heeks (2002)	A1	Botswana	ICT
Moodley (2003)	A2	South Africa	B2B e-commerce
Forman (2005)	A3	USA	Internet
Gengatharen and Standing (2005)	A4	Australia	e-marketplaces
Sun and Wang (2005)	A5	China	Internet access & use
Arbore and Ordanini (2006)	A6	Italy	Broadband
Hinson and Sorensen (2006)	A7	Ghana	E-business
Labrianidis and Kalogeressis (2006)	A8	Europe	A list of ICTs
Pighin and Marzona (2008)	A9	Italy	ICT use and process automation
Atzeni and Carboni (2008)	A10	Italy	ICT
Billon, Ezcurra, and Lera-López (2009)	A11	Europe	Website
Karen L. Middleton and Chambers (2010)	A12	USA	Wifi
Galve-Górriz and Gargallo Castel (2010)	A13	Spain	ICT
Rodríguez-Ardura and Meseguer-Artola (2010)	A14	Spain	E-commerce
Wielicki and Arendt (2010)	A15	USA, Spain, Portugal, Poland	ICT-based solutions
K. L. Middleton and Byus (2011)	A16	USA	ICT
Chang, Wu, and Cho (2011)	A17	Taiwan	ICT
Oni (2013)	A18	Nigeria	Applic. of ICT tools
Bach (2014)	A19	Europe	ICT indicators
Oliveira and Dhillon (2015)	A20	Europe	B2B e-commerce
Billon, Lera-Lopez, and Marco (2016)	A21	Europe	ICT
Doherty, Ramsey, Harrigan, and Ibbotson (2016)	A22	Ireland	Broadband technologies
Billon, Marco, and Lera-Lopez (2017a)	A23	Europe	ICT
Billon, Marco, and Lera-Lopez (2017b)	A24	Europe	ICT
Ayinla and Adamu (2018)	A25	Global	BIM technology
Ruiz-Rodríguez, Lucendo-Monedero, and González-Relaño (2018)	A26	Europe	ICT
Jordá Borrell, López Otero, and Contreras Cabrera (2018)	A27	Global	ICT
Bowen and Morris (2019)	A28	United Kingdom	Broadband, website, social media

Data in two studies are collected on a global scale. Various technologies are subject to the articles as indicators of the digital divide, such as the Internet, broadband, e-business, e-marketplace, website, social media, wifi, e-commerce, and B2B e-commerce. Some studies did not indicate the specific technology; instead, they used

the general term ICT. The sample sizes of the selected studies vary from 5 to more than 40,000 enterprises. Firm sizes in the studies are also various. Samples include enterprises with different sizes, from micro-enterprises to large-size enterprises, in sectors including manufacturing, finance, service, construction, and food. Four studies (A1, A5, A15, and A20) have samples in more than five sectors. Based on the level of the study, there are two main groups of articles: country or region level and firm-level articles. Country-level articles (A8, A11, A19, A21, A23, A24, A27) mainly used secondary data and applied econometric statistical analyses. Data of the selected studies come mainly from surveys. Almost half of the studies used secondary data. The selected studies used various quantitative methods for analyzing their data, such as the Chi-square test, regression analysis, correlation analysis, ANOVA, MANOVA, factor analysis, cluster analysis, spatial data analysis, logit analysis, structural equation modeling.

It is found that there are 54 different factors identified in the selected literature. Based on the selected articles in this literature review, we categorized the factors determining the digital divide as technological (Table 3), organizational (Table 4), and environmental factors (Table 5), using Technology-Organizational-Environmental (TOE) framework (Tornatzky & Fleischer, 1990). Table 3 presents factors related to technology. The most common technological factors reported in the selected articles are identified as perceived usefulness, cost, degree of ICT readiness, and relative advantage.

**Table 3: Technological Factors**

<b>Factors</b>	<b>Article No.</b>
Relative advantage	A4, A22
Perceived benefits	A4
Perceived usefulness	A4, A7, A22
Perceived impact on the image of the firm	A22
Perceived need	A1
Cost	A1, A2, A25
Digital awareness	A18
The degree of ICT readiness	A14, A15, A20
Prior IT investment	A3
Technology/interoperability	A25
Technology integration	A20
Innovation target (technology) to be used	A9

Table 4 shows organizational factors. The most common organizational factor is firm size. As it is directly related to both firms' financial ability to acquire and human resources to use, firm size is a prominent factor in adopting the technology. Small businesses with limited financial and human resources struggle with following technological developments. In addition to firm size, several other organizational factors are identified in the articles, such as factors related to human resources (employees' education, expertise, training, investment per employee), owner's characteristics, internalization, organizational culture, and firm's age.

**Table 4: Organizational Factors**

<b>Factors</b>	<b>Article No.</b>
Firm size	A3, A5, A6, A8, A20
Firm's age	A5, A10
Organizational Culture	A9, A25
Ethnicity	A12, A16
Owners age	A8, A12
Owner innovativeness	A4
Owners Education level	A8
Outsourcing strategy	A6
Financial constraints	A10
Lack of resources	A28
Reorganization	A10
Internationalization	A14, A28
R&D (Innovation capacity)	A10, A23
Employees' education	A13, A20, A24
Labor composition	A10
Skills and capabilities	A2, A25
Training	A13, A25
Individual growth ability of employees	A9
Geographic dispersion of employees	A3
Perceived obstacles	A20

Table 5 presents the identified environmental factors in the selected articles, which are related to the environment of the firm. The most commonly reported environmental factor is location. After that, sector, customers, firms' pressure, and financial support are other significant environmental factors reported by the researchers. The location of the firm is an important factor in the adoption of technology. The urban and rural divide still exists for businesses. Also, businesses in less developed countries or regions tend to be on the wrong side of the digital divide.

**Table 5: Environmental Factors**

<b>Factors</b>	<b>Article No.</b>
Location	A5, A6, A8, A21, A28
Sector	A5, A8, A21, A24
Sectoral composition	A11
Customers	A14, A22, A25
Pressure of firms	A3, A14, A20
Network intensity	A8
Trading partner collaboration	A20
Financial support, subsidies, government support	A8, A10, A17
Government policy	A2
Legal requirements	A25
REM ownership structure and governance	A4
Critical mass	A4
Infrastructure	A2
Innovation performance of the country	A19
GDP per capita	A11
Fiscal decentralization	A21
Population density	A11
The extent of countries' globalization	A27
Digital development of the country	A26
Accessibility to ICT capabilities of the country	A27
Technological readiness of market forces	A14
The educational level of the region	A11, A21

### 3 Discussion

This study has presented the results of a systematic literature review of studies on the digital divide among businesses, published between 2000 and 2019. The business digital divide phenomenon has been investigated in developing and developed countries, particularly in Europe. There is a relatively small number of studies in developing economies. The divide has been approached with different digital technologies, involving adoption and use. The studies suggest that the digital divide exists among businesses in different sizes, sectors, and countries. Identified factors determining the business digital divide are categorized as technological, organizational, and environmental factors. The most commonly reported factors in the articles are identified as firm size, human resources, location, sector, customers, the pressure of firms, financial support, perceived usefulness, cost, and the degree of ICT readiness.

The literature has increasingly emphasized digitalization as an important vehicle for generating value from information technology for society, industry, and enterprises (Reis, Amorim, Melão, Cohen, & Rodrigues, 2019). In order to significantly benefit from digitalization, extensive changes are required in the organization. Digitalization implies significant changes for businesses, including strategy and business models, internal and external processes, organizational culture, etc. (Parviainen, Tihinen, Kääriäinen, & Teppola, 2017), a digital transformation. We found that the literature on the digital divide has barely addressed the digital transformation issues.

The size and pace of the digital transformation make investments in digitalization for businesses of all sizes and in all industries inevitable to ensure success and survival (Hossnofsky & Junge, 2019). “Digitalisation is feared as a source of disruption, with the risk that only a few firm will emerge as winners while many firms and workers lose out, leading to a more polarised economic structure” (Veugelers, Rückert, & Weiss, 2019). Therefore, digitalization involves internal and external challenges for businesses, particularly SMEs. With limited financial and human resources, digitalization is a real threat for many SMEs and can widen the digital divide between SMEs and large businesses. Firms need dynamic capabilities to cope with the digital transformation and to adapt to the changing environment. However, it is a challenge for businesses to design mechanisms that enable repeatable, continuous adaptation (Vial, 2019). Besides, it is challenging for businesses to grasp how digitalization can be leveraged to transform their business models to achieve sustainable benefits (Parida, Sjödin, & Reim, 2019). Businesses need to understand how they can continuously derive and leverage value through developing their IT capabilities (Eikebrokk & Olsen, 2007). We, therefore, argue that further studies should explore the digitalization divide, focusing on factors causing the divide in digitalization processes and digitalization capabilities.

The business digital divide studies mainly focus on the adoption and use of ICTs, and there are not many studies about outcomes of ICT usage (third-level digital divide) in businesses. For example, there is not much evidence that the digitalization of the business causes a significant productivity boost (Veugelers et al., 2019). Future research can also aim to investigate the divide between businesses in terms of outcomes and benefits of using ICTs.

## 4 Conclusion

The digital divide is a global phenomenon that affects people, organizations, and countries around the world. This study provides a systematic literature review about the factors that contribute to the business digital divide. The review is conducted by using two databases: Scopus and Web of Science. Twenty-eight journal articles published between 2000 and 2019 made up the sample of this study and were analyzed in the review. We investigated the characteristics of the business digital divide research and summarized the research distribution in terms of sample characteristics, methodological approaches, and the digital divide determinants. The digital divide exists among businesses in different sizes, sectors, and countries. Identified factors determining the digital divide are categorized as technological, organizational, and environmental factors.

The main limitations of the study can be summarized as follows: Only two databases (Scopus and Web of Science) were used in this study. This review is based on only journal articles written in English. There are certainly other types of publications and studies in different languages, which address the business digital divide. Lastly, it is possible to have different search results using different search strings.

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