

Cultural factors influencing ICT adoption and the internet: A review of the literature

Factores culturales que influyen en la adopción de las TIC e internet: una revisión de la literatura

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ABSTRACT

This study aims to identify the cultural factors that influence the adoption of information and communication technologies (ICT) and the Internet, according to the academic literature, in order to generate a framework for future lines of research that will contribute to the reduction of the digital divide. For this research, a systematized review of research published in Spanish and English in the Scopus database and in the Google Scholar search engine, between 1970 and 2020 in all types of geographic regions, was carried out. As a result of the search, 138 publications were identified, of which 21 were selected and evaluated. The analysis of the information was organized in two stages: in the first, bibliometric data were reviewed and in the second, cultural factors influencing the adoption of ICTs and the Internet. Among the findings was that 81% of the publications were made in urban areas, while South Africa was the country with the highest number of publications. The cultural factors that influence the adoption of ICTs and the Internet are: avoidance of uncertainty, power distance, individualism and masculinity. It should be noted that 43% of the documents found were published more than ten years ago and, due to technological evolution and cultural change in the regions of study: Australia, Fiji, Greece, Iran, Jordan, Malaysia, México, Saudi Arabia, South Korea, South Pacific, United States, countries of the American, Asian, African and European continents, European countries, Pakistan, Canada, South Africa and Taiwan, there is an opportunity to generate new research to explore the current cultural dimensions.

Keywords

Technological adoption;
digital divide; cultural
dimensions; internet.

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RESUMEN

Este estudio tiene como objetivo identificar los factores culturales que influyen en la adopción de las tecnologías de la información y comunicación (TIC) e internet, de acuerdo con la literatura académica, con el fin de generar un marco de referencia para futuras líneas de investigación el cual contribuya en la reducción de la brecha digital. Para esta investigación se llevó a cabo una revisión sistematizada de las investigaciones publicadas en español e inglés en la base de datos Scopus y en el motor de búsqueda Google Scholar, entre 1970 y 2020 en todo tipo de región geográfica. Como resultado de la búsqueda se detectaron 138 publicaciones, de las cuales se seleccionaron y evaluaron 21. El análisis de la información se organizó en dos etapas: en la primera se revisaron los datos bibliométricos y en la segunda los factores culturales que influyen en la adopción de las TIC e internet. Entre los hallazgos se encuentra que 81% de las publicaciones fueron realizadas en áreas urbanas, mientras que Sudáfrica fue el país que registró el mayor número de estas. Los factores culturales que influyen en la adopción de las TIC e internet son: evitar la incertidumbre, distancia de poder, el individualismo y la masculinidad. Cabe señalar que 43% de los documentos encontrados se publicaron hace más de diez años y, debido a la evolución tecnológica y el cambio cultural de las regiones de estudio (Arabia Saudita, Australia, Estados Unidos, Corea del Sur, Fiji, Pacífico Sur, Grecia, Irán, Jordania, Malaysia, México, Países del continente americano, asiático, africano y europeo, países europeos, Pakistán, Canadá, Sudáfrica y Taiwán), se detecta la oportunidad para generar nuevas investigaciones que exploren las dimensiones culturales actuales.

Palabras clave

Adopción tecnológica;
brecha digital;
dimensiones culturales;
internet.

INTRODUCTION

Information and communication technologies (ICTs) have become tools that would make different daily activities easy. Due to their impact in recent years, the number of cell phone and internet users has increased even in areas with lower connection levels (World Bank, 2014). Despite the progress made in terms of access to services and the use of technologies, the digital divide prevails and it mostly affects rural areas.

The main predominating factors that influence the adoption of ICTs and Internet are the sociodemographic characteristics and cultural aspects of individuals, as well as their skills and opportunities to access these resources (Ford & Kotzé, 2005; Sunkel, 2006; Van Dijk, 2006; Tsatsou, 2012; IFT, 2016; Park, 2017; INEGI, 2019; Reisdorf, Blank, & Dutton, 2019; Martínez-Domínguez & Mora-Rivera, 2020). Regarding the effect of sociodemographic characteristics, several studies point out that income and education are the main determinants in the adoption of these tools (Laforet & Li, 2005; Sunkel, 2006; Van Biljon, 2006; Van Dijk, 2006;

Siyal, Chowdhry & Rajput, 2006; Tsatsou, 2012; IFT, 2016; Idiegbeyan-Ose, Nkiko, Idahosa & Nwokocha, 2016; Miraz, Ali & Excell, 2017; Park, 2017; Martínez-Domínguez, 2018; IFT, 2018; Reisdorf, Blank & Dutton, 2019; INEGI, 2020; Martínez-Domínguez & Mora-Rivera, 2020; OECD, 2020).

In addition, the study of traditional culture and other behavioral patterns of individuals enables the analysis of ICT and Internet use (Tsatsou, 2012); however, the cultural impact has been a little studied element, compared to the analysis of the effect of sociodemographic factors (Van Dijk, 2006).

This article aims to describe the cultural factors that influence the adoption of ICTs and the internet, and to identify the divides in the academic literature on the subject, in order to contribute to actions aimed at reducing the digital divide and to generate a framework for future lines of research related to the topic of study.

The document is organized as follows: 1) it discusses the concepts related to the object of study (digital divide, impact of the cultural factor on the adoption of ICTs and the Internet, theories and models used in the study of the cultural factor); 2) the methodology applied for the review and analysis of the information is also discussed; 3) the results are shown; and 4) a discussion of the results is made and, finally, 5) the conclusions of the literature review are presented.

The object of study: concepts

Digital divide

Belloch (2012) and the World Economic Forum (2019) define ICTs as the set of technological tools used for the storage, retrieval, processing and communication of information. These electronic devices include digital television, cell phones and computers (IFT, 2016).

Although in recent years, access to electronic devices and the internet has increased in developing countries (World Bank, 2019), in less developed countries only

one in seven people have access to the internet, which causes a strong digital inequality in a large sector of the population (World Bank, 2019).

The notion of a *digital divide* refers to the digital inequality existing among countries, within countries, between individuals, families and other social groups with respect to ICT access and internet use (Van Dijk, 2006; Idiegbeyan-Ose, Nkiko, Idahosa & Nwokocha, 2016). An example of this is found in rural areas, where there are limitations in accessing network services due to the remoteness in which they are located, lack of infrastructure, low socioeconomic and educational status, higher unemployment rates, high average age, and for having a population with more indigenous people (Placencia, 2014; Morales, Casarín & Salas, 2015; INEGI, 2017; Park, 2017; Salemink, Strijker & Bosworth, 2017; Martínez-Domínguez, 2018; Martínez-Domínguez and Mora-Rivera, 2020). Digital inequality in rural areas gives rise to an impact in the economic progress of these communities.

Authors Salemink, Strijker and Bosworth (2017) and Domínguez (2018) agree that rural areas lack sufficient potential and profitability to generate investments, because profit projection is higher in urban areas (Carter & Weerakkody, 2008). Likewise, almost all internet users are concentrated in urban areas, as they have better infrastructure and more possibilities of access to technological devices (INEGI, 2019; OECD, 2020); however, the digital divide also remains in urban areas due to different factors, such as sociodemographic factors, which have already been studied.

Other theorists point out that sociodemographic characteristics (mainly education and income level) are significantly related to ICT and internet use (Laforet & Li, 2005; Sunkel, 2006; Van Biljon, 2006; Van Dijk, 2006; Siyal, Chowdhry & Rajput, 2006; Tsatsou, 2012; IFT, 2016; Idiegbeyan-Ose, Nkiko, Idahosa & Nwokocha, 2016; Miraz, Ali & Excell, 2017; Park, 2017; Martínez-Domínguez, 2018; IFT, 2018; Reisdorf, Blank & Dutton, 2019; INEGI, 2020; Martínez-Domínguez & Mora-Rivera, 2020; OECD, 2020). Some factors that widen the digital divide include the digital skills of individuals, the lack of infrastructure in the place of residence (Domínguez, 2018), as well as the cultural environment of individuals.

The cultural factor plays a relevant role in the use of the internet, as well as in generating the patterns and frequency of use (Ford & Kotzé, 2005; Van Biljon, 2006;

Van Dijk, 2006; Carter & Weerakkody, 2008; Van Biljon & Kotzé, 2008; Tsatsou, 2012; Stump & Gong, 2016; Park, 2017; Philip, Cottrill, Farrington, Williams & Ashmore, 2017). Cultural influences enhance the understanding of ICT and internet adoption: the stronger the individual's national and ethnic identity, the lower the inclination to adopt changes associated with globalization and with new information technologies (Ayouby, Creoteau & Raymond, 2013). This is why it is relevant to analyze and understand the internal and external factors involved in promoting the use of technology, in order to formulate and develop effective strategies that contribute to strengthening digital futures (Alam *et al.*, 2018).

Impact of the cultural factor on the adoption of ICTs and the internet

Over the years, the concept of culture has been defined in a number of ways; the following are some of the most noticeable:

- United Nations Educational, Scientific and Cultural Organization (UNESCO, 2021): A set of distinctive spiritual, material, intellectual, material, intellectual and affective features that characterize a society or social group.
- Hofstede (2011, p. 3): the collective programming of the mind that distinguishes members of one group or category of people from others.
- Warnier (2001, p. 14): a complex totality made of norms, habits and repertoires of action and representation, acquired by the individual as a member of a society.
- Giménez (2001, p. 11): the set of signs, symbols, norms, models, attitudes and values inherent to social life.

Culture implies a collective manifestation, while groups are made up of a variety of individuals. Ford & Kotzé (2005) define culture in ICT adoption as: “patterns of thinking, feeling and acting in the way people communicate with each other and computers” (p. 714).

The impact of culture on ICT and internet adoption has been studied at different levels: organization, country and individual (Hofstede, 2011). By the same token, Jenkins and Ito (2015) suggest that participatory culture assumes that people are able to make decisions collectively and individually by adopting values.

Theories and cultural models applied to the study of ICT and internet adoption

Cultural theories and models have allowed the identification and description of the dimensions that are used to classify the cultural information of the research conducted. Table 1 shows some references for the study of cultural factors that influence the adoption of ICT and internet (Mao *et al.*, 2005; Van Biljon, 2006; Carter & Weerakkody, 2008; Varela, Tovar, & Chaparro, 2010; Hofstede, 2011; Morales, Casarín, & Salas, 2015; Chamorro, 2016; Taherdoost, 2018).

Table 1. Theories and cultural models applied in the TIC and internet adoption studio

Model / Theory	Factors or cultural dimensions	Autor
Hall's model	Identify three context characteristics: <ul style="list-style-type: none"> • Cultural (high and low) • Temporal (monochromatic and polichromatic) • Spacial (territoriality) 	Hall (1976)
Hofstede's cultural dimensions model	The model contemplates the next cultural dimensions: <ul style="list-style-type: none"> • Power distance • Prevent uncertainty • Individualism versus colectivism • Masculinity versus femininity • Long term orientation versus short term • Indulgence versus restriction 	Hofstede (2011)
Baumgartner's cultural dimensions model	It contemplates the following cultural dimensions: <ul style="list-style-type: none"> • Achievement versus secondment • Activity orientation • Affective versus neutral • Authotiry conception 	Baumgartner (2003)

Model / Theory	Factors or cultural dimensions	Autor
	<ul style="list-style-type: none"> • Context • Power degree • Economic progress • Technology experience • Save appearance • Gender roles • Human nature orientation • Individualism versus colectivism • Instrumental versus expressive • Intern control versus extern control • Common international trade • Long term versus short term orientation • Sens of life • Non verbal communication • Political decentralization • Power distance • Property • Resources • Space • Specific versus diffuse • Technological development • Time orientation • Time perception • Avoid uncertainty • Universalism versus particularism 	
Trompennars' dimensions model	<p>Cultural dimensions:</p> <ul style="list-style-type: none"> • Universality versus particularity • Individualism versus colectivism • Neutrality versus emocionalidad • Specificity versus diffuse • Ejecution versus attribution • Relationship respect to distance • Attitude towards the environment 	Trompenaars (1996)

Model / Theory	Factors or cultural dimensions	Autor
Schwartz's model	<p>Values dimensions:</p> <ol style="list-style-type: none"> 1) Attachment versus autonomy 2) Dominance versus harmony 3) Hierarchy versus egalitarian 	Schwartz (1999)
Technology acceptance model	<p>The model focuses on two structures:</p> <ol style="list-style-type: none"> 1) Perceive usefulness 2) Perceive ease of use 	Davis (1989)
Planned behaviour theory	<p>It incorporates concepts that allow predicting and understanding adoption behaviors. The study variables are:</p> <ul style="list-style-type: none"> • Behaviour attitudes • Subjectives standart of behaviour • Conductual control 	Ajzen (1991)
Difussion of innovations theory	<p>The model specifies the characteristics that determine the adoption of an innovation:</p> <ul style="list-style-type: none"> • Relative advantage • Compatibility • Complexity • Posibility test • Observability 	Rogers (2003)
Unified theory of technology use	<p>Containts four determiners:</p> <ul style="list-style-type: none"> • Performance expectative • Effort expectative • Social influence • Facilitating conditions 	Venkatesh, Thong, Chan, Hu & Brown (2011)

Source: developed by the author.

Table 1 includes from two (Technology Acceptance Model) to 29 elements (Baumgartner's Cultural Dimensions Model). Hofstede's cultural dimensions' model has been the main reference for the development of several research studies related to the study of ICT and internet adoption (Kirkman, Lowe & Gibson, 2006).

Cultural theories and models are tools that enable the identification of the predominant cultural dimensions in the field of study of the factors that influence the adoption of ICTs and the Internet. This contributes to making sound and effective decisions to reduce the digital divide. The choice of model depends on the dimensions to be explored in the particular field of research.

Methodology

In order to meet the objective of this study, a systematized literature review was conducted in accordance with the SALSA (Search, Appraisal, Synthesis and Analysis) methodological framework (Grant & Booth, 2009; Codina, 2018).

Search strategy

In response to the research question “What are the cultural factors that influence the adoption of ICT and the internet?”, the Scopus database and the Google Scholar search engine were used. Scopus used an advanced and specific search with keywords and the search equation: Culture AND IT AND internet adoption; this was performed on October 23, 2020 and 129 documents were found. In Google Scholar the following concepts were used: cultural factors and ICT adoption, cultural factors and internet adoption, and cultural factors in rural, semi-urban and rural areas that influence ICT and internet adoption.

The search was conducted in Spanish and in English in both sites, and the search period was established from 1970 to 2020, because in the 1970s Edward Hall (1976), a pioneer in the study of these factors, began to develop models of cultural dimensions.

Evaluation of documents

From the search results, relevant studies on cultural factors influencing ICT and Internet adoption were selected based on the following criteria: language, type of document and specific inclusion criteria related to the topic of study (Sampieri, Collado & Baptista, 2014; Guirao Goris, 2015; Snyder, 2019) (see Table 2).

Table 2. Document selection criteria

Idiom	Type of document	Inclusion criteria
English and spanish	<ul style="list-style-type: none"> Articles Books Books chapters Conferences documents Tesis 	<ul style="list-style-type: none"> Cultural factors that influence the ICTs adoption and the Internet Cultural factors that predominates in urban, semi-urban and rural areas regarding the adoption of ICTs and the Internet Cultural models and theories applied in the study of the ICTS adoption and the Internet

Source: developed by the author.

For the selection of documents, there were two reviews: the first one consisted of reading the titles, summaries, results and conclusions, which made it possible to identify the documents that met the established inclusion criteria; the second one consisted of a critical reading of the documents, with the intention of discarding irrelevant articles and confirming the acceptance of those that contributed to the objective of this study.

Critical reading was based on answering the following questions: do the cultural factors studied and identified in the paper focus on the adoption of ICTs and the internet? Does the paper expose the methodology, theory or reference model used to identify the cultural factors that influence the adoption of ICTs and the internet? Does the paper show the ICTs or internet uses under study? Are the results relevant to the objective of this literature review? And, are the results relevant to the objective of this literature review? If the answer was yes, the paper was selected.

Data analysis

The selected documents were analyzed in two phases: in the first phase, bibliometric data were reviewed, such as categorization of publications per country, year of publication, type of document, references cited and author; in the second phase, scientific production was examined in terms of the following items: cultural factors that influence ICT and internet adoption, theories and cultural models applied, as well as the identification of divides in the field of research. Based on this, an Excel document was prepared with the following fields: author(s), year of publication, type of ICT or internet use, reference cultural model or theory, relevant findings, country in which the study was carried out, field of study (rural, urban), field and method of study. This made it possible to organize the information and therefore ease data processing.

Results

The Scopus search resulted in 129 documents published from 1997 to 2020, 12 relevant documents of which were selected, based on the criteria described above; 9 relevant documents were identified in Google Scholar. In total, there were 21 documents associated with the research topic, of which 17 are articles, three are conference papers and one is a thesis.

Tables 3 and 4 show a summary of the analysis performed, specifying the factors or cultural dimensions identified that influence the use of ICTs and the internet, the type of information technologies and the internet under study, the theory or cultural model of reference, the country, the setting (urban, rural) and the field of study. The bibliometric data of the selected documents are displayed in table 1, which shows the years in which the publications were generated, from 2004 to 2020, as well as the number of publications per year, reflecting an average of one publication per year. The highest number of publications (three) corresponds to 2008, while in 2006, 2013, 2015 and 2020 two publications were generated per year, and in the rest only one publication per year. In addition, the number of citations of the publications is shown, data obtained through the query made in Google Scholar on July 5, 2021. The average citation of the documents is 159 citations per year, and the highest citation of publications was observed in 2006 and 2009.

Table 3. Scopus Search Results

Author /Year	ICT and Internet type	Theory or cultural reference model	Relevant findings	Place of study	Scope of study	Field of study
Gengatharen 2008	E-commerce adoption	Hofstede's cultural dimensions model	The “collectivist” dimension in rural areas is decisive in sustaining internet portals	Australia	Rural-Urban	Small and medium sized enterprises (SMEs)
Moghadam & Assar (2008)	Adoption of TIC and Internet	Hofstede's cultural dimensions model	Predominant dimensions were individualism and masculinity for the student group and employees	Iran	Urban	Students and employees
Lean, Zailani, Ramayah & Fernando (2009)	Adoption of e-government services	Technology acceptance model, dissemination of innovation theory, Hofstede's	it is disclosed that there was no influence of cultural factor that avoids uncertainty in the adoption of e-services	Malaysia	Urban	Internet users

Author /Year	ICT and Internet type	Theory or cultural reference model	Relevant findings	Place of study	Scope of study	Field of study
		cultural dimensions model.				
Tsatsou (2012)	Internet adoption	Hofstede's cultural dimensions model	The cultural factors of long-term or short-term orientation, and to a lesser degree uncertainty avoidance are shown to be relevant in Internet adoption	Greece	Urban	Internet users and non-users
Ayouby, Croteau & Raymond (2013)	Internet adoption	Orthogonal cultural identification theory	Ethnic identification(values) seems to be more ingrained in individuals than culture at the national level, which is reflected in individuals' abstention from adopting a new technology	Jordan	Rural	Community dwellers

Author /Year	ICT and Internet type	Theory or cultural reference model	Relevant findings	Place of study	Scope of study	Field of study
Takieddine & Sun (2015)	Internet banking dissemination and adoption	Hofstede's cultural dimensions model	Countries belonging to a cultural group with high power distance, masculinity, uncertainty avoidance and low individualism have lower rates of Internet banking dissemination as well as Internet access	European countries	Urban	Individual
Stump & Gong (2016)	Adoption of social networks	Hofstede's cultural dimensions model	Individualism and masculinity have a significant impact on technology adoption levels	Countries in the Americas, Asia, Africa and Europe	Urban	Individual

Author /Year	ICT and Internet type	Theory or cultural reference model	Relevant findings	Place of study	Scope of study	Field of study
Mapeshoane & Pather (2016)	E-commerce adoption	Unified theory of technology acceptance and use.	A new dimension regarding adoption related to national culture was identified: masculinity, type of business ownership and purchase orientation are factors that attenuate e-commerce adoption in SMEs in the tourism sector	South Africa	Urban	Companies
Chou, Li & Ho (2018)	Mobile commerce adoption	Unified Theory of Technology Acceptance and Use and Hofstede's Cultural Dimensions Model.	Power distance has an interaction effect with social influence, and a negative relationship with social influence on behavioral intention to use mobile commerce	Taiwan	Urban	Individual

Author /Year	ICT and Internet type	Theory or cultural reference model	Relevant findings	Place of study	Scope of study	Field of study
Blagoev & Shustova (2019)	Internet banking adoption	Hofstede's cultural dimensions model	Individualism plays an important role in most cases of Internet banking adoption	European countries	Urban	Individual
Sabri, Hakim & Zaila (2020)	ICT implementation and adoption	Hofstede's cultural dimensions model	The low uncertainty avoidance factor affects universities' readiness to employ ICT. The factors femininity, power distance, long-term orientation, and individualism have a positive effect on university students' readiness to implement ICT applications	Saudi Arabia	Urban	University students
Sharma, Singh &	Internet banking adoption	Unified Theory of Technology Acceptance and Use and	Uncertainty avoidance dampens the influence of performance expectancy and facilitating	Fiji, South Pacific	Urban	Individuals

Author /Year	ICT and Internet type	Theory or cultural reference model	Relevant findings	Place of study	Scope of study	Field of study
Sharma (2020)		Hofstede's Cultural Dimensions Model.	conditions on Internet banking adoption			

Table 4. Search results in Google Scholar

Author(s)/Year	Type of ICT and Internet	Theory or Cultural Reference Model	Relevant Findings	Place of study	Scope of study	Object of study
Yong (2004)	ICT Adoption	Technology Acceptance Model and Hofstede's Model of Cultural Dimensions	ICT use and acceptance occurs in cultures with low hierarchical distance, low control of uncertainty and individualistic cultures	Mexico	Urban	University population
Ford & Kotzé (2005)	Use of interfaces	Hofstede's Cultural Dimensions Model	High power distance, high uncertainty avoidance, masculinity, and short-term orientation would provide a more usable interface	South Africa	Urban	University students

Author(s)/Year	Type of ICT and Internet	Theory or Cultural Reference Model	Relevant Findings	Place of study	Scope of study	Object of study
Erumban & De Jong (2006)	Adoption of ICTs	Hofstede's cultural dimensions model	The dimensions of high power distance and uncertainty avoidance appear to be the most important dimensions and have shown the lowest ICT adoption rates	52 countries	Urban	Individuals
Van Biljon (2006)	Cell phone usage	Hofstede's cultural dimensions model and Baumgartner's cultural dimensions model.	The cultural dimensions involved in the use of a cell phone have been found to be: technology development, uncertainty, family orientation and the newly identified constructs, independence from care, independence to explore and solve problems, and	South Africa	Rural-urban	University students

Author(s)/Year	Type of ICT and Internet	Theory or Cultural Reference Model	Relevant Findings	Place of study	Scope of study	Object of study
			efforts to maximize time and technology			
Van Biljon & Kotzé (2008)	Adoption and use of mobile telephony	Hofstede cultural dimensions model and Baumgartner's cultural dimensions model.	The group of responses were significantly correlated and clustered into new variables: technology development, uncertainty, family orientation, and the newly identified constructs, independence from care, independence to explore and solve	South Africa	Rural-urban	University students

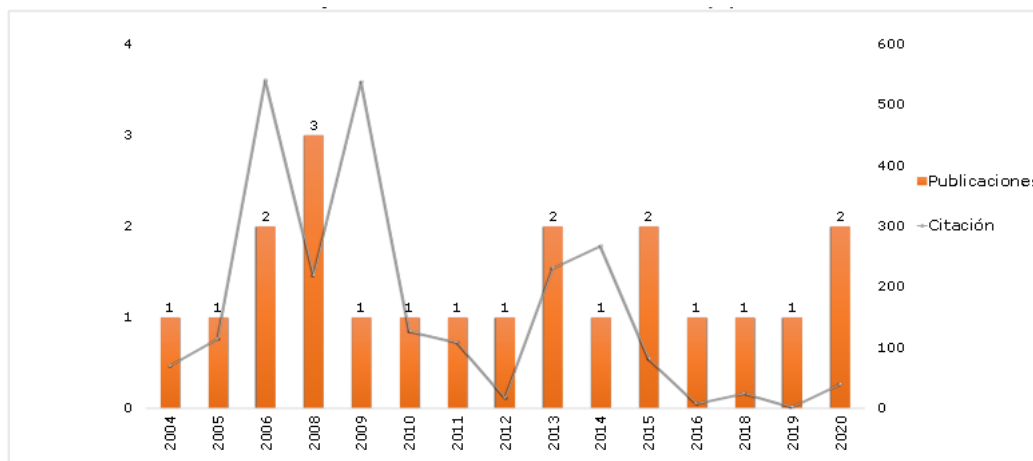
Author(s)/Year	Type of ICT and Internet	Theory or Cultural Reference Model	Relevant Findings	Place of study	Scope of study	Object of study
			problems, and efforts to maximize time and technology			
Valera, Tovar y Chaparro (2010)	Use of ICTs	Technology Acceptance Model and Hofstede's Cultural Dimensions Model	There is no significant relationship between the indices of hierarchical distance and ICT use of teachers/managers and students, and a very weak correlation is suggested between individualism/collectivism and ICT use	Mexico	Urban	University teachers, managers and students

Author(s)/Year	Type of ICT and Internet	Theory or Cultural Reference Model	Relevant Findings	Place of study	Scope of study	Object of study
		Hofstede Cultural Dimensions Model				
Al-Hujran, Al-dalahmeh & Aloudat (2011)	Adoption of e-Government Services	Technology Acceptance Model and Hofstede's Cultural Dimensions Model	Power distance and uncertainty avoidance had a significant impact on citizens' intention to adopt e-government. The other three cultural dimensions that had no impact are individualism, masculinity, and long-term orientation	Jordan	Urban	Citizens

Author(s)/Year	Type of ICT and Internet	Theory or Cultural Reference Model	Relevant Findings	Place of study	Scope of study	Object of study
Lee, Trimi & Kim (2013)	Cell phone adoption	Hofstede's cultural dimensions model	Individualistic cultures tend to seek information on their own from direct, formal sources, whereas in collectivistic cultures people rely more on the subjective assessment of an innovation conveyed by other like-minded people who have adopted it	United States and South Korea	Urban	Individuals
Ashraf, Thongpapanl & Auh (2014)	E-commerce adoption	Technology Acceptance Model and Hofstede's Cultural	The predominant cultural dimensions in Pakistan were: high uncertainty avoidance, followed by power distance; in Canada: high individualism and masculinity	Pakistan and Canada	Urban	University students

Source: self-preparation.

Graphic 1. Publications and citation by year



Source: self-preparation.

Graphic 2 shows the researchers who have studied the impact of cultural factors on the use of ICTs and the internet (the production of studies by each author was one document per year). The researchers with the highest number of citations in their publications are Lean *et al.* (2009), with 538 citations, followed by Erumban & De Jong (2006), with 495 citations.

Graphic 3 shows the scientific production by geographical area, where it can be seen that the largest number of publications was generated in South Africa (four), followed by Jordan (two), Mexico (two) and European countries (two).

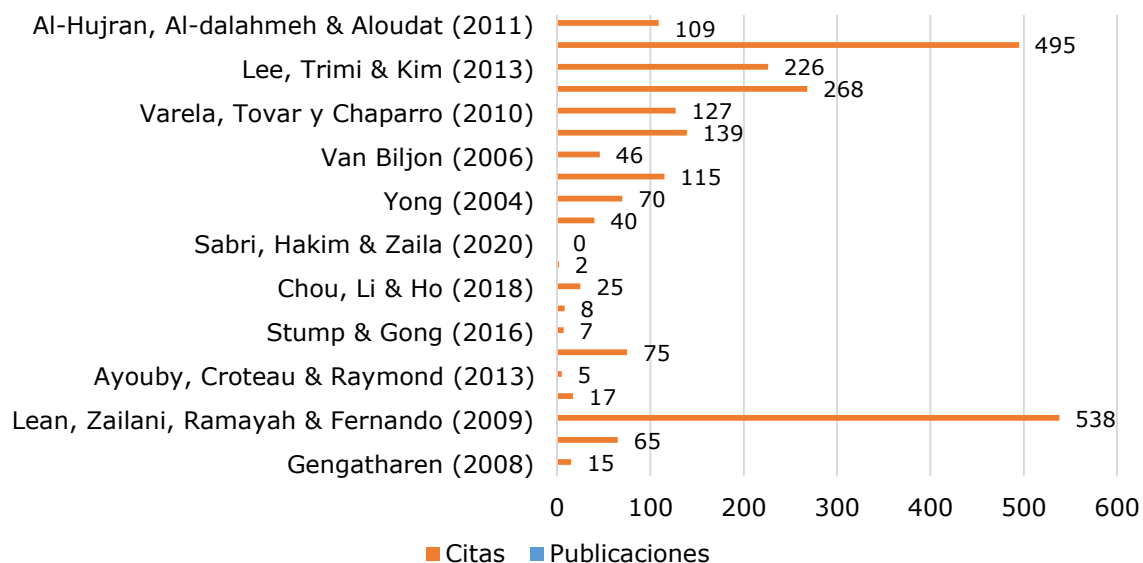
Cultural factors impacting the adoption of ICTs and internet

Of the total studies reviewed, 81% presented data from urban areas, 14% from rural-urban areas, and 5% from rural areas. The main technological devices and internet uses mentioned in the publications were: the ICT group in general (24%), e-commerce (19%), internet banking (14%), cell phone (14%), electronic administrative services (10%), social networks (5%) and the use of interfaces (5%) (see Graphic 4).

According to the data, 81% of the publications explored only the cultural dimension of uncertainty avoidance, 76% individualism vs. collectivism, 67% power

distance, 48% masculinity vs. femininity, 38% long-term vs. short-term orientation, 10% technological development, 5% indulgence vs. restraint and 5% on time perspective.

Graphic 2. Publications and citations by author

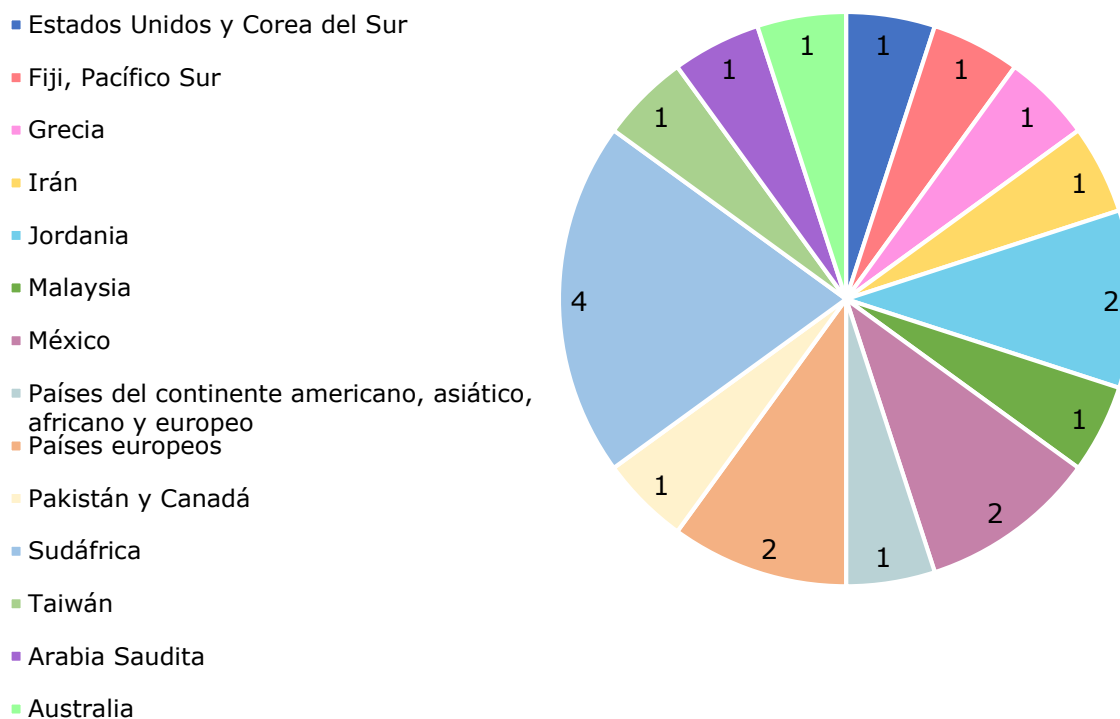


Source: self-preparation.

It was also found that 90% of the publications used Hofstede's cultural dimensions' model as a reference, 24% the technological acceptance model, 14% the unified theory of acceptance and use of technology, 10% Baumgartner's cultural dimensions, 5% the orthogonal identification theory and 5% the Diffusion of Innovation Model. For this, 62% of the authors developed and applied questionnaires to collect the information, 29% based their study on the analysis of the indicators generated in the survey conducted by Hofstede at the country level, and 9% conducted semi-structured interviews.

The studies involved the participation of company employees, teachers, managers and university and graduate students, as well as residents of different countries. For the above reasons, cultural dimensions vary from one place to another (Carter & Weerakkody, 2008).

Graphic 3. Publications by country



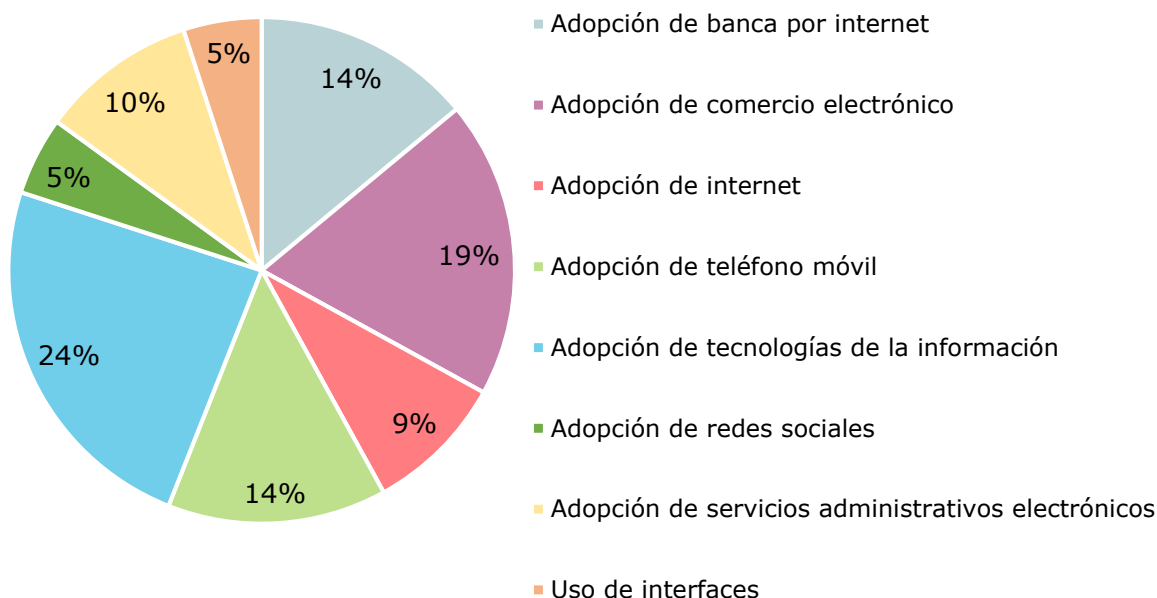
Source: self-preparation.

Discussion of results

The cultural dimension “uncertainty avoidance” is identified as the most studied by the researchers, which is consistent with the review made by Leidner & Kayworth (2006); however, the authors detect other predominant cultural dimensions in the use of ICT and internet that have not been observed in the present research: technological development, indulgence in the face of restriction, and time perspective.

Table 5 shows the cultural dimensions that were studied in order to identify their influence on the adoption of ICTs and the Internet, as well as the number of studies that conclude that these dimensions have an impact on the use of ICTs.

Graphic 4. Technological variables and the internet



Source: self-preparation.

Although certain study regions reviewed in this research have similar characteristics, the predominant cultural dimensions vary from one environment to another, so the effect on the use or non-use of ICTs may change, a theory that is consistent with that mentioned by Carter & Weerakkody (2008).

Conclusions

The purpose of this research was to identify the cultural factors that influence the adoption of ICTs and the internet, as well as the divides in the academic literature. In response, it was found that the cultural dimension called “uncertainty avoidance” has the greatest impact on digital inclusion in rural and urban areas, followed by the dimensions “power distance”, “individualism” and “masculinity”. This finding, added to the

consideration of the sociodemographic characteristics of a region, it may be useful for people who are responsible for developing initiatives or public policies aimed at reducing the digital divide, which will allow digital inequality to decrease considerably.

Table 5. Cultural dimensions that influence the adoption of ICTs and the Internet

Cultural dimensions	Studies that conclude a significant	Theory or cultural model of reference
Uncertainty avoidance	8	Hofstede's cultural dimensions model
High uncertainty avoidance	2	
Low uncertainty avoidance	1	
Power distance	4	
High power distance	2	
Low power distance	2	
Individualism	8	
Masculinity	6	
Long or short term orientation	1	

Cultural dimensions	Studies that conclude a significant	Theory or cultural model of reference
Short term orientation	1	
Long term orientation	1	
Colectivism	2	
Efforts to maximize time and technology	2	Hofstede's Cultural Dimensions Model / Baumgartner's Cultural Dimensions Model
Assistance independence	2	
Independence to explore and solve problems	2	
Technology development	2	Baumgartner's cultural dimensions model
Familiar orientation	2	
Femininity	1	Hofstede's cultural dimensions model

Cultural dimensions	Studies that conclude a significant	Theory or cultural model of reference
Ethnic identification (values)	1	Orthogonal cultural identification theory

Source: self-preparation.

Most of the studies reviewed explored the cultural factors that predominate in individuals and organizations, which have a defined educational profile, which implies that the cultural dimensions detected are limited to a particular profile; however, these may vary due to the characteristics of other groups or communities under study.

In addition, it is observed that the studies analyzed were conducted in urban and rural areas, although no studies focused on semi-urban or intermediate density areas were identified. This poses a future challenge to generate research in these types of areas in order to explore the cultural dimensions that influence the adoption of ICTs and the internet, and contribute to the effectiveness of strategies, initiatives and public policies focused on reducing the digital divide.

In addition to the speed of current technological and cultural changes, this research found that 43% of the articles analyzed date back more than ten years, which shows the need to generate new research aimed to identify current cultural dimensions, analyzes how popular culture converges with mass media, and study the effect of this on ICT and internet adoption and usage patterns (Jenkins, 2006), in order to contribute to the development of efficient and effective strategies to reduce the digital divide and at the same time promote economic progress in areas lagging behind in technology.

REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. Ajzen, I. (ed.), *Organizational behavior and human decision processes*, 50(2) (pp. 179-211). <https://doi.org/10.4135/9781446249215.n22>

- Al-Hujran, O.; Al-dalahmeh, M. & Aloudat, A. (2011). The role of national culture on citizen adoption of eGovernment services: An empirical study. *Electronic Journal of E-Government*, 9(2), 93-106.
- Alam, K.; Erdiaw-Kwasie, M. O.; Shahiduzzaman, M. & Ryan, B. (2018). Assessing regional digital competence: Digital futures and strategic planning implications. *Journal of Rural Studies*, 60(March), 60-69. <https://doi.org/10.1016/j.jrurstud.2018.02.009>
- Ashraf, A.; Thongpapanl, N. y Auh, S. (2014). The application of the technology acceptance model under different cultural contexts: The case of online shopping adoption. *Journal of International Marketing*, 22(3), 68-93.
- Ayouby, R.; Croteau, A. M. & Raymond, L. (2013). Impact of cultural influences on Internet adoption. *Hawaii International Conference on System Sciences*, 2842-2851. <https://doi.org/10.1109/HICSS.2013.258>
- Banco Mundial. (2014). *Tecnologías de la Información y las comunicaciones: resultados del sector*. Banco Mundial. <https://www.bancomundial.org/es/results/2013/04/13/ict-results-profile>
- Banco Mundial. (2019). *Desarrollo digital*. Banco Mundial. <https://www.bancomundial.org/es/topic/digitaldevelopment/overview>
- Belloch, C. (2012). *Las Tecnologías de la información y comunicación en el aprendizaje*. Departamento de Métodos de Investigación y Diagnóstico En Educación. Universidad de Valencia.
- Blagoev, V. & Shustova, E. (2019). The National Culture Effect on the Adoption of Internet-Banking. *Economic Studies*, 28(6).
- Carter, L. & Weerakkody, V. (2008). *E-government adoption : A cultural comparison*. 10, 473-482. <https://doi.org/10.1007/s10796-008-9103-6>
- Chamorro, T. (2016). Las dimensiones culturales de Geert Hofstede y la intención emprendedora en estudiantes universitarios del departamento del Quindío (Colombia). *Pensamiento & Gestión*, (41), 60-90.
- Chou, Y. H. D.; Li, T. Y. D. & Ho, C. T. B. (2018). Factors influencing the adoption of mobile commerce in Taiwan. *International Journal of Mobile Communications*, 16(2), 117-134. <https://doi.org/10.1504/IJMC.2018.089754>
- Codina, L. (2018). *Revisiones bibliográficas sistematizadas: procedimientos generales y Framework para Ciencias Humanas y Sociales* (tesis de máster). Departamento de Comunicación. Universitat Pompeu Fabra.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, 13(3), 319-339. <https://doi.org/10.2307/249008>

- Domínguez, M. M. (2018). Acceso y uso de tecnologías de la información y comunicación en México: factores determinantes. *PAAKAT: Revista de Tecnología y Sociedad*, 8(14). <https://doi.org/10.32870/pk.a8n14.316>
- Erumban, A. A. & de Jong, S. B. (2006). Cross-country differences in ICT adoption: A consequence of Culture? *Journal of World Business*, 41(4), 302-314. <https://doi.org/10.1016/j.jwb.2006.08.005>
- Ford, G. & Kotzé, P. (2005). Designing usable interfaces with cultural dimensions. *Lecture Notes in Computer Science*, 3585, 713-726. https://doi.org/10.1007/11555261_57
- Foro Económico Mundial. (2019). ¿Qué son las TICs? *Foro Económico Mundial*. <https://es.weforum.org/agenda/2019/02/que-son-las-tics/>
- Gengatharen, D. E. (2008). Interpreting the success and failure of regional internet community portals in promoting e-commerce adoption by SMEs : A cultural perspective. *Journal of Systems and Information Technology*, 10(1), 56-71. <https://doi.org/10.1108/13287260810876894>
- Giménez, G. (2001). Cultura, territorio y migraciones. Aproximaciones teóricas. *Alteridades*, 11(22), 5-14. <https://www.redalyc.org/articulo.oa?id=74702202>
- Grant, M. J. & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal*, 26(2), 91-108. <https://doi.org/10.1111/j.1471-1842.2009.00848.x>
- Guirao Goris, S. J. A. (2015). El artículo de revisión. *Utilidad y tipos de revisión de literatura*, 9(2). <http://revista.enfermeriacomunitaria.org/articuloCompleto.php?ID=7.Consultadoel23/07/2008>
- Hall, E. T. (1976). *Beyond Culture*. New York: Anchor Book.
- Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context. *Online Readings in Psychology and Culture*, 2, 1-26. <https://doi.org/https://doi.org/10.9707/2307-0919.1014>
- Idiegbeyan-Ose, J.; Nkiko, C.; Idahosa, M. & Nwokocha, N. (2016). Digital divide: Issues and strategies for intervention in Nigerian libraries. *Journal of Cases on Information Technology*, 18(3), 29-39. <https://doi.org/10.4018/JCIT.2016070103>
- Instituto Federal de Telecomunicaciones (IFT). (2016). *Adopción de las TIC y usos de internet en México*. México: IFT.
- Instituto Federal de Telecomunicaciones (IFT). (2018). *Comunicado de prensa. Estudio sobre adopción de las TIC y usos de internet en México*. México: IFT.
- Instituto Nacional de Estadística y Geografía (INEGI). (2017). *Encuesta Nacional Sobre*

Disponibilidad y Uso de Tecnologías de la Información en los Hogares (ENDUTIH) 2017. INEGI.

Instituto Nacional de Estadística y Geografía (INEGI). (2019). *Encuesta Nacional sobre Disponibilidad y Uso de Tecnologías de la Información en los Hogares (ENDUTIH) 2019.* INEGI. <https://www.inegi.org.mx/programas/dutih/2019/>

Instituto Nacional de Estadística y Geografía (INEGI). (2020). *Estadística a propósito del día mundial del internet.* INEGI. https://www.inegi.org.mx/contenidos/saladeprensa/aproposito/2020/eap_internet_20.pdf

Jenkins, H. (2006). *Convergence-Culture.* New York: New York University Press.

Jenkins, H. & Ito, M. (2015). *Participatory culture in a networked era: A conversation on youth, learning, commerce, and politics.* Cambridge, UK: John Wiley & Sons.

Kirkman, B. L.; Lowe, K. B. & Gibson, C. B. (2006). A quarter century of culture's consequences: A review of empirical research incorporating Hofstede's cultural values framework. *Journal of International Business Studies*, 37(3), 285-320. <https://doi.org/10.1057/palgrave.jibs.8400202>

Laforet, S. & Li, X. (2005). Consumers' attitudes towards online and mobile banking in China. *International Journal of Bank Marketing*, 23(5), 362-380. <https://doi.org/10.1108/02652320510629250>

Lean, O. K.; Zailani, S.; Ramayah, T. & Fernando, Y. (2009). Factors influencing intention to use e-government services among citizens in Malaysia. *International Journal of Information Management*, 29(6), 458-475. <https://doi.org/10.1016/j.ijinfomgt.2009.03.012>

Lee, S. G.; Trimi, S. & Kim, C. (2013). The impact of cultural differences on technology adoption. *Journal of World Business*, 48(1), 20-29. <https://doi.org/10.1016/j.jwb.2012.06.003>

Leidner, D. E. & Kayworth, T. (2006). Review: A review of culture in information systems research: Toward a theory of information technology culture conflict. *MIS Quarterly: Management Information Systems*, 30(2), 357-399. <https://doi.org/10.2307/25148735>

Mao, E.; Srite, M.; Bennett Thatcher, J. & Yaprak, O. (2005). A research model for mobile phone service behaviors: Empirical validation in the U.S. and Turkey. *Journal of Global Information Technology Management*, 8(4), 7-28. <https://doi.org/10.1080/1097198X.2005.10856406>

Mapeshoane, T. J. & Pather, S. (2016). The adoption of E-commerce in the Lesotho tourism industry. *Electronic Journal of Information Systems in Developing Countries*, 75(1), 1-24. <https://doi.org/10.1002/j.1681-4835.2016.tb00550.x>

- Baumgartner, V. J. (2003) *A Practical Set of Cultural Dimensions for User-Interface Analysis and Design* (doctoral dissertation). http://www.mavas.at/val/education05_thesis00_Asp
- Martínez-Domínguez, M. & Mora-Rivera, J. (2020). Internet adoption and usage patterns in rural Mexico. *Technology in Society*, 60. <https://doi.org/10.1016/j.techsoc.2019.101226>
- Martínez-Domínguez, M. (2018). Acceso y uso de tecnologías de la información y comunicación en México: factores determinantes. *PAAKAT: Revista de Tecnología y Sociedad*, 8(14). <http://dx.doi.org/10.32870/Pk.a8n14.316>
- Miraz, M. H.; Ali, M. & Excell, P. S. (2017). Cultural, economic and societal impacts on users' behaviour and mobile broadband adoption trends. *ArXiv*, 1(1).
- Moghadam, A. H. & Assar, P. (2008). The relationships between national culture and E-adoption: A case study of Iran. *American Journal of Applied Sciences*, 5(4), 369-377. <https://doi.org/10.3844/ajassp.2008.369.377>
- Morales, K. F.; Casarín, A. V. & Salas, L. M. (2015). Apropiación tecnológica: Una visión desde los modelos y las teorías que la explican. *Perspectiva Educacional, Formación de Profesores*, 54(2), 109-125.
- Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura (UNESCO). (2021). Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura. <http://www.unesco.org/new/es/Mexico/work-areas/culture>
- Organization for Economic Cooperation and Development (OECD). (2020). Digital Economy 2020. OECD. <https://doi.org/10.1787/bb167041-en>
- Park, S. (2017). Digital inequalities in rural Australia: A double jeopardy of remoteness and social exclusion. *Journal of Rural Studies*, 54, 399-407. <https://doi.org/10.1016/j.jrurstud.2015.12.018>
- Philip, L.; Cottrill, C.; Farrington, J.; Williams, F. & Ashmore, F. (2017). The digital divide: Patterns, policy and scenarios for connecting the 'final few' in rural communities across Great Britain. *Journal of Rural Studies*, 54, 386-398.
- Placencia, G. L. (2014). Programa "Mi Compu.Mx": Alfabetización digital para todos. *Revista Iberoamericana de Producción Académica y Gestión Educativa*, 1(2).
- Reisdorf, B. C., Blank, G. & Dutton, W. H. (eds.). (2019). Internet Cultures and Digital Inequalities. In *Society and the Internet: How Networks of Information and Communication are Changing Our Lives* (pp. 80-85). United Kingdom: Oxford University Press.
- Rogers, E. M. (ed.). (2003). *Diffusion of innovations*. New York: Simon and Schuster.
- Sabri, O.; Hakim, T. & Zaila, B. (2020). The role of hofstede dimensions on the readiness

- of iot implementation case study: Saudi universities. *Journal of Theoretical and Applied Information Technology*, 98(16), 1-12.
- Salemink, K.; Strijker, D. & Bosworth, G. (2017). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. *Journal of Rural Studies*, 54, 360-371.
- Sampieri, R. H.; Collado, C. F. & Baptista, M. D. (2014). *Metodología de la investigación Sexta Edición*.
- Schwartz, S. H. (1999). A Theory of Cultural Values and Some Implications for Work. *Journal of Developmental Entrepreneurship*, 48(1), 23-47. <https://doi.org/10.1111/j.1464-0597.1999.tb00047.x>
- Sharma, R.; Singh, G. & Sharma, S. (2020). Modelling internet banking adoption in Fiji: A developing country perspective. *International Journal of Information Management*, 53(June). <https://doi.org/10.1016/j.ijinfomgt.2020.102116>
- Siyal, M. Y.; Chowdhry, B. S. & Rajput, A. Q. (2006). The adoption of E-commerce by overseas Sindhis: An empirical study. *2006 Innovations in Information Technology, IIT*. <https://doi.org/10.1109/INNOVATIONS.2006.301912>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104(March), 333-339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Stump, R. L. & Gong, W. (2016). Social networking sites: An exploration of the effect of national cultural dimensions on country adoption rates. *12th International Conference on e-Business, Proceedings; Part of 12th International Joint Conference on e-Business and Telecommunications*. <https://doi.org/10.5220/0005509002330245>
- Sunkel, G. (2006). *Las tecnologías de la información y la comunicación (TIC) en la educación en América Latina: una exploración de indicadores (No. 125)*. United Nations Publications.
- Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, 22, 960-967.
- Takieddine, S. & Sun, J. (2015). Internet banking diffusion: A country-level analysis. *Electronic Commerce Research and Applications*, 14(5), 361-371. <https://doi.org/10.1016/j.elerap.2015.06.001>
- Trompenaars, F. (1996). Resolving international conflict: Culture and business strategy. *Business strategy review*, 7(3), 51-68. <https://doi.org/10.1111/j.1467-8616.1996.tb00132.x>
- Tsatsou, P. (2012). The Role of Social Culture in Internet Adoption in Greece: Unpacking “I Don’t Want to Use the Internet” and Frequency of Use. *Information*

- Society*, 28(3), 174-188. <https://doi.org/10.1080/01972243.2012.670190>
- Van Biljon, J. A. (2006). *A model for representing the motivational and cultural factors that influence mobile phone usage variety* (doctoral dissertation). University of South Africa, Pretoria. <http://hdl.handle.net/10500/2149>
- Van Biljon, J. & Kotzé, P. (2008). Cultural Factors in a Mobile Phone Adoption and Usage Model. *Journal Of Universal Computer Science*, 14(16), 2650-2679.
- Van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34(4-5), 221-235. <https://doi.org/10.1016/j.poetic.2006.05.004>
- Varela, L. A. Y.; Tovar, L. A. R. & Chaparro, J. (2010). Modelo de aceptación tecnológica (TAM): Un estudio de la influencia de la cultura Nacional y del perfil de los usuarios en el uso de las TIC. *INNOVAR. Revista de Ciencias Administrativas y Sociales*, 20(36), 187-203.
- Venkatesh, V.; Thong, J. Y. L.; Chan, F. K. Y.; Hu, P. J. H. & Brown, S. A. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. *Information Systems Journal*, 21(6), 527-555. <https://doi.org/10.1111/j.1365-2575.2011.00373.x>
- Warnier, J. P. (2001). *La mundialización de la cultura*. Editorial Abya Yala.
- Yong, L. A. (2004). Modelo de aceptación tecnológica (TAM) para determinar los efectos de las dimensiones de cultura nacional en la aceptación de las TIC. *Revista Internacional de Ciencias Sociales y Humanidades, SOCIOTAM*, 1(1). <http://www.redalyc.org/pdf/654/65414107.pdf>