# Multi-Country Analysis of E-commerce Adoption: The Impact of National Culture and Economic Development

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## *Abstract*

**Background:** *The effect of national culture on e-commerce adoption and usage has yet to be thoroughly examined. This multi-country study examines the influence of Hofstede's cultural dimensions on e-commerce adoption. It also explores the moderating effect of economic development on the relationships between national culture factors and e-commerce adoption.*

**Method:** *Secondary data, collected from reputable organizations on sixty countries, are used to test the hypotheses. Correlation, linear regression, cluster analysis, and ANOVA were used to assess the hypotheses presented in the model.*

**Results:** *The data supported our hypotheses on the direct relationships between national culture factors namely power distance, individualism, long term orientation, and indulgence, and e-commerce adoption. The regression analysis showed that individualism is the most important of all culture factors. The results also indicated that power distance and individualism have different impact on e-commerce adoption, depending on the level of economic development.*

**Conclusions**: *This study contributes to the growing empirical base of literature on e-commerce and national culture. It validated the importance of a cultural perspective in explaining e-commerce adoption at the national level. It also demonstrated the importance of economic development and its role in shaping the relationships between national culture and e-commerce.*

**Keywords**: E-Commerce Adoption, National Culture, Cross-Country, Indulgence, Economic Development.

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## Introduction

In the last decade the diffusion rate of electronic commerce (e-commerce) across countries was significant, but still did not meet expectations. A variety of reports predicted higher levels of adoption in previous years than the actual achieved numbers. Further, the rates of e-commerce adoption vary significantly across countries (Chevalier, 2021; Ding et al., 2017; Keenan, 2021; Postnord, 2014). One possible explanation for this uneven rate of adoption is due to the differences in the meaning and value attributed to technologies among people, depending on their socio-cultural attitudes (Coccia, 2014; Hallikainen & Laukkanen, 2018). Hofstede (1984, 2001) has shown that differences in values and attitudes influence the way people interact with, and make use of, their environment. Thus, within a specific society, these socio-cultural values might influence the perceptions of the citizens in a way that affects their usage decisions. In fact, different cultures react differently to new products and technological innovations making cultural differences an important factor in the evaluation of technologies (Mou & Cohen, 2015; Švarc et al., 2019).

Existing research in Information Systems (IS) has highlighted the importance of national culture on the adoption of different technologies (Capece et al., 2013; Gupta et al., 2021; Hallikainen & Laukkanen, 2018; Khan et al., 2020; Kummer et al., 2016; Lee et al., 2013; Song et al., 2017; Waseem et al., 2019). In e-commerce research, it has been noted that the effect of national culture on e-commerce adoption and usage has yet to be thoroughly examined (Hallikainen & Laukkanen, 2018; Sohaib et al., 2019). The existing literature falls short when it comes to presenting a comprehensive culturally-based interpretation of the differences in e-commerce usage rates across countries of different cultures. This paper investigates the effect of national cultural dimensions on the adoption of e-commerce in sixty countries. We also argue that the impact of national culture on e-commerce adoption is moderated by the economic development of the country. By doing this, we bridge a significant gap in the extant literature.

Most countries consider e-commerce a significant tool for economic growth (Ahluwalia & Merhi, 2020; Alsaad & Taamneh, 2019; Hallikainen & Laukkanen, 2018). Unfortunately, e-commerce adoption at the global level remains quite low (Chevalier, 2021). Many studies point to below average e-commerce adoption in several countries (Chevalier, 2021; Ecommerce News, 2014; Keenan, 2021; Postnord, 2014). Zhu and Thatcher (2010) assert that e-commerce adoption rates vary among different countries, with regions exhibiting significant variations. According to Statista, the e-commerce share of Asia-Pacific was 51% of the global retail and is expected to reach 61% by 2025 (Coppola, 2021). According to earlier report by Statista (Coppola, 2021), e-commerce sales accounted for only 2.2% of the total retail sales in India. Other countries have different numbers in the same report. For instance, in China and South Korea, e-commerce sales accounted for 23.1% and 16% of the total retail sales respectively. Disparities exist even within the same continent or the same group (developed vs. emerging) of nations (Chevalier, 2021). In Europe, of the populace between 15 and 79, those shopping online ranged from less than 40% in Italy to more than 80% in the United Kingdom (Postnord, 2014). Chevalier (2021) reported that the share of e-commerce of total retail sales is only 19.1% in the UK, 12.6% in Denmark, and 7.9 in Germany. A 276.9% increase in worldwide cross-border e-commerce is anticipated in 2021 compared to 2014 (Keenan, 2021). The total retail e-commerce sales worldwide are expected to reach $4.9 trillion by the end of 2021 (Keenan, 2021). Fifty seven percent of online shoppers make purchases from overseas retailers. The question then arises, "Does national culture have any influence on e-commerce?" Researchers have recently called for papers to investigate the impact of national culture on e-commerce because of the scarcity of such research in the existing literature (Capece et al., 2013; Hallikainen & Laukkanen, 2018; Lee et al., 2013). This research answers these calls.

The existing research that investigated the impact of national culture on e-commerce is based on data collected from individuals (Abumalloh et al., 2020; Belkhamza & Wafa, 2014; Al Kailani

& Kumar, 2011; Karahanna et al., 2013; Kim et al., 2016; Qu et al., 2015; Smith et al., 2013). Hofstede defines culture as "the collective programming of the mind which distinguishes the members in one human group from another" (Hofstede, 1991, p. 21). Based on this definition, we argue that in order to truly examine the impact of national culture on e-commerce, country level data are needed, because a large number of participants is required to accurately measure a cultural characteristic of a nation; otherwise, the results would be biased. Another issue with the existing research is the generalization of the results. Generalization of the results reported in the existing research that examined the influence of national culture on e-commerce adoption is rather limited because of methodological constraints: studies that examine national culture and e-commerce adoption consider data from one country or at best a limited number of countries. We use data from a larger sample size in this study and thus overcome this limitation.

Our paper seeks to overcome the limitations in the extant literature by (1) examining the impact of national culture on e-commerce adoption using country level secondary data, and by (2) generating a significantly robust sampling frame comprising sixty countries in order to improve the generalizability of the findings. The countries included in this study are from different continents, cultural backgrounds, and levels of economic development. This study attempts to answer the following two research questions: Does national culture impact e-commerce adoption? Does the level of economic development have any impact on the relationships between national cultural factors and e-commerce adoption? To explore the possible relationships between national culture and e-commerce, we used sets of secondary data published by reputable organizations such as World Economic Forum (specifically from "The Global Information Technology Report," 2016), Hofstede, and World Bank.

This paper also distinguishes itself from the extant literature in investigating the influence of all six factors proposed by Hofstede. Extant literature examined the impact of national culture on e-commerce with the main focus on Uncertainty Avoidance (Al Kailani & Kumar, 2011; Karahanna et al., 2013). Third, this study not only investigates the direct linear relationships between national cultural factors and e-commerce adoption, but it also assesses the impact of economic development on these relationships. Zhao et al. (2014) found that economic development moderates the relationships between some of the GLOBE cultural dimensions and e-government adoption. In this study, we explore whether economic development moderates the relationships between Hofstede cultural dimensions and e-commerce adoption.

Besides contributing to the scholarly literature, cross-cultural research including this paper, is very important and has implications for practical use. Globalized e-commerce has made it easy for people from different countries to buy and sell online. This means that organizations are more challenged than ever when it comes to acquiring new market while keeping their existing customers. This wider market created by the globalization has customers from different ethnicities, cultures, beliefs, etc. Thus, in order to attract more customers, practitioners need to understand the impact of cultural factors on the individuals' decisions to adopt e-commerce or not (Karahanna et al., 2013).

The remainder of this paper is organized as follows: Section 2 provides a brief background on e-commerce adoption and national culture. Section 3 explains the research model and research hypotheses. Section 4 describes the data. Section 5 explains the analysis and results. Section 6 discusses the results found in the paper. Section 7 summarizes the paper's implications for both research and practice. Finally, section 8 concludes the paper by noting the paper's limitations and identifying opportunities for future research.

# E- commerce Adoption and National Culture

Kalakota and Whinston (1996) define e-commerce as "the delivery of information, products/services, or payments via telephone lines, computer networks or any other means." Treese and Stewart (1998) define e-commerce more generally as the "use of the global Internet for purchase and sale of goods and services, including services and support after the sale." Electronic commerce has several advantages over the brick and mortar retail marketplace. Consumers can purchase products without having to travel to the stores, saving time and money, and they have access to a wider selection of products. They can make transactions from anywhere with anyone around the globe. A comparison between e-commerce and brick and mortar shopping reveals various convenience advantages associated with e-shopping; namely search convenience, which is defined as "products easy to find and compare" (Kaufman-Scarborough & Lindquist, 2002), possession convenience, time convenience, and schedule convenience (Pavlou & Gefen, 2004).

It is expected that global e-commerce will increase by 27.6% and reach $5 trillion (Cramer-Flood, 2021). International organizations tracking e-commerce sales have reported significant diversity in growth rates among different nations. For instance, it was expected that e-commerce sales would reach 14.4% of all US retail spending in 2020 and will reach a 19.2% by 2024 (E-Marketer, 2021). These studies have also reported significant diversity in percentage of retail e-commerce sales in different countries and regions. For instance, in the retail e-commerce sales growth, Latin American nations will have an increase of 36.7% while Middle Eastern and African nations will only have 19.8% increase by 2024 (E-Marketer, 2021). According to Euromonitor International, Asia Pacific's e-commerce sales are expected to nearly double by 2025 reaching $2 trillion (Euromonitor, 2021).

As mentioned earlier, e-commerce adoption varies significantly among countries. Even though some researchers have looked into the causes for international divergences in adoption of e-commerce, there is a lack of empirical studies that examine the factors underlying such divergences (Ahluwalia & Merhi, 2018; Merhi & Ahluwalia, 2017). Researchers have investigated different factors that may be causing this disparity (Ahluwalia & Merhi, 2020; Merhi & Ahluwalia, 2015; Zhu & Thatcher, 2010). National culture was found to be an important factor that influences the adoption rate of various other technologies, therefore, it may affect e-commerce adoption as well. Researchers have recently called for papers to investigate the impact of national culture on e-commerce because of the scarcity of such research in the existing literature (Capece et al., 2013; Hallikainen & Laukkanen, 2018; Lee et al., 2013).

National culture has been defined in different ways in the extant literature. Kroeber and Parsons (1958) define culture as "transmitted and created content and patterns of values, ideas, and other symbolic-meaningful systems as factors in the shaping of human behavior and the artifacts produced through behavior." Hall (1976) has stated that beliefs and values indicate the way people think, behave, solve problems, make decisions, and even organize their economic, political, and transportation systems. On the other hand, Hofstede defines culture as "the collective programming of the mind which distinguishes the members in one human group from another" (Hofstede, 1991, p. 21).

With the exception of Gong (2009), studies that examined the impact of national culture on e-commerce adoption are based on data from a single country (Capece et al., 2013; Kim et al., 2016; Yoon, 2009) or few countries (Belkhamza & Wafa, 2014; Karahanna et al., 2013; Qu et al., 2015; Smith et al., 2013; Sohaib & Kang, 2014). All these studies collected primary data from individuals using questionnaires. Gong (2009) is perhaps the only study that investigated the impact of national culture using secondary data. Nevertheless, these research studies are valuable because they illuminate various significant factors that are important for e-commerce adoption. A succinct review of this literature is provided next. Table 1 also summarizes the relevant literature.

| Table 1 - Relevant Literature Review | | | | |
|---|---|---|---|---|
| **Authors** | **Objective** | **Count of Country(ies)** | **Type of Analysis** | **Findings** |
| Gong (2009) | Investigate the impact of national culture on the diffusion process of business-to-consumer e-commerce using Hall's cultural classifications and Hofstede's framework | 58 | independent samples *t*-test and nonparametric correlation analyses | High-context and polychronic cultures are more conducive to the adoption and diffusion of e-commerce |
| Yoon (2009) | Explore the effect of national culture on consumer acceptance of e-commerce in China using Hofstede's cultural dimensions as moderators. | 1 | PLS-SEM | - Uncertainty avoidance and long-term orientation had moderate impact on the relationship between trust and intention to use - Masculinity had a moderate effect on the relationship between perceived usefulness and intention to use and the relationship between perceived ease of use and intention to use. <br> - Power distance and individualism had no effect on any of the relationships |
| Capece et al. (2013 | Investigate the role of culture on consumers' acceptance of e-commerce in Italy by employing Hofstede's cultural dimensions as moderators to TAM | 1 | Pearson Correlation | - Power distance and individualism affect the relationship between trust and intention to use e-commerce in Italy. <br> - Masculinity, uncertainty avoidance and long-term orientation have no effect on the diffusion of e-commerce |
| Karahanna et al. (2013) | Examine the impact of Hofstede's cultural dimension of uncertainty avoidance on consumer perceptions of e-loyalty. | 38 | PLS-SEM | Uncertainty avoidance moderates the effects of information quality on perceived usefulness, and of trust on e-loyalty, but not system quality relationships |
| Smith et al. (2013) | Examine the role of culture in influencing online shopping use, comparing differences across three countries: Germany, Norway, and the United States | 3 | PLS-SEM | - The TAM held for the U.S. but the relationships did not hold for Germany and Norway <br> - Cognitive involvement influences perceived usefulness and perceived ease of use <br> - Affective involvement does not influence behavior intention in Germany |

| Table 1 - Relevant Literature Review | | | | |
|---|---|---|---|---|
| **Authors** | **Objective** | **Count of Country(ies)** | **Type of Analysis** | **Findings** |
| Belkhamza & Wafa (2014) | Understand how e-commerce is being adopted in two different countries: Malaysia and Algeria, and how uncertainty avoidance makes a difference on this adoption | 2 | Regression | - Uncertainty avoidance was found to influence the relationship between perceived usefulness and attitude, but not on the relationship between subjective norm and attitude<br>- No influence of uncertainty avoidance on the relationship between subjective norm and intention |
| Qu et al. (2015) | Explore how a country's social trust impacts the use of open and closed B2B e-commerce | 27 | Logistic regression | Social trust in a country promotes the use of open B2B e-commerce, but it impedes the use of closed B2B e-commerce |
| Kim et al. (2016) | Examine the impact of national culture on consumer acceptance of e-commerce in Russia using Hofstede's cultural dimensions as moderators to TAM | 1 | PLS-SEM | Did not report the results |

Interesting and mixed results were found in previous studies that examined the impact of national culture using survey data. Yoon (2009) examined the moderating impact of national factors on the relationships between perceived usefulness, perceived ease of use, and trust using data collected from the Chinese. Yoon found that (1) uncertainty avoidance and long-term orientation had moderate effects on the relationship between trust and intention to use e-commerce, and (2) masculinity also had a moderating effect on the relationship between perceived usefulness and intention to use e-commerce and the relationship between perceived ease of use and intention to use. Power distance and individualism were found to have no significant effect on the relationship between trust and intention to use e-commerce. Capece et al. (2013) replicated the same study in Italy and found the opposite results. Power distance and individualism were found to have significant effects on the relationship between trust and intention to use e-commerce, whereas the other factors did not have any significant impact as was found in the Yoon (2009) study. Kim et al. (2016) also attempted to replicate the same model in Russia, but did not report the results of their Structural Equation Modeling (SEM) test.

Belkhamza and Wafa (2014) examined the impact of uncertainty avoidance on e-commerce adoption using data collected from Malaysia and Algeria. They found that uncertainty avoidance moderates the relationships between perceived usefulness, subjective norm, attitude, and intention to use e-commerce. In a study that investigated the impact of uncertainty avoidance and perceived risk on e-commerce in the USA, Jordan, and India, Al Kailani and Kumar (2011) found that uncertainty avoidance and perceived risk negatively impact e-commerce adoption. Karahanna et al. (2013) collected data from 3500 consumers from 38 countries and found that uncertainty avoidance moderates the relationships between information quality and perceived usefulness, and between trust and e-loyalty. Smith et al. (2013) examined the effect of ease of use, perceived usefulness, cognitive, and affective involvement on e-commerce in Germany, Norway, and the U.S.A. They found that cognitive

involvement influences perceived usefulness and perceived ease of use in all three countries, but the relationship between affective involvement and behavioral intention does not hold in Germany. Using content analysis and Hofstede's and Hall's cultural factors, Sohaib and Kang (2014) examined 64 websites from Pakistan and Australia and found that the e-commerce websites somehow reflect the cultural environment that surrounds the online consumers.

Gong (2009) is the only international study that used secondary data to examine the impact of national culture on e-commerce diffusion. Gong based her study on Hall's cultural classification and the uncertainty avoidance score collected by Hofstede. Hall (1976) argues that culture is a unidimensional construct in which countries are categorized into two groups: high vs. low context. In high context countries, individuals attempt to collect facts personally from closed networks before making a decision, whereas in low context countries, individuals tend to do a search (probably from the Internet) to get information. Hall (1976) also argues that culture is based on individuals' attitude towards time (monochromic vs. polychromic). In a monochromic culture, individuals tend to do things in a structured and organized manner (step by step) and finish each step on time, whereas in a polychromic culture, individuals tend to do multiple tasks simultaneously, without taking into consideration the deadlines. Using these categorizations, Gong (2009) found that high-context and polychromic cultures are more favorable to the adoption and diffusion of e-commerce than low-context and monochromic cultures. She also found an unexpected finding, which is a significant positive impact of uncertainty avoidance on e-commerce adoption. Gong (2009) used time-series secondary data (1999-2006) collected from different international organizations. Data from 58 countries were used in this study. The adoption rate of e-commerce for each country is calculated as the compound average growth rate of the ratio of B2C e-commerce revenue over the GDP measure. Gong called for more research to examine the impact of Hofstede's national cultural dimensions on e-commerce adoption in order to gain deep insights into the relationships that exist between these variables. To our best knowledge, no study has answered this call.

## Research Model and Hypotheses

This study is an extension of the culture-based research that has focused on information technology (IT) adoption and usage (Gong et al., 2007; Merhi, 2018; Merhi & Ahluwalia, 2015), which found that a decision to adopt a technology is influenced by the social, cultural and perceived values of the individuals within a society. IS researchers (e.g. Hernandez-Ortega et al., 2017) have identified cultural values as one of the influential factors in technology usage and concluded that national culture influences and shapes the shared values of the people. Studies that examined the effect of national culture on technology adoption have either used Hofstede's cultural model or the GLOBE (House et al., 2004) model. The concept of culture adopted and used in this paper is based on Hofstede's framework because it is simpler, intuitive and more familiar than the GLOBE Study (Hadwick, 2011; House et al, 2004).

Hofstede suggests that people share a collective national character that represents their cultural mental programming, which shapes values, beliefs, assumptions, expectations, perceptions, and behavior. Hofstede's model has received a great deal of attention from scholars (Gong, 2009; Hallikainen & Laukkanen, 2018; Smith et al., 2013). Based on a survey of more than 72 countries, Hofstede presented four dimensions, namely: Power Distance, Uncertainty Avoidance, Individualism/Collectivism, and Masculinity/Femininity. Later, two other dimensions were added: Long-Term Orientation/Short Term Orientation and Indulgence/Restraint. This model and in particular these dimensions of national culture are often used by academics, consultants, and management groups to help sort out and understand differences between national cultures, particularly when considering technology adoption at a national level (Bagchi et al., 2004; Erumban & De Jong, 2006; Gong et al., 2007; Kovačić, 2005).

Hofstede's model has been criticized mainly because the data were collected from only one organization (Lim et al., 2006). Despite the limitations of this model, researchers have found it to represent broad differences in national cultures and to help in understanding how various members of different societies behave in given situations (Smith et al., 2013). Researchers from many disciplines have replicated Hofstede's empirical results and used his cultural dimensions (Akinduko et al., 2017; Gong, 2009; Hallikainen & Laukkanen, 2018; Karahanna et al., 2013; Merhi, 2018; Merhi & Ahluwalia, 2015; Merkin, 2006; Mladenović et al., 2017). We adopted and used Hofstede's model in this study for several reasons:

- It offers the most robust measurements of national cultures, and its dimensions are considered the most discriminating factors between countries (Gong et al., 2007).
- It has been validated and found to be useful for numerous studies across many disciplines (Bagchi et al., 2004; Blodgett et al., 2008).
- It links national cultural dimensions to communication practices, which is central to this study (Sørnes et al., 2004).
- Our results can be compared to those of earlier studies in order to validate relationships or call for future research to advance the body of knowledge.

We now explain each studied dimension of national culture and its expected relationship with e-commerce adoption.

## *Power distance (PDI)*

PDI is defined as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (Hofstede, 1991, p. 27). This simply refers to the ability of individuals to accept an unequal distribution of power among members of their society (House et al. 2002). In other words, PDI shows the extent to which a society accepts inequality among its people by the classification of the citizens concerning authority, control, standing, rank, and wealth (House et al., 2004). This is expressed by hierarchical and centralized decision structures, authority, and application of formal rules (Shore & Venkatachalam, 1996). For this reason, the use of formal rules from top level to low level is often used as one of the main characteristics for categorizing how individuals deal with each other in countries with high PDI.

Nations with low PDI tend to have decentralized decision-making, citizens who are more participative, and hierarchical decision structures do not exist (Garfield & Watson, 1997). Citizens of societies with low PDI tend to be individualistic while nations with a low power distance demonstrate collectivistic qualities (Hofstede, 2001). Generally, low PDI cultures tend to have individuals who embrace IT because they consider it to be in line with their perceptions of power distribution (Bandura, 1986). Erumban and De Jong's (2006) and Warkentin et al. (2002) found that power distance is among the most vital cultural factors in determining new technology adoption rates at the country level. While IT adoption tends to be accepted in predominately low power distance nations, these same low power distance nations tend to be more innovative (Shane, 1992). For example, Capece et al. (2013) found PDI to have a moderating effect on the relationship between trust and e-commerce adoption in Italy, which is a low PDI country. Based on these arguments, we postulate that:

**Hypothesis 1**: PDI is negatively related to e-commerce adoption.

## *Individualism vs. Collectivism (IDV)*

Individualism "pertains to societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family" (Hofstede, 1991, p.51). Individuals in societies high in IDV tend to pay more attention to their personal lives than to the group. It is noticed that the autonomy is high in societies that have high IDV scores.

Individuals in these countries tend to adopt and use new technologies because of the desire to do things individually.

Collectivism "pertains to societies in which people from birth onwards are integrated into strong, cohesive groups, which throughout people's lifetimes continue to protect them in exchange for unquestioning loyalty" (Hofstede, 1991). Individuals in societies low in IDV consider the group (extended family, community, association, etc.) as the main source of their identity. They also believe that the obligations and group harmony come before their personal and individual objectives (Coccia, 2014; Hyun et al., 2020). Thus, using something new can be contrary to the prevailing group norm; therefore, individuals of societies low in IDV tend to not use new technologies.

One of the advantages of e-commerce is convenience and independency. Consumers can buy products from anywhere at any time. They do not have to check if the store in the neighborhood has an item or not. For this reason, we expect societies with high IDV to adopt and use e-commerce more than those societies with low IDV. Consequently, we hypothesize:

   **Hypothesis 2:** IDV is positively related to e-commerce adoption.

## Masculinity vs. Femininity (MAS)

Societies with high MAS scores are those where "men are supposed to be assertive, tough and focused on material success; women are supposed to be more modest, tender and concerned with the quality of life" (Hofstede et al., 1998). This is a dichotomous score: a high MAS score indicates that a culture emphasizes MAS values and has very rigid gender roles and expectations, whereas a country with a low MAS score indicates that gender roles overlap, and both men and women are supposed to be modest, tender, and concerned with the quality of life.

Gong et al. (2007) noticed that technologies that depend on the Internet are more appropriate in the Feminine cultures because they facilitate information sharing and communication between people, groups and organizations. E-commerce is an Internet-based application that allows individuals to share information and to buy and sell freely online. Any person, regardless of gender, can use e-commerce to complete their transactions. Thus, one can expect this technology to be used more frequently in low MAS societies. Based on this brief discussion, we postulate:

   **Hypothesis 3**: MAS is negatively related to e-commerce adoption.

## Uncertainty Avoidance (UAI)

UAI refers to "the extent to which the members of a culture feel threatened by uncertain or unknown situations" (Hofstede, 1991, p. 13). It reflects the social norms, rules, and/or actions the members put in place in order to ease the ambiguity of future events. Societies with high UAI tend to not deviate from the status quo and prefer clear rules that formalize the structure of their life. Citizens in such countries are generally more resistant to changes in established patterns (Garfield & Watson, 1997; Merhi & Ahluwalia, 2017; Wu et al., 2013). Thus, they would tend to avoid or reduce the risk induced by the unknown.

UAI is one of the most prominent national cultural indicators of IT adoption rates in countries across the world (Al Kailani & Kumar, 2011; Belkhamza & Wafa, 2014; Karahanna et al., 2013). Societies with a low UAI culture are more willing to take risks and favor a more non-traditional lifestyle with an openness to innovation (Merhi, 2018). IT thrives in low uncertainty avoidance cultures, where authority is much more open to taking the risk (Khalil, 2011). Lower uncertainty avoidance cultures have adopted the new wave of technological innovation at a rate vastly

higher than high uncertainty avoidance cultures (Zhao, 2014). Members in high uncertainty avoidance cultures are less likely to adopt new technological advancements because of the uncertainty and ambiguity attached to it (Khalil, 2011). Based on this, we hypothesize that:

**Hypothesis 4**: UAI is negatively related to e-commerce adoption.

## Long-Term Orientation vs. Short Term Orientation (LTO)

Long-term orientation (LTO) stands for "the fostering of virtues oriented toward future rewards—in particular, perseverance and thrift" (Hofstede et al., 2010, p. 239). On the other hand, Short Term Orientation (STO) stands for "the fostering of virtues related to the past and present—in particular, respect for tradition, preservation of "face," and fulfilling social obligations" (Hofstede et al., 2010, p. 239). Societies high in LTO tend to develop long term plans that allow them to outperform the current and past phases. These societies tend to invest in technology that allows them to advance. They are also capable of adapting to the changes required by the new plans and the necessary technology more than STO societies (House et al., 2004). No study has examined the influence of LTO on e-commerce adoption.

E-commerce is a new way of doing business that allows organizations to expand beyond their geographical locations. It also allows customers to buy from different countries. One of the advantages of e-commerce is the increase of economic development within the country, since it helps in increasing the organizational revenues. For this reason, one can expect that societies with high LTO tend to adopt e-commerce because it is a new technology that helps them to improve their economy in the long term. At the same time, countries with low LTO will more likely stick to the old brick and mortar way of doing business. Based on these premises, we hypothesize that:

**Hypothesis 5**: LTO is positively related to e-commerce adoption.

## Indulgence vs. Restraint (IND)

Indulgence refers to "a society that allows relatively free gratification of basic and natural human desires related to enjoying life and having fun" (Hofstede, 2011, p. 15). In contrast, restraint refers to "a society that controls gratification of needs and regulates it by means of strict social norms" (Hofstede, 2011, p. 15). Countries with a high level of IND tend to use more technology than countries with a low level of IND (Hofstede, 2011). Researchers found that enjoyment has a positive impact of online shopping (Cheema et al., 2013). Thus, nations with high levels of IND are more likely to adopt and use e-commerce than those nations with low levels of IND. Based on this brief discussion, we postulate:

**Hypothesis 6**: IND is positively related to e-commerce adoption.

## Economic Development

In a recent report on information economy published by the United Nations (2017), it was found that there is a large disparity in e-commerce diffusion and adoption among developed and emerging nations. According to the most recent report, the economic development of a country has a large impact on this disparity. A nation's lack of economic development has been found to be a major hindrance when it comes to e-commerce adoption in many countries.

Researchers have found, for example, that lack of economic development is the main barrier for e-commerce diffusion and adoption in developing countries such as Indonesia (Rahayu & Day, 2017) and Rwanda (Uwamariya et al., 2015). The results of these studies are also consistent with the reports of the United Nations (2017) on information economy in which the economic development of a country is regarded as one of the major reasons to explain the

large disparity in e-commerce diffusion and adoption among developed and emerging nations. Hofstede (2001) found that many of his national cultural dimensions are correlated with national wealth, which means that national culture is impacted by economic factors. Tang and Koveos (2008) argue that changes in the economic conditions of nations are the source of cultural dynamics. They further found that national wealth, measured by GDP per capita, has a curvilinear relationship with three dimensions of Hofstede's culture model: power distance, individualism, and long-term orientation. Tang and Koveos (2008) also found that uncertainty avoidance and masculinity reflect stable institutional traditions that may not change over time.

In this study, we examine the influence of economic development on the relationships between national cultural dimensions and e-commerce adoption. We use Gross National Income (GNI) per capita as a measure for economic development. The reason for using GNI per capita and not GDP per capita is because GDP looks at the level of an economy produced inside the nation whereas GNI is the total dollar value of everything produced by a country and the income its residents receive from inside or outside the nation. Thus, GNI per capita is considered to be a better measure of economic well-being than GDP. We investigate the direct relationships between cultural dimensions and e-commerce adoption while positing that the level of economic development (GNI per capita) plays a moderating role in those relationships. Based on these arguments and the results of Tang and Koveos (2008), we postulate three hypotheses:

**Hypothesis 7a**: Economic Development moderates the effect of PDI e-commerce adoption.
**Hypothesis 7b**: Economic Development moderates the effect of IDV e-commerce adoption.
**Hypothesis 7c**: Economic Development moderates the effect of LTO e-commerce adoption.
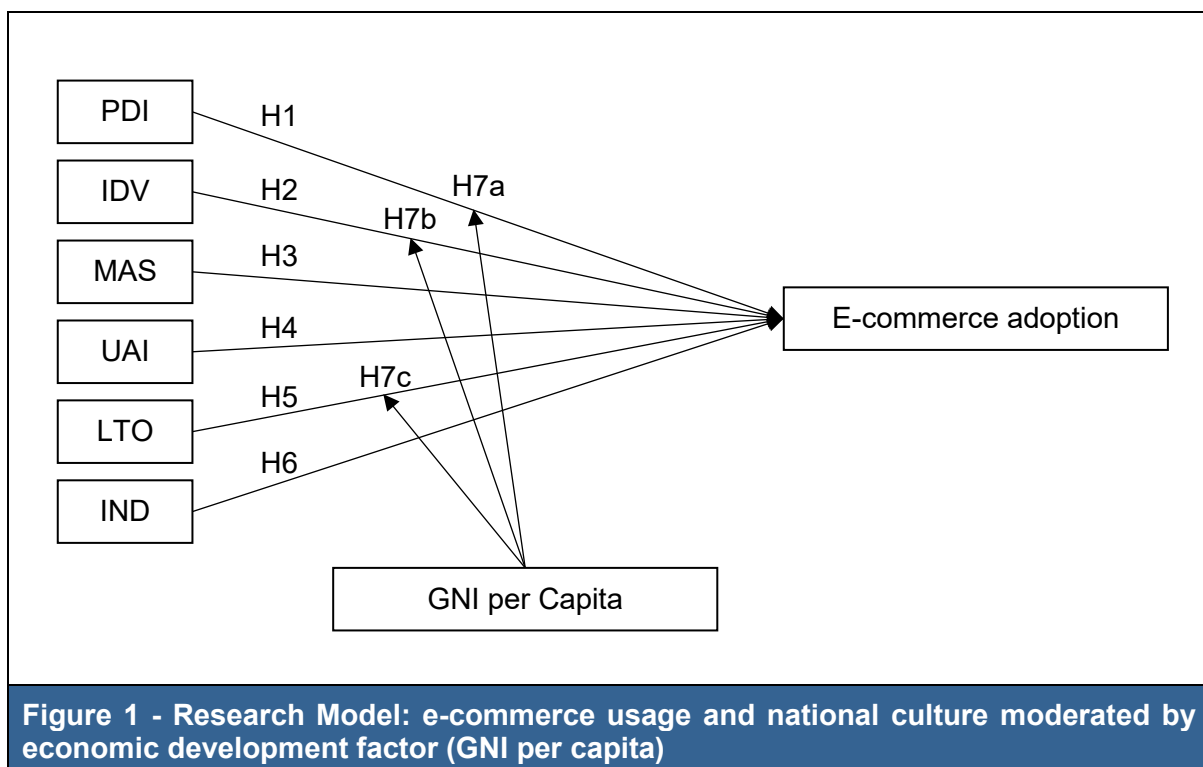
The hypotheses are depicted in Figure 1.



**Figure 1 - Research Model: e-commerce usage and national culture moderated by economic development factor (GNI per capita)**

## Data

This study examines the impact of national culture factors on e-commerce adoption at the global level. Thus, secondary data were considered most suitable to answer the research questions because of the difficulty and lack of resources to collect primary data. Although data for 139 countries are available for the dependent variable (e-commerce adoption), we were limited by the availability of the data on the culture factors. The final sample size used in this study is 60.

The data used in this study were obtained from three credible sources/organizations. Data The cultural dimensions were adopted directly from the Hofstede website (http://www.geert-hofstede.com). All six cultural dimensions are included in this study. E-commerce adoption rates were taken from "The Global Information Technology Report." GNI per capita was adopted from World Bank website. Table 2 includes all of the details on the variables used in this study, as well as their sources.

| Table 2 - Measures and Source | | |
| --- | --- | --- |
| **Variable** | **Measures** | **Data Source** |
| E-Commerce usage *(DV)* | Business-to-consumer Internet use | The Global Information Technology Report 2016: https://www.weforum.org/reports/the-global-information-technology-report-2016 |
| Cultural Variables *(IV)* | Power Distance (PDI); Individualism/Collectivism (IDV); Masculinity/Femininity (MAS); Uncertainty Avoidance (UAI); Long-Term Orientation (LTO); and Indulgence/Restraint (IND) | Hofstede website: https://geerthofstede.com/research-and-vsm/dimension-data-matrix/ |
| Economic Development *(MV)* | GNI per capita | World Bank: https://data.worldbank.org/indicator/NY.GNP.PCAP.CD |

**Note**: DV: dependent variable; IV: independent variables; MV: moderating variable.

E-commerce adoption was measured using the following question: In your country, to what extent do businesses use the Internet for selling their goods and services to consumers? The data of the culture factors are drawn from Hofstede's website. These indices have been used hundreds of times by researchers in the IS field. In 2001, Hofstede demonstrated the reliability and validity of his instrument by a thorough analysis of all cross-national studies published in a variety of disciplines that used his cultural scales. Therefore, this study adopted Hofstede's indices to measure the culture factors of the countries included in the study. Finally, the data of GNI per capita were collected from the WorldBank database.

## Data Analysis and Results

The data were analyzed by first executing descriptive analytic procedures and correlation analysis, followed by testing the hypotheses using SPSS software. Table 3 presents the results of the descriptive statistics of the variables. The results indicate that there is a good variability in the factors used in this study. Different countries from different levels of advancement and cultural background are included in this study. The results also indicate that the data are not abnormal based on the skewness and/or kurtosis measures.

| Table 3 - Descriptive Analysis | | | | | |
|---|---|---|---|---|---|
| **Variable** | **Mean** | **Std.** | **Variance** | **Skewness** | **Kurtosis** |
| PDI | 57.02 | 21.45 | 460.12 | .009 | -.321 |
| IDV | 46.70 | 23.95 | 573.81 | .128 | -1.255 |
| MAS | 50.67 | 21.11 | 445.65 | .024 | .449 |
| UAI | 64.42 | 23.66 | 559.60 | -.337 | -.555 |
| LTO | 50.23 | 23.05 | 531.20 | .228 | -.913 |
| IND | 47.78 | 22.16 | 491.26 | .157 | -.437 |
| GNI | 26062 | 21512 | 462781629 | -.279 | -1.141 |
| E-com | 6.12 | 2.01 | 4.018 | .871 | -.156 |

The correlation coefficient measures the strength and direction of the relationship between a pair of variables (Hair et al., 2010). Table 4 provides the results of the correlation test. The results show that PDI, IDV, LTO, IND, and GNI are significantly correlated with e-commerce in the direction as postulated. This confirms H1, H2, H5, and H6. All cultural variables, with the exception of MAS, are also significantly correlated with GNI.

| Table 4 - Correlation Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **E-com** | **PDI** | **IDV** | **MAS** | **UAI** | **LTO** | **IND** |
| E-com | | | | | | | |
| PDI | -.607*** | | | | | | |
| IDV | .602*** | -.630*** | | | | | |
| MAS | -.104$^{ns}$ | .194* | .014$^{ns}$ | | | | |
| UAI | -.173$^{ns}$ | .178* | -.157$^{ns}$ | .056$^{ns}$ | | | |
| LTO | .125*** | .044$^{ns}$ | 062$^{ns}$ | .012$^{ns}$ | .015$^{ns}$ | | |
| IND | .376*** | -.287** | .168 $^{ns}$ | .091$^{ns}$ | -.103$^{ns}$ | -.533*** | |
| GNI | .799*** | -.546*** | .561*** | -.054$^{ns}$ | -.326** | .025*** | .295** |

*** <0.001; **<0.05; *<0.10; ns: not significant

To further understand the relationships between the cultural dimensions and e-commerce adoption, we performed a regression analysis. The results are presented in Table 5. The regression analysis shows that LTO and IND have significant relationships with e-commerce adoption. Thus, H5 and H6 are confirmed. The data did not confirm the other relationships between PDI, IDV, MAS, UAI, and e-commerce adoption.

The results also show that the cultural factors collectively explain 76.7% ($R^2$=.767) of the variance of e-commerce adoption. This indicates the importance of the national cultural dimensions in explaining e-commerce adoption at the country level. Of all cultural variables, IND was found to have the highest coefficient (.028), which means that among all cultural dimensions, IND is the best predictor of e-commerce adoption at the country level.

| Table 5 - Regression Analysis: Culture and E-Commerce (n=60) | | | | | |
|---|---|---|---|---|---|
| **Variable** | **B** | **Std.Error** | **b** | **Sig.** | **VIF** |
| PDI | -.012 | .010 | -.121 | .229 | 2.035 |
| IDV | .013 | .008 | .150 | .130 | 1.948 |
| MAS | -.008 | .007 | -.088 | .235 | 1.113 |
| UAI | .008 | .006 | .093 | .213 | 1.123 |
| LTO | .024 | .007 | .271 | .003 | 1.493 |
| IND | .028 | .008 | .308 | .001 | 1.706 |
| | | | | | |
| $R^2$ | | .767 | | | |
| F | | 22.632*** | | | |

*** <0.001

In order to gain more insights into the relationships between national culture and e-commerce adoption by taking the variation of the economic development factor (GNI) into consideration, we performed a cluster analysis. This analysis yielded two groups: group 1 is composed of 22 countries and group 2 contains 38 countries. The list of the countries in each group is included in the Appendix. The results of the cluster analysis are very close to the classification by the World Bank (2018). One can notice that countries of group 1 have low level of income and development compared to those countries in group 2. Countries in group 2 are also more advanced and developed than countries in group 1. Table 6 includes the descriptive analysis of both groups.

| Table 6 - Group Differences Analysis | | | | | |
|---|---|---|---|---|---|
| **Variable** | **Group** | **Min** | **Max** | **Mean** | **Std.** |
| PDI*** | 1 | 45 | 104 | 70.86 | 15.676 |
| | 2 | 11 | 104 | 49.00 | 20.352 |
| | | | | | |
| IDV*** | 1 | 8 | 65 | 29.23 | 14.071 |
| | 2 | 12 | 91 | 56.82 | 22.715 |
| | | | | | |
| MAS[ns] | 1 | 34 | 83 | 52.32 | 12.800 |
| | 2 | 5 | 110 | 49.71 | 24.801 |
| | | | | | |
| UAI[ns] | 1 | 13 | 95 | 62.95 | 23.382 |
| | 2 | 8 | 112 | 65.26 | 24.084 |
| | | | | | |
| LTO[ns] | 1 | 13 | 93 | 46.76 | 24.056 |
| | 2 | 13 | 100 | 51.96 | 22.653 |
| | | | | | |
| IND[ns] | 1 | 0 | 97 | 42.58 | 23.408 |
| | 2 | 13 | 100 | 50.46 | 21.328 |
| | | | | | |
| GNI*** | 1 | 1510 | 11960 | 6618.18 | 3038.969 |
| | 2 | 12570 | 82330 | 37318.95 | 19436.308 |
| | | | | | |
| E-com*** | 1 | 2.33 | 8.15 | 4.1991 | 1.42344 |
| | 2 | 4.20 | 9.00 | 7.2250 | 1.34522 |

Group 1: 22 countries; group 2: 38 countries.
ANOVA significance level: *** <0.001; ns: not significant

To examine whether differences exist between the two groups, we performed an ANOVA analysis, which revealed that both groups have different levels of e-commerce adoption. As for the cultural dimensions, the ANOVA results indicate that these groups have a significant difference in PDI and IDV. A summary of the results of the hypotheses is presented in Table 7.

| Table 7 - Results | |
|---|---|
| **Hypothesis** | **Supported?** |
| **H1:** *Power Distance (PDI) is negatively related to e-commerce adoption.* | Yes |
| **H2:** *Individualism (IDV) is positively related to e-commerce adoption.* | Yes |
| **H3:** *Masculinity (MAS) is negatively related e-commerce adoption.* | No |
| **H4:** *Uncertainty Avoidance (UA) is negatively related to e-commerce adoption.* | No |
| **H5:** *Long-Term Orientation (LTO) is positively related to e-commerce adoption.* | Yes |
| **H6:** *Indulgence (IND) is positively related to e-commerce adoption.* | Yes |
| **H7a:** *Economic Development moderates the effect of PDI e-commerce adoption.* | Yes |
| **H7b:** *Economic Development moderates the effect of IDV e-commerce adoption.* | Yes |
| **H7c:** *Economic Development moderates the effect of LTO e-commerce adoption.* | No |

## Discussion

The results of this study indicate that six out of the nine postulated hypotheses are supported. The data confirmed that PDI is negatively related to e-commerce adoption. This relationship has not been tested before in e-commerce literature, so we are unable to compare our results to previous findings. Similar results, however, were found in a study on the effect of national culture on e-government usage (Merhi, 2018). Interestingly, the data of this study also confirmed the moderating effect of economic development on the relationship between PDI and e-commerce. The grouping of the nations based on the GNI per capita revealed two groups. The results suggested that there is a difference between wealthy and poorer nations. This finding concurs with the results of Tang and Koveos (2008). The negative effect of PDI means that e-commerce is adopted more in those countries with a low level of PDI than in those nations with a high level of PDI.

The data suggest that IDV is positively related to e-commerce adoption. No research has examined this relationship in e-commerce before. Yoon (2009) examined the moderating effect of IDV on the relationship between trust and e-commerce adoption and found no significant impact. Kovačić (2005) found a significant effect of IDV on e-government adoption. The results of the ANOVA analysis suggest that there is a difference between the two groups of nations identified by the cluster analysis. This finding concurs with the results of Tang and Koveos (2008) that the national wealth of a nation has a curvilinear relationship with IDV.

The data of this study failed to confirm the relationship between MAS and e-commerce adoption. Also, the group analysis did not indicate any differences between the groups. This is a new relationship explored in this study. Merhi (2018) failed to confirm a significant relationship between MAS and e-government usage. It is likely that gender does not matter in e-commerce. Nations of both high and low MAS use e-commerce equally.

The results also indicate that UAI has no impact on e-commerce. Extant literature reported mixed findings on this relationship. Using the score published by Hofstede, Gong (2009) found a significant relationship between UAI and e-commerce. Gong (2009) used a different variable for e-commerce adoption. Using survey data, Karahanna (2013) did not find a significant relationship between UAI and e-commerce adoption, however, Yoon (2009) found a significant direct effect of UAI on e-commerce adoption. Karahanna (2013) found a moderating effect of UAI on trust and e-commerce adoption. Similarly, Yoon (2009) and Belkhamza and Wafa (2014) found a moderating impact of UAI on the relationship between perceived usefulness and e-commerce adoption.

The data indicate that LTO is positively related to e-commerce adoption. The regression analysis showed that LTO is the second strongest predictor of e-commerce. This finding concurs with the results of Yoon (2009), who found that LTO has a huge impact on e-commerce adoption. Our study is the first to examine the influence of LTO on e-commerce using the secondary scores published by Hofstede. This is a great contribution to the literature. The results mean that nations with a high LTO tend to adopt e-commerce more than nations with a low LTO. The reason may be because high LTO nations believe that e-commerce will improve their economy in the long term.

Finally, the results show that IND is positively related to e-commerce. The regression analysis indicates that IND is the strongest predictor of e-commerce adoption. No prior study has examined the impact of IND on e-commerce. This is another contribution to the literature. Hofstede (2011) argues that countries with a high level of IND tend to use more technology than those who have a low level of IND. Cheema et al. (2013) found that enjoyment has a positive impact on online shopping. The findings of this study are in line with these previous studies. The results indicate that countries where the citizens enjoy using the technology and have more freedom of doing so adopt e-commerce more than citizens of low IND countries. This is may be because of the instant gratification that they feel when using e-commerce.

## Implications

### Implications for Practice

This study has important practical implications. First, organizations that are expanding and trying to sell their products to other countries will find the results of this study to be highly beneficial. The results found in this study indicate that these organizations should examine more than the socio-economic factors when studying the factors affecting their decisions to expand. It seems that the unique cultural and historical environment of a given country must be taken into account as one of the important influencers affecting e-commerce usage.

Secondly, the findings of this study provide insights for international institutions such as the World Bank, the United Nations, and other developmental institutions by providing a novel perspective for explaining some of the reasons behind uneven adoption of e-commerce in different countries. These organizations are donating huge resources for developing countries to develop and adopt technologies that can improve the economic status of these emerging countries. This study gives useful insights for the decision makers of these organizations, allowing them to invest some time on examining the culture in those countries and to make the needed changes to improve the adoption of e-commerce.

Thirdly, governments can set up effective and easy to use legal structures that can expeditiously arbitrate disputes arising from e-commerce transactions. Industries can devise their own mechanisms for deterring dishonest digital firms. For example, in the USA, the Better Business Bureau (BBB) allows consumers to file complaints against businesses and provide information to other consumers about the complaint-data. At the firm level, companies can clearly state and honor hassle free return policies and provide easy to use communication methods (i.e. telephone, email, mailing address) that consumers can use to seek help and request redress with trust.

Finally, our cluster analysis indicated that some cultural factors impact e-commerce adoption differently based on the economic development. This should also inform the decision makers of organizations, governments, and international institutions on ways to adjust their strategies based on the economic development of the country and the culture.

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## *Implications for Research*

This study offers a number of important contributions to cross-cultural and e-commerce research. First, the extant literature that examined the impact of national culture on e-commerce adoption is based on data from a single country (e.g. Capece et al., 2013; Kim et al., 2016) or few countries (e.g. Belkhamza & Wafa, 2014; Karahanna et al., 2013; Qu et al., 2015). These and other studies that examined culture and e-commerce have collected data from a number of individuals from countries. In this study, we used data collected from sixty countries. Thus, the results reported in this study are more robust and generalizable.

Second, this is the first study that investigates the impact of Hofstede's national cultural dimensions on e-commerce adoption at the country level. Gong (2009) is the only study that examined this topic using secondary data. Gong (2009) only examined the influence of UAI on e-commerce. Research in IS has shown that national culture impacts e-government usage (Kovačić, 2005; Merhi, 2018), but no one tested the impact of culture on e-commerce adoption. Thus, this study fills a gap in the literature by exploring, for the first time, the effect of PDI, IDV, MAS, LTO, and IND on e-commerce adoption.

Our third contribution relates to the investigation of the impact of economic development on the relationships between national culture and e-commerce. Zhao et al. (2014) examined the moderating effect of GNI on the relationship between GLOBE dimensions and e-government and found significant differences. This study is the first to examine the moderating impact of GNI on the relationship between national culture and e-commerce. It is also the first study that examines the moderating effect on Hofstede's dimensions, specifically on PDI, IDV, and LTO and any behaviors. Extant studies that used Hofstede's dimensions have always examined the direct linear relationships (Kovačić, 2005; Merhi, 2018).

## Limitations and Future Research

This study has certain limitations that are mainly attributed to the use of secondary data. Huge datasets, which cost resources and time, are required in order to empirically examine the effect of national culture on e-commerce in a multi-country setting. Thus, the outcomes reported in this study are confined to the data presented by Hofstede, the Global Information Technology Report, and the World Bank. Although Hofstede's cultural dimensions have been commonly used by researchers and appear to be the most appropriate cultural dimensions, scholars have criticized this model in two areas: (1) generalizability, because the data were gathered from a single organization - IBM; and (2) applicability, because the data may be out of date. However, it should be noted that the results found in the study are important because we made sure that the analysis fit the objective of the study. Many other researchers have also used these dimensions in different disciplines and especially in IS studies. This study should motivate future research on this topic. For instance, GLOBE is a fresher model of national cultural dimensions. Future research can use GLOBE's dimensions to examine their impact on e-commerce. Another limitation, which is also related to the data, is the small sample size. This limitation is due to the limited availability of data regarding cultural factors. To overcome this limitation, a new study on national culture should be done that includes more countries.

This study focused on the impact of national cultural dimensions on e-commerce adoption. We, therefore, used only national cultural factors. The results of this study showed that economic development factors can moderate the relationships between national culture and e-commerce usage. Future research should consider investigating the impact of trust on the relationships between cultural dimensions and e-commerce adoption.

## Conclusion

This study was motivated by the lack of empirical evidence regarding the relationships between national cultural dimensions and e-commerce adoption at the country-level. Using secondary data published by very reputable international organizations, the results of this study validate the importance of a cultural perspective in explaining e-commerce adoption at the national level. This is the first study that examines the impact of national cultural dimensions on e-commerce adoption at the country level. We investigated two types of relationships in this study: (1) the direct effect of national culture on e-commerce, and (2) the impact of economic development on the relationship between national cultural factors and e-commerce. For instance, the data showed that power distance and individualism have different impacts on e-commerce adoption, depending on a country's level of economic development. This study is expected to be useful for practitioners, especially those who deal with different cultures. In addition, this study contributes to the growing empirical base of literature on e-commerce and national culture.

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## Appendix

Group 1:
Argentina; Brazil; Bulgaria; China; Colombia; Ecuador; India; Indonesia; Iran; Jamaica; Malaysia; Mexico; Pakistan; Peru; Philippines; Romania; Russia; South Africa; Taiwan; Thailand; Turkey; Vietnam.

Group 2:
Australia; Austria; Belgium; Canada; Chile; Czech Rep; Denmark; Estonia; Finland; France; Germany; Great Britain; Greece; Hong Kong; Hungary; Ireland; Israel; Italy; Japan; Latvia; Lithuania; Malta; Netherlands; New Zealand; Norway; Poland; Portugal; Singapore; Slovak Rep; Slovenia; Spain; Sweden; Switzerland; Trinidad and Tobago; U.S.A.; Venezuela; UAE; South Korea.

## About the Authors

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