

Social Media and E-Commerce at the Global Level: Do ICT Access and ICT Skills Matter?

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ABSTRACT

The global proliferation of mobile devices coupled with the heightened use of social media has led to increasing levels of social interactions, electronic commerce, and the phenomena of social commerce. Whilst previous information systems literature has sought to examine the benefits and factors that influence e-commerce adoption at both the individual and firm level, studies on e-commerce adoption at the global level have seldom been undertaken. Furthermore, previous studies have failed to examine the mediating role social media use plays in examining the effects of ICT access and ICT skills on e-commerce. Founded on the technology-organization-environment framework, this study seeks to fill this gap by examining the effects of ICT access, ICT skills, and social media use on global e-commerce adoption on one hand and the mediating role of social media use on the other. The study relied on cross-sectional data from 135 countries globally for the year 2016. The data analysis using partial least square structural equation modelling (PLS-SEM) shows that ICT access, ICT skills, and social media use positively influence e-commerce adoption at the global level. Furthermore, social media use plays a significant role in mediating the influence of ICT access and ICT skills on e-commerce adoption. The results of this study provide fresh insights into the global adoption of e-commerce. The authors indicate some implications of the study for policy and practice.

KEYWORDS

E-Commerce, ICT Access, ICT Skills, Social Media

1. INTRODUCTION

Today's business environment has become dynamic due to the rapidly changing nature of our competitively digitalized world characterized by social media and electronic commerce (e-commerce). As a result of this dynamism, businesses that can change and adapt have a higher propensity to thrive (Rahayu & Day, 2015). Social media consists of Internet-based applications that rely on the idea and technological foundations of Web 2.0 which enables the creation and exchange of user-generated content (Kaplan & Haenlein, 2010). *E-commerce*, on the other hand, has been referred to as the buying and selling of goods services, and information over the Internet and the World Wide Web (Kroenke, 2011). E-commerce has brought sellers closer to their customers and thus, varied market

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dynamics and features. Both social media and e-commerce have been known to complement each other. For instance, social media may be used to support, improve, or complement traditional and online marketing activities as well as gather market intelligence through e-commerce by developing, marketing, and distributing products, communicating with customers, and also improving customer retention and relations (Abed, Dwivedi, & Williams, 2015). Through this complementarity, social media has enabled businesses to reach a large number of customers around the globe irrespective of their size through social media advertising and building of relationships (Saravanakumar and SuganthaLakshmi, 2012). All these are achievable through social commerce. *Social commerce* is the use of web 2.0 and social media technologies and infrastructure to create new business models for electronic commerce and support online interactions and user contributions to assist in the acquisition of products and services (Abed, Dwivedi, & Williams, 2015). Marketing strategies adopted through social commerce engage individuals who shop online through graphics, promotions, and personalized purchase choices. It is therefore not surprising that a lot of companies especially in the United States (US) were reported in 2018 to have adopted Facebook and Instagram for marketing purposes (Statista, 2019a). These supports the increasing number of businesses and consumers that engage in social commerce as a form of commerce mediated by social media (Grange, Benbasat, & Burton-Jones, 2020). Given these, Shen and Eder (2011) consider *social commerce* as the “technology-enabled shopping experiences where online consumer interactions while shopping provide the main mechanisms for conducting social shopping activities” (p. 20).

The increasing use of social media platforms coupled with the recent surge in the adoption and use of social commerce (Abed, 2020; Villa, Ruiz, Valencia, & Picón, 2018) has triggered the migration of businesses from traditional means of delivering goods and services to customers to modern electronic means. Thus, many businesses have gone electronic by investing in ICTs (Information and Communication Technologies) to “improve services, processes, business automation, and internal processing of business information and knowledge” (Awa et al., 2015, p. 573). The use of social e-commerce activities has become possible due to increasing access to ICTs, the digital literate nature of individuals especially in developed countries (Adam, Alhassan, & Afriyie, 2020; Lehner & Sundby, 2018), and the presence of social media platforms (Friedrich, 2016; Kim & Kim, 2018). However, the effects of these factors (i.e., ICT access, ICT skills) on e-commerce adoption especially at the global level has been under-investigated. A majority of studies conducted in the area of e-commerce adoption have either concentrated on the individual factors driving the adoption of e-commerce (Perez-Amaral, Valarezo, Rafael, Garín-mu, & Herguera, 2020; Horng & Wu, 2020) or the factors underpinning firms adoption of e-commerce (Ocloo, Xuhua, Akaba, Shi, & Worwui-brown, 2020; Susanty, Handoko, & Puspitasari, 2020; Yeng & Sin, 2020). It is similarly impossible to write off the essence of social media on the use of e-commerce adoption and therefore the need to examine the mediating effects of social media use on e-commerce adoption. This study intends to fill the gaps in the literature by relying on the foundations of the Technology-Organization-Environment framework to examine the effects of *ICT access*, *ICT skills* and *Social media use* on e-commerce at the global level as well as the mediating role of *Social media use*. Methodologically, we adopt partial least squares structural equation modelling and data drawn from multiple archival sources for 135 countries relating to the year 2016. The study seeks to answer the research questions below;

- i. What are the effects of ICT access, ICT skills, and social media use on e-commerce adoption?
- ii. What are the mediating effects of social media use on the linkages between ICT access, ICT skills, and e-commerce adoption?

“In the remaining sections, we present the theoretical background and develop a research model and its related hypotheses. We then present the research methodology where we outline the details of data collection, analysis, and results in sections 3, and 4. This is followed by the discussion of the findings and the conclusions.

2. THEORY AND HYPOTHESES DEVELOPMENT

This study relied on the foundations of the Technology-Organization-Environment framework (TOE). Developed by Depietro, Wiarda, and Fleischer (1990), the TOE framework seeks to explain the process through which an organization adopts and implements technological innovations. According to the TOE framework, the ability of a firm to adopt and successfully implement technological innovations is determined by its technological, organizational, and environmental contexts. These contexts are regarded as the constructs of the TOE framework”.

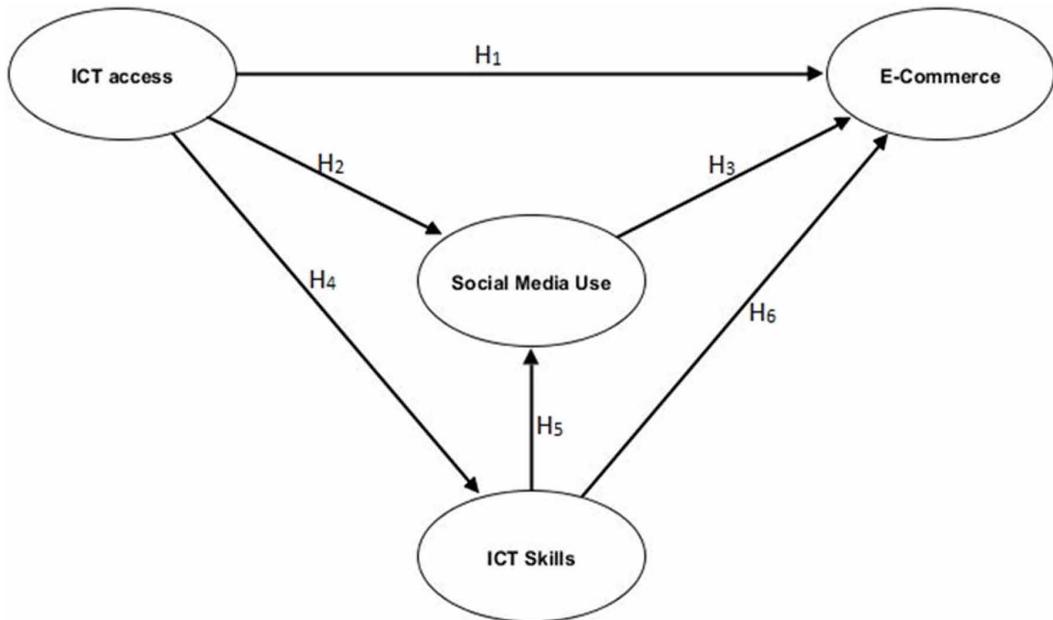
First, the *technological context* encompasses the internal and external technologies that are important to the firm. These internal and external technologies may include equipment and processes. Second, the *organizational context* relates to the features and resources of the firm. These include the size of the firm, managerial structure, degree of formalization, among others. Lastly, the *environmental context* encompasses variables such as the firm’s competitors, the size and structure of the industry, the regulatory environment, and the macroeconomic context (Depietro et al., 1990). These constructs together present “both constraints and opportunities for technological innovation” (Depietro et al., 1990, p. 154). That is, the *technology*, *organization* and *environment* constructs determine the way a firm considers the need for new technologies and adopt it.

“The TOE framework has been adopted and applied by past studies in the field of information systems to expatiate on several phenomena in areas spanning *electronic data interchange adoption* (Lee, Ainin, Dezdar, & Mallasi, 2015; Musawa & Wahab, 2012; Vesela, 2017), *cloud computing adoption* (Gangwar, Date, & Ramaswamy, 2015; Raut, Gardas, Jha, & Priyadarshinee, 2017; Yoo & Kim, 2018), *enterprise systems* (Ramdani, Chevers, & Williams, 2013; Sun & Mouakket, 2015) and *electronic commerce* (Aljowaidi, Arbia, & Arabia, 2015; Ibrahim & Stevens, 2014; Mohtaramzadeh, Ramayah, & Jun-Hwa, 2018; Rodríguez-Ardura & Meseguer-Artola, 2010). However, there is a dearth of studies that have applied this theory to examine e-commerce adoption at the global level. That is, the majority of studies that have applied this theory in the area of e-commerce adoption have been tailored to the firm/industry level (Awa & Ukoha, 2012; Bagale, 2014; Lip-sam & Hock-Eam, 2011; Rahayu & Day, 2015; Shi, 2013) and therefore limits their generalizations of results. This study applies the TOE framework to the global context to eliminate the shortfalls of prior studies. The motivation behind our reliance on the TOE framework for this study can be traced to the fact that, unlike other theories such as the *Technology Acceptance Model* (TAM), and the *Unified Theory of Acceptance Use of Technology* (UTAUT), the TOE framework provides three unique constructs, i.e., *technology*, *organization* and *environment* factors that help researchers to examine the levels of technological adoption across firms. Furthermore, given that the study’s constructs were mainly technological (ICT access and Social media) and organizational (ICT skills) in nature, the use of the TOE framework proved a better fit. Figure 1 provides a diagrammatic representation of the research model informed by the TOE framework with accompanying hypotheses.

2.1 ICT Access and E-Commerce

The adoption and use of ICTs for e-commerce intensify the socioeconomic divisions among individuals, businesses, and countries (Sharma & Gupta, 2003). This is because individuals, firms, and countries around the globe have varying access to ICTs. In developing countries, for instance, the cost of ICT access charges, subscription charges for internet service providers, and costs associated with the connection of telephone lines to stay online is very expensive (Al-Somali, Gholami, & Clegg, 2011). As a result of this, some firms find it difficult to consistently deploy ICTs for e-commerce (Elahi & Hassanzadeh, 2009). Since ICT access is an important ingredient to e-commerce adoption, It means that if a nation has a good technological infrastructure, individuals and firms would have better access to ICTs and as such, would adopt e-commerce (Aljowaidi et al., 2015; Ibrahim & Stevens, 2014). We, therefore, extend this evidence to hypothesize that;

Figure 1. Research Model



H₁: The level of ICT access of a country is positively associated with its E-commerce adoption

2.2 ICT Access and Social Media Use

Social media refers to both the enabling tools and technology and the content that is generated by the technologies (Bertot, Jaeger, & Grimes, 2010) and so may include, but not limited to social networking sites (e.g. WhatsApp, Facebook), blogs (e.g. Wikipedia), etc. (Bertot et al., 2010; Strandberg, 2013). ICT access plays a key role in a country's social media use (Bertot et al., 2010) that is why ICT access is identified as a prerequisite for social media adoption and use (Thomas & Lim, 2010). Where individuals have ICT access in terms of mobile devices and internet connectivity, they tend to increase their use of social media platforms. More social interconnectivity results in the greater ability of members of a country to work together to promote social benefits (Bertot et al., 2010). We, therefore, extend this to postulate that, ICT access of a country is positively associated with its social media use. We argue that a country that puts in place a good technological infrastructure will present its citizenry with ICT access. The more access to ICTs, the more connectivity of citizens on social media platforms. Therefore, we hypothesize that;

H₂: ICT access of a country is positively associated with its social media use

2.3 Social Media Use and E-Commerce

The growing use of social media platforms such as Facebook and Twitter has led to a type of e-commerce known as social commerce (Liang, Ho, Li, & Turban, 2011). Social commerce refers to the use of social networking sites to conduct commercial activities (e.g. the buying and selling of goods) (Liang et al., 2011). With the use of social media, individuals can interact and share information on products and services sold or rendered by businesses (Lee & Phang, 2015). This, therefore, means that individuals can obtain as much information they desire for a product before they purchase it.

Social media use has therefore been found to influence customer buying behaviour (Dahnil, Marzuki, Langgat, & Fabeil, 2014). Similarly, the advent of social media platforms enables businesses to embark on massive advertisements for their products. Businesses can target individuals with adverts based on the large amounts of information they disclose on social media about themselves (Saravanakumar & SuganthaLakshmi, 2012). Based on these findings, we posit that *social media use* of a country is positively associated with its e-commerce adoption. We argue that the use of social media in a country will result in an increase in social commerce adoption. Therefore, we hypothesize that;

H₃: Social Media use of a country is positively associated with its E-commerce adoption

2.4 ICT Access and ICT Skills

The ability to solve problems of ICT and knowledge in digital surroundings has been attributed to the extent of ICT skills (Claro et al., 2012). ICT skills of individuals in a society are enhanced when they are educated and trained on how to use ICT related devices (Ajuwon, Librarian, Odeku, & Library, 2008). However, to achieve proficiency in ICTs, individuals are required to have access to ICTs (Dlodlo, 2009; Deursen & Dijk, 2009). When individuals have access to ICTs, they are propelled to acquire skills for their use. For employment purposes, most firms today require that applicants possess some basic computing skills (Dlodlo, 2009). However, individuals will acquire these skills required by firms if countries put in measures to ensure that their citizenry has access to ICTs. It is through access to ICTs that ICT skills can be realized (Hakkarainen, Muukkonen, & Lipponen, 2001). We, therefore, hypothesize that;

H₄: ICT access of a country is positively associated with its ICT skills

2.5 ICT Skills and Social Media Use

Digital skills play a critical role in the opportunities internet users have (Livingstone & Helsper, 2010). A considerable number of studies have empirically reported the differences in individuals' ICT skills especially with individuals who have different socioeconomic backgrounds and ICT experiences (Deursen & Dijk, 2009; Gui & Argentin, 2011; Meneses, Mominó, Meneses, & Momin, 2010). These studies indicate that individuals from lower socioeconomic groups tend to have lower skills in ICTs thereby worsening the inequalities in individuals' ICT skills. In addition, some studies in this area have produced evidence indicating that differences in digital skills relate to differentiated web usage (Correa, 2010; Livingstone & Helsper, 2010). That is, skilled users are more likely to engage in various online activities with a higher frequency and magnitude than individuals with fewer skills. We, therefore, hypothesize that;

H₅: ICT skills of a country are positively associated with its Social Media use.

2.6 ICT Skills and E-Commerce

E-commerce offers a promising way for organizations to meet the difficulties of an ever-changing business environment (Bagale, 2014; Kapurubandara & Lawson, 2006). However, for firms to benefit from the opportunities presented by e-commerce, it is important that consumers possess the necessary ICT skills to conduct business on the internet. Evidence indicates that the lack of ICT skills is a key barrier to the effective adoption of e-commerce in developing country countries (Kapurubandara & Lawson, 2006; Lawrence & Tar, 2010). The lack of necessary education in IT has been perceived to be a factor why individuals and firms in developing countries do not appreciate the value of computers and the internet as a conduit to participating in e-commerce (Lawrence & Tar, 2010). Therefore, there is a need for employees and consumers to be educated and trained in IT to increase their ICT

skills and enable them to effectively engage in e-commerce. When this is done, they will appreciate the value of ICTs and the internet as a way of participating in e-commerce. This, therefore, leads us to our final hypothesis that;

H₆: ICT skills of a country are positively associated with its E-commerce adoption

3. RESEARCH METHODOLOGY

3.1 Data

The data for this study was collected from various archival sources. We relied on secondary data because the use of secondary data sources offers the ability to generalize results based on a large data set. This data relied on is also robust to common method bias threat and offers easy reproducibility (Jarvenpaa, 1991). The data sources consisted of the Global Information Technology Report (GITR) from the World Economic Forum (WEF) (World Economic Forum, 2016; Baller, Dutta, & Lanvin, 2016), the Human Capital Index (HDI) from the 2016 World Development Report (UNHDI, 2016) and the International Telecommunication Union (ITU, 2017). Variables used for this study were taken from these reports. ICT access was drawn from the ITU database whilst ICT skills drawn from the UNHDI. E-commerce data was drawn from the WEF's Global IT Report (Baller et al., 2016). We considered only data for countries that were available in all reports. The common data points were analysed throughout the reports, resulting in a total of 135 countries. Indicators that had less than 5% missing data were mean-replaced (Hair Jr, Hult, Ringle, & Sarstedt, 2016).

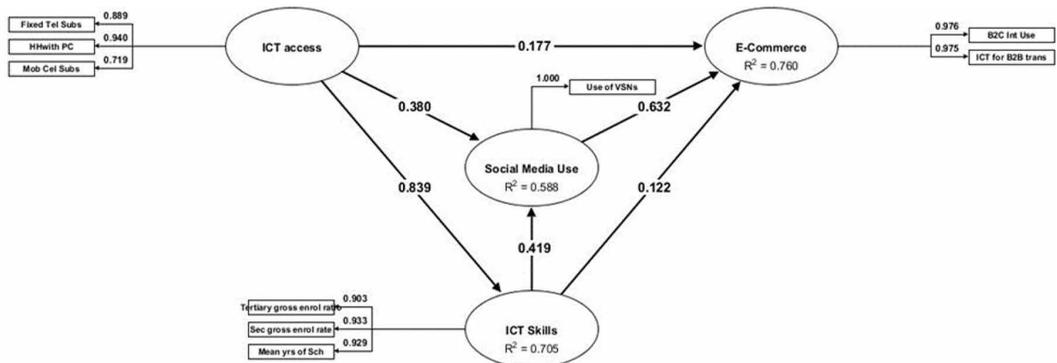
3.2 Constructs, Variables, and Measures

The study used *ICT access*, *ICT skills*, *Social media*, and *e-commerce* as the four latent variables. The *ICT access* construct covers access to the Internet, mobile phones, personal computers, and other communication technologies. To measure *ICT access*, we used *fixed telephone subscriptions*, *households with personal computers*, *households with internet access*, *internet bandwidth per user*, and *mobile cellular subscriptions*. This was drawn from the ICT development index, from the 2016 International Communications Union (ITU) report (ITU, 2017). *ICT skills* were measured by *secondary and tertiary enrolment rates as well as mean school years*. The *ICT skills* construct was also drawn from the World Development Report. *Social media use* and *e-commerce* constructs were drawn from the Network Readiness Report of the Global Information Technology Report from the World Economic Forum (Baller et al., 2016). The *Social media* construct was measured by *the use of virtual social networks* whilst *e-commerce* was measured by *business to consumer internet use and internet use for business to business transactions*.

3.3 Data Analysis Method

The first phase in the assessment or interpretation of PLS-SEM results involves the review of the measuring models. For formative and reflective constructs, the relevant parameters for testing measurement models vary (Hair, Risher, Sarstedt, & Ringle, 2019; Urbach & Ahlemann, 2010). Constructs in this study were reflective, therefore, a test for reliability and validity of the measurement model was carried out before an evaluation of the structural model was undertaken. We assessed the measurement model for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity by adhering to standard decision rules (Hair et al., 2019). After an evaluation of the measurement model was carried out, we further assessed the structural model. Thus, an assessment of the significance and relevance of the structural model relationships was first carried out, followed by an assessment of the Goodness of Fit (GOF) (Hair et al., 2019; Urbach & Ahlemann, 2010).

Figure 2. Results of PLS analysis



4. RESULTS OF DATA ANALYSIS

4.1 Assessment of the Measurement Model

The first step in evaluating PLS-SEM results requires a review of the measurement models. The assessment or estimate of the measurement model allows the researcher to evaluate the theory adopted for the study as well as the actual data obtained. First, indicator reliability was assessed by monitoring reflective indicator loadings. Loadings of 0.708 and above are recommended as they show that the latent variable accounts for more than 50% of the indicator variance and thus guarantees the item's acceptable reliability (Hair et al., 2019). When the model was first run, not all indicators loaded significantly on their assigned constructs. Therefore, they were deleted and the model was rerun. Specifically, *households with internet access* that had a loading of 0.213 and *internet bandwidth per user* with a loading of 0.430 were below the minimum threshold of 0.708. The results are presented in Figure 2.

Secondly, internal consistency reliability was assessed. The Cronbach's alpha, composite reliability, and Rho A were all used to assess the internal consistency reliability of the model. The required threshold for Cronbach's alpha is 0.70 (Nunnally, 1978). A high Cronbach Alpha value indicates that the scores of all indicators in a construct are of the same range and meaning (Cronbach, 1951). Cronbach's alpha values in this study exceeded the threshold of 0.70 as shown in Table 1. The Cronbach's alpha has been criticized for being a less measure of reliability as items are unweighted (Hair et al., 2019; Urbach & Ahlemann, 2010). Therefore, as an alternative measure of internal consistency reliability, composite reliability, and Rho_A have been recommended. Composite reliability values as presented in Table 1 exceeded the minimum threshold of 0.70 and as such was considered adequate (Fornell & Larcker, 1981). Similarly, Rho_A values exceeded the minimum threshold of 0.70. This indicates that internal consistency reliability has been achieved (Dijkstra & Henseler, 2015).

After checking for internal consistency reliability, we further assessed the convergent validity of each latent variable/construct. The criterion recommended for assessing internal consistency reliability is the Average Variance Extracted (AVE) (Fornell & Larcker, 1981). The minimum recommended threshold for AVE is 0.50 (Hair et al., 2019). All AVE values in this study as shown in Table 1 exceed the minimum threshold of 0.50. This indicates that the construct explains at least 50% of the variability of its items and this demonstrates adequate convergent validity (Hair et al., 2019).

Lastly, in the assessment of the measurement model, discriminant validity was assessed by relying on the Fornell and Larcker criterion and the cross-loadings. The Fornell & Larcker (1981) criterion argues that to achieve discriminant validity, a construct should share more variance with its assigned indicators than with any other construct. As presented in Table 2, the individual constructs share

Table 1. Construct Reliability

Construct	Composite Reliability	Rho_A	Cronbach's alpha(α)	AVE
ICT access	0.8633	0.8889	0.8111	0.7298
ICT Skills	0.9199	0.9443	0.9117	0.8496
Social Media Use	1.0000	1.0000		1.0000
E-Commerce	0.9495	0.9751	0.9489	0.9513

Table 2. Discriminant Validity: Fornell & Larcker (1981) criterion

Construct	ICT access	ICT Skills	Social Media Use	E-Commerce
ICT access	0.7298			
ICT Skills	0.7045	0.8496		
Social Media Use	0.5356	0.5450	1.0000	
E-Commerce	0.5509	0.5437	0.7256	0.9513

more variance with their assigned indicators than with any other construct. This is denoted by the diagonals in Table 2. We can, therefore, infer that discriminant validity has been achieved. Similarly, to assess for discriminant validity, cross-loadings were monitored (Chin, 1998). Using this criterion, discriminant validity is said to be achieved when each indicator loading is greater for its construct than for any other construct. In Table 3, it can be generalized that, the constructs are discriminant of each other as they load higher on their allocated constructs than with any other construct.

4.2 Analysis of the Structural Model

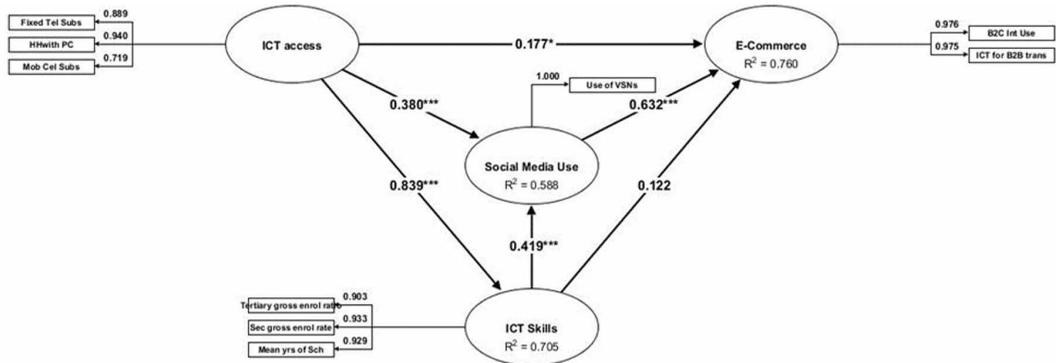
After the successful assessment of the measurement model, an assessment of the structural model was carried out. Thus, we assessed the structural model for the significance of the path coefficient between the model's constructs and the goodness of fit (GOF).

First, a bootstrapping procedure was carried out in SmartPLS using a large number of 5000 subsamples to evaluate the structural model for the path coefficient (Hair et al., 2019; Urbach & Ahlemann, 2010). The bootstrapping procedure reveals t-statistics for the analysis of direct and indirect

Table 3. Cross Loadings

Indicator	ICT access	ICT Skills	Social Media Use	E-Commerce
Use of VSNs	0.7319	0.7382	1.0000	0.8518
B2C Int Use	0.7302	0.7578	0.8224	0.9761
ICT for B2B trans	0.7175	0.6794	0.8395	0.9746
Fixed Tel Subs	0.8887	0.7451	0.5711	0.6396
HHwith PC	0.9395	0.8493	0.7482	0.7615
Mob Cel Subs	0.7190	0.5091	0.5347	0.4587
Tertiary gross enrol ratio	0.7189	0.9029	0.5920	0.5958
Sec gross enrol rate	0.7634	0.9326	0.7034	0.6773
Mean yrs of Sch	0.8303	0.9295	0.7338	0.7527

Figure 3. Hypothesis Testing for Direct and Indirect Effects



effects (Hair, Hult, Ringle, & Sarstedt, 2016). Using a 0.1 (10%) two-tailed distribution, and a 95% confidence interval, t-values of 1.65 and above is recommended for a significance level (Hair, Ringle, & Sarstedt, 2011). Results in Table 4 shows that all 3 direct hypotheses have been supported. That is, all hypotheses exhibit a critical t-value of 1.65 and above. Furthermore, in Table 5, the results of indirect hypotheses are presented. Critical t-values of all indirect hypotheses presented in Table 5 exceeds the minimum threshold of 1.65.

Finally, in the assessment of the structural model, the goodness of fit of the model was evaluated. The evaluation of this shows whether the model is well or ill-fitted (Henseler, Ringle, & Sarstedt, 2015). The most widely used criterion for assessing the goodness of fit is the R square determination coefficient (R²) (Hair et al., 2019). R² shows the combined effects of the exogenous latent variables on the endogenous latent variable (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). As a guide, R² values of 0.25, 0.50, and 0.75 are regarded as weak, moderate, and substantial respectively (Hair et al., 2011; Henseler, Ringle, & Sinkovics, 2009). As seen in Table 6, the R² of the model is 0.760. This indicates that the combined exogenous latent variables account for 76% of the endogenous factor variance (Hair et al., 2019; Urbach & Ahlemann, 2010).

5. DISCUSSION OF FINDINGS

All the hypothesized pathways concerning H₁, H₂, H₃, H₄, H₅, and H₆ were established to be significant and positive. This was established within a robust and reliable model as specified in Figures 1, 2, and 3. The model contributes to three key findings to contemporary knowledge on how *social media* mediates *e-commerce adoption and use*. The first is the direct effects of *ICT access* on *e-commerce*, and the indirect/or mediating role of *social media/ICT skills* on *ICT access* effects on *e-commerce*.

Table 4. Hypothesis Testing (Direct Effects)

Hypotheses	Relationship	Standard beta	Standard error	t-value	Inference	95% CI LL	95% CI UL
H ₁	ICT access -> E-Commerce	0.5649	0.0693	8.1573	Supported	-0.0281	0.7569
H ₆	ICT Skills -> E-Commerce	0.2651	0.0739	3.5873	Supported	0.0766	0.4413
H ₃	Social Media Use -> E-Commerce	0.6320	0.0541	11.6860	Supported	0.4801	0.7590

Table 5. Hypothesis Testing (Indirect Effects)

Hypotheses	Relationship	Standard beta	Standard error	t-value	Inference	95% CI LL	95% CI UL
H ₄	ICT access -> ICT Skills	0.8394	0.0260	32.2278	Supported	0.7718	0.9002
H ₂	ICT access -> Social Media Use	0.3798	0.1137	3.3412	Supported	0.1223	0.6743
H ₅	ICT Skills -> Social Media Use	0.4194	0.1110	3.7774	Supported	0.1214	0.6712

Table 6. R Squared

Construct	Coefficient of determination (R ²)	Adjusted R ²
ICT Skills	0.7045	0.7023
Social Media Use	0.5876	0.5813
E-Commerce	0.7599	0.7543

The second is the direct effects of *ICT skills* on *e-commerce* and the mediating role of *social media* on *ICT skills* effects on *e-commerce*. The last is the effects of *social media* on *e-commerce*.

Regarding our first finding, we argue that whilst Internet inaccessibility is a barrier to ICT diffusion in developing countries (Khan, Xu, Dou, & Yu, 2016), the reliance of e-commerce on the access of ICTs like the Internet and other communication technologies cannot be overemphasized. There have been arguments that e-commerce diffusion can be associated with telecommunication liberalization that ensures that ICT and Internet access become more affordable to firms and consumers (Gibbs, Kraemer, & Dedrick, 2003). Access to ICTs is the foundation of e-commerce. This is why developed countries have a high rate of e-commerce adoption while developing countries have a lower rate due to some barriers (Lawrence & Tar, 2010). Though other infrastructures such as financial institutions play a role in the diffusion of e-commerce, access and quality such as reliable, fast, and less expensive internet of ICTs are more pivotal (Hanna, 2016; Molla & Licker, 2004). In Boateng, Heeks, Molla, and Hinson (2011), the critical issue of ICT accessibility is emphasized as one of the critical issues that affect the conduct of e-commerce supporting our hypothesis that ICT access positively influences e-commerce. At the firm level, this is also emphasized by Asare, Gopolang, and Mogothlwane (2012) who found that SMEs consider poor telecommunication infrastructure and high costs of accessing ICT as a challenge (Asare et al., 2012) that affects the diffusion of e-commerce. Furthermore, evidence shows that whilst low Internet access among buyers and lack of knowledge are barriers to e-commerce adoption, new technologies can help customers to access fast internet (Jehangir, Dominic, & Khan, 2011) to easily use e-commerce”.

On the effect of *ICT skills* on *e-commerce*, our findings reveal that the digital literacy of a population can enhance the level of adoption and use of e-commerce and that ICT skills also play a critical role in mediating ICT access effects on e-commerce. This is why e-commerce is widely enabled by ICT literacy and ICT proliferation (Kamaruzaman, Handrich, & Sullivan, 2010). Also, whilst access to ICTs alone does not guarantee use, the population needs to have the needed skills to leverage the accessibility of the ICTs to utilize e-commerce platforms. This means that the social and cultural infrastructure of a country in terms of literacy and education levels is important for e-commerce adoption. These in addition to a country’s experience and receptivity to ICTs are important. Therefore, a government’s educational and skill training programs enhance e-literacy and create awareness of e-commerce between businesses and consumers (Zhu & Thatcher, 2010). Our findings are consistent

with Nair (2010) assertion that when people are ICT literate, they use digital mediums more regularly to create value for themselves by accessing information and purchasing products and services. This confirms the fact that ICT literacy impacts e-commerce development in any country. Besides, with a high digital literacy level in a country, the positive effect of e-commerce adoption and use on the life of people and business growth will be more appreciated than with a low digital literacy level (Basarir-Ozel & Mardikyan, 2017). The level of education and skills as a critical component of the human capital of a country is therefore critical in building the e-commerce capabilities of a country (Ho, Kauffman, & Liang, 2011)".

Through social media platforms, consumers do not only buy products, but they also share their shopping experience, read reviews, collaborate online through what is referred to as social commerce (Curty & Zhang, 2011; Huang & Benyoucef, 2013). Whilst social media promotes the consumers' social interactions and relationships, it also significantly influence the consumers' buying behaviour (Liang, Ho, Li, & Turban, 2011). As a result of this, many businesses are increasingly showing interest in deploying social media through social commerce to boost sales volumes (Zhou, Zhang, & Zimmermann, 2013) and ensure a rich buying experience for customers. Social commerce initiatives largely rely on the consumers' social interactions and so is critical for businesses to understand that consumers can be influenced to participate in using social media to buy goods and services (Zhang, Benyoucef, & Zhao, 2016)".

Whilst our findings emphasize the studies above in their support of the effects of social media on e-commerce, we posit that the mediating role of social media in the current dynamics of social commerce as a new boost to e-commerce can be further strengthened through an interactive effect between ICT access and ICT skills. This is because whilst social media per se may have a positive influence on e-commerce, the existence and of social media platforms will not generally ensure a more robust effect unless buyers and potential buyers have access to ICTs such as mobile phones and internet subscriptions. Furthermore, we argue that access to ICTs and the availability of social media platforms will not be sufficient unless buyers and potential buyers have the needed ICT skills to be able to use those ICTs including social media.

5.1 Theoretical and Practical Implications

We make some key contributions to theory, practice, and policy. Past studies that have relied on the TOE framework to examine e-commerce adoption has largely been conducted at the single country/industry level. Our study provides a deeper and holistic understanding of e-commerce adoption at a global level. Also, prior studies have mainly concentrated on the direct effects of technology, organization, and environmental factors on the adoption of e-commerce. By introducing social media use as a mediating variable, this study provides more understanding on the adoption of e-commerce adoption at the global level and the role social media use plays in e-commerce adoption. For practice and policy, our study makes it possible for practitioners and policymakers to understand that ICT skills through digital literacy, training programs, and other educational development can boost e-commerce adoption. Policymakers may consider infrastructural development that can bridge the digital divide among citizens to enable more access to ICTs since these can translate into broader e-commerce adoption and economic development.

6. CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

To understand the mediating role of social media on ICT access and ICT skills effects on global e-commerce our study relied on secondary data for 135 countries. From this, our study contributes to IS research in various ways. Our study adds to knowledge by arguing that the role of social media as well as ICT access and ICT skills, is critical in driving e-commerce adoption at the global level. Previous studies have largely focused on the individual/firm level. Secondly, this study is one of the

very few studies that examine how ICT access and ICT skills of countries affect the global adoption of e-commerce.

On the limitation of our study, we could not rely on primary data and so depended on metrics and indices formulated by international reporting agencies. Our study is therefore limited by our reliance on secondary data drawn from varying sources. Relying on primary data could have ensured control over the definition of the variables and since collecting primary data was not feasible the limitation of the study stems from this. However, the data were reliable because they were formulated by reputable and authorized organizations through the use of robust statistical procedures. Our study could not include all countries in the world because the data was not commonly available in all the sources we relied on. Future studies can consider extending this study by introducing a different mediating variable into the model and including more countries as well.

Conflicts of Interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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APPENDIX: LIST OF COUNTRIES

Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belgium, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Chad, Chile, China, Colombia, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Gabon, Gambia, The Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guyana, Haiti, Honduras, Hong Kong SAR, Hungary, Iceland, India, Indonesia, Iran-Islamic Rep, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Rep. Kuwait, Kyrgyz Republic, Lao PDR, Latvia, Lebanon, Lesotho, Liberia, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe

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