

Adoption of electronic commerce as a resilience strategy for women's entrepreneurship in the Democratic Republic of Congo

Adoption of
electronic
commerce in
DRC

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Abstract

Purpose – The present article aims to determine the factors that explain the intention to adopt electronic commerce among women traders in a developing country like Democratic Republic of Congo (DRC) during a health crisis period.

Design/methodology/approach – This study was conducted in the DRC, in Bukavu Town. A convenience sample of 282 respondents consisting of solely women entrepreneurs (importing traders) in Bukavu Town was selected and the structural equation model was used to test the research hypotheses resulted from Ajzen's theory of planned behaviour.

Findings – The finding results showed that only the factors attitude towards electronic commerce adoption and subjective norms which predict women traders' intention to adopt electronic commerce. The analysis shows that about 38.9% of the variation in the dependent variable is explained by the above variables.

Originality/value – Few studies have presented technology and electronic commerce adoption as resilience of women entrepreneurs in a time of crisis, despite the abundance of the review literature on adoption. This study provides a new approach to assist women entrepreneurs as well as researchers in understanding the drivers of electronic commerce adoption factors in the DRC.

Keywords Electronic commerce, PLS, Theory of planned behaviour, Women entrepreneurs, South Kivu

Paper type Research paper

1. Introduction

The outbreak of the Corona virus (COVID-19) in China in December 2019 has spread rapidly throughout the world. To reduce the spread of the virus, governments took necessary measures, such as total or partial confinement of the entire population, depending on reported cases in each country.

On 24th March 2020, the President of the Democratic Republic of Congo (DRC), the President signed a decree proclaiming a state of health emergency against COVID-19 with

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several measures such as closure of land and sea borders, prohibition of gatherings, closure of universities, schools, places of worship and restaurants as well as a curfew from 8p.m. to 5a.m. coupled with total or partial lockdown in certain parts of the country, mainly in cities and other major towns.

These decisions seriously affected private consumption expenditures such as transport, leisure, retail, etc. and reduced manufacturing activities. Basically, these measures had led to a paralysis of economic activities and total or partial closure of several micro-, small- and medium-sized enterprises, especially those run by women, because the latter have not been able to put in place resilience strategies to survive (Ntererwa, 2020).

Faced with this situation, some researchers believe that it is urgent to maintain the momentum for the implementation of economic policies and trade liberalisation, as it represents a real lever for the development of small economies on the African continent, while others show the need for businesses to use ICTs in the conduct of their activities (Abodohou, 2020).

E-commerce would be one of the resilience strategies that women entrepreneurs can adopt to cope not only with the current crisis but also to increase their income while remaining sustainable in the market given its advantages, including the possibility of selling at any time. For example, women entrepreneurs who are forced to remain on national soil because of international flight restrictions and border closures will still be able to keep their businesses running.

It has been shown that e-commerce is growing strongly in all regions and that consumers in emerging economies are the most likely to shop online. The example of Latin America is where sales doubled during 2019–2020 on the online marketplace Mercado Libre. Transaction volume on the African e-commerce platform Jumia has increased by 50% in the first half of 2020. Between August 2019 and August 2020, the share of online retail sales increased from 19.4% to 24.6% in China, which is the leading African supplier. In Kazakhstan, the share of online retail sales increased from 5% in 2019 to 9.4% in 2020. In Thailand, shopping app downloads in March 2020 increased by 60% in one week (UNCTAD, 2021).

Looking at the African context, 74 million African women still do not have access to mobile Internet, a gap of 37 points for men. The smartphone is the main connection vector and the reference tool for a wide range of services, from information to mobile payment, but the price of the latter remains a major barrier for female consumers (Diallo, 2020). About 27% of women have access to the Internet and only 15% of them have the means to use it (USAID, iMMAP and DFS, 2021; Banque Européenne d'investissement, 2020).

The DRC is still lagging in this area too, with 77.29 million people, or 82.4% of the population, not yet connected (Ministère du numérique, 2022). However, despite this, an Internet penetration rate of 17.6% of the overall population has been recorded, which represents a jump of 25.4% between 2002 and 2022. This significant increase would be caused by the COVID-19 pandemic (Ministère du numérique, 2022; Banque Européenne d'investissement, 2020; Banque Mondiale, 2023).

The adoption of e-commerce as a resilience strategy for women entrepreneurs during the pandemic has so far received little empirical attention. The existing literature on the topic can be grouped in three major groups. The first group has majorly focused on the impact of the health crisis (Oudda *et al.*, 2020). As for the second, its major contributions had been on the mechanisms of the digital in the management of the COVID-19 health crisis and the challenges for bridging the digital divide in the world (Thiam and Ndiaye, 2020). The third group finally had more focused on the aspect of the health and/or financial crisis on either credit rationing, the behaviour of financial intermediaries or the indebtedness of small and medium enterprises (SMEs) (Achibane and Chakir, 2019; Aissata, 2012; Katchunga *et al.*, 2021).

This paper is subdivided as follows: Section 2 deals with a brief review of the literature, Section 3 deals with the methodology of the work used to capture e-commerce adoption intention. Section 4 is devoted to the presentation of the empirical results. Section 5 is based on the conclusion and perspectives of the research.

2. Literature review and research model

Briefly, the concepts of the determinants of e-commerce adoption, its barriers and the theory of planned behaviour are discussed in this section.

It should be noted that in this study, we use the model of planned behaviour to explore in depth the mechanism underlying the formation of attitudes towards adoption of e-commerce by women entrepreneurs. This choice is not accidental but driven by different reasons. First, it relies on the work of [Grandón *et al.* \(2011\)](#) cited by [Chafik and Bennaceur \(2015\)](#) on “comparing theories to explain e-commerce adoption”. These authors suggest using TCP to predict the behaviour of SME managers in adopting new technologies in general. Secondly, the model used in this study is recent among other models (innovation-diffusion theory, theory of reasoned action, theory of interpersonal behaviour, technology acceptance model and the technology-organisation-environment framework). Thirdly, it has shown robustness and parsimony in previous studies especially when it comes to studying the intention of e-commerce.

(1) Determinants of e-commerce adoption.

Over time, the relevance of e-commerce has not diminished although it has been widely studied by several researchers. Empirical studies on the adoption of e-commerce aim to show the different relevant factors that can promote its adoption either on the business side or on the consumer side.

There are a variety of models used by researchers to study the factors that explain e-commerce adoption. To conduct our analysis in a relevant way, we will present the empirical studies dealing with the determinants of e-commerce adoption by category of models.

With respect to the technological, organisational and environmental context adoption model or TOE model, [Scupola \(2009\)](#) finds that two environmental context factors including customer pressure, access and quality of information and communication technologies influence Danish and Australian SMEs to adopt e-commerce. The characteristics of the CEO and the support of the management are also considered as determinants in the organisational context, and finally, regarding the technological context, the study showed that barriers and benefits are still important factors in the adoption decisions in all Danish and Australian companies. To these factors mentioned above, [Al-Alawi and Al-Ali \(2015\)](#), [Ilin *et al.* \(2017\)](#) add the perceived relative benefits, government resources and government regulation as determinants of e-commerce adoption by firms. Similarly [Garg and Choeu \(2015\)](#) find that relative advantage, competitive pressure and computer literacy influence firms' adoption of e-commerce. As for [Chatzoglou and Chatzoudes \(2016\)](#), it is the factors, firm size, firm reach, IT infrastructure and Internet skills that favour the adoption of e-commerce by firms.

Regarding the Rogers (Diffusion of innovation) and Davis (Technology acceptance model) models, [Alam *et al.* \(2011\)](#) find five key factors for e-commerce adoption namely: relative advantage, compatibility with the firm's activities, organisational readiness, manager characteristics and finally security. [Chafik and Bennaceur \(2015\)](#) show that the entrepreneurial orientation of the firm and external pressures drives firms to adopt e-commerce. The involvement of the leader and strategic coherence also enable firms to adopt e-commerce according to [Bellaaj \(2015\)](#). Regarding the theory of planned behaviour ([Grandón, Nasco and Mykytyn Jr, 2011](#); [Nasco *et al.*, 2008](#)) show that subjective norms and attitudes drive firms to adopt e-commerce.

The factors explaining the adoption of e-commerce are cost reduction, increased sales, increased productivity, reduced processing time, extended market reach and increased customer loyalty. However, the constraints to the development of e-commerce in developing countries are lack of skilled human resources, internal resistance, security issues, unprepared trading partners, internal constraints, lack of IT resources and lack of legal infrastructure ([Rahayu and Day, 2017](#)).

(2) Barriers to the adoption of e-commerce

Despite this opportunity offered by e-commerce, many businesses in general and SMEs have had difficulty adopting it. This non-adoption is due to several reasons that have already been mentioned by several researchers, some of which we will review. However, it is worth noting that the constraints faced by firms in the 1990s may or may not be those faced by firms today.

[El-Nawawy *et al.* \(1999\)](#), in their study of the barriers to e-commerce adoption faced by Egyptian SMEs, find that awareness and education, market size, e-commerce infrastructure, telecommunications infrastructure, legal system, government issues, accessibility/cost structure, and social and psychological factors are determining factors. Thirteen years later, [Zaied \(2012\)](#) conducting an almost similar study shows through his results that technical barriers are the most important, followed by legal and regulatory barriers, thus the lack of security on the internet is the most important barrier that prevents the implementation of e-commerce in SMEs in Egypt, followed by the limited use of Internet banking and web portals by SMEs. Similarly, the findings of [Cloete *et al.* \(2002\)](#), in a study conducted in South Africa show that lack of information, lack of time to explore options, lack of access to computers, lack of access to hardware and software, limited knowledge of e-commerce models and methodologies are the barriers to the adoption of e-commerce by South African SMEs.

In Taiwan, [Chen \(2004\)](#) finds that lack of financial resources and lack of IT staff are the two main barriers to e-business adoption by SMEs in Taiwan. [Kaynak *et al.* \(2005\)](#) argue that the difficulty of finding and retaining qualified personnel with the required skills and knowledge and the risk of dissipation of firm-specific knowledge do not favour Turkish SMEs to adopt e-business. In the same vein [Kwadwo *et al.* \(2016\)](#) show that the high cost of e-commerce infrastructure and implementation, staff training and consultancy fees, Website creation and maintenance and other infrastructure are barriers to e-commerce adoption. SMEs in Ghana and most African countries do not have the financial resources to acquire the ICT resources or infrastructure that form the backbone of e-commerce plans.

[Huet \(2017\)](#) in his book on “Digital in Africa. the five digital leaps” shows that lack of postal address, malfunctioning of the post office, complexity of logistics, cybercrime, access to the Internet by the population, non-banking, culture (population not used to buying online due to lack of trust) are the major impediments to the development of e-commerce in Africa.

Regarding intra-regional commitments on e-commerce, no continental measures have been taken to properly regulate the aspects related to e-commerce (e.g. data flows, data localisation), apart from mechanisms that aim to facilitate e-commerce through trade facilitation measures. As facilitation measures, we can mention the automation of customs procedures, access to Internet connection by customs, recognition of electronic copies of supporting documents for transit, import and export, etc. ([UNCTAD, 2018](#)).

As for the adoption of e-commerce by women, studies show that women have less access to the Internet than men, especially in developing countries, but trade is dominated by women, which has forced them to resort to online ordering of their goods to sustain them. Many the more than 300 million unconnected women live in sub-Saharan Africa. Primary research has indicated a gender disparity in Internet connection of 45% in Niger and 33% in DRC ([Raphael *et al.*, 2019](#)).

(3) The theory of planned behaviour

The theory of planned behaviour was initiated by Icek Ajzen in 1985. It is an improvement on the theory of reasoned action developed in collaboration with Martin Fishbein. Both theories aim to understand the behaviour of individuals while identifying the individual and contextual factors that may determine it ([Ajzen, 1991](#); [Ajzen and Fishbein, 1980](#)). In the theory of reasoned action, an individual's intention is influenced by two psychological and sociological variables that can be correlated with each other: attitude towards behaviour and social norms. This means that an individual's behaviour is influenced by behavioural intention, which in turn depends on attitude

towards the behaviour and social norm. Perceived control is the variable added to the theory of reasoned action to give rise to the theory of planned behaviour (Emin, 2004). It is this variable that makes the theory of planned behaviour increasingly effective. It has a double influence and is the only variable that is directly related to behaviour. On the one hand, it influences the intention to adopt a behaviour or not and on the other hand, it influences the behaviour in a direct way.

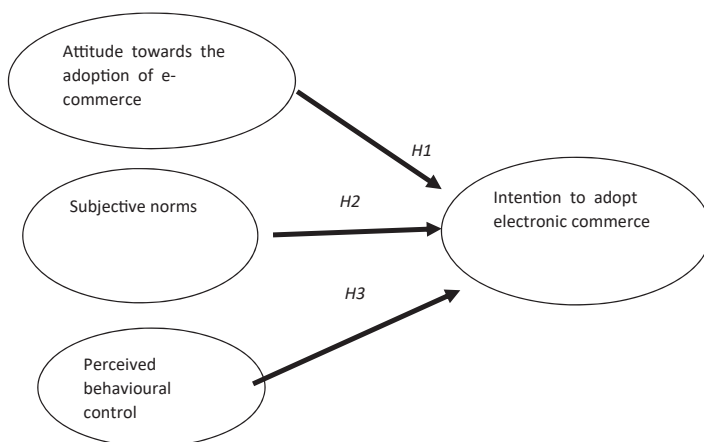
As in the theory of reasoned action, the crucial factor in the theory of planned behaviour is the intention of an individual to perform a behaviour. Motivational factors are supposed to be captured by intentions. These are indications of the effort that individuals are willing to make to achieve the desired outcome. Generally, the stronger the intention to engage in a behaviour, the more likely it is to be achieved. However, it should be noted that a behavioural intention can only be expressed in a behaviour if the behaviour in question is the result of an effort on the part of the individual (Ajzen, 2011).

(4) The research model

According to Krueger (2000), in the study of behavioural intention, hypothetical-deductive models developed based on TCP are most often successfully mobilised. Intention indicates the subjective probability that an individual will or will not adopt a given behaviour (Fishbein, 2011). It shows how much effort a person is willing to put into a given behaviour. According to TCP, intention is influenced only by three variables: attitude towards the behaviour, subjective norms and perceived behavioural control. Thus, behaviour is predicted by intention.

Figure 1 illustrates our research hypotheses.

- (1) Perceived attitude. Leyens (1997) defines attitude as “a state of mind that allows us to communicate our values to those around us and is therefore of primary importance to ourselves and to others”. Attitude, according to Ajzen (1991), refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question and is highly dependent on the expected outcomes of the behaviour. Le (2008) shows that a positive attitude of SME managers explains the intention to adopt e-commerce. Puschel’s (2010) study shows that a positive attitude of consumers towards online shopping positively affects their intention to adopt e-commerce as a mode of procurement. In this study, we suggest that:



Source(s): Figure adapted from Ajzen, 1991

Figure 1.
Research hypotheses

H1. The more positive the attitude towards e-commerce adoption of women entrepreneurs would increase, the higher their intention to adopt it, and vice versa.

Previous empirical work on the adoption of new technologies (Ajzen, 2019a, b; Askari, 2020; Fadwa, 2019; Passaro, 2017) confirms the influence of attitude on behavioural intention, in this case the intention to adopt e-commerce.

(2) Perceived subjective norms.

Norms indicate how our own behaviour is influenced by other people's behaviour (Gergen, 1992). For Koubaa and Sahib Eddine (2012), they are the views of family, friends, entourage, . . . regarding the individual's intention. It is therefore the perceptions that a person makes with regard to his or her social context and the pressure of people close to him or her. Several studies show that the more positive the social pressure is, the higher the intention to adopt e-commerce (Moon, 2020). In other words, it is assumed in this study that:

H2. Subjective norms would positively influence the e-commerce's adoption intention of women entrepreneurs.

(3) Perceived behavioural control

Perceived control is when an individual displays behavioural control over the performance of another control over the performance of a behaviour and not an actual existing control. Saied (2012) and many other empirical studies have been able to demonstrate the positive and significant effect of perceived behavioural control on e-commerce's adoption intention. Thus, this study proposes as hypothesis:

H3. Women entrepreneurs' intention to adopt e-commerce would be negatively influenced by perceived control in case women do not feel able to adopt e-commerce successfully and achieve expected results.

Broadly speaking, our research hypotheses are as follows:

3. Research methodology

(1) Justification of the choice of the study area

The study is spatially limited to Bukavu town, the major city of the province of South Kivu, located in eastern DRC. Several major factors led us choosing this research area. With an estimated population of 90 million, the DRC is the second largest country in Africa with a surface area of 2.3 million km² and is considered a real "geological scandal" because of its very rich subsoil full of mineral resources (copper, a major producer in Africa; cobalt, a major producer in the world; coltan, gold, diamonds, etc.) but the country remains weak and economically dependent with a very high rate of imports which made it more vulnerable than other countries during the COVID-19 pandemic with the closure of the borders (Musibono, 2016).

In addition, Bukavu is among several cities at country level that are linked to the cross-border trade corridor. Since 1990, following the deterioration of the country's economic, social and security fabric due to multiple civil wars, Bukavu, has been importing more products than it exports. As a result, trade is one of the engines that sustain growth of the city's economy.

(2) Data collection techniques

Cross-sectional approach using a research questionnaire was used in this study. This study opted for women owners and/or managers of SMEs capable of making and/or influencing business decisions in the city of Bukavu, in the East of the DRC as the target population.

This category stood as the target group of this research for several reasons. During the COVID-19 pandemic, unlike other categories of women entrepreneurs, the afore-mentioned group was the most affected by the closure of borders, as main importers of consumption and capital goods from around the world, particularly in China, Dubai, Turkey, Uganda and Tanzania.

Thus, the data collection was carried out using a survey questionnaire addressed to this category of women. The questionnaire was administered from 22 to 30 July 2021. The questionnaire included socio-economic variables such as age, level of education, location, etc. and variables related to the planned behaviour model (intention to adopt e-commerce, attitudes towards adopting e-commerce, subjective norms and perceived behavioural control) which were measured on a 7-point Likert scale with scores ranging from 1 (strongly disagree) to 7 (strongly agree). The survey questionnaire was written in French and submitted in the same language as this is the language of education in the DRC. For women entrepreneurs unable to respond in French, enumerators administered the questionnaires in Swahili, a local language widely spoken in the city although these cases were few. Translation into English was done using certified translators. Considering the sample size, authors used trained enumerators during data collection. All filled and submitted questionnaires were daily checked to minimise risks of errors and to ensure the quality of data collected. Therefore, 35 questionnaires were administered per day.

The use of structural equation (PLS-SEM) requires to take a ratio of at least five observations per estimated parameter with an additional recommendation for a ratio of 10 observations (Hair *et al.*, 2017). Therefore, the minimum respondents for such study had to be 230 (46 items multiplied by 5) women importers. However, for this study we were able to reach 282 women traders. Women entrepreneurs were surveyed from their workplaces by enumerators using data collection tools (smartphone or tablet, via KoboCollect application). Participation in the survey was always voluntary and anonymity was guaranteed. No woman was forced to participate in the survey.

- (3) Retained items used in this study and their measures were inspired by the work of Chafik (2015) and Cobelli *et al.* (2021). To test our questionnaire, before administering it we administered it to 30 women entrepreneurs to ensure that it was understandable and appropriate.

3.1 Data processing

Data processing was done using SMART PLS and SPSS 25 software.

(1) Empirical model

The TCP model used in this study, to identify factors determining adoption of e-commerce as well as the adoption of technologies, is derived from different studies: (Saied, 2012; Chafik, 2015; Cobelli *et al.*, 2021; Grandón *et al.*, 2011; Nasco, 2008). It is empirically implemented through structural equation modelling (SEM) in reference to studies of Chafik (2015) and Cobelli *et al.* (2021). In recent years, it has been observed an increased interest in the application of SEM. SEM is a concept used to describe a growing and increasingly general set of statistical methods for modelling data. The greatest strength of this model is its ability to model the relationships between latent variables.

(2) Measures and model formulation

This section presents the mathematical formulation of our model and the path diagram. The dependent variable in our model is the intention to adopt e-commerce while constructs in the

LCM are considered as independent variables. Thus, variables in the MCP model were constructed based on the work of Wang (2021), Chafik (2015). Attitude towards e-commerce adoption was measured by 10 items. As for subjective norms, these were measured by 12 items. Perceived behavioural control and intention to adopt e-commerce at last were measured by 10 and 4 items respectively.

Our model can be presented as follows:

$$INT = PBT\beta_{.i} + \epsilon_{.i} \text{ Or } INT = ATT\beta_{.1i} + SUBJ\beta_{.2i} + PERC\beta_{.3i} + \epsilon_{.i}$$

Description of variables used in the model is presented in Table 1.

4. Results

This section presents respondents' sociodemographic characteristics and SEM's results.

(1) Socio-demographic characteristics of women entrepreneurs

The majority of the respondents are young (50% are under 40 years old), which proves that import trading is an activity that pushes these women to travel more either to get new supplies or to explore potential markets or new opportunities, hence a certain level of dynamism is required. 39% of respondents declared holding higher university degrees (Bac +5 or Bac+3), 46.8% only completed high school (Bac) while 12.4% only managed to have a primary school certificate and 1.8% never attended school. Running a business requires a minimum level of education. The majority of respondents (78.7%) started their businesses with a capital of \$5,000 or less compared to only 0.7% who started with a capital of more than \$25,000. The majority of surveyed businesses are young; 72.6% of them were created in the last ten years. This is mainly explained by programs initiated by different NGOs to promote women's financial independence and awareness over the last few decades.

Family support, own funds and husband's support are the three main sources of financing for the surveyed SMEs, with a percentage of 80. By combining these three sources, it can be seen that our respondents' businesses are mostly financed at start-up by family money. Catering for family needs, seeking a profitable business and achieving financial independence and self-fulfilment are the three main sources of motivation for women traders to start their own businesses.

Variables	Description	Measure	Nature
Intention(INT)	This variable measures the likelihood of an individual adopting electronic commerce	Ordinal variable, Likert scale	Dependent
Attitudes(ATT)	Measures the potential adopter's perception of the benefit of adopting electronic commerce	Ordinal variable, Likert scale	Independent
Subjective Norms(SUBJ)	This variable measures "an individual's belief about the behaviour of other people"	Ordinal variable, Likert scale	Independent
Perceived behavioural control (PERCEIV)	This variable expresses the perception of the identification of constraints and difficulties that may compromise the transformation of the intention into a behavioural act	Ordinal variable, Likert scale	Independent

Table 1.
Description of variables

Source(s): Authors own creation

(2) Analysis of e-business adoption intention

This section presents different steps taken to estimate and validate the final structural equation model used to address our research hypotheses. Therefore, we first ran some descriptive statistics and correlation analysis before testing our hypotheses using structural equations through the PLS approach.

(1) Descriptive statistics

As presented in [Appendix](#), it can be observed that with regard to variable “attitude”, the majority of women traders have a positive attitude towards adoption of e-commerce (average = 4.87). For the “subjective norm”, results show that the majority of women traders would be encouraged by their family and friends to adopt e-commerce (mean = 4.27). As for the variable “perceived control”, women traders do not find too many personal constraints to adopt e-commerce. This means that the women traders in the city make a comparison between adoption of e-commerce and skills and competences they possess. They feel they have the necessary skills and competences to adopt e-commerce. Finally, with regard to the variable intention to adopt e-commerce, the majority of women entrepreneurs intend to adopt e-commerce during this period of health crisis with a mean of 4.7. In order to analyse the strength of the relationships between the different sub-study variables we calculated the correlation coefficients. The correlation matrix is presented in the following table:

Correlation results presented in [Table 2](#) between attitudes towards adopting e-commerce and intention to adopt e-commerce is equal to 0.558 with a significance of $p < 0.01$, implying a strong, positive and significant relationship between these two variables. Women traders will adopt e-commerce when they have positive or strong attitudes towards e-commerce. This is also the case for the “attitude towards adopting e-commerce” variable. The “intention to adopt e-commerce” variable has a strong and positive correlation with subjective norms at 0.545 with a significance of $p < 0.01$.

The correlation table above clearly shows that there is a weak negative correlation between the “intention to adopt e-commerce” and the “perceived behavioural control”, but this correlation is not significant at either 0.01 or 0.05 levels of significance. In other words, we can say that the intention to adopt e-commerce does not depend on behavioural control, which means that the latter is not an explanatory factor for intention to adopt e-commerce. It is worth noting that there is a low correlation between behavioural control and the other explanatory factors in the TCP model. The correlation coefficient is -0.288 with a significance $p < 0.01$ between behavioural control and attitude towards e-commerce adoption. The lack of correlation between behavioural control and the subjective norm should be noted. Despite the relevance of correlation analysis, many authors such as [Rakotomalala \(2011\)](#) supported by [Field \(2005\)](#) show that correlation can be a useful tool but its predictive power of variables is null. Thus, we move to the next step which is the analysis of structural equations.

	1	2	3	4
Intent to adopt (1)	1			
Attitude towards the behaviour (2)	0.558**	1		
Subjective norms (3)	0.545**	0.624**	1	
Perceived behavioural control (4)	-0.035	-0.288**	-0.021	1

Note(s): **. The correlation is significant at the 0.01 level (two-tailed)

Source(s): Authors own creation

Table 2.
Correlation matrix
between study
variables

(2) Analysis of the structural equations.

In order for the analysis of the structural model to be meaningful, the reliability and validity indicators of the items must first be verified and the problem of multicollinearity between the variables must be resolved.

- Internal consistency and reliability tests

The results of reliability analysis and internal consistency test are presented in [Table 4](#). [Hair \(2019\)](#) recommends using Cronbach's alpha, composite reliability and average variance extracted to test for internal consistency and reliability of dependent and independent variables.

- Estimation of the discriminant validity of the reflective constructs of the model

First, an item can only be retained if its external load is also higher than 0.7 ([Hair, 2019](#)). [Table 3](#) is composed of only those variables that met the conditions for reliability and internal consistency. The construct 'perceived behavioural control' had a Cronbach's alpha greater than 0.7 but was eliminated due to its composite reliability (0.484) and its extracted mean variance (0.168). Item 2 'norm2' on the subjective norms construct was also eliminated as the external loading was 0.668 (below 0.7). Without going further in the analysis, it can clearly be seen that our third hypothesis has been rejected since the perceived behavioural control variable will not appear in the final model to be estimated. This result already corroborates results found in the correlation matrix analysis which showed no correlation between the e-commerce adoption intention variable and the perceived behavioural control variable. As for discriminant validity, referring to [Fornell \(1981\)](#), the square root of the mean variance extracted must not be less than 0.5 and must be greater than the correlations between the latent variables. Our model fulfilled this criterion as presented in [Table 4](#). A quick glance at this table shows that the convergent validity of the constructs is adequate as the square roots of the AVE are all greater than 0.5 and the correlations. This result implies a low risk of multicollinearity.

- Estimation of structural equations by bootstrapping:

The results of the SEM analysis in this study, whose objective is to find the explanatory factors of e-commerce adoption intention among women traders, are presented in [Figure 2](#).

Results of SEM analysis, which aimed at finding explanatory factors of e-commerce's adoption intention among women traders, are presented in [Figure 2](#). The final model was estimated using bootstrapping method. The latter randomly draws a sample from the population (original sample) and runs the regression on this new sample.

According to the SEM results summarised in [Table 5](#) and [Figure 2](#), two variables (constructs) can be included in our final estimated model namely: attitude towards e-commerce adoption and subjective norms. They are both significant with p -value of 0.000 which are less than 0.05 (5%).

Results presented in [Table 5](#) show that only two of the three determinants of the TCP model have significant effects on the intention to adopt e-commerce by women traders. These include factors such as attitude towards e-commerce and subjective norm. This leads us to confirm our [H1](#) and [H2](#). On the other hand, behavioural control has no direct effect on women traders' intention to adopt e-commerce. This table simply implies that the more positive women's attitudes towards e-commerce adoption are, the more likely they are to adopt it. Moreover, the more important people in the eyes of women traders (friends, husband, children, ...) encourage them to adopt it, the more likely they are to do it.

Variables	Items	External loads	Cronbach's alpha	Composite reliability	Average Variance Extracted (AVE)
Judging criteria		>0.70	>0.50	>0.60	>0.50
Attitude towards electronic commerce adoption			0.952	0.959	0.701
	Att1	0.813			
	Att2	0.844			
	Att3	0.866			
	Att4	0.870			
	Att5	0.881			
	Att6	0.868			
	Att7	0.741			
	Att8	0.821			
	Att9	0.862			
	Att10	0.799			
Subjective norms			0.930	0.940	0.586
	Subj1	0.732			
	Subj10	0.722			
	Subj 11	0.769			
	Subj 12	0.750			
	Subj 3	0.795			
	Subj 4	0.771			
	Subj 5	0.719			
	Subj 6	0.782			
	Subj 7	0.744			
	Subj 8	0.815			
	Subj 9	0.768			
Intention to adopt electronic commerce			0.894	0.927	0.761
	Int1	0.779			
	Int2	0.894			
	Int3	0.911			
	Int4	0.898			
Perceived behavioural control			0.091	0.846	0.124
	Perc1	0.818			
	Perc10	-0.509			
	Perc11	-0.353			
	Perc2	0.434			
	Perc3	0.132			
	Perc4	0.209			
	Perc5	0.239			
	Perc6	-0.005			
	Perc7	-0.002			
	Perc8	0.002			
	Perc9	0.020			

Source(s): Authors own creation

Table 3.
Reliability test and
convergent validity

- Test of predictive power and model fit.

The coefficient of determination R^2 , the GOF (goodness-of-fit index) and the out-of-sample predictive power Q^2 were used, as suggested by Hair (2019), to analyse the predictive power of the model as well as the model fit test. For him a model is well predicted if Q^2 is greater than 0. According to Nomran and Haron's (2019) study, the GoF index lies between 0 and 1. When the GoF index is less than 0.1, it is not fit, between 0.10 and 0.25, it is considered small, 0.25 and 0.36. It is medium and when it is greater than 0.36 it is considered large.

The significant independent variables in our estimated model explain 38.2% of variation in the dependent variable (e-business adoption intention) as shown in Table 6. Our model fit index is above 0.516 (>0.36). A blindfolding procedure with the omission distance of 7 was

Variables	Attitude towards electronic commerce adoption	Subjective norms	Intention to adopt electronic commerce
Attitude towards electronic commerce adoption	0.837		
Subjective norms	0.626	0.766	
Intention to adopt electronic commerce	0.564	0.55	0.872

Table 4.
Discriminant validity **Source(s):** Authors own creation

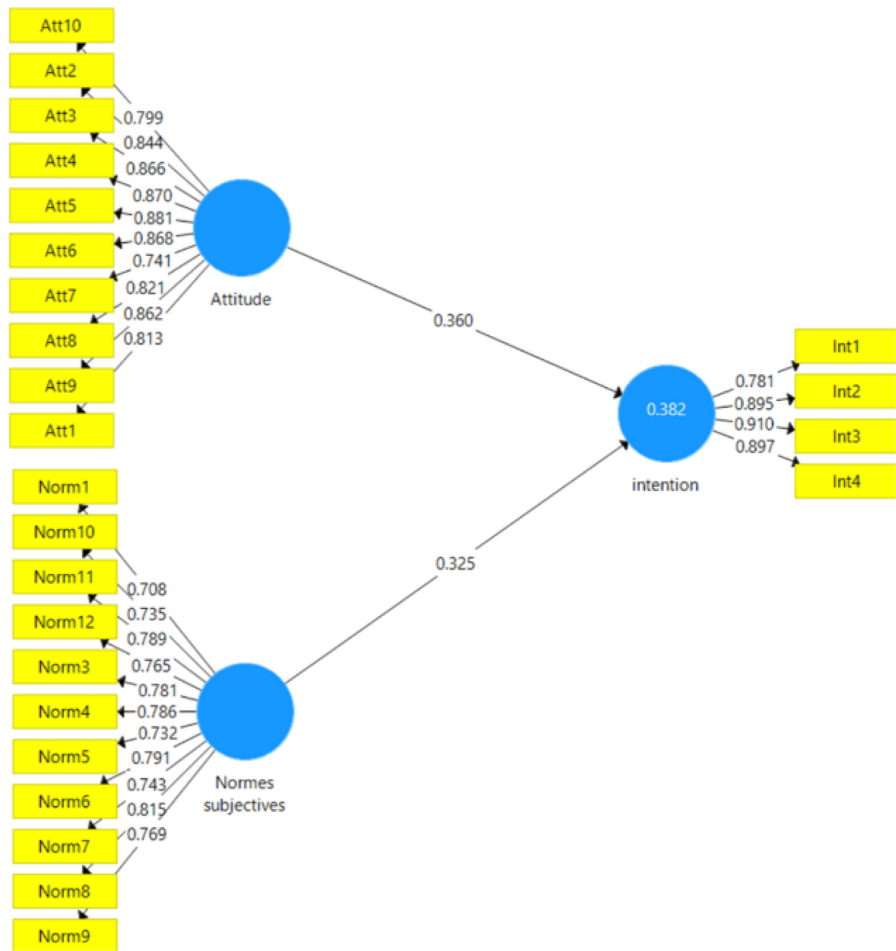


Figure2.
Estimated final model

Source(s): Authors own creation

Adoption of
electronic
commerce in
DRC

Total effects	Path coefficients	Standard deviation (STDEV)	t-value (O/STDEV)	p-values	97.5% confidence interval
Attitude towards electronic commerce adoption → intention to adopt electronic commerce	0.36	0.083	4.36	0	[0.206,0.521]
Subjective norms → intention to adopt electronic commerce	0.325	0.073	4.421	0	[0.172,0.456]
Perceived behavioural control → intention to adopt electronic commerce	-0.096	0.884	0.377	0.105	

Source(s): Authors own creation

Table 5.
Structural model estimation

	R^2	R^2 fitted
Electronic commerce adoption intention	0.382	0.377
Fit test of the constructed model	AVE	Q^2
Electronic commerce adoption intention	0.761	0.592
Attitude towards electronic commerce adoption	0.586	
Subjective norms	0.761	
Average AVE	0.6975184	
Average AVE* R^2	0.266452	
GOF = $\sqrt{\text{Average AVE} * R^2}$	0.5161	

Source(s): Authors own creation

Table 6.
Predictive power test and Model fit test

applied to assess the Q^2 predictive relevance (out-of-sample predictive power) of the antecedents of the endogenous construct. The analysis indicated that the Q^2 value for intention to adopt e-commerce was greater than zero (0.592). This result confirms that the antecedents have predictive relevance for the endogenous construct under consideration and that our model has a high GoF.

5. Conclusion and discussion

The health crisis that has ravaged the world for the past two years has shown the limits of business in terms of the use of information and communication technologies in the DRC, in general, and in the city of Bukavu, in particular. This study intends to identify explanatory factors to adoption of e-commerce as a resilience strategy of women entrepreneurs in the city of Bukavu. To achieve this objective, the study used the theory of planned behaviour proposed by Ajzen implemented by a regression analysis using the PLS-SEM. The results obtained showed that only two factors, namely attitude towards e-commerce adoption and subjective norms, were significant in predicting the e-commerce's adoption intention of women traders. The analysis shows that about 38.9% of the variation in the dependent variable is explained by the two variables. Study findings reported in this study supported the overall research and corroborated the previous findings.

The results found show that attitude towards e-commerce adoption was found to be a significant factor in the adoption of e-commerce by women entrepreneurs in Bukavu city with a highest path coefficient of 0.36.

As such, these results are consistent with previous studies that have argued for a positive relationship between attitude towards e-commerce adoption and intention to adopt

e-commerce (Cobelli *et al.*, 2021; Grandón, Nasco and Mykytyn, 2011; Nasco *et al.*, 2008; Riemenschneider and McKinney, 2002). However, these results are in contradiction with Chafik and Bennaceur (2015) who find that attitude does not influence adoption of e-commerce by Moroccan SME managers as adopting e-commerce for them is not seen as an innovative fact that will bring another consideration in society unlike women entrepreneurs in the DRC who will be seen as pioneers and role models.

As for the subjective norms variable, the results showed that subjective norms are a significant factor that would push women traders in Bukavu city to adopt e-commerce with a path coefficient of 0.327. These results corroborate previous studies that supported a positive relationship between subjective norms and intention to adopt e-commerce (Grandón, Nasco and Mykytyn, 2011; Nasco *et al.*, 2008; Riemenschneider and McKinney, 2002; Riemenschneider *et al.*, 2003).

Also, these results were not consistent with Chafik and Bennaceur (2015) who found only entrepreneurial orientation to influence the adoption of e-commerce by SME owners in Morocco; similarly, with Cobelli *et al.* (2021) who showed that only the variables attitudes towards behaviour and perceived behavioural control influence doctors in Italy to adopt telemedicine in this period of health crisis because Moroccan entrepreneurs and Italian pharmacists are able to use the Internet and its use in their work can in no way be influenced by external pressures but by expected benefits and the digitalisation of the current world.

Finally, there is a negative but not significant relationship with the intention to adopt e-commerce. This is in contradiction with results found by Harrison *et al.* (1997) who found that behavioural control influences the adoption of technology and information in SMEs in the USA. Study results also contradict those of Cobelli *et al.* (2021) which showed significant influence of behavioural control on the adoption of telemedicine in this period of crisis, but these results corroborate those of Nasco *et al.* (2008) and Riemenschneider *et al.* (2003)). This negative and non-significant relationship of the perceived behaviour variable is quite normal for women traders in the DRC as they do not perceive any difficulty in adopting e-commerce, in essence they are self-efficient.

Based on the research findings, practical implications are suggested. In developing countries, such as the DRC, this type of trade has the potential to produce important social and economic benefits such as the removal of geographical barriers, meaning that sellers have a global reach; the reduction of transaction costs, the convenience of having a website that operates 24 h a day, etc. The majority of the women traders interviewed are motivated to adopt e-commerce and study findings had shown that on the one hand, the women traders in the city of Bukavu had the financial and human resources (self-efficacy) to enable them doing it. On the other hand, they had a positive attitude towards adopting e-commerce and that their relatives would encourage them to adopt it. To this end, to support and stimulate investment in e-commerce services, the Congolese government has an important role to play in implementing adequate policies. According to GSMA (2021) in their report published in the course of 2021, the DRC is lagging behind other countries in adoption of e-commerce legislation because so far, no laws on transaction laws, data protection, cybercrime and consumer protection have been passed, whereas countries such as Rwanda have already done so. The attitude variable is formed on the accumulation of beliefs but cannot be taken for granted as new beliefs could change it (Fishbein, 2011). In addition, laws and regulations to be put in place by the state, the establishment of a security environment, the fact that the repeated wars in the country make certain areas inaccessible with repeated looting and rape of women would not facilitate transactions. The social norm has a significant influence on the intention; therefore, it is necessary to activate the social networks to share information and knowledge on its e-commerce website within its entourage. The objective for women traders would be to reduce misunderstandings and

increase knowledge about e-commerce among customers, by transmitting relevant information using interpersonal media.

As a perspective, more empirical studies need to be done to complete this work. This includes for example, using the improved model of planned behaviour suggested by Ajzen (2019a, b). Secondly, future studies have to take into account all types of entrepreneurs and not just focusing on the “commerce” sector. Finally, some other variables need to be integrated in order to improve the explained variance of this model while diversifying the theoretical model (TAM, DOI, TEO, etc.).

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Appendix**Adoption of
electronic
commerce in
DRC**

	<i>N</i>	Minimum	Maximum	Moyenne
Attitude towards electronic commerce adoption				
Att1	282	1.00	7.00	4,6489
Att2	282	1.00	7.00	4,8014
Att3	282	1.00	7.00	4,9610
Att4	282	1.00	7.00	4,9468
Att5	282	1.00	7.00	5,0319
Att6	282	1.00	7.00	5,1206
Att7	282	1.00	7.00	4,9362
Att8	282	1.00	7.00	4,6631
Att9	282	1.00	7.00	4,8936
Att10	282	1.00	7.00	4,7943
Attitude towards electronic commerce adoption				4,8798
Subjective norms				
Subj1	282	1.00	7.00	4,5426
Subj2	282	1.00	7.00	4,4645
Subj3	282	1.00	7.00	4,6170
Subj4	282	1.00	7.00	4,2837
Subj5	282	1.00	7.00	4,4504
Subj6	282	1.00	7.00	4,2482
Subj7	282	1.00	7.00	4,1631
Subj8	282	1.00	7.00	4,2447
Subj9	282	1.00	7.00	4,2163
Subj10	282	1.00	7.00	3,9255
Subj11	282	1.00	7.00	4,0745
Subj2	282	1.00	7.00	4,0993
Subjective norms				4,2775
Perceived behavioural control				
Perc1	282	1.00	7.00	4,1489
Perc2	282	1.00	7.00	3,6596
Perc3	282	1.00	7.00	3,55887
Perc4	282	1.00	7.00	3,4965
Perc5	282	1.00	7.00	2,9610
Perc6	282	1.00	7.00	3,4752
Perc7	282	1.00	7.00	3,0284
Perc8	282	1.00	7.00	4,0177
Perc9	282	1.00	7.00	4,3794
Perc10	282	1.00	7.00	4,0106
Perceived behavioural control				3,6766
Intention to adopt electronic commerce				
Int1	282	1.00	7.00	4,9397
Int2	282	1.00	7.00	4,8156
Int3	282	1.00	7.00	4,7518
Int4	282	1.00	7.00	4,6277
Intention to adopt electronic commerce				4,7837

Source(s): Authors own creation

Table A1.
Descriptive statistics of
the variables
under study

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