Adoption of Financial NICTs in the SMEs of Bukavu in the DR Congo: What Perspective?

Alain Mukamba Mulungula[1], Frederic Nimubona[2], Vwima Ngezirabona Stany[3]

[1]Department of Commercial and Administrative Sciences, Institute Superior Pedagogies in Bukavu, Bukavu, Democratic Republic of Congo
[2]Faculty of Economics and Management, University of Burundi, Bujumbura, Burundi
[3]Faculty of Economics and Management, Evangelical University in Africa (UEA), Bukavu, Democratic Republic of Congo
Email: mukambawenga@gmail.com

Abstract

Access to information and communication technologies ensures the performance of SME, their competitiveness by allowing them to be resilient to competition. This article focuses on the analysis of the factors adoption of financial NICT by SME in the city of Bukavu in DR Congo. We analyze the variables that drive SME in Bukavu to adopt financial NICT. This study is based on 130 SME (all's categories) selected in the city of Bukavu. The results obtained show that the adoption of financial NICT by SMEs in the city of Bukavu is explained by the organizational culture, competitive pressure, the relationship with partners and the lack of resources. In addition, the results of the confirmatory factor analysis and structural equations showed that the index of financial NICT adoption for SMEs in the city of Bukavu is 73.4% and revealed that the model is good and reliable with a $\alpha = 0.745 > 0.7$.

Keywords

Adoption, Financial, NICTs, SMEs, Bukavu-RDC and Perspective

1. Introduction

In recent years, information and communication technologies (ICTs) have become accessible to everyone around the world, abolishing distance and time. This phenomenon affects not only citizens but also businesses of all sizes. The adoption of ICTs further increases the market share of SMEs by minimizing competition (Jacks, 2009). It enhances the image of a small, medium or large enterprise. SME managers are then led to adopt them in order to optimize the supply and

demand of goods and services. To this end, they offer solutions for e-business, supply chain management, intranet, electronic data interchange and other tools for processing and routing information (Idris, 2017). Developed with the help of computers, the internet and telephony, they have revolutionized the way businesses are managed for decades (Daniel et al., 2002). By adopting them, SMEs are responding to the abundance of production as well as consumption flows. In the DRC, SMEs represent more than 90% of all enterprises. They face a wide range of institutional, financial and other challenges including limited access to finance, technology and markets. These challenges are compounded by the issue of entrepreneurship and management skills. Most of them do not use ICT in the conduct of their business. Several studies emphasize the roles of technological innovation in the management of a company (Charue-Duboc & Gastaldi, 2017). Whatever the size, innovations are diversified and act on the organization of the company. ICT as an innovation approaches SMEs from customers and other business partners due to their highly competitive environment (Choquet & Vieira, 2013). Therefore, SMEs need more than ever to step back and make decisions that allow them to adjust their actions. The literature on ICT adoption in SMEs mostly concerns two types of analysis. The first concerns the technical factors (internal and external) of ICT adoption (quality of platforms, usability, compatibility, etc.) and the second, the business characteristics in ICT adoption (Fall & Birba, 2015). However, little work has been done on the role of socio-economic factors in ICT adoption. In fact, many firms use ICT to reap the collateral benefits associated with this innovation but do not actually use it. Others, on the other hand, have them and actually use them. These different ICT profiles may be the result of different socio-economic characteristics. However, the empirical literature has largely neglected this fact. Also, almost all the research does not specify the size of the firm in the adoption of an innovation. (Ramdani et al., 2013); (Berrajah, 2008); (Martin & Matlay, 2001) and (Riquelme, 2002) have emphasized firm size, number of employees and turnover in ICT adoption. On the other hand, (Culkin & Smith, 2000); have shown that there is some complexity and "hesitation". The hesitation is mainly due to the vague knowledge of managers about the impact of ICT on the productivity of the company. To address these controversies, our research looks at the socio-economic characteristics of SMEs in addition to the purely technical factors of innovation adoption. And in the face of the imprecision of the literature concerning the size of the firm in the adoption of innovation, our study refers to the results of Godin (2017), in which Marchal decided in favor of SMEs.

From then on, it becomes relevant to question the factors of financial NICT adoption in SMEs in Bukavu. More specifically, we intend to answer the following question: what are the determinants of financial NICT adoption in SMEs in the city of Bukavu? The objective of our work is to study the factors that influence ICT adoption in SMEs in Bukavu (1); study the role of socio-economic factors in financial NICT adoption in SMEs Bukavu (2). The article is structured

around four points. After presenting the theoretical framework of our research and the chosen methodology, we will analyze and discuss the main results of the empirical study conducted among 135 SMEs in the city of Bukavu, in the Democratic Republic of Congo. The article is structured around four points. After presenting the theoretical framework of our research and the chosen methodology, we will analyze and discuss the main results of the empirical study conducted among 135 SMEs in the city of Bukavu, in the Democratic Republic of Congo.

2. Theoretical Foundations

This section presents theories on new information and communication technologies, adoption models and notions related to SMEs. It is structured around two main paragraphs. The first paragraph introduces ICTs. The second paragraph presents the models of ICT adoption by SMEs.

2.1. Theories on ICT and Financial Technology

The birth of ICTs is linked to the evolution of computing, telecommunications and audiovisual technologies. They represent computer technologies that are applied in the economy and facilitate the socio-cultural revolution (Boubakary, 2016). They generate new possibilities and abolish borders (Zapata, 2002). In the business world, thanks to ICTs, exchange with the outside world at a distance becomes easy. They play a role in the competitiveness of companies and in the efficiency of administrations and public services (health, education, security). In the context of e-commerce, the OECD has shown that it is a process of selling and buying goods and services using ICT. E-commerce covers both information exchanges and transactions concerning products, equipment or consumer goods, and services. Broadly speaking, it applies to any exchange of data using a telecommunications network for commercial purposes (Ghachem, 2008). With ICT, communication becomes flexible. This allows companies and individuals to exchange different information by maximizing time and facilitating communication. These exchanges are carried out through the Internet and online payment and are increasingly developing in all areas. Buying anything, anywhere is no longer a dream. New standards and payment methods have been developed to facilitate electronic payment. Carter et al. (2001) have shown that these are payments that are made over the internet or via telecommunication networks. They are generated from either a computer or a mobile phone. They range from bank cards to bank transfers and check. In this practice, the payment is made either digitally (e-payment) using a credit card, debit card or prepaid (Bhattacharya & Khan, 2018). Alongside credit card payments are account-to-account transfer payments and virtual wallet payments. The latter two are complemented by the e-check payment and the E-card payment. Payment by account-to-account transfer facilitates payment abroad. With the virtual wallet, the buyer makes his pay-

ment through sites specialized in e-payment (paypal[1] in the lead). This operation requires an e-mail address and the bank card number.

2.2. SMEs and Financial Technology

Financial technology has brought about a considerable change in the daily practices of large and small businesses (MacGregor & Vrazalic, 2004). It allows SMEs, as well as large companies, to pay special attention to customer. This thesis is corroborated by Fallon & Moran (2000) and supported by (Berrajah, 2008); (Martin & Matlay, 2001) and (Riquelme, 2002). With financial technology, companies have moved from traditional management to modern practice with customer focus as a key element. This attention consists of learning as much as possible about the customers in order to offer them what they want and to meet their needs. The same studies have shown that company size, number of employees and turnover are considered in the adoption of financial technology. Other studies have shown that the adoption of ICT by SMEs is not an easy task (Culkin & Smith, 2000). Studies such as (Pacitto, 2006) have shown that the performance of financial technology in SMEs depends on their geographical location. The location of the SME is an important factor in the successful adoption of technological innovations and e-commerce. The literature also shows that customer pressure is an important motivating factor in the adoption of financial technology the SME (Riemenschneider & Mykytyn, 2000) and (Power & Sohal, 2002). On the other hand, (MacGregor & Vrazalic, 2004); (Riemenschneider & Mykytyn, 2000) and (Raymond et al., 2001) have shown that the ICT adoption process depends to a very large extent on pressure from business partners. All this reasoning has led to models of ICT adoption. Contrary to the gaps in the literature, studies on the adoption of new financial technologies are approached within the general framework of a country and/or a city without specifying the category or segment of firms involved. Our study fills this gap by focusing on SMEs in the city of Bukavu in DR Congo. The literature on the adoption of innovations is abundant in developed countries, but very little of it concerns developing countries, especially those in Central Africa in general and the DR Congo in particular. The few works that do exist, as seen in the previous paragraphs, focus mainly on ICTs and neglect, for the most part, the diversity of innovation practices as well as the factors likely to influence their adoption within SMEs. This is why we focus on ICT in the context of new financial technologies. Similarly, the adoption models previously mentioned have been used differently depending on the cases studied. The following paragraph develops the key concepts and hypotheses of our study.

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[1]PayPal is an online payment service that allows people to pay for purchases, receive payments, or send and receive money. To benefit from these services, a person must create an account and then transmit various banking details to PayPal, such as the number of this payment. Thereafter, transactions are carried out without having to re-submit bank details, an email address and a password being sufficient.

2.3. Conceptual Framework and Development of Hypotheses

This review of the literature allows us to emphasize the role of socio-economic factors of SMEs in the choices made in terms of information technology. Moreover, in addition to these factors, there are others that contribute to the best performance of the SME. The literature review conducted by (Spanos et al., 2002); (Bayo-Moriones & Lera-López, 2007) within the framework of the ICT adoption theory is mobilised in the context of this study. This theory is supported by a number of authors for whom the adoption of ICT in companies depends on the environment, human capital, internal organisation, strategy and characteristics of the company. We chose the ICT adoption model in SMEs because this model is one of the most widely used models to explain ICT adoption in organisations (Hussin & Noor, 2005); (Alam et al., 2005); (Van Slyke et al., 2004) and (Teo & Pok, 2003). Other models have important limitations in the context of technology adoption in organizations. The MAT model, for example, does not fully reflect social influences on an organizational context (Alkalbani et al., 2013). It simply seeks to explain the individual's intention to develop the behavior in question (Grandon & Mykytyn, 2004).

The TAR model focuses on predicting goal achievement (Anderson & Schwager, 2004). The TCP model focuses on explaining and predicting managers' behavioral intentions and not on technology adoption at the organizational level (Mahmood, 2002). To properly measure the level of ICT adoption in SMEs in Bukavu, we adapted the theory of ICT adoption in SMEs by Spanos et al, (2002) to the realities of this sector in Bukavu. This theory unifies 9 explanatory variables of ICT adoption in SMEs. In this study, four variables are considered independent and one dependent variable. ICT adoption (ATIC) is retained as the dependent variable. Organizational culture, the competitive pressure, the number of customer-supplier partners and the lack of resources are taken as independent variables. Corporate culture is a fundamental element in explaining much of the behavior within an organization (Fidha & Tarifa, 2009). It expresses an overall relationship of the organization to innovation. Organizations with a culture that emphasizes innovation tend to implement more innovations and develop a competitive advantage. In this respect, corporate culture plays a major role in the creation and development of ICT within a company (Rave-Habhab, 2011). Several studies have shown the influence of organizational culture on the use of technology, particularly ICT (Bhat & Gaur, 2009). In rural areas, BEPs do not see a quantifiable impact of ICT adoption on their profit margin (Blinn & Sangaré, 2012). Therefore, such an organizational culture would not be conducive to ICT adoption. Corporate culture plays the role of supporting or sustaining innovation and facilitates ICT adoption (Rave-Habhab, 2011). This is facilitated by the acceptance of new ideas by members of the organization. To this end, corporate culture is then seen as the result of a cumulative and specific process in which social interactions play a key role in ensuring technological in-

novation. Therefore, our first hypothesis will be:

H1: Organizational culture positively influences ICT adoption in SMEs.

We have highlighted that ICT adoption allows SMEs to bypass competition. Authors such as (Rogers, 2010) and (Kuan & Chau, 2001) have highlighted the importance of competitive pressure in the adoption of innovation. Competitive pressure is an important element in the adoption of information systems (Porter, 2008). Thus, they highlight the fact that the adoption of information systems leads to a change in the competitive environment. The literature emphasizes that competitive pressure is an important factor influencing the adoption of ICT in a clear way (Information Resources Management Association, 2018). For his part, (Imre, 2017) mentioned that competition influences adoption in small firms in a very modest way. This contradicts other authors. As a result, the importance of competition on technology adoption has been demonstrated but with an ambiguous sign. We turn to the positive side of the influence of competitive pressure on ICT adoption.

H2: Competitive pressure positively influences the adoption of ICT by SMEs.

Our third hypothesis seeks to link business partners to ICT adoption in SMEs. Several studies have investigated the relationship between suppliers, buyers and e-business adoption (Mehrtens et al., 2001) and (Rashid, 2001). The influence depends on the characteristics and specificities of suppliers and buyers. These may include geographical distance, habits, customs and preferred purchasing behavior. Here, the focus is on characteristics relating to the habits of customers to contact the company, and the willingness of suppliers to interact electronically with the company.

H3: The number of business partners (customers-suppliers) positively influences the adoption of ICT by SMEs.

Finally, the last hypothesis links the resources of an SME to ICT adoption. Recent studies, mainly in developing countries, have revealed that ICT adoption in SMEs is linked to the resources available to them (Piget & Kossaï, 2013). Indeed, lack of human resources and skills are the most important barriers to ICT adoption for SMEs in OECD countries (Panagariya & UNCTAD, 2000). Barriers to ICT adoption in SMEs in Australia could be the cost of investment and the lack of human resources and skills (Nabeel, 2005). Also, financial concerns are among the main barriers to ICT adoption in Australian SMEs (In, 2008). For their part, (Mwai & Muriithi, 2016) showed that lack of resources negatively affects ICT adoption in SMEs. For (Wymer & Regan, 2005), SMEs are not likely to have resource availability in terms of time, money and expertise. These negatively impact their ability to use new technologies effectively.

H4: Lack of resources negatively influences ICT adoption in SMEs.

We therefore assume that the adoption of ICTs in SMEs in the city of Bukavu will make them more efficient and competitive. This adoption will have a positive effect on organizational culture (H1), a strong capacity to absorb competitive pressure (H2), and a strong relationship with business partners (H3). Final-

ly, it will have a negative effect on the lack of resources in SMEs (H4). The adoption of ICT by SMEs in the logic of (Sin Tan et al., 2009) refers to the use of technologies (hardware, software and network…). The set of our research hypotheses is presented through Figure 1.

3. Methodology

By nature, qualitative research is relevant because it allows for the study of new, previously unknown and unexploited phenomena in the literature (Cassell et al., 2017). This is the case of ICT adoption in SMEs in the city of Bukavu. This is why, in view of the research question and the previously mentioned unexploited theoretical aspects of ICT adoption, we chose to conduct an inductive qualitative study.

3.1. Data Collection and Sample Design

We sampled managers and owners of SMEs in the city of Bukavu. According to statistics from the Industry Division and IPMEA, the number of small and medium-sized enterprises in the city of Bukavu is estimated at 1750, spread over the three communes of Bukavu. We proceeded with a pre-survey and noted a redundancy in the information collected. Therefore, instead of pre-surveys 35, we limited the pre-survey to manager-owners 30 of SMEs. We proceeded with criterion sampling (Carricano et al., 2010) using the snowball technique (Moalla, 2013). We conducted paper and pencil interviews from 2 to 9 January 2021. After calculation, a sample of 135 SMEs was drawn from the formula that was used by (Akonkwa et al., 2014). To find this sample, we resorted to a relative variance of 0.095 used in the study by Boubakary (2016). To achieve this, we incorporated this relative variance into the formula used by Akonkwa et al. (2014). From this sample, three strata were formed[2] with a sampling rate of 0.0771[3] identical within each stratum. The sample is broken down in terms of communes as follows: Ibanda commune (43 respondents); Kadutu commune (78 respondents) and Bagira commune (14 respondents).
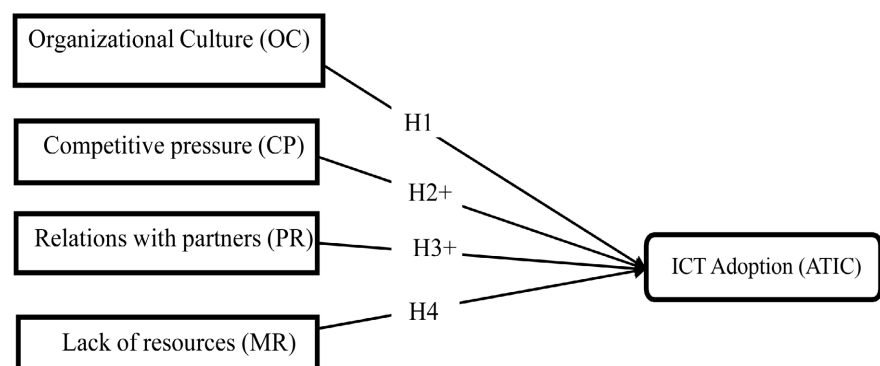

Figure 1. Effects of ICT adoption in SMEs in Bukavu.

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[2]In our study, municipalities are considered as strata.
[3]The sampling rate is obtained by the following formula $f = n/N$.

3.2. Statistical Methods for Data Analysis

In this study, we used principal component analysis and structural equations to test the scale variables. In relation to factor analysis, we used the Bartlett specificity test and the Kaiser Meyer and Olkin (KMO) test/we used the MSA (Measure of Sampling Adequacy) test to check whether the data were factorable. Factor analysis allowed us to analyze the internal structure of several variables using a reduced number of dimensions (Bennour & Crestani, 2007). Through these analyses, we made the preparation of the data, the choice of a calculation procedure, the dimensionality and the interpretation (Carricano et al., 2010). However, we checked the factor loading criterion as well as the communality criterion. Factor loading allowed us to measure the correlation of a variable with a factor that is presented by the square of the loading. The appearance of factor contributions close to the two extremes 0 and 1 is done using an orthogonal rotation of the varimax type (Pupion, 2012). Items with a contribution < 0.5 are eliminated. Communality, on the other hand, examines the share of variance explained in the linear combination of each factor. Communality is also described by the quality of the representation. This criterion makes it possible to assess the level of representation of each item. Items whose communality is ≥0.5 are to be retained (Carricano et al., 2010). After this stage, the measurement scale is captured to analyze its validity and reliability. It is valid when it is capable of capturing a phenomenon (Kim & Mondello, 2014).

In this study, only face or content validity is considered. This is based on the judgment of the researcher and his peers. Therefore, our survey questionnaire was administered to five Airtel Money[4] users for validation. In addition, the reliability of the measurement scales was checked using the cronbach's alpha coefficient (a) based on variance and covariance. It is between 0 and 1, which means that the higher it is, the closer it is to 1. Being close to 1 means that the scale is reliable (Evrard et al., 2009). In contrast, with structural equations, we opted for LISREL (Linear Structural Relationships). This is a confirmatory approach to the assumptions of the conceptual model. To assess the goodness of fit of the model, we used chi2 tests, GFI (Good ness of Fit Index), RMSEA (Root Mean Square Error of Approximation), NNFI or Tucker-Lewis Index and CFI (Comparative Fit Index). In order to determine the level of ICT adoption in SMEs in the city of Bukavu, we used the adoption index developed by (Rivière, 2014). With this index, we proceeded to determine the relative score of the importance of each factor by taking the averages of these. The score obtained allowed us to calculate the adoption weight, which is equivalent to dividing the importance score attributed to each factor by the total importance scores. This adoption weight serves as a weighting factor for the adoption scores. Each adoption score is weighted by the relative weight of the importance of the corresponding aspect to give the weighted adoption score. The summation of the weighted adoption scores gives the weighted

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[4]Airtel money is one of the services (payment, online purchase) offered by the telecommunication network airtel in DRC.

average score. For this purpose, the use of a 5-point Likert scale was necessary. The weighted average score is divided by 5 to obtain the adoption index (which is multiplied by 100 to express it as a percentage). SPSS.20 and LISREL respectively facilitated this 9.30 task. The SPSS software for the constitution of the database; the realization of the descriptive statistics and the factorial analysis in principal component and the LISREL for the structural equations.

4. Results

The results of the descriptive statistics show that the majority of the managers who own SMEs are male. Indeed, 63.8% of the managers are men and 36.2% are women. These results appear to be true insofar as, in most cases, men have a higher risk aversion than women. Similarly, it can be seen that the age of these managers varies between 41 and 60 years for the majority. This category represents 49.2% while the others represent respectively 35.4% for those above 60 years and 15.4% for those below 40 years. In terms of educational level, 48.5% of the sample had a secondary education, 19.2% a university education and 15.4% a primary education. These results coincide with the reality of the city of Bukavu. It was found that the majority of entrepreneurs in Bukavu City start their business too early and drop out of school early. It was found that after secondary school, young people automatically prefer to be entrepreneurs. This category is based on a common saying in the city that "those who have a high level of education do not succeed in life" in Lingala "Batanga too bazanga". However, these answers should be taken with caution, as often when business is booming, some leaders overestimate their level of education and sometimes even present false school documents.

In addition, it was observed that the majority of the managers, i.e. 48.5%, had followed the economics of management training course. Apart from this course, 43.1% of our sample took the scientific option. The remaining 8.5% of our sample took either the general pedagogy, the social humanities, the literary or the self-taught option. With regard to seniority in management, 38.5% of our sample have been in management between 1 and 5 years. 36.9% have been in management for between 6 and 10 years and 24.6% have been in management for more than 10 years. It turned out that the majority of managers have a strong experience in managing a business. Another fact is that more than fifty percent of these SMEs are family owned. This is why 65.4% of them are managed by owners and only 22.9% by managers-employees. Nevertheless, regardless of the type of SME, the contributions of the managers constitute more than half of the share capital. Therefore, out of the 100 percent sample, 46.2 percent stated that they have half of the share capital of the SME and only 41.5 percent stated that they contribute 100 percent of the share capital. In analyzing these results, we note that their sources of finance are diverse. Apart from the fund the owner-managers or co-owner-managers use loans to start the business.

Regarding the number of employees, the results show that it varies signifi-

cantly from one SME to another. SMEs with fewer employees 10 represent 60% of the sample. In others, this number varies between 11 and 40 persons. These types of SMEs represent about 28.5% of our sample. Others, on the other hand, employ more than 40 people (11.5% of the sample). With regard to the evolution of sales, the results show that sales vary considerably according to the types of activities carried out by the SMEs. Indeed, 33.8% of our sample stated that their sales have been very unstable over the last 5 months. On the other hand, 29.2% of our sample claim to have achieved high sales, 24.6% claim to have achieved average sales and 12.3% acknowledge to have achieved very high sales. Most of these variations are due to the health crisis of COVID-19, which paralyzed the circuit of economic activities and continues to hinder entrepreneurial progress. This pandemic has favored some SMEs, while penalizing others. SMEs working in the agro-food sector have seen their turnover increase, while those in the transport sector have seen theirs decrease. Finally, the majority of SMEs in the city of Bukavu, i.e. 45.4% of the total sample, operate in general trade. Those working in transport activities represent 25.4% and in services 16.2%. SMEs working in industry represent 13.1%. ICT is adopted by most SMEs in Bukavu. 92.3% of our sample said that they adopt ICT in their activities and only 7.7% do not.

4.1. Factor Analysis Results

The first Table 1 allows us to measure the constructs of our measurement scale. Through this table, we verify the type of relationship that the adoption of ICT in SMEs in the city of Bukavu has with the variables retained in our study. After analysis, the first component that appears is "the relationship with business partners, both customers and suppliers". This variable explains 27.16% of the total variance. It is followed by "competitive pressure". This includes 3 of its initial items and explains 14.90% of the total variance. The third component is "organizational culture". It also includes some initial items and explains 13.24% of the total variance. The last component is "lack of resources". It includes 2 items and explains 9.79% of the total variance. The results of the factor analysis show a structure with 12 items. Four items were removed because of a low correlation (<0.5) with one of the components. The cronbach's alpha obtained is (0.745 > 0.7) after the items were removed. This shows that our measurement scale is reliable and proves that it is no longer possible to remove an item to improve the final solution. This is good, as our data are factorable because (KMO = 0.681; Chi-square = 417.058; ddl = 66; significance = 0.000*). The reduction of the items from 16 to 12 grouped into four components is justified by an orthogonal varimax rotation in 5 iterations. The majority of the 12 extracted items have communalities greater than 0.50. This means that each of these items has a high degree of commonality. This means that each of these items contributes more than 50% to the significance of its respective component. The Cronbach's alpha of is 0.745 acceptable because it 0.70 is above the minimum acceptance

Table 1. Summary of the measurement model of the constructs in our model[a].

| Components | Items | Component | | | | Municipalities |
		1	2	3	4	
relationship with partners	Item 6	0.761				0.769
	Item 7	0.684				0.602
customers-suppliers ($\alpha = 0.679$)	Item 9	0.678				0.685
	Item 13	0.645				0.659
	Item 11		0.784			0.686
competitive pressure ($\alpha = 0.694$)	Item 10		0.753			0.734
	Item 12		0.740			0.662
organiza tional culture ($\alpha = 0.696$)	Item 5			0.818		0.652
	Item 1			0.763		0.683
	Item 3			0.630		0.749
lack of resources ($\alpha = 0.563$)	Item 14				0.854	0.606
	Item 15				0.775	0.519
Cronbach's alpha $\alpha = 74.5$		3.259	1.786	1.589	1.175	
		27.158	14.881	13.241	9.788	

Source: designed by us based on estimates.

threshold. This proves that the scale selected correctly measures what it was intended to measure (Martin & Matlay, 2001).

Extraction method: principal component analysis. Rotation method: Varimax with Kaiser Normalization. a. The rotation has converged in iterations 5.

The second Table 2 allows us to assess the discriminant validity of the constructs. The results in this table analyze the capacity of each measure to generate different results from the measures of other constructs. However, it can be seen that there is a correlation between the variables. The square root values of the AVEs are all higher than the correlations of the component (1.000) with the other components. This means that each measure is able to generate different results to other constructs. This proves that the discriminant validity of our constructs is assured. Therefore, the results obtained allow us to validate the conditions required for hypothesis testing. The homogeneity of the scales is sufficient, the convergent validity and the discriminant validity are acceptable.

The values in the diagonal represent the square roots of the AVEs and the other values represent the interconstructed correlations.

Table 3 evaluates our research model based on structural equation estimates. The results show that three variables have a positive and significant influence

Table 2. Estimation Of the discriminant validity of the reflective constructs of the model[5].

	CULTO	REPAR	PRECO	MARES
CULTO	**1.000***			
REPAR	0.538	**1.000***		
PRECO	0.268	0.396	**1.000***	
MARES	0.373	0.573	0.248	**1.000***

Source: designed by us based on estimates.

Table 3. Analyses the structural links between latent variables in the model.

Assumptions	Causal relationship	Estimator	p value	z-value	R2	Significance
H7	CULTOATIC	0.12	0.000*	14.3	0.72	Significant
H11	REPARATIC	1.73	0.000*	10.7	0.69	Significant
H9	PRECOATIC	0.37	0.000*	13.1	0.57	Significant
H12	MARESATIC	-0.06	0.000*	10.07	0.31	Significant

on ICT adoption in SMEs in Bukavu city. These are the organizational culture component (z-value = 14.3 > 1.96 and p = 0.000 < 0.05), the relationship with partners (z-value = 10.7 > 1.96 and p = 0.000 < 0.05) and competitive pressure (z-value = 13.1 > 1.96 and p = 0.000 < 0.05). On the other hand, the lack of resources component has a significant negative influence on the adoption of ICT in SMEs in the city of Bukavu with (z-value = 10.07 > 1.96 and p = 0.000 < 0.05). These results allow us to validate all the hypotheses.

The research model identified by LISREL shows that the "organizational culture" variable yields a (β = 0.59), the relationship with business partners variable (β = 1.73), the competitive pressure variable (β = 0.37) and the lack of resources (β = −0.06). This nomological validity is tested by the structural model that links the adoption scale captured from these four dimensions (**Figure 2**).

The result in **Table 4** assesses the quality of the model. The assessment of the quality of the structural equation model allows us to clarify the link between the model fit and the collected data. It turns out that the collected data reflect the fit of the model. This is true as long as all fit indices exhibit satisfactory values. In other words, the RMSA is (0.000*) close; 0.05 the IFI is (1.064***) acceptable because ≥0.90, the CFI is 1 acceptable as ≥0.90 and the GFI is (0.999) acceptable as close to 0.95. Also, the X/dll^2 ratio is (0.09***) less than 5 for this model. In sum, our model presents a good degree of adjustment. These results lead to the calculation of the ICT adoption index in SMEs in the city of Bukavu on the basis of the Liker measurement scale ranging 1 from 5.

[5]Note: CULTO: organizational culture, REPAR: relationship with business partners, PRECO: competitive pressure, MARES: lack of resources.
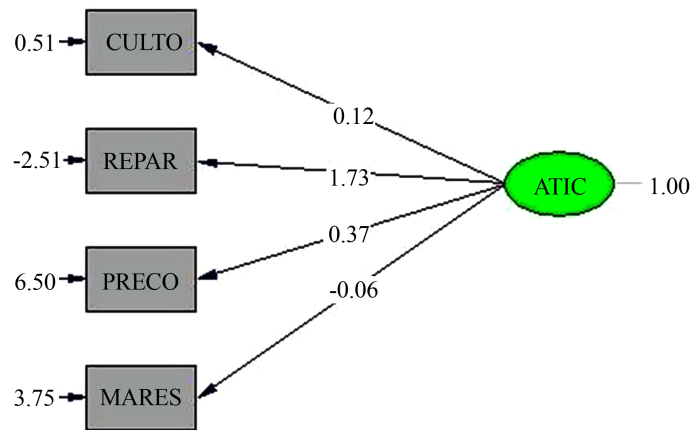
Chi Square = 0.18, df = 2, *p*-value = 0.91248, RMSEA = 0.000

Figure 2. Determinants of ICT adoption by SMEs in the city of Bukavu. Source: construction under LISREL Student 9.30.

Table 4. Assessment of the quality of the model.

Indicators	Values	Acceptable limits
Chi2/Degree of freedom	0.09***	<à 5
Root Mean Square Error of approximation (RMSA)	0.000*	Porches of or 0.05; 0.8
Incremental Fit Index (IFI)	1.064***	0 (very poor quality) to (perfect 1 quality)
Comparative Fit Index (CFI)	1.000*	(very poor quality) to (perfect 1 quality)
Goodness of Fit Index (GFI)	0.999*	Porches of or 0.9; 95

Source: Our compilation under LISREL Student 9.30.

Table 5 determines the level of ICT adoption in SMEs in the city of Bukavu. The results show that the level of ICT adoption in SMEs in Bukavu city is 3.67. Dividing the adoption score by the level of the 5-point measurement scale (3.67/5), we get a score of 73.4%. This score means that SMEs in Bukavu have a 73.4% adoption of ICT.

The statistical tests carried out led to the formulation of findings concerning the state of validation of the various hypotheses initially put forward. From these results, we conclude that H1, H2, H3, which postulated a positive relationship between organizational culture, competitive pressure and relationship with business partners, are validated. On the other hand, H4 is also validated, despite the presence of a negative relationship with ICT adoption as initially predicted (**Table 6**).

4.2. Discussion, Economic Implications of Results and Future Prospects

The empirical study carried out in this study highlights the internal and external

Table 5. Level 6. Of ICT adoption by SMEs.

Variables	Adoption note	Adoption weight	Weighted adoption score
CULTO	3.77	25.70	0.97
REPAR	3.67	24.98	0.92
PRECO	3.61	24.63	0.89
MARES	3.62	24.69	0.89
Total	14.67		3.67
Adoption index			0.73

Source: designed by us based on estimates.

Table 6. Summary of results.

Dependent variable	ICT adoption	
Independent variables	Assumptions	
Organizational culture	H1	Confirmed
Competitive pressure	H2	Confirmed
Relationship with partners	H3	Confirmed
Lack of resources	H4	Confirmed

Source: designed by us based on estimates.

factors of ICT adoption in SMEs. The socio-economic characteristics of the SME are studied superficially. The SME managers, being confronted with the same reality, are then able to provide an explanation adapted to the need to adopt ICT. Indeed, the respondents underlined that the gender, the age of the manager, his or her level of education, experience, ownership structure and sector of activity have an impact on the adoption of ICT in SMEs. Therefore, the more male the manager, the more likely he is to adopt ICT to improve the organization, unlike female managers. These results are in line with Pilote (2014) who showed that male managers are more likely to adopt ICT than female managers. Similarly, our results found that the majority of managers are of advanced age. Despite this, ICTs are adopted by 73.4% of SMEs in Bukavu city. This proves that in Bukavu, older entrepreneurs adopt ICTs more than younger entrepreneurs. This phenomenon can be explained by imitation and globalization. These results are in contradiction with those of Gambardella and Torrisi (2001) who showed that the age of the manager is an important factor in the ICT adoption process in SMEs. For them, young managers of small establishments have an advantage in adopting ICT than their older counterparts, who perceive it as a rip-off. The level of education of the managers in our study positively affects ICT adoption. Managers who are better educated and have better knowledge to reduce the degree of uncertainty and risk have a high probability of adopting ICT. These re-

sults meet those of Mughal & Diawara (2011) for whom the level of training, the level of qualification and the level of education of employees positively influence the adoption of ICT. ICT adoption in SMEs is associated with several managerial characteristics. Work experience and competence are important factors in ICT adoption. More experienced managers tend to adopt ICT than those who have no work experience. From this perspective, the experience of the manager is a facilitating factor for ICT adoption. The role played by the business leader (manager/owner) is central to the business and his or her decision influences the strategic and organizational direction of all business activities, both current and future (Raymond et al., 2001; Ates et al., 2013). His knowledge about and positive attitude towards ICT, his willingness to grow the business (Fambeu, 2016) and to expand internationally (Rene Samba, 2013), positively influence the adoption of ICT.

Our results indicate that the sector of activity is a key element in the adoption of ICT. These results corroborate those of (Culpan, 1995) and (Holmes & Cavanagh, 2016) who showed that the activity carried out by the SME seems to influence the level of ICT adoption and use in SMEs. Attitudes towards technology change according to the sector of activity. Despite this coincidence in terms of results, it is worth noting that there are disparities in the accounting practices of companies in different sectors. This suggests that there are disparities in the adoption of ICT in SMEs by sector. All in all, ICT adoption is strongly influenced by the relationship component with customer-supplier partners as our study shows. These results are in line with those of (Arora & Gambardella, 2005) & (Baptista, 2001) who have shown that managers should focus heavily on their partner relationships because the existence of complementarity between different external partnership practices strongly influences ICT adoption. The characteristics and diffusion process of a particular technology can have a significant impact on the diffusion of another technology.

Again, we conclude that competitive pressure also influences ICT adoption in SMEs in Bukavu. These results coincide with those of (Porter, 2008) for whom competitive intensity is generally related to the degree of industry concentration and the ability of competitors to erect barriers to mobility. These same results are consistent with those of (Frambach & Schillewaert, 2002) who have shown that for firms operating in highly competitive markets, the adoption of an innovation may be necessary to maintain its position in the market. In such an environment, not proceeding with an innovation already adopted by other competitors may constitute a competitive disadvantage. In any case, the strategy of innovation and its potential implications for the effectiveness and efficiency of the company's activities remain of paramount importance. In relation to organizational culture, our results showed that it plays a prominent role in the context of the city of Bukavu in ICT adoption. This is due to the cultural diversity of the DRC, which provides SMEs in Bukavu with the cognitive capacities to appropriate ICTs more easily. These results are in line with those of (Barmeyer & Mayr-

hofer, 2009) who showed that cultural values have always been determinant for the resolution of internal coordination and external adaptation within firms.

Finally, our results showed that the lack of resources has a weak influence on the adoption of ICT in Bukavu. These results are in line with those of (Singh et al., 2011); (Piget & Kossaï, 2013) who showed that the lack of resources appears in the dimensions that can influence or not ICT. The lack of resources to finance ICT investments is one of the major barriers related to adoption. To this end, ICT adoption would be influenced by the willingness of the manager to provide the necessary resources for ICT implementation. Thus, ICT adoption in SMEs favors a complicity of partnership such as improving customer service through new methods and expanding its market through the digital marketing process.

5. Conclusion

The main concern of this study was to analyze the factors that encourage SMEs in the city of Bukavu to adopt ICTs in their management practices. The analysis was done through a survey of 130 SMEs in the city of Bukavu based on the items integrated into the measurement scale using content analysis. The presentation of theories on ICT and SMEs was made possible by a review of the theoretical literature, while the review of the empirical literature allowed us to choose different tests based on previous work. These tests facilitated the verification of hypotheses and the evaluation of ICT adoption factors in SMEs in the city of Bukavu. The verification and validation of the hypotheses were done using an exploratory factor analysis and a structural equation model through the PLS approach.

From the categorical variables, this study postulates that six variables significantly explain the adoption of ICT in SMEs in the city of Bukavu. These include the gender of the manager, age, level of education, experience, ownership structure and sector of activity. On the other hand, the variables size of the SME and the quality of training were not significant and were removed from the model. Similarly, starting from the scale variables, the results of the factor analysis revealed that our model is good and reliable with and $\alpha = 0.745 > 0.7$. Discriminant validity showed that the square root values of the AVEs are all higher than the correlations of the component with the other components. The structural equations confirmed that ICT adoption is a multidimensional construct consisting of 16 items grouped into 4 components. It was observed that ICT adoption has a positive and significant relationship with organizational culture. This result confirmed hypotheses H1, H2 and H3. On the other hand, adoption has a significant but negative effect with the lack of resources. This result confirmed hypothesis H4. This research is therefore part of the dynamic of researching the factors determining the adoption of ICTs in the context of the city of Bukavu, in South Kivu, DR Congo.

Several contributions from an academic and management perspective can be drawn from this study. On the theoretical level, it highlights the socio-economic factors of SMEs by explaining the role of each of them in the adoption of ICT in

SMEs. These characteristics are particularly relevant in the process of adopting a new technology; they are strongly linked to the leaders of SMEs. Therefore, the characteristics of the leader become the key to successful ICT adoption in SMEs. Our study also contributes to the literature on ICT adoption by proposing a model of ICT adoption in SMEs in the city of Bukavu in the Democratic Republic of Congo. It is an opportunity for us to propose a model of ICT adoption that can be applied to SMEs in Bukavu in general. It should be noted that this possibility will make it possible to integrate other variables not retained, knowing that they could have had an impact on the adoption of ICT in SMEs in the city of Bukavu. This being the case, it would be useful to mention that there have not yet been any studies on the ICT adoption model for SMEs in the city of Bukavu. This is why we drew inspiration from ICT adoption models for SMEs developed in other countries. Our study offers an opportunity to develop an ICT adoption model that would take into account not only firms that have adopted ICTs, but also those intending to adopt them as well as late adopters, as studied in the empirical review elsewhere.

Despite its contributions, our study is not without its limitations. Firstly, the very limited sample size and geographical scope of the survey constitute one of the weaknesses of the study in terms of its external validity. These limitations should not undermine the results obtained. This is why it seems desirable to analyze either the model of adoption of e-commerce and credit cards (visa, maestro, etc.) at individual level in the DRC. Finally, an examination of the adoption of e-management within companies, or e-finance in banks could be envisaged; or a study of the adoption of ICTs in SMEs taking into account all SMEs in the Kivu region. This would take into account the behavior of SMEs during adoption and post adoption combined in the analyses.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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