

Analysis of the SME-Bank Relationship in the Context of Digital Financial Services in Bukavu

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Abstract

This research proposes to analyze how SMEs in the city of Bukavu adopt the NFS provided by banks. It also verifies the explanatory factors of the adoption of these services capable of explaining the SME-bank relationship. Finally, it assesses the model for developing a long-term SME-bank relationship. We started with a survey of 352 SMEs in the city of Bukavu taken at random. Through principal component analysis (PCA) and structural equations using the PLS technique, the results show that in the adoption phase, expected effort, convenience and perceived risk have a positive effect on the intention to use NFS by SMEs in Bukavu. Similarly, these variables explain 92% of the variance in intention to use NFS versus 8% of current intention to use NFS. On the other hand, the gender of the manager, the sector of activity and the age of the SME have a moderating effect on the intention to use NFS. It was observed that the gender of the leader has a moderating effect on the relationship between expected effort, perceived usefulness, perceived risk, and social influence with the intention to use digital financial services. While SME age has no moderating effect on the relationship between expected effort, perceived usefulness, perceived risk, and social influence with the intention to use DFS. Industry has a moderating effect only on the relationship between expected effort and current use of NFS. Similarly, SME age, executive gender, and industry have a moderating effect on the relationship between convenience and current SFN use. The post-adoption model was confirmed with a better prediction. The results also provided evidence that expected convenience, perceived usefulness, and perceived risk influence the adoption intention of SFNs and also the current use of these services in the post-adoption phase, especially the trust of SMEs. In doing so, we validated the existence of

a positive and significant relationship between SME trust and satisfaction on the one hand, and between SME satisfaction and their commitment to their bank in the context of SFNs on the other. Finally, the results did not establish the relationship between SMEs' commitment and the level of the relationship established with their bank. Therefore, these results could not identify or show the appropriate relationship chain in the context of NFCs.

Keywords

SME-Bank Relationship, Digital Financial Services (DFS), Adoption, Post-Adoption and Bukavu City

1. Introduction

For decades, several studies have highlighted the importance of SMEs in the economic health of developed and developing countries. SMEs are important structures in a market economy and play an equally important role in innovation and economic growth in industrialized countries (Tsambou & Kamga, 2017). In developing countries, and specifically in Sub-Saharan Africa, SMEs constitute the majority of firms. They occupy 90% of firms in Cameroon (Boubakary, 2020), over 80% in the DRC (Olopade et al., 2019) and 80% in Congo Brazzaville to name a few. However, despite this percentage, SMEs contribute less than 20% of GDP in most African countries, while they contribute up to 60% in high-income countries (Tadesse, 2009). On average, they employ less than 30% of the manufacturing workforce in Sub-Saharan Africa, 74.4% in Asian countries, 62.1% in Latin America and the Caribbean, and 73% in OECD countries (Safoulaitou et al., 2013). They are a powerful engine of economic growth and job creation in developing countries. Several studies now claim that difficulties in accessing finance are the main obstacle to SME development in Sub-Saharan Africa. This is in addition to problems of corruption, poor infrastructure, excessive taxation and innovation. While innovation enables the creation of new value for the firm, SMEs in the DRC seek to challenge the innovation problem. Innovations provide responses to new consumer and supplier requirements, market or societal needs, and competition. Data (2005) distinguishes four types of innovation. First, product innovation concerns the design of a new or technologically improved material good, equipment, instrument, supplies, product or service. Second, process innovation concerns the production or distribution processes of the good or service. Next, organizational innovation refers to organizational changes in the production of goods or services, as well as innovative behaviors. Finally, market innovation concerns the penetration of a new market as well as changes in the relationships that the company maintains with its environment (suppliers, competitors, banks, etc.). It is this last type that interests us most in this study. This article analyzes the SME-bank relationship

in the context of the adoption of digital financial services. Several studies in the context of digital financial services adoption have focused on the technical factors of adoption (platform quality, ease of use, compatibility, etc.), without analyzing the roles of socio-economic factors (Fall & Birba, 2015). These authors estimated from a sample of 4141 individuals a logistic model to determine the factors of mobile banking adoption while focusing on the socioeconomic factors of these individuals. The results showed that gender, education, employment, literacy and being banked positively influence the likelihood of adoption. In contrast, being still in school and per capita income negatively influences m-banking adoption, which is reflected in these results. Other studies have used the Technology Acceptance Model (TAM) (Abbad et al., 2009), the Theory of Reasoned Action (TRA) (Shih & Fang, 2006); the Theory of Planned Behavior (TCP) (Brown & Chalmers, 2003); and the Unified Theory of Technology Acceptance and Use (UTAUT) model (Park & Chen, 2007; Savić & Pešterac, 2019). Clearly, the literature on innovation adoption is abundant in developed countries and very little in developing countries, especially those in Central Africa in general and in DR Congo in particular. The few studies that do exist have focused mainly on ICT. Most of these studies have neglected the diversity of innovation practices and the factors likely to influence their adoption within SMEs. Similarly, the adoption models mentioned have been used differently depending on the cases studied. Finally, in most of these studies, post-adoption analysis was neglected. With regard to the results and methodology of the work that has focused on the adoption of NFS, there is controversy on the one hand. One set of factors that have not yet been tested on the other. To overcome these controversies' and fill these gaps, this study will consider, in addition to the purely technical factors of innovation adoption, the socio-economic factors of the SME (such as age and industry, turnover, etc.). In addition, we will focus on the post-adoption analysis of the NFS in addition to the adoption analysis. Finally, the UTAUT model is selected as the adoption model. To do so, it is important to ask the following questions:

- Does the adoption of digital financial services impact the SME-bank relationship?

This study has three main objectives. The first objective is to analyze the purposes of NFS adoption in SMEs (1). This is the main objective of the adoption phase. The second objective is to specify the explanatory factors of the adoption of NFS capable of explaining the SME-bank relationship (2). This is the objective of the post-adoption phase. The third objective is to evaluate the model in order to develop an SME-bank relationship at LT (3). This is the objective of the study. To answer the research questions and thus verify the objectives, we formulate the following hypothesis:

- The adoption of digital financial services has a positive impact on the SME-bank relationship.

This study follows a quantitative research design with cross-sectional data col-

lected through a self-administered questionnaire on a random sample of SMEs in the city of Bukavu. Indeed, the lack of statistical data on the adoption of digital financial services during the post-adoption period leads us to collect meaningful data. This is why we chose to use qualitative techniques in this study, based on a questionnaire survey. The analysis of the data is done using principal component analysis and structural equations. This article consists of three parts. The literature review (1), the methodology and choice of statistical methods (2) and the adoption and post-adoption results (3).

2. Literature Review and Hypothesis Analysis

2.1. The UTAUT Model (Unified Theory of Acceptance and Use of Technology)

In the field of information technology adoption, each theory has its own limitations, and complementarity between these theories has been retained (Min et al., 2008). After analyzing eight adoption theories that could shed light on up to 70% of the variance in intention, Venkatesh et al. (2003) proposed the UTAUT. This model attempts to establish an integrative framework that combines theories of intention and theories of ICT use into one comprehensive model. The UTAUT model defends ICT use exclusively on the basis of four fundamental variables of behavioral intention: expected performance, social influence, expected effort, and facilitating conditions. For them, ICT use is determined by facilitating conditions and behavioral intention. Other moderating variables affecting expected performance, expected effort, social influence and facilitating conditions for which effects influence ICT acceptance and use have been included by other authors. These are variables related to the characteristics of individuals or firms that can influence their beliefs and acceptance. With UTAUT, the relationship between perceived usefulness and behavioral intention is direct and is based on the hypothesis that: the decision to use an ICT has an effect on the analysis of the consequences of this use by the individual on the improvement of his/her performance. UTAUT has been applied for instant messaging adoption (Lin & Anol, 2008), online learning (Chiu & Wang, 2008), M-commerce (Min et al., 2008; Chong, 2013), online banking adoption (Riffai et al., 2012) and finally, the adoption of mobile services (Park & Chen, 2007; Zhou & Wu, 2010; Savić & Pešterac, 2019). Tan (2013) through UTAUT found that the majority of online banking users in Malaysia prefer E-Banking over M-Banking and that perceived usefulness, perceived ease of use, convenience, computer efficiency, device features, and security exert a significant influence on E-Banking adoption. The majority of studies that have used the UTAUT model have been conducted in the area of mobile banking.

2.1.1. The Notion of “Post-Adoption”

In the broader model of technology adoption and use, post-adoption behavior at the individual level occurs in three stages: the first stage reflects an organization's decision to adopt a technology. The second stage occurs when intended

users, as well as unintended users, comment on the application and make an individual decision to adopt the technology (Leonard-Barton & Des-champs, 1988). The third stage occurs when the individual actively chooses to explore, adopt, use, and eventually extend one or more of the computer applications. Very few studies have analyzed the post-adoption phase of an innovation. To fill this gap, Bhattacharjee (2001) proposed a post-adoption model called PAM (Post-adoption Model) developed from studies conducted on the theory of confirmation of expectations. With this model, Bhattacharjee highlights the intention of the continuity of use of an information system by three variables: the perceived usefulness of the IS considered, the confirmation of expectations concerning its use and the satisfaction of using an IS. The literature shows that only a few studies have focused on post-adoption by setting up models to analyze the acceptance of innovations (Karahanna & Straub, 1999). Indeed, the post-adoption phase cannot be analyzed solely in the context of the adoption phase. The post-adoption analysis depends largely on the specificity of the SME. If a transactional approach is appropriate for one SME, it may not be for another. It is therefore up to each SME to judge and decide which relational approach would be best suited to its situation and context.

2.1.2. Conceptual Models and Study Hypotheses

The majority of studies using UTAUT, including those on mobile banking, have been conducted in Asian countries and others in Europe. To our knowledge, there are no studies on NFC adoption in the DRC. Given the context of the study, we have retained only those variables deemed appropriate in order to simplify it. However, unlike the original UTAUT models, we include moderating variables that make it easier to test for the influence of determinant variables on intention to use. These are the gender of the SME owner, the age of the SME, and the industry, and we elute experience and willingness to use from our model. The general model of the adoption phase is presented in the appendices, see (Figure 1). This model shows the relationships that exist between the different variables. This leads to the formulation of hypotheses.

2.2. The Conceptual Models and Study Hypotheses

In this section we present the study variables while establishing the link between the independent variables and the dependent variable.

▪ Expected effort and intention to use DFS

When an individual believes that using the NFS has positive outcomes and does not require additional effort, they will tend to put more effort into using it. The expected effort measures the degree of ease associated with using the system (Venkatesh et al., 2003). Empirical studies on the adoption of SFNs, especially in the context of mobile banking (Luarn & Lin, 2005; Gu et al., 2009; Crabbe et al., 2009) attest to the influence of expected effort on the intention of consumers (individuals and firms) to accept and use the financial services offered by mobile technology. Therefore, we assume a positive relationship between expected effort and intention to use NFS. Therefore, we formulate the following hypothesis:

H1: Expected effort (EA) positively influences the intention to use digital financial services.

▪ **Security and intention to use DFS**

Security is defined as the protection of information or systems from threats (Luo & Wang, 2003). In the context of SFNs, threats can be made by attacks on data transactions and the system or by unauthorized access to an account through false authentication. Perception of security is a user's subjective belief that their communication with the system is secure from all potential threats (Ally et al., 2005). It is the probability with which a consumer believes that their private information will not be seen, stored, and manipulated during data transfer and storage, by inappropriate parties and in an inconsistent manner (Pavlou, 2001). The higher the level of perception, the more favorable the attitude. This leads to the following hypothesis:

H2: Perceived security (PS) acts positively on the intention to use digital financial services.

▪ **Convenience and intention to use DFS**

Convenience is defined as the perceived expenditure of time and effort by users of NFCs to cover a transaction (Berry et al., 2002). For Brown (1990), five dimensions analyze convenience: time, place, acquisition, use, and execution. Lichtenstein & Williamson (2006) attest that time savings and 24/7 access appear to be the most important aspects of NFC convenience. Bhatiasevi (2016) attests that there is a significant relationship between convenience and technology adoption. In doing so, the higher the level of convenience offered by digital financial services, the more users will adopt it. The expected sign is therefore positive.

H3: Convenience (COM) has a positive influence on the intention to use digital financial services.

▪ **Perceived usefulness and intention to use DFS**

Perceived usefulness describes the degree to which a user believes that using a system will help him or her achieve performance gains during transactions (Venkatesh et al., 2003). It is the level at which the user perceives that the technology is good enough to benefit from its use (Jeong & Yoon, 2013). Rogers (1995) proposes in his study that in order for a technology to diffuse rapidly in a community, users must have a clear motive for its adoption. Thus, increased utility exerts an influence on the intention to use. To this end, we formulate the following hypothesis:

H4: Perceived usefulness has a positive and significant influence on the intention to use NFS.

▪ **Social influence and intention to use DFS**

Social influence is also considered "social norms" or "subjective norms". It is the level of perception that an individual has in relation to other people estimated for him think he should use a new system (Venkatesh et al., 2003). For Ortigosa et al. (2014), social norms influence users' intention to adopt the NFS. Khatimah et al. (2019) empirically revealed that hedonic motivation and social

influence have a significant impact on e-money payment habits in Indonesia. Indeed, the more the user is influenced by his relatives, the more he will intend to use NFCs.

H5: Social influence has a positive and significant influence on the intention to use SFNs.

▪ **Perceived cost and intention to use DFS**

It is the users' knowledge trade-off between the perceived benefits of using SFNs and the monetary cost involved (Venkatesh et al., 2012). Siddik et al. (2014) argue that transaction costs such as procedural, withdrawal, and deposit fees exert an influence on users' behavioral intention to adopt SFNs. This may alter the decision to use or not use these services. Mohamad et al. (2019) concluded in a study that financial cost has a significant relationship with the adoption of NFS in Malaysia. From all this, we can therefore retain that the more expensive SFNs are compared to conventional channels, the more reluctant users will be to adopt them through their behaviors.

H6: Perceived cost has a negative influence on the intention to use NFS

▪ **Perceive risk and intention to use DFS**

Kwateng et al. (2018) defined perceived risk as the user's certainty about the potential and uncertain negative risks of the mobile money transaction. It has been observed that reducing uncertainty exerts a positive influence on users' intention to adopt NFS. The influence of perceived risk, as a singular on behavioral intention has been both supported in some studies (Lü et al., 2011; Yang et al., 2012), and rejected in others, this in the context of mobile banking. Thus, the higher the risk, the less users intend to use NFC.

H7: Perceived risk negatively and significantly influences the intention to use digital financial services.

▪ **The relationship between intention to use and current use of DFS**

Intention is a conative element intermediate between attitude and behavior. It represents a desire, a wish, and willingness to transmit a behavior. Intention involves ideas such as "I must do", "I will do" or "I will do" (Limayem & Rowe, 2006). Triandis (1980), developed a theory of "interpersonal behavior", in which, intention is the set of cultures that individuals agree to act in a certain way. Several studies and theories of consumer behavior believe and assert that intentions facilitate the prediction of consumer behavior (Chen et al., 2011; Riffai et al., 2012; Martins et al., 2013). These results lead us to analyze this relationship in our study and admit a priori that:

H8: intention to use has a positive effect on current NFS usage.

▪ **Influence of the moderator variables**

The purpose here is to analyze the effect of moderating variables on the relationships between functional, extra-functional and contextual variables on the one hand and intention to use and current use of NFS on the other. The impact of socioeconomic variables such as age, gender and sector of activity on adoption has been analyzed since the dawn of time by researchers in the field of IS and

technology adoption (Igarria & Parasuraman, 1989).

▪ **Influence of the age of the SME**

The age of the firm is also a baseline characteristic sometimes found in the literature. Shinkle & Kriauciunas (2012) showed that there is a positive relationship between firm age and innovation adoption. For them, newly created firms adopt innovations more easily than firms that are somewhat older. To conclude, the results obtained by Martins et al. (2013) confirmed a moderate effect of the relationships between expected performance, expected effort, social influence and intention to use and current use of banking services with age. This confirms the hypotheses proposed by the UTAUT model. Therefore, the following assumptions are made:

- **H9: SME age has a moderating effect on the relationship between expected effort and intention to use digital financial services.**
- **H10: SME age has a moderating effect on the relationship between perceived security and intention to use NFS.**
- **H11: SME age has a moderating effect on the relationship between convenience and current use of NFS.**
- **H12: SME age has a moderating effect on the relationship between perceived usefulness and intention to use NFS.**
- **H13: SME age has a moderating effect on the relationship between social influence and intention to use NFS.**
- **H14: SME age has a moderating effect on the relationship between perceived transaction cost and current NFS use.**
- **H15: SME age has a moderating effect on the relationship between perceived risk and intention to use NFS.**

▪ **Influence of the gender of the SME manager**

In the technology acceptance literature, several studies have analyzed the impact of user gender on technology use. In the literature on technology acceptance, several studies have analyzed the impact of user gender on technology use. This is the case of the study by (Igarria & Parasuraman, 1989) which analyzes the adoption of microcomputer, m-commerce adoption (Chong et al., 2011) and online banking and email (Martins et al., 2013). Venkatesh et al. (2003), through the UTAUT model, hypothesized that men are better at perceiving the perceived usefulness of technology. Conversely, women's acceptance of technology is particularly based on expected effort. Women are more motivated by social influence and are more concerned about the opinions and interference of others. The results of these studies lead to the following hypotheses:

- **H16: Manager gender exerts a moderating effect on the relationship between expected effort and intention to use NFS.**
- **H17: The gender of the manager has a moderating effect on the relationship between perceived safety and intention to use NFS.**
- **H18: Gender of manager moderates the relationship between convenience and current use of NFS.**

- H19: Gender of manager exerts a moderating effect on the relationship between perceived usefulness and intention to use SFN.
- H20: Gender of manager exerts a moderating effect on the relationship between social influence and intention to use SFN.
- H21: Gender of manager moderates the relationship between perceived transaction cost and current use of NFS.
- H22: The gender of the manager exerts a moderating effect on the relationship between perceived risk and intention to use SFN.
- **The influence of the SME sector of activity**

Innovation processes vary greatly across sectors. Some sectors experience rapid evolution and radical innovations, while others have a simpler, more adaptive evolution. The technology adoption process in the hospital sector is different from other sectors (Nobre & Biron, 2002). Ben Dhifallah (2011) looked at the adoption of innovations in industrial materials manufacturing companies; Ferrary (2008) analyzes the adoption of innovations in high-tech start-ups while Simon & Tellier (2008) observe the emergence of creative projects in semiconductor manufacturers. Indeed, the use of SFNs is strongly associated with the sector of activity. Therefore, the following hypotheses are tested:

- H23: The sector of activity of the SME exerts a moderating effect on the relationship between expected effort and intention to use SFN.
- H24: The sector of activity of the SME exerts a moderating effect on the relationship between perceived safety and intention to use NFS.
- H25: SME industry has a moderating effect on the relationship between convenience and current SFN use.
- H26: SME industry has a moderating effect on the relationship between perceived usefulness and intention to use SFN.
- H27: The SME's sector of activity exerts a moderating effect on the relationship between social influence and intention to use SFN.
- H28: The SME's sector of activity exerts a moderating effect on the relationship between, perceived transaction cost and current use of SFN.
- H29: The SME's sector exerts a moderating effect on the relationship between perceived risk and intention to use SFN.

The adoption model (1) of this study is summarized in **Figure 2**. Regarding the post-adoption phase, relational variables such as trust, satisfaction, and commitment play a key role in mediating evaluations and loyalty behavior as suggested by the literature review. The post-adoption model in this study highlights the variables determined in the adoption phase, the variables related to the quality of the relationship and finally, the model considers the variables determining loyalty behavior in the context of digital financial services. The three levels are well represented in **Figure 3**. These three relationship variables compose the mediating variables between the explanatory variables of the adoption phase. To do this, we analyze the relationships between the adoption phase explanatory variables and the mediating variables and the relationship between the mediating variables and the variables to be explained. Knowledge of how the mediating

variables of the post-adoption phase are associated with each other leads to the following hypotheses:

▪ **Satisfaction and trust**

We view satisfaction as cumulative satisfaction, which is based on all of a partner's experiences with the SME. Trust influences the intensity of the relationship, the higher the level of trust, the stronger and deeper the relationship.

- **H1: There is a positive relationship between SMEs' satisfaction and their trust in their bank in the context of using digital financial services.**

▪ **Satisfaction and commitment**

Relational quality generally consists of the linkage of satisfaction and commitment. Satisfaction is related to social needs of consumers, and repeated satisfaction of these needs can lead to emotional bonds. The relationship between satisfaction and commitment is not direct. Between the two, we incorporate the concept of trust as a mediating variable of the relationship. The more the relationship is no longer satisfactory; each party will give up the continuity because of the benefits or the value to lose from the relationship

- **H2: SMEs' satisfaction promotes their commitment to the bank in the context of digital financial services use.**

▪ **Trust and commitment**

There is a strong causal relationship between trust and commitment. The effect of trust on commitment is in most cases considered the end point of the relationship. Conversely, it has less impact on the calculated dimension of commitment. To this end, the Following hypothesis is made:

- **H3: La confiance des PME favorise l'engagement envers la banque dans le contexte de l'utilisation du NFS.**

With respect to the relationship between satisfaction and the explanatory variables in the adoption phase, we make the following assumptions:

- **H4.1: Expected effort in using the NFS has a positive effect on SMEs' satisfaction with the bank.**
- **H4.2: Perceived security in using SFNs is positively associated with SMEs' satisfaction with their bank.**
- **H4.3: Positive assessment of the convenience of SFNs is positively associated with SMEs' satisfaction with their bank (The more convenient the SME perceives the use of SFNs to be, the more satisfied they will be).**
- **H4.4: Perceived usefulness in using SFNs is positively associated with SMEs' satisfaction with their bank.**
- **H4.5: The positive evaluation of the transaction cost of SFN is positively associated with SMEs' satisfaction with their bank.**

Regarding the relationship between trust and the explanatory variables of the adoption phase, we make the following assumptions:

- **H5: There is a significant influence of some functional, extra-functional and contextual variables on SMEs' satisfaction with their bank.**

Literally, we assume that there is a relationship between trust and the explanatory variables selected in the adoption phase. Starting from the general hypo-

thesis, we test the following hypotheses:

- **H5.1: The expected effort in the use of SFNs exerts a positive impact on SMEs' trust in their bank.**
- **H5.2: Perceived security in the use of SFNs has a positive effect on SMEs' trust in their bank.**
- **H5.3: Perceived usefulness in SFNs is positively related to SMEs' trust in their bank.**
- **H5.4: Social influence has a positive effect on SMEs' trust in their bank.**
- **H5.5: Perceived risk in the use of NFS is negatively related to SMEs' trust in their bank.**

Finally, regarding the relationship of the commitment variable with these variables, we propose the following hypotheses:

- **H6: SMEs' commitment to their bank in the NFC context promotes their loyalty to their bank.**

In the online context, consumer engagement also affects the duration of the relationship between consumers and firms (Eastlick et al., 2006). Taking these results into account, we propose the following hypothesis:

- **H6.1: SMEs' commitment to their bank in the context of SFN promotes the creation of a relationship over time between these SMEs and banks.**

We believe that with a higher level of commitment, partners are likely to deepen their relationship with the firm. Thus, we propose the following hypothesis:

- **H6.2: SME engagement with SFN promotes the creation of a deeper relationship between these SMEs and banks.**

Finally, the impact of engagement on the extended relationship can be estimated. Indeed, committed partners are motivated to buy new products. Thus, we estimate that:

- **H6.3: SMEs' commitment to the bank in the context of SFN is the basis for the creation of an extended relationship between these SMEs and banks.**

The general model in the post-adoption phase is shown in **Figure 4**. In this model, trust, satisfaction, and commitment represent the mediating variables between the explanatory variables (adoption phase) and the variables under study. **All these hypotheses will be tested using principal component factor analysis and structural equations through the PLS method. The different tests allowing to test these hypotheses are presented in the following section.**

3. Methodology and Statical Approaches of Research

This section presents the data processing steps to test the hypotheses of this study. First, we present the necessary tests to validate the measurement scales. Then, we present the analysis methods.

3.1. Assessing the Reliability and Validity of the Study

The analysis of validity and reliability allows the researcher to know how the re-

sults obtained can contribute to the scientific field in which the study is conducted. However, three types of validity are to be distinguished: structure validity, validity of the measurement instrument, and internal and external validity of the results (Thiétart, 2014).

3.2. Reliability and Validity of the Measurement Scale

Three techniques are used to improve reliability: the test-retest technique, the split-half technique, and the alternative forms “multiple scales” technique (Evrard et al., 2009). The alternative forms technique has become exceptionally common and widely used in research practice. Researchers check two types of validity to ensure that this criterion is met: convergent validity and discriminant validity. The former checks whether indicators measuring the same concept are correlated, while the latter checks whether indicators measuring different concepts are weakly correlated or not. To do this, this study refers to exploratory factor analysis accessing principal component analysis (PCA) which facilitates the cleaning of the measurement scales of a pre-test sample and the structural equation method through the PLS approach to analyze the final sample¹.

3.2.1. Principal Component Analysis (PCA)

PCA facilitates the resolution of four successive problems (Evrard et al., 2009): the preparation of the data in order to know if the data are factorizable (1), the problem of the choice of the calculation procedure (2), the problem of dimensionality (3) and the problem of the interpretation of the results. However, checking the factorability of the data requires two techniques: the Bartlett specificity test and the Kaiser Meyer and Olkin (KMO)/MSA (Measure of Sampling Adequacy) test. The Bartlett test helps to verify the nullity of correlations between the variables in the study. The variables must not be independent of each other. This test is mainly significant on large samples. The Kaiser Meyer and Olkin test verifies that the variables adequately measure a concept (Igalens & Roussel, 1998). To have an acceptable factorial solution, the KMO value must be greater than 0.5. The interpretation of a PCA is done through the value of the coefficient (α) which must be between 0 and 1, the higher and closer to 1, the more reliable the scale is considered. However, there is no precise rule regarding the threshold of acceptance of (α), it varies among researchers. For Perrien et al. (1984), the value of α is between 0.5 and 0.6, while for (Peterson, 1995) this value must be greater than 0.8. Evrard et al. (2009) propose thresholds for α acceptance depending on the nature of the research. For an exploratory study, the value of α is acceptable if $\alpha > 0.6$ whereas for a confirmatory study; the recommended value of α should be >0.8 .

3.2.2. Structural Equation Methods

These methods make it possible to specify the nature of the relationships between the latent variables and their measures, to determine the type of privileged

¹We will justify this choice in the following pages.

relationship between the latent variables or to analyze the causal inferences between several explanatory variables and the variables to be explained (Croutsche, 2002). They are based on the analysis of the covariance structure (LISREL: Linear Structural Relationship) or on the analysis of the variance structure (PLS: Partial Least Squares). In this study, the PLS approach is preferred. Its objective is to maximize the explained variance of the latent dependent variable, whereas LISREL aims to reproduce the theoretical covariance matrix. The use of PLS requires that the model be linear (1), that it be recursive (2), that the observations be independent of each other (3), that the reflexive variables be one-dimensional (4) and that the minimum number of observations be equal to 10 times the number of relationships emanating from the construction of the central model (Chin, 1998) (5). Four steps should be observed when using the PLS approach (Vinzi et al., 2010; Tenenhaus et al., 2005): Reliability assessment using Cronbach's Alpha and Dillon-Goldstein's rho, which must be greater than or equal to 0.7 (1). Checking for One-dimensionality using the PCA eigenvalues, the first of which must be 1 and the following <1 (2). We also check that the manifest variables are more correlated with the latent variable than they are supposed to measure with the others. Convergent validity is assessed by examining the correlations of the items with their latent variable, which must be >0.7 (3). Discriminant validity is assessed to see if the latent variables are more strongly related to their indicators than to the other slow variables in the model. The model is valid when the square root of the correlation between two latent variables is less than the AVE (Average Variance Extracted) index of each latent variable. This index is also known as the average commonality and must have a value greater than or equal to 0.5 (Tenenhaus et al., 2005). For Chin (1998), the AVE must have a value greater than or equal to 0.5. After these steps, we proceed to the evaluation of the predictive relevance of the model and to the significance tests of the coefficients. The predictive relevance of the model is announced by the percentages of variance explained for each regression of the model. It is in this sense that Croutsche (2002) showed that the model is significant if the "R²" is >0.1 . Similarly, Chin (1998) indicates that "R²" of 0.67, 0.33 and 0.19 can be considered substantial, moderate and low respectively. On the other hand, the quality of each structural equation can also be assessed by the Stone-Geisser Q², which must be >0 . The test of the significance of the regression coefficients is non-parametric in nature of PLS modeling. It is performed using resampling techniques (Bootstrap or jackknife) giving the confidence intervals. The global evaluation of the predictivity of the model is given by the Goodness of Fit (GoF) index which is the geometric mean between the average communality and the average R². Nevertheless, we can consider that a GOF ≥ 0.9 attests to a good fit of the model to the data. We chose the PLS approach because it provides more significant structural coefficients than the maximum likelihood (LISREL) based methods.

4. Results

We present the results of the validation of the scales as well as the results of de-

scriptive statistics of the characteristics of the SMEs. Then, we present the results of the exploratory analysis through the structural equations by the PLS method.

4.1. Validation and Purification of Measurement Scales through PCA Analysis

Validation of a measurement scale is provided by reliability, convergent validity, and discriminant convergence. These three tests do not apply to single-item scales (Churchill Jr., 1979) or to nominal scales (age, gender, industry, and current use of NFS).

4.1.1. Convergent Validity Test and Reliability

The convergent validity test concerns variables measured by metric scales. To perform this test, a correlation analysis between the items of each scale is first performed. Then, a PCA can be performed. If the PCA analysis yields more than one factorial axis, a second PCA with Varimax rotation is performed. The reliability of these variables is tested by calculating Cronbach's Alpha.

▪ The scale for measuring expected effort

Expected effort is measured using five items. **Table 1** shows that the correlations between these items are all positive and significant. The KMO index of this measurement scale is acceptable ($0.6730 > 0.5$). Bartlett's test is significant and proves that these data are factorable. However, the quality test of variable representation proved that one variable (EFF_ATT2) and (EFF_ATT2) are not significant because < 0.5 . Therefore, we extract them from our analyses. Thus, instead of performing a PCA on five items, it will be performed on only three.

▪ The Perceived Safety Scale

The scale for measuring perceived safety consists of three items. The correlations between these items are positive and significant which means the high uniqueness of the perceived safety measure. The KMO index is acceptable (0.618) and Bartlett's test is significant ($p < 0.000$) proving the factorability of the data. A PCA analysis was performed on these three items. Despite these good results, this variable has an unacceptable Cronbach's α of (0.615) and the α 's for each item are also insignificant (0.534; 0.410 and 0.597). The quality of the element representation is not as good. This implies that for the majority of SMEs, insecurity is not observed when using SFNs. In **Table 2**, we decide to remove it from the model.

▪ The Convenience measurement scale

Convenience is measured by three items. **Table 3** shows that the correlations between the three items are positive and significant showing the high unity of the convenience measure. The KMO index is acceptable (0.569) and Bartlett's test is significant ($p < 0.000$), the data are factorable. The PCA results reveal the existence of a single factorial axis that explains 85.131% of the variance. The quality of the representation of each item is greater than 0.5. Cronbach's Alpha (0.657) is at a minimum acceptable and confirms the internal validity of this scale. After the removal of convenience item 3, the PCA results identify a single factorial component in which the items explain **83.481%** of the variance. **Both**

Table 1. Exploratory factor analysis on the expected effort scale after deletion of EFF_ATT2 and EFF_ATT1.

Items	Representation quality	Factor contribution	α without item	α of the scale
EFF_ATT3	0.635	0.879	0.756	
EFF_ATT4	0.773	0.820	0.613	0.777
EFF_ATT5	0.673	0.797	0.723	
Equity value		2.081		KMO = 0.673
Test of Bartlett		Significant		$p < 0.000$
Variance explains		69.361%		N = 352

Source: SPSS.25 software output.

Table 2. Exploratory factor analysis on the perceives security.

Items	Representation quality	Factor contribution	α without item	α of the scale
SEC_PER1	0.560	0.748	0.534	
SEC_PER2	0.662	0.814	0.410	0.615
SEC_PER3	0.483	0.695	0.597	
Equity value		1.705		KMO = 0.618
Test of Bartlett		Significant		$p < 0.000$
Variance explains		56.836%		N = 352

Source: SPSS.25 software output.

Table 3. Exploratory factor analysis on the convenience scale after the removal of COM3.

Items	Representation quality	Factor contribution	α without item	α of the scale
COM1	0.835	0.914		
COM2	0.835	0.914		0.802
Equity value		1.670		KMO = 0.802
Test of Bartlett		Significant		$p < 0.000$
Variance explains		83.481%		N = 352

Source: SPSS.25 software output.

of these items have the same value of the quality of representation which is greater than 0.5 of 0.835. The internal validity of this scale is ensured with a Cronbach's Alpha of 0.551, considered acceptable. The deletion of the COM3 item would significantly improve the Cronbach's Alpha. The following table shows these results.

- **The perceived usefulness measurement scale**

The PCA reveals a single factorial component in which the items explain 51.572% of the variance. The quality of item representation is >0.5 for three items (UT_PER3, UT_PER4, UT_PER5) and lower for two other items (UT_PER1, UT_PER2). The internal validity of this scale is assured with a Cronbach's Alpha of 0.751, which is acceptable. Removing these two items significantly improves the Cronbach's Alpha. Therefore, we decided to remove these items from the final questionnaire to improve the structure of the measurement scale. **Table 4** presents the results after deleting these items and shows the improvement of the results.

▪ **The social influence measurement scale**

Social influence is measured by three items. **Table 5** shows that the correlations between these items are positive and significant. The KMO index is acceptable (0.649), the Bartlett test is significant and the data can therefore be factorized. The PCA analysis is conducted on all these items and shows a single factorial axis. The items explain 60.898% of the variance. The quality of the representation of all these items is higher than 0.5. The Cronbach's alpha coefficient is equal to (0.675) and proves a good reliability of the scale.

Table 4. Exploratory factor analysis of the perceived usefulness scale after removal of UT_PER1 and UT_PER2.

Items	Representation quality	Factor contribution	α without item	α of the scale
UT_PER3	0.702	0.838	0.697	
UT_PER4	0.718	0.847	0.681	0.780
UT_PER5	0.666	0.816	0.731	
Equity value		2.085		KMO = 0.701
Test of Bartlett		Significant		$p < 0.000$
Variance explains		69.511%		N = 352

Source: SPSS.25 software output.

Table 5. Exploratory factor analysis of the social influence measurement.

Items	Representation quality	Factor contribution	α without item	α of the scale
INF_SOC1	0.619	0.787	0.576	
INF_SOC2	0.533	0.730	0.654	0.675
INF_SOC3	0.674	0.821	0.510	
Equity value		1.827		KMO = 0.649
Test of Bartlett		Significant		$p < 0.000$
Variance explains		60.898%		N = 352

Source: SPSS.25 software output.

▪ **The scale for measurement perceived transaction cost**

The perceived transaction cost is measured by three items. **Table 6** shows that the correlations between the three items are positive and significant, justifying the high unit of measurement. The KMO index is acceptable (0.705) and the Bartlett test is significant. The PCA shows a single factorial axis explaining 71.985% of the variance. The quality of the representation of the items is higher than 0.5. The Cronbach's alpha is acceptable (0.804) and confirms the internal validity of this scale.

▪ **The perceives risk measurement scale**

Perceived risk is measured using three items. **Table 7** shows that the correlations between these items are positive and significant and confirm the high uniqueness of this measurement scale. The KMO index is acceptable (0.721) and Bartlett's test is significant confirming that the data are factorizable. The PCA analysis was carried out and revealed the existence of a single factorial axis which explained 77.239% of the variance. The quality of the representativeness of the items is >0.5 for all the items. The value of Cronbach's alpha is acceptable (0.852), which confirms the internal validity of this scale.

Table 6. Exploratory factor analysis on scale for measurement transaction cost.

Items	Representation quality	Factor contribution	α without item	α of the scale
COU_TRA1	0.670	0.819	0.779	
COU_TRA2	0.740	0.860	0.714	0.804
COU_TRA3	0.749	0.865	0.705	
Equity value		2.160		KMO = 0.705
Test of Bartlett		Significant		$p < 0.000$
Variance explains		71.985%		N = 352

Source: SPSS.25 software output.

Table 7. Exploratory factor analysis on scale for measurement perceived risk.

Items	Representation quality	Factor contribution	α without item	α of the scale
RIS_PER1	0.782	0.885	0.785	
RIS_PER2	0.809	0.900	0.758	0.852
RIS_PER3	0.725	0.852	0.835	
Equity value		2.317		KMO = 0.721
Test of Bartlett		Significant		$p < 0.000$
Variance explains		77.239%		N = 352

Source: SPSS.25 software output.

▪ The intention to use scale

The intention to use is measured by three items. Through **Table 8** we see that the uniqueness of the scale to measure this variable is confirmed by the positive and significant correlations of these items. The KMO index is acceptable (0.712) and Bartlett's test is significant. The PCA analysis shows a single factorial axis explaining 76.078% of the variance. The quality of the representation of these items is >0.5. The Cronbach's alpha coefficient is (0.842) which confirms the internal validity of this scale.

We have outlined the validation process for the measurement scales used in this study. These processes prove that the conditions required to assert construct validity are met. Thus, the data collected from the sample of 352 are analyzed and presented in Subsection (II.) and Section (2).

4.1.2. The Results of the Descriptive Analyses

This section is devoted to the presentation of the detailed results of the descriptive statistics characterizing the SMEs surveyed, which can be found in **Table A1**. This table shows that the majority of the managers/owners of the SMEs surveyed are men (78%) and 21.3% are women. However, it can be seen that 47.7% of the managers interviewed are between 31 and 40 years old and only 4% are between 18 and 20 years old; 14.8% are between 21 and 25 years old, 26.6% are between 26 and 30 years old and 7.1% declared to be over 40 years old. As for the level of education, it is clear that 30.4% of the executives surveyed have a state diploma, 42.3% have a bachelor's degree, 5.4% have a bachelor's degree and 21.9% have some other education. These results seem to be true insofar as the majority of entrepreneurs in the city of Bukavu stop their studies too early to start a business. However, those who have obtained diplomas (state, degree and bachelor's degree) are mostly from the economic sciences (16.5%), management sciences (14.2%), management information systems (8.8%), law (4.8%), engineering school (3.4%), humanities and letters (3.1%). On the other hand, executives who have followed another training (apprenticeship and trade, etc.) represent 49.1%.

Table 8. Exploratory factor analysis on scale for measurement intention to use digital services.

Items	Representation quality	Factor contribution	α without item	α of the scale
INT_UT1	0.698	0.836	0.835	
INT_UT2	0.805	0.897	0.738	0.842
INT_UT3	0.779	0.883	0.765	
Equity value		2.282		KMO = 0.712
Test of Bartlett		Significant		$p < 0.000$
Variance explains		76.078%		N = 352

Source: SPSS.25 software output.

These results show that many entrepreneurs in the city of Bukavu did not follow the normal university curriculum. Finally, with regard to the age of the SME, we note that 39.5% of the SMEs surveyed are between 3 and 5 years old, 22.7% are between 6 and 8 years old, 21% are between 1 and 2 years old (the youngest), 8.2% are between 9 and 11 years old and the oldest are between 12 and 14 years old, i.e. 8.5% of the sample. In order to trace the difference between small and medium enterprises (SMEs) users and non-users of digital financial services, we proposed a series of questions to identify exactly which digital channels these SMEs use (branch, ATM, Internet, SMS, WAP) and other questions about the types of use of digital financial services. It was found that the majority of SMEs use branches (65.8%), WAP (27.8%), SMS (21%) and ATMs (14.8%). Through these channels, SMEs are used to make insurance payment operations (45.5%), others to request a RIB (11.6%), others to make a transfer (4.3%), others to order a checkbook (33%), others to request a help service (2.6%) and finally, to pay bills (1.7%).

4.1.3. Validation and Estimation of the Model by the PLS Method

We present two models: **Figure 1** represents the structure of the relationships between the latent variables and the indicators and the second one establishes the estimated causal links between the latent explanatory variables and the latent variables to be explained. PLS allows for the simultaneous assessment of reliability and validity, estimating the relationships and links between observable and constructed variables (Chin, 2000).

▪ Evaluation of the measurement model

Using the PLS method, the model is evaluated through the loadings between the reflection constructs and their indicators and the weights between the formative constructs and their indicators. It allows obtaining the standardized R^2 between the constructs and the multiple adjusted R^2 for all the constructs and the coefficients of determinations. It emerges that these R^2 are respectively 82% for expected effort, 87% for perceived usefulness, 91% for convenience, 88% for transaction cost, 91% for perceived risk, 82% for social influence and 90% for the intention to use digital financial services. However, the final determination of the validity and purification of the measurement instrument is made from the PCAs through the tests of reliability, convergent validity and discriminant validity on the entire sample.

▪ Reliability of the constructs

For all variables in the adoption model, we assess reliability which measures the internal consistency of the constructs. In **Table 9**, reliability is ensured by checking the Cronbach's alpha of the constructs at the minimum threshold of 0.7, and the composite reliability (CR) which is superior to the traditional measure of consistency (Cronbach's alpha) because it does not depend on the number of indicators².

²The minimum acceptance threshold is 0.7.

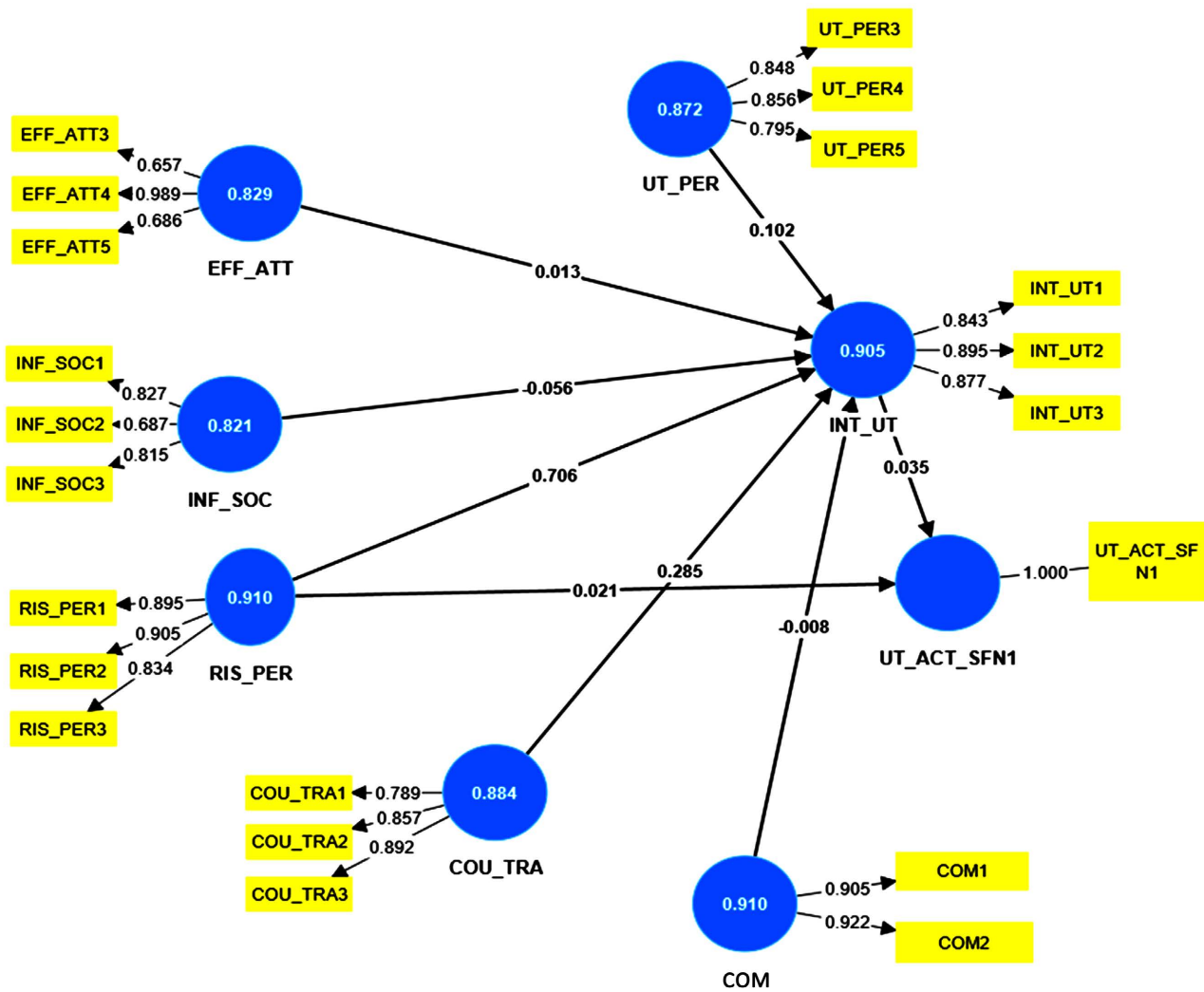


Figure 1. Shows the “adoption” model under the SmartPLS software presenting the results of the PLS algorithm technique. Source: Output of the SmartPLS version 4 software.

Table 9. Reliability of constructs.

Constructs	CR composite reliability	Cronbach’s Alpha
COM	0.821	0.802
COU_TRA	0.818	0.805
EFF_ATT	3.561	0.778
INF_SOC	0.702	0.678
INT_UT	0.856	0.842
RIS_PER	0.867	0.852
UT_PER	0.789	0.781

Source: output of the SmartPLS version 4 software.

From the results presented in the table above, it appears that the majority of the composite reliability indicators (CR) vary between 0.70 and 0.86, a sufficient reliability justifying a very high level of internal consistency. The Cronbach’s al-

pha values of these constructs are very satisfactory and are above 0.78 except for social influence (0.678). The Cronbach's alpha for the social influence variable has a value slightly below the acceptance threshold (Nunnally, 1978). In this study, we accept this value since in structural equation methods, the interpretation of Cronbach's alpha needs to be more flexible as pointed out by Bagozzi and Yi (2012).

- **The convergent validity of the constructs**

Here we analyze the convergent validity of the model constructs by examining the validity for each construct in two steps. First, neuter the variables by keeping only those indicators with a correlation threshold > 0.7 (Fernandes, 2012). Subsequently, analyzing the average shared variance (AVE) which must be > 0.5 . The detailed results are in Table 2. It is observed that convergent validity is ensured since the majority of the items present a correlation threshold > 0.7 with mean shared values (MSV) greater than 0.5 varying between 0.60 and 0.83. This last indicator ensures both the convergent validity of the constructs (Chin, 1998) and the discriminant validity.

- **Discriminant validity of constructs**

The discriminant validity of constructs is verified by comparing the correlation of constructs with the square roots of AVEs. It is considered consistent when the variance shared between a construct and any other construct is less than the variance shared by the construct with its indicators (AVEs) (Sosik et al., 2009). With this in mind, we use the technique of construct growth loading through SmartPLS. Table 3 presents these results. It can be seen that the square root values of the AVE are all higher than the correlations of the construct with the other constructs. This guarantees the discriminant validity. Finally, the results obtained show that the conditions required to test the hypotheses are met. The homogeneity of the scales is sufficient, the convergent validity as well as the discriminant validity are accepted. These lead to the analysis of the quality of the model.

- **Model quality evaluation**

The assessment of the model quality by the PLS approach does not provide an index to test the quality of the model as a whole. However, we proceed by assessing the quality of the measurement model, assessing the quality of the structural model and assessing the quality of each structural equation.

- **Measurement model quality assessment**

To check the quality of the measurement model, we check the values of the coefficient of determination (R^2) of each of the dependent variables. This allows us to evaluate the predictive power of the research model. These results show that the model variables taken together explain overall ($R^2 = 94\%$) the variance in intention to use NFS and (50%) current NFS use. Based on the sample size of this study, we find that both R^2 values meet the minimum limit of 0.13 suggested by Wetzel et al. (2009). Thus, these values give very satisfactory results and prove that the model is significant.

- **Quality evaluation of each block of variables**

The quality of each structural equation is measured by the Stone-Geisser Q^2 coefficient (Redundancy) of the endogenous variables. However, we use this index through the Blindfolding technique using the SmartPLS software. The results of this technique show that the Q^2 indices are positive and different from zero for the intention to use (0.938) and the current use (0.002), all > 0 , proving that the model has predictive validity.

▪ **Quality assessment of the structural model**

The quality of the structural model is verified by the GOF index. This index is calculated using the average of the communality and the average of the R^2 of the endogenous variables. The model in this study includes two endogenous variables namely: intention to use NFS and current use of NFS. The GOF index is calculated by the commonality and explained variance of the variable Intention to use NFS: $GOF = \sqrt{(0.941) \times (0.761)} = 0.74055$. We do not consider the variable Current use of SFNs in the calculation of GOF because this variable has a single indicator (Wetzel et al., 2009; Vinzi et al., 2010). Furthermore, Figure 2 presents the evaluation results of the structural model through the Bootstrap technique.

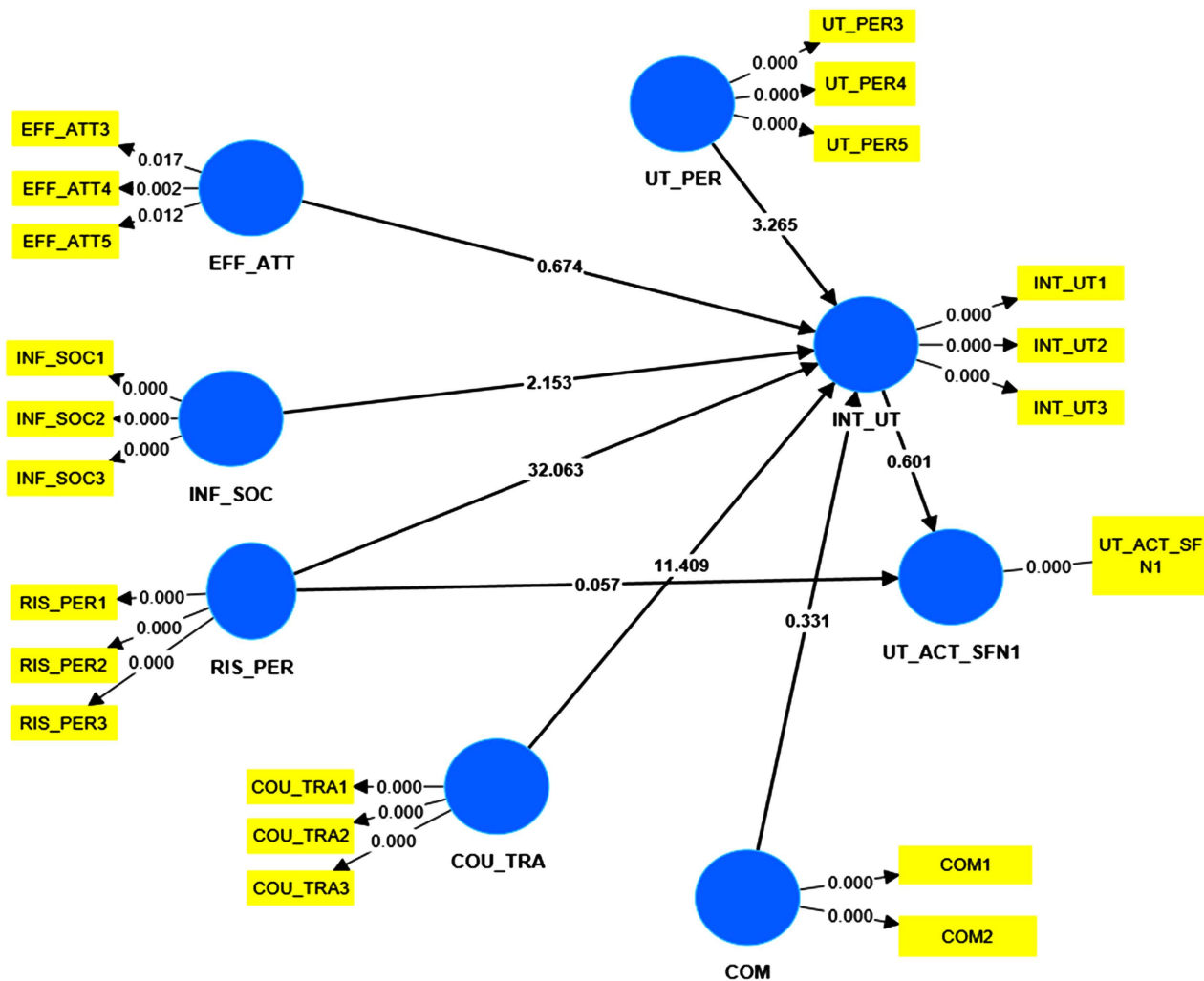


Figure 2. The results of the Bootstrap technique. Source: Output of the SmartPLS version 4 software.

▪ Evaluation of the structural model

After validation of the measurement model and verification of the quality of the model, we analyze the structural model by focusing on the tests of the various hypotheses formulated. These results were obtained using the Bootstrap technique according to the recommendations of Chin (1998) and are summarized in Table 10 below and interpreted at the bottom of this table. Table 10 below presents the estimation of the structural model parameters using the Bootstrap technique.

The results of the analysis prove that the more SMEs perceive the use of NFS as clear and understandable, easy to handle, the more they will intend to use it. Therefore, the hypothesis (H1: $\beta = 0.50$) is validated. Similarly, the intention to use NFS is significantly and positively associated with convenience. The more convenient the use of SFNs is for SMEs in terms of lifestyle, the more they will intend to use them. Therefore, (H3: $\beta = 0.741$) is validated. However, the results attest that there is no significant relationship between perceived usefulness and current intention to use SFNs. Therefore, (H4: $t = 3.265$; and $\beta = 0.001$) is not validated. This means that outside of NFS, SMEs may use traditional means to conduct transactions. In addition, social influence does not have a significant relationship with the intention to use SFNs. Thus, hypothesis 5 is not validated ($t = 2.153$; and $\beta = 0.031$). This means that the opinions of the owner's parents, partners, colleagues, banks, donors are not significant and do not influence the intention to use SFNs. Similarly, the cost of use does not influence the current use of NFS. Therefore, hypothesis 6 is not validated ($t = 1.4828$; $\beta = -0.07$). This provides evidence that there are no financial barriers that influence the intention to use NFS. Furthermore, the results prove a significant relationship between perceived risk and intention to use NFS by SMEs. Thus, hypothesis 7 is confirmed ($\beta = 0.955$). That is, the more risky the use of NFS is perceived to be in terms of security, privacy, and physical security, the more SMEs will not intend to use them. Finally, the hypothesis (H8: $\beta = 0.548$) is also validated. This means that there is a statistically significant positive relationship between current usage and intention to use NFS. The more SMEs have the intention, willingness, and preference for NFS, the more they will use it. Figure 3 summarizes the results of the NFS adoption phase by SMEs in Bukavu.

Table 10. Estimation of the parameters of the structural model using the Bootstrap technique.

Assumptions	Correlation coefficient	(t) Val	Decisions
H1: The expected effort → The intention to use	0.501***	0.674	Confirmed
H3: Convenience → Current use	0.741***	0.331	Confirmed
H4: Perceived usefulness → intention to use	0.001	3.265	Rejected
H5: Social influence → Intention to use	0.031	2.153	Rejected
H6: Transaction cost → Intention to use	0.000	11.409	Rejected
H7: Perceived risk → Intention to use	0.955***	32.063	Confirmed
H8: Intention to use → Current use	0.548***	0.601	Confirmed

Source: Output of the SmartPLS version 4 software.

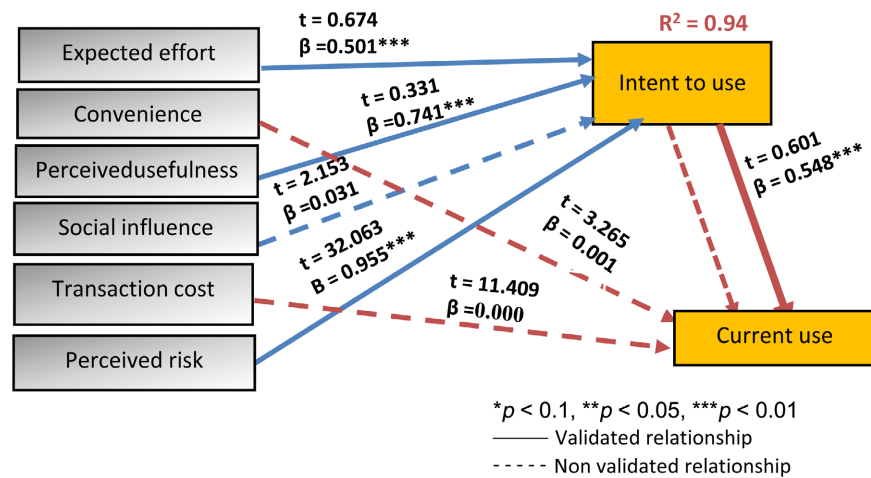


Figure 3. The results of the research (adoption phase). Source: Based on our own results.

Three moderating variables namely the age of the SME, the gender of the manager and the sector of activity were retained. These variables are tested by means of two multiplicative variables constructed for each of the independent variables. First, the moderating effect of the age of the SME on the relationships with expected effort, perceived usefulness, social influence and perceived risk, on the one hand; and on the other hand, the moderating influence of this same variable on the relationship between convenience and transaction cost on the one hand and current NFC usage on the other. Second, the moderating effect of gender on the relationship between expected effort, perceived usefulness, social influence and perceived risk on the one hand, and intention to use NFC on the other. But also, the moderating influence of this variable on the relationships between convenience and transaction cost on the one hand and current NFC use on the other. Finally, the moderating effect of the sector of activity on the relationships between expected effort, perceived usefulness, social influence and perceived risk, on the one hand, and the intention to use NFS, on the other. Similarly, the moderating influence of this variable on the relationships between convenience and transaction cost on the one hand and current NFS use on the other. By including these variables in the model, we find that they explain 92% of the variance in intention to use NFC and 8% of current NFC use. These results are presented in **Table 7**. It can be seen that hypotheses (H9), (H12), (H13), (H15) and H28 are rejected. That is, there is no moderating effect of SME age on the relationship between perceived utility, perceived risk, expected effort, social influence, and intention to use NFCs. Also, industry has no moderating effect on the relationship between perceived transaction cost and current NFC usage. Also, SME age does not exert a moderating effect on current SFNs usage. However, the hypotheses (H9, H13, H11, H16, H19, H20, and H25) are validated. SME age has a moderating effect on the relationship between expected effort and social influence on the one hand and intention to use on the other. Similarly, SME age has a moderating effect on the relationship between convenience and current

NFS use. The gender of the manager also exerts a moderating effect on the relationship between expected effort, perceived usefulness, and social influence on intention to use NFS. This same variable exerts a moderating effect on the relationship between convenience and current use of NFS.

4.2. Results of the Post-Adoption Research Model

In this section, we seek to validate and refine the measurement scales used in the post-adoption phase. Note that the analyses are performed on the same sample with the same characteristics.

4.2.1. Validation of Measurement Scales by PCA Analyses

This paragraph presents the validity of the scales used to measure the constructs of the post-adoption model. For the intention and current NFS use variables, validation tests were performed during the adoption phase. To do this, we perform a PCA on the relationship variables and the m-relationship variable. If the PCA analysis provides more than one factorial axis, a second PCA analysis with Varimax rotation will be performed. The reliability of these variables is tested by calculating Cronbach's Alpha.

▪ The confidence measurement scale

Table 11 shows that the correlations between the items are all positive and significant. The KMO index of this scale is 0.817% (acceptable), and Bartlett's test is significant to validate the feasibility of a factor analysis, this means that these data are factorizable. In this case, we perform the PCA on all four items. The PCA of these items reveals a single factorial axis in which the items explain 70% of the variance. The quality of the representation of these items is higher than 0.5. The internal consistency of the scale is very good with a Cronbach's Alpha of 0.855.

▪ The satisfaction measurement scale

Satisfaction are measured by five items. **Table 12** shows that all these items have positive and significant correlations. The KMO index of this measurement

Table 11. Exploratory factor analysis on the confidence measurement scale.

Items	Representation quality	Factor contribution	α without item	α of the scale
CON1	0.698	0.835	0.815	0.855
CON2	0.718	0.847	0.808	
CON3	0.661	0.813	0.828	
CON4	0.710	0.842	0.811	
Equity value		2.787		KMO = 0.817%
Test of Bartlett		Significant		$p < 0.000$
Variance explains		70%		N = 352

Source: SPSS.25 software output.

Table 12. Exploratory factor analysis on the satisfaction measurement scale.

Items	Representation quality	Factor contribution	α without item	α of the scale
SAT1	0.724	0.851	0.865	
SAT2	0.717	0.847	0.866	0.893
SAT3	0.648	0.805	0.878	
SAT4	0.693	0.832	0.871	
SAT5	0.718	0.847	0.866	
Equity value		3.500		KMO = 0.888
Test of Bartlett		Significant		$p < 0.000$
Variance explains		70%		N = 352

Source: SPSS.25 software output.

scale is 0.888 (Acceptable) and Bartlett's test is significant and allows the PCA analysis to be performed on the five items. The PCA of these items reveals a single factorial axis representing 70% of the total variable. The quality of the representation of these items is higher than 0.5. The value of Cronbach's Alpha is (0.888) acceptable confirming the internal validity of the construct.

▪ **The commitment measurement scale**

Engagement was measured by three items. The results in **Table 13** show that there are positive and significant correlations between these elements. The KMO index for this variable is 0.814, which is acceptable. The Bartlett test is significant and validates the feasibility and validity of a PCA on these items. The PCA of these items provides a single factorial axis in which they explain 72.908% of the variance. The quality of the representation of these items is higher than 0.5.

▪ **The scale for measuring the relationship over time**

We do not perform a PCA for the relationship over time scale because it is measured by two items. The main purpose of a PCA is to identify the latent structure of a measurement scale and to purify it by reducing the number of observable variables. This can only be done when the number of items that make up the measurement scale is large. Since it is measured using two variables, it is not worthwhile to perform a PCA for this variable. Calculating Cronbach's Alpha in **Table 14**, we find that it has an acceptable value of (0.60) which ensures internal consistency.

▪ **The in-depth relationship scale**

With regard to the scale for measuring the deep relationship, we also refrain from analyzing the PCA for the same reasons as above. However, its Alpha value is presented in the following **Table 15**.

▪ **The scale of measurement of the extended relationship**

This scale is measured from three items. **Table 16** below shows that a PCA on these items reveals a single factorial axis that explains 73.916% of the variance. The quality of the representation of these items is higher than 0.5. The internal consistency of the scale is also very good with a Cronbach's Alpha of 0.823.

Table 13. Exploratory factor analysis on the engagement scale.

Items	Representation quality	Factor contribution	α without item	α of the scale
ENG1	0.755	0.869	0.719	
ENG2	0.730	0.855	0.744	0.814
ENG3	0.702	0.838	0.770	
Equity value		2.187		KMO = 0.888
Test of Bartlett		Significant		$p < 0.000$
Variance explains		72.908%		N = 352

Source: SPSS.25 software output.

Table 14. Reliability analysis for the relationship over time scale.

Items	Item/Scale Correlation	α of the scale
Long-term relationship 1	0.426	
Long-term relationship 2	0.426	0.60

Source: SPSS.25 software output.

Table 15. Reliability analysis for the in-depth relationship measurement scale.

Items	Item/Scale Correlation	α of the scale
REL_SCAL 1	0.667	
REL_SCAL 2	0.667	0.500

Source: SPSS.25 software output.

Table 16. Exploratory factor analysis on the scale measuring the extended relationship.

Items	Representation quality	Factor contribution	α without item	α of the scale
REL_EXTE1	0.711	0.843	0.783	
REL_EXTE2	0.732	0.856	0.764	0.823
REL_EXTE3	0.775	0.880	0.721	
Equity value		2.217		KMO = 0.714
Test of Bartlett		Significant		$p < 0.000$
Variance explains		73.916		N = 352

Source: SPSS.25 software output.

▪ Evaluation of the measurement model

To analyze the model of this study, the PLS Algorithm technique via the SmartPLS software was used. The results of this analysis are presented in the **Figure 4**.

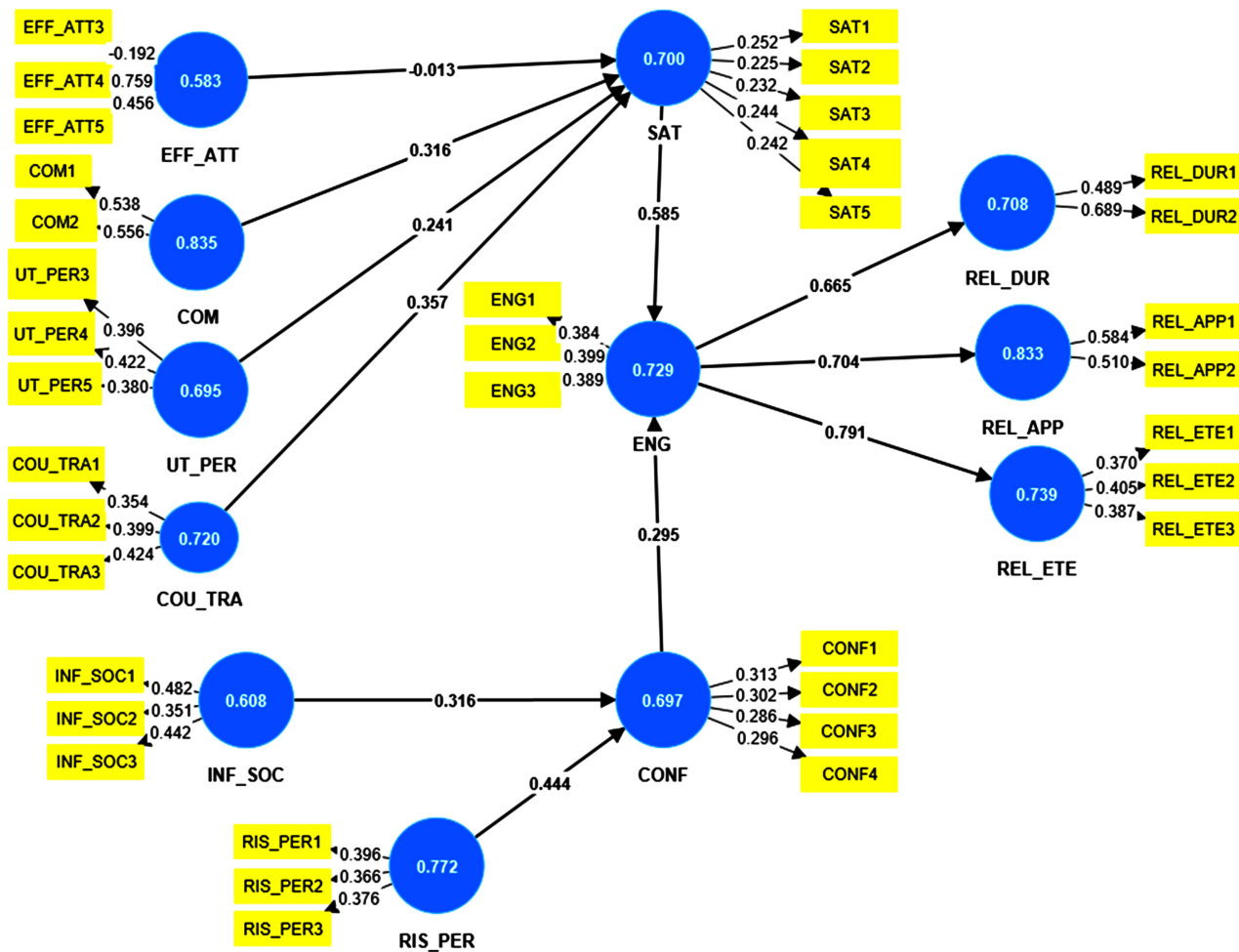


Figure 4. Evaluation of the measurement model. Source: Output of the SmartPLS version 4 software.

In the post-adoption phase, the standardized R^2 between the constructs and the multiple adjusted R^2 for all the constructs and the coefficients of determination are respectively 58% for expected effort, 87% for perceived usefulness, 83% for convenience, 72% for transaction cost, 77% for perceived risk, 60% for social influence, 69% for trust, 73% for the extended relationship, 83% for the deep relationship, 70% for the long-term relationship, 70% for satisfaction and 72% for commitment. These results lead to the evaluation of the reliability of the constructs.

▪ **Evaluation of the reliability of the construct**

The reliability of the constructs is measured by the Cronbach’s Alpha of the constructs and the composite reliability (CR). However, in the context of exploratory research, it is considered acceptable if it is between 0.5 and 0.7 (Nunnally, 1978). However, in the context of exploratory research, it is considered acceptable if it is between 0.5 and 0.7 (Nunnally, 1978). Table 17 shows the results of the reliability of the construct.

It is found that the acceptable composite reliability (CR) values range from 0.783 to 0.894. This confirms a very high level of internal consistency. Three

Table 17. Reliability of constructions.

Construits	Composite reliability (CR)	Cronbach Alpha
Convenience	0.803	0.802
Confidence	0.856	0.855
Transaction cost	0.813	0.805
Expected effort	0.374	0.778
Engagement	0.815	0.814
Social Influence	0.695	0.678
In-depth relationship	0.811	0.801
Relationship Over Time Scale	0.643	0.597
Extended relationship	0.825	0.823
Perceived Risk	0.854	0.852
Satisfaction	0.894	0.893
Perceived Usefulness	0.783	0.781

Source: SPSS.25 software output.

variables show unacceptable reliability because they are lower than 0.7. These are expected effort (0.374), social influence (0.695) and relationship over time (0.643). The Cronbach's Alpha values of the model constructs are satisfactory and confirm a good internal consistency of the measurement scales. All values are above the acceptance threshold of 0.7, excluding social influence (0.678) and relationship over time (0.597). However, these two Alphas are acceptable at the threshold > 0.5 .

▪ Assessment of convergent validity

Here, we analyze the correlation threshold between the constructs and its indicators in order to clean up the variables. The validity is obtained for a threshold > 0.7 . To do this, all constructs whose threshold is < 0.7 will be deleted. **Table 5** details these results. It can be seen that all the items have a correlation threshold > 0.7 except for the items of the expected effort scale (-0.149 , 0.560 and 0.338), item 1 of the transaction cost scale (0.687), items 2 and 3 of the social influence scale (0.531 and 0.669) and item 1 of the relationship in time (0.549). Also, the mean shared variance (MSV) values were all > 0.5 with the exception of the MSV for expected effort (0.150), social influence (0.421), and extended relationship (0.451). These results lead to the removal of the expected effort items from the model. After its deletion, it appears that all the items of the measurement scale of the variables become > 0.7 except item 3 of the social influence (0.696). Therefore, we decide to keep these items based on the recommendation of [Fernandes \(2012\)](#) we also report that the values of the average shared variance (AVE) are all > 0.5 . Thus, internal consistency is ensured.

▪ Assessment of the discriminant validity

Through **Table 4**, we notice that the square root of the AVE is superior to the correlations of the construct with the other constructs. The discriminant validity presented through the correlations between the constructs and the square root of the AVE is detailed in **Table 4**.

▪ **Evaluation of the quality of the model**

To evaluate the quality of the model, three phases are necessary: the quality of the measurement model, the quality of the structural model and the quality of each structural equation.

▪ **Assessing the quality of the measurement model**

The dependent variables in the “post-adoption” phase are satisfaction, trust, commitment, relationship over time, deep relationship and extended relationship. Through the PLS algorithm technique, we find that all the variables introduced in the model globally explain $R^2 = (48.5\%)$ of trust and $R^2 = (64.6\%)$ of satisfaction, which in turn explain $R^2 = (67.3\%)$ of commitment. Furthermore, these variables explain $R^2 = (44\%)$ of the relationship over time and $R^2 = (62.4\%)$ of the extended relationship and $R^2 = (49.4\%)$ of the deep relationship. These obtained R^2 are satisfactory with regard to the size of our sample. We note that the obtained R^2 values respect the minimum limit of 0.02 suggested by [Wetzel et al. \(2009\)](#). Therefore, the post adoption phase model is significant.

▪ **Quality assessment of each block of variables**

Table 18 proves that all Stone-Geisser Q^2 coefficients (cv-redundancy) of the endogenous variables turn out to be positive and non-zero for all endogenous variables. This ensures the quality of each structural equation. In conclusion, these results show that the model has predictive validity.

▪ **Evaluation of the quality of the structural model**

The results in **Table 19** present the communality and R^2 values of the endogenous variables, and also the averages of these values which allow the calculation of the GOF index.

For this purpose, $GOF = \sqrt{(3.373) \cdot (0.734)} = 1.34$. This means that the overall quality of the model is satisfactory. The quality of this model is assured, now we evaluate the structural model in the next section.

Table 18. Q^2 coefficients of endogenous variables.

Variables endogènes	Q^2 Predict
Confidence	0.477
Engagement	0.590
In-depth Relationship	0.507
Relationship Over Time Scale	0.432
Extended Relationship	0.547
Satisfaction	0.638

Source: Output of the SmartPLS version 4 software.

Table 19. The R² and communality of the dependent variables.

Construits	R ²	Communality
Confidence	0.487	0.697
Engagement	0.674	0.729
In-depth Relationship	0.495	0.833
Relationship Over Time Scale	0.442	0.708
Extended Relationship	0.625	0.739
Satisfaction	0.650	0.700
Mean	3,373	0,734

Source: Output of the SmartPLS version 4 software.

▪ Hypothesis testing of the research in the post-adoption phase

In this section, we analyze the structural model by testing the significance of structural links (1). Then, we discuss the results obtained and compare them with previous research (2).

▪ Evaluation of the structural model

The results obtained by the Bootstrap method in **Table 6** analyze the significance of the structural links that make up the research model. The results of the Bootstrap technique prove that the (t) values of 13 relationships have significant and positive coefficients. Therefore, some variables are validated and others are not. **Table 20** below shows the results of the estimation of the parameters of the structural model by the Bootstrap method.

In **Table 21** below, we summarize the results of the validation of the assumptions made in the post-adoption phase.

In the following paragraph, **Figure 5** summarizes the results of the model validation in the post-adoption phase.

4.2.2. Discussion of the Results

The main objective of this study being to analyze the relationship of SMEs with banks in the context of NFCs, the results of the statistical estimations prove that the post-adoption model explains (48.5%) of trust, (64.6%) of satisfaction which in turn explains (67.3%) of commitment. The relationship variables explain (44%) of the relationship over time, (62.4%) of the extended relationship, and (49.4%) of the deep relationship. These results are consistent with previous studies, although others disagree. Regarding the effect of the variables of intention to use NFC on trust, it was found that SMEs' trust in their bank plays a crucial role in the context of NFC. These results are in line with previous studies in the digital environment. In this environment, trust appears to be an indispensable element for transactions (Reichheld & Schefer, 2000). However, SFNs involve banking transactions without the intervention of bank staff. As such, these transactions involve risks and uncertainties that require more effort and trust in

Table 20. Estimation of the parameters of the structural model by the Bootstrap method.

	Correlation coefficients	(t) Value	Decisions
COM → CONF	0.981***	0.023	Confirmed
COM → SAT	0.979***	0.026	Confirmed
COM → ENG	0.005	2.824	Reject
CONF → SAT	0.983***	0.022	Confirmed
TRA_COST → CONF	0.990***	0.012	Confirmed
TRA_COST → SAT	0.998***	0.002	Confirmed
Expect Effort → CONF	0.987***	0.016	Confirmed
Expect Effort → SAT	0.948***	2.098	Confirmed
ENG → In-depth Relationship	0.000	19.905	Reject
ENG → Relationship Over Time	0.000	17.342	Reject
ENG → Extend Relationship	0.000	31.420	Reject
Socia_Infl → CONF	0.989***	0.014	Confirmed
Socia_Infl → SAT	0.981***	0.023	Confirmed
Per Risk → SAT	0.961***	0.049	Confirmed
SAT → ENG	0.000	7.108	Reject
SAT → C CONF	0.952***	0.060	Confirmed
Per_Usefu → CONF	0.995***	0.006	Confirmed
Per_Usefu → SAT	0.965***	0.044	Confirmed

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 21. Presents a summary of the hypotheses that were not validated.

Validated Hypotheses	Hypotheses not validated
H1; H3; H4; H4.1; H4.3; H4.4; H4.5; H5; H5.1; H5.3; H5.4; H5.5; H6	H2; H6.1; H6.2; H6.3

Source: Based on our own results.

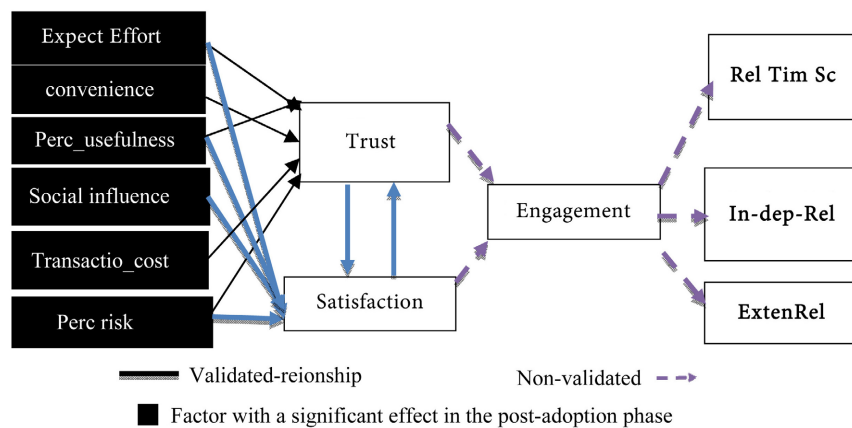


Figure 5. Hypothesis validation summary model.

the bank. The results show the importance of perceived risk (H5.5) and perceived usefulness (H5.3) in the intention to adopt NFS. Expected effort was removed from the model due to the low correlation rate of these items. These results corroborate with those of Gefen and Straub (1997) and Chen et al. (2011). These authors demonstrate that a service that is not easy to use can lead consumers to perceive that the company is neither transparent nor honest, which then prevents them from establishing and maintaining a successful relationship. Furthermore, the results confirm that social influence has a weak influence on the intention to use the SFN in the post-adoption phase. This is due to the fact that social influence has a strong influence in the adoption phase because it is during this period that SMEs try out the use. In addition, it was observed that SME satisfaction is positively influenced by the effort put into using SFNs, the usefulness of the services offered, the influence of friends, partners, sister SMEs, (...) and risk assessment. This result is consistent with studies by Gefen and Straub (1997). Furthermore, convenience and transaction cost have a direct impact on trust and satisfaction. These results are in contradiction with Chen et al. (2011) who found that these variables have no effect on satisfaction and trust. Regarding convenience, these results are consistent with those of Chen and Chen (2008) who analyzed the impact of convenience on satisfaction and trust in the virtual context. They confirmed the positive and significant effect of convenience on loyalty.

Furthermore, the estimates revealed that SMEs' trust in banks influences their level of satisfaction with banks. These results are in line with Pavlou (2001); Luo et al. (2003). This proves that a positive evaluation of SFNs offered by banks increases the level of satisfaction of SMEs with it. These results meet those of N'Goala (2000), who proved that customers' trust in their banks does not influence commitment to them. In this study, it appears that SMEs' trust in their banks has no effect on their commitment to the LT relationship. These results are justified through the specificity of SFNs. Similarly, SME satisfaction has no effect on SME commitment to banks. This result contradicts those of (Luarn & Lin, 2005). The SMEs involved in the relationship do not intend to stay in the relationship with that bank; they can perform digital transactions without the help of the bank. These results meet those of Liang and Chen (2009). These same results confirm those of Reichheld and Schefter (2000) concerning the importance of trust in the digital context. The latter prove that in order to build customer loyalty, one must earn their trust. In the context of NFCs, trust is a crucial factor in the basis of customers' judgments and evaluations. Thus, trust, satisfaction, loyalty and commitment evolve in a causal relationship. This causality attests to the importance of relationship quality variables as factors related to usefulness, ease of use and risk in guiding the LT relationship. Trust appears to be a key factor in the context of online and offline NFS. It plays a crucial role in SME satisfaction but a secondary and marginal role in intentional and behavioral loyalty. The place of trust in the creation of the LT relationship is relative and its

consideration depends on contexts and particularities.

5. Conclusion

This study analyzes the purposes of SFN adoption in SMEs, but also specifies the explanatory factors of SFN adoption capable of explaining the SME-bank relationship. It evaluates the model for developing a long-term SME-bank relationship. To achieve this, we collected data related to the use of NFS, its adoption and future use using a survey questionnaire addressed to 152 SMEs in the city of Bukavu taken at random. Estimates were made through principal component analysis (PCA) and structural equations using the PLS technique. Using these statistical methods, the results of the descriptive statistics showed that the majority of SME managers are men (78%) and a minority are women (21.3%). The majority of the managers are between 31 and 40 years old (47.7%) and 14.8% (the youngest) are between 21 and 25 years old while the oldest ones are over 40 years old (7.1%). The majority of these managers did not have a normal university education (49.3%) of them received short courses. However, it was noticed that they have obtained at least a state diploma (42.3%). With regard to the age of the SME, the results showed that 39% of them are between 3 and 5 years old, the youngest ones are between 1 and 2 years old (21%) and the oldest ones are between 12 and 14 years old (8.5%). In fact, after the descriptive statistics, we presented the results of the adoption phase first, followed by those of the post-adoption phase second.

In the adoption phase, it was found that expected effort, convenience, and perceived risk had a positive effect on the intention to use NFS by SMEs in Bukavu City. In addition, the variables globally explain the adoption model at 92% of the variance of the intention to use NFS compared to 8% of the current intention to use NFS. Furthermore, the moderator variables inserted in the model exert a moderating effect on the intention to use NFS. The gender of the manager exerts a moderating effect on the relationship between expected effort, perceived usefulness, perceived risk, and social influence with the intention to use digital financial services. While the age of the SME has no moderating effect on the relationship between expected effort, perceived usefulness, perceived risk, and social influence with the intention to use NFS. Industry has a moderating effect only on the relationship between expected effort and current use of SFNs. Similarly, SME age, manager gender, and industry have a moderating effect on the relationship between convenience and current SFN use. In the results of the post-adoption phase, we confirmed the model through a better prediction when confidence represents the corollary of satisfaction. Three variables (expected effort, perceived usefulness and perceived risk) influence the intention to adopt NFS and at the same time the current use of these services in the post-adoption phase, in particular the confidence of SMEs. Statistical estimations validated the existence of a positive and significant relationship between SMEs' trust and satisfaction on the one hand, and between SMEs' satisfaction and their commit-

ment to their bank in the context of NFS on the other. Ultimately, the results did not establish a relationship between SME engagement and the level of the relationship established with their bank. Therefore, these results could not identify or show the appropriate relationship chain in the context of NFCs.

Conflicts of Interest

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

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Appendix

Table A1. Descriptive statistics of respondents.

		Numbers	Percentages
Manager's gender	Woman	75	21.30%
	Male	277	78.70%
Age of the manager	18 to 20 years old	4	1.10%
	21 to 25 years old	52	14.80%
	26 to 30 years old	103	29.30%
	31 to 40 years old	168	29.30%
	40 years old and more	25	7.10%
Levels of education	Other	77	21.90%
	State Diploma	107	30.40%
	Graduated	149	42.30%
	Licensed	19	5.40%
Type of education	Letter	75	26.60%
	Other training	173	49.10%
	Humanities and testers	11	3.10%
	Computer sciences	31	8.80%
	Economics	58	16.50%
	Law	17	4.80%
	Engineering school	12	3.40%
	management	50	14.20%
Age of SME	1 to 2 years	74	21.00%
	3 to 5 years old	139	39.50%
	6 to 8 years old	80	22.70%
	9 to 11 years old	29	8.20%
	12 to 14 years old	30	8.50%
SFN channels used by SME	Agency	126	35.80%
	ATM	51	14.50%
	Internet	3	0.90%
	WAP	98	27.80%
	SMS	74	21.00%
Transactions made through these channels	Consult the account	4	1.10%
	Make a transfer	15	4.30%
	Order a checkbook	116	33.00%

Continued

Request a RIB	41	11.60%
Pay bills	6	1.70%
Request a service to help	9	2.60%
Assurance	160	45.50%

Source: Ourselves from the output of the SPSS software 25.