

# Predictive Factors of IT Systems Adoption by SME Employees in Developing Countries: Evidence from SME Employees in North Kivu, DRC

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## Abstract

*This research aimed to identify the determinants of technology usage among SME employees in the North Kivu Province of the Democratic Republic of Congo. We based our model on the Technology Acceptance Model. In addition to perceived usefulness and ease of use, the proposed model includes relative advantage as a predictor of technology usage. This study used the PLS-SEM method to test the proposed hypotheses from 247 responses. The results confirmed the hypotheses. The research findings demonstrate a positive relationship between perceived usefulness and use, perceived ease of use and use, and relative advantages and use of new technologies. Congolese SME managers can rely on these findings to highlight these key determinants in promoting technology usage among SMEs in a country where technology usage by businesses remains low.*

**Keywords:** *Perceived ease of use, Perceived usefulness, Relative advantages, SI adoption, Technology.*

## Introduction

The emergence of information technologies has been the most important event in the management field in recent decades [1], making technology adoption one of the most discussed topics in the literature over the last years [2-3]. Every year, several studies are carried out on this topic. The critical role IT plays in SMEs can explain the growing interest in technology [4]; in addition to allowing companies to increase productivity and performance [5], technology also serves as a means of allowing the company to react to its external environment [4] quickly. Considering the importance given to information systems [6-7], there is a growing interest in understanding their critical success [8].

Several studies have been conducted worldwide on information systems [9]. However, according to [10], generally, these studies have focused on developed countries in

North America and Europe. While some researchers are gradually addressing developing countries [11-12], in DRC, few studies address information systems [2]. The author notes that the introduction of computerized business information systems has just lately become a government priority in the DRC. This slower adoption of computer-based information systems raises questions since it has already been established that information systems are valuable to businesses regardless of industry [12].

This author suggests that the debate, even in the developing country, no longer revolves around the value of computer-based information systems but on how to derive their benefits. To benefit from IS in a country where SMEs are gradually embracing computerized IS, understanding the drivers of post-adoption behavior is essential [13] to enable management to rely on them for IS success. For several years the value of SMEs in an economy

has been proven. They are development enablers, especially in developing countries [14-15]. To be efficient, SMEs use computerized IS [16-18].

In investigating the predictive factors of IS adoption, several authors have focused on large companies [19] in developed countries [20], thereby creating a research gap in developing countries and especially in the DRC, which has a very different context compared to the other countries. The adoption of IS has been very slow in DRC, and related studies are at an early stage [21]. This study, therefore, addresses this research gap by identifying the predictive factors of IS usage among Congolese SME employees.

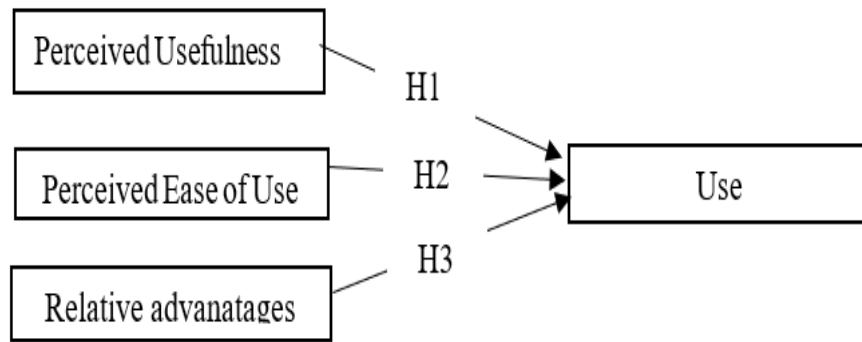
Several models have been proposed in the literature to capture the determinants of IS adoption. The Technology Acceptance Model (TAM) developed in 1989 by [22], is the most widely used and has been validated by several researchers [23-25]. But despite its high popularity, to our knowledge, not enough studies have been conducted in the DRC context.

The findings of this research may be helpful to managers/owners of Congolese SMEs in migrating to computerized systems and thus join the government's ambition to prioritize digitalization [26]. In addition, this research would serve as a reference for other research on management information systems in this country, where SMEs' computerization is struggling to start entirely. Consequently, the author addresses the following central question: What are the predictive factors of adopting computerized information systems by employees in North Kivu, DRC?

## **Theoretical Framework and Hypothesis Development**

Understanding the reasons behind users' acceptance and usage of new technologies is critically important for the new systems' development and implementation [13,27], and consequently, several models have been developed. The TAM model is the most frequently used model in information systems research [28-29]. Since its introduction in 1989 by [22], the model has been validated by several empirical studies [30-32]. Inspired by the theory of reasoned action developed by [33], the TAM model, in its simplest form, argues that actual use of technology is predicted by perceived ease of use, perceived usefulness, attitude towards service, and behavioral intention [29].

Despite its popularity among information systems researchers and practitioners, due to its inadequacies, the TAM model has been subjected to various criticisms and improvements [34-35]. Some researchers criticize, for example, the model's exclusion of structural and cost imperatives which influence new technology usage [36]. According to [37] the TAM model suffers from a limited descriptive and predictive capacity. In addition, the continuous discussions around the TAM model have distanced researchers from other relevant information system-related topics [37]. Moreover, efforts to adapt the model to the evolving IT context have created chaos by proposing several versions of the model, thus creating confusion about which of these versions is commonly accepted [37]. Although criticized, the TAM is still the most widely used model for predicting the acceptance or rejection of new technology [25].



**Figure 1.** Research Model

Information systems research has identified two main determinants for predicting the adoption of new technology: perceived usefulness (PU) and perceived ease of use (PEOU) [38]. Perceived usefulness is “the degree to which a person believes that using a particular system would enhance his or her job performance” [22]. Thus, a higher perceived usefulness system is a system that users believe has a positive use/performance ratio (Davis, 1989). Several empirical studies show a positive relationship between PU and system usage [39-41].

**Hypothesis 1(H1):** Perceived usefulness positively and significantly influences system usage.

Perceived ease of use refers to “the degree to which a person believes that using a particular system would be free of effort” [22]. Typically, a system perceived as more straightforward to use than another is more likely to be accepted by users [22]. Several studies [42-44] have tested and confirmed the positive relationship between a system’s perceived ease of use and usage.

**Hypothesis 2(H2):** Perceived ease of use positively and significantly influences the usage of an information system.

However, another construct closely related to perceived usefulness explains technology adoption and use. This is a relative advantage, RA [45]. [46] Comparative advantage is “the degree to which an innovation is perceived as being better than the idea it supersedes.” The

willingness of the users to switch to a new technology increases when the technology is perceived to be better than the one it replaces [47-48]. Concerning the link between relative advantages and system usage, [49] suggests a positive relationship. Accordingly, we suggest the following hypothesis:

**Hypothesis 3(H3):** Relative advantages positively influence system usage.

## Materials and Methods

The survey involved 247 employees of SMEs in North Kivu Province. Since we did not know the total number of employees in the entire province and could not reach all of them, we applied the convenience sampling method. We used a 5 to 1 Likert scale questionnaire (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree) to collect the data. A minimum of 3 items represented each construct in the model. Respondents were informed of the purpose and nature of the survey before the actual data collection. They were also clearly informed of the anonymous nature of their responses.

This study used partial least squares structural equation modeling (PLS-SEM) analysis, specifically Smart PLS3, for hypothesis analysis. PLS-SEM is a statistical instrument that researchers use to analyze empirical data and test relationships simultaneously [50]. PLS-SEM was chosen for its ability to explore several relationships quickly.

## Results

### Evaluation of the Measurement Model

The study examined three indicators for the convergent and discriminant validity of the model: Cronbach's Alpha, Composite Reliability, and average variance, AVE. The

respective values of Cronbach's Alpha and Composite Reliability should equal 0.7 except for exploratory studies and the AVE at least 0.5 [50]. The values shown in Table 1 are respectively greater than 0.7 and 0.5, reflecting a good validity level.

**Table 1.** Relevant Indicators of the Measurement Model

Latent Construct	Cronbach's Alpha	Composite Reliability	AVE
-	>0.7	>0.7	>=0.5
PEOU	0.763	0.873	0.708
PU	0.707	0.818	0.529
RA	0.743	0.826	0.502
U	0.719	0.877	0.780

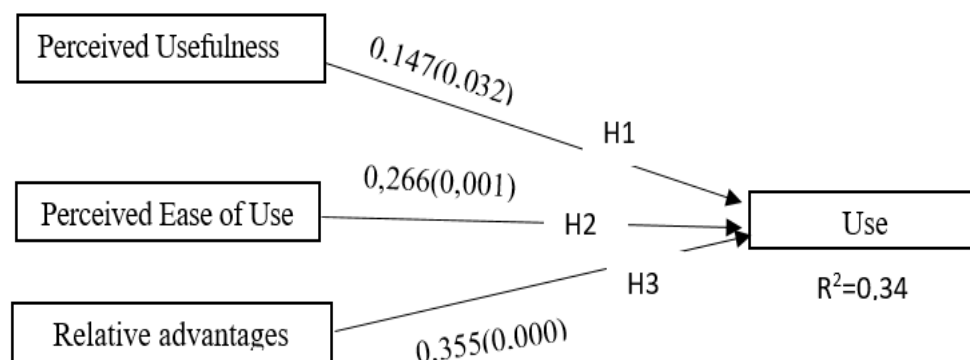
### Structural Model Assessment

The evaluation of the explanatory power of the model requires the measurement of the divergence between its respective variables [51]. The  $R^2$  and path coefficients are key measures for evaluating a structural model [52]. As indicated in Figure 2, the  $R^2$  value was found to be 0.34 for usage. Thus, the three technology adoption predictors under analysis (PU, PEOU, RA) account for about 34% of the technology use (U). The findings validated all the

proposed hypotheses. These were validated since the p-value was found to be less than 0.05 and the path coefficient was positive for the different situations. H1 is supported since Perceived usefulness positively affects the use (coefficient=0.147, p-value=0.032). As for H2, there is a positive relationship between Perceived ease of use (coefficient=0, 266, p-value=0.001). The third hypothesis found a positive relationship between relative advantages and use (coefficient=0.355, p-value=0.000).

**Table 2.** Factors affecting employee technology usage

Hypothesis	Path	Path Coefficient	p-value	Remarks
H1	PU-U	0,147	0,032	Supported
H2	PEOU-U	0,266	0,001	Supported
H3	RA-U	0,335	0,000	Supported



**Figure 2.** Structural Model

## Discussion

Technology adoption is one of the most discussed topics in the information systems literature [53]. Given this background, we surveyed SME employees on the factors encouraging the use of information technology in their everyday work. The study's findings showed that technology usage is positively influenced by perceived usefulness, perceived ease of use, and relative advantages.

The perceived usefulness assumption is fully supported in the literature [42-44]. Consequently, the more valuable an employee perceives a technology, the more likely they will want to use it [43]. In addition to perceived usefulness, perceived ease of use has been identified as a determinant of technology use by SME employees in North KIVU. This hypothesis is consistent with the findings of several other research studies that establish a positive relationship between perceived ease of use and the use of new technology [42-44, 54]. The last hypothesis about the link of relative advantages to computer system use was also confirmed. This is consistent with the findings of [49].

Furthermore, the low  $R^2(0.34)$  may be explained by omitting some explanatory constructs from the model. Other constructs can explain technology adoption in addition to the TAM model [55]. Although we have included the relative advantage variable in the model, several other possible explanations exist for adopting new technology. Several additional factors are cited in the literature. [56] identified six more factors to explain technology adoption. These include social influence, technology anxiety, trust, perceived risk, perceived fitness, and resistance to change. Furthermore, [57] mention self-efficacy, subjective norm, pleasure, anxiety, facilitating conditions, social influence, innovation, and satisfaction as key determinants of new technology usage.

Ultimately, the results revealed three factors - perceived usefulness, perceived ease of use, and relative benefits - influencing technology use among SME employees in Beni, North Kivu. This research helps SMEs in developing as they now know where to focus when adopting new technologies. To use the latest technologies, the employees should consider them beneficial, easy to use, and providing several benefits compared to the systems they replace.

## Conclusion

In a country where SMEs are gradually moving towards computerized information systems, understanding the predictive factors of these systems' usage is essential. The present study, conducted in the Democratic Republic of the Congo, was designed to address this issue by examining the factors that predict the utilization of computer-based technologies among SMEs' employees in North Kivu. In developing countries, very few studies address information system issues. This situation is explained mainly by the low level of computerization of businesses in these countries. Our study has consequently been found relevant in the desire to fill this research gap.

We used the expanded TAM model to achieve our goal and collected data from 247 employees selected by the convenience sampling method. The proposed model was tested using the PLS-SEM method. As a result, all hypotheses were confirmed. Perceived usefulness, perceived ease of use, and relative advantages positively influenced employee technology usage. Since employees perceive technology to be valuable and easy to use, they are likely to use it continuously. Beyond these two determinants, employees use technologies more widely if they think they are better than the systems they are meant to replace.

The main theoretical implication of this study is the use of relative advantage as a predictive factor of employee technology

usage. This variable complemented perceived service and perceived ease of use, traditionally used to predict individual and group behavior toward new technologies.

From a practical point of view, these research results can be used by managers of Congolese SMEs in migrating to computer-based information systems. As a result of this study, the managers now better understand the elements that must be emphasized to implement the new technologies successfully. To promote the computerization of SMEs, managers must highlight the system quality to reinforce its perceived usefulness, ease of use, and relative advantages.

In addition to the new evidence and practical implications, this research is subject to some

limitations. First, we only identified three determinants predicting further technology usage. Future research may include other variables such as social influence, facilitating conditions, and perceived risk. Moreover, we only surveyed employees in one province of the DRC; hence, the study can be extended to the other twenty-five provinces to identify a general trend across the country.

### Conflict of Interest

The author declares no conflict of interest.

### Acknowledgment

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