

Barriers to SME Computerization in Developing Countries: Evidence from SMEs in North Kivu, Democratic Republic of Congo

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Abstract

SMEs are widely recognized as the development enablers in developing countries. They contribute to job creation and, in so doing, to poverty reduction. To remain competitive, SMEs use several tools, including computerized information systems. However, given their characteristics, several constraints hinder their computerization; these constraints are even more accentuated in developing countries. This study attempted to identify the barriers to computerization as outlined in the literature and to ascertain them in the DRC context. In order to achieve this, we examined the relevant literature and carried out a survey of 53 respondents, principally local ICT stakeholders. Using descriptive statistics, we established that Congolese SMEs face the same computerization challenges identified in the literature. These constraints include the local SME characteristics - poor financial resources, low internal and external expertise, and low management involvement -, high infrastructure costs - expensive software and hardware - and the availability of the technological infrastructure - poor internet access -. The Congolese digital ecosystem stakeholders can, each at their own level, use these results to assist the digitalization of Congolese SMEs and thus make them more agile in the achievement of their goals.

Keywords: *ICT, Barriers, Computerization, DRC, SME.*

Introduction

Small and medium-sized enterprises are key enablers of development in addition to being the main contributors to poverty reduction in developing countries [1-3] And for their success, SMEs use various tools including information technology [4-6].

Information technology has been recognized as very useful to small businesses by some governments to such an extent that they have supported their deployment in SMEs [7- 8]. Moreover, several SME leaders recognizing the various benefits of technology have embraced it to support the growth of entities under their management [9-11].

The trend toward computer-based information systems adoption among SMEs has also been visible in Africa despite the slow technol-

ogy adoption on the continent, as in many developing countries. [9], [12]. In developing countries, SMEs face several barriers to adopting IT systems. And in DRC particularly, although SMEs are gradually adopting computer-based information systems, much remains to be done in light of the low rate of technology adoption among SMEs [13]. This is because the adoption of technology among Congolese SMEs has been extremely slow [14].

As the value of information technology is widely acknowledged, including in developing countries [15-17], a perceived slow technology adoption as observed in the DRC is questionable. This study responds to this concern by attempting to identify the barriers that may explain the low adoption of information technology in DRC SMEs. In addition, given the fact that less attention has been paid to examining the barriers and

challenges to IT adoption [18], we believe that this study is worthwhile.

Literature Review

Technology adoption is one of the most discussed topics in the literature for the last decades [19]. Whether it is about IS adoption, system evaluation researchers are paying particular attention to this topic. This attention can be attributed to the importance of information technology in modern society.

While there is general agreement on the importance of technology, a number of barriers hamper IT adoption within SMEs in developing countries. In a literature review, [20] identify five challenges to technology adoption. Based on the findings of their studies, SME managers are confronted with a lack of technical competence, high hardware and software infrastructure costs, lack of organizational support, lack of government support, and other adoption challenges.

These findings confirm the classification of [9] who group IT adoption barriers into internal and external barriers. According to the above authors, internal barriers include owner/manager characteristics, organizational characteristics, adoption, implementation cost, and return on investment, and external barriers include infrastructure, social, cultural, political, legal, and regulatory barriers.

The different barriers are related to the SMEs' characteristics; unlike large enterprises, SMEs have different characteristics affecting technology adoption [7]. [21-22] highlight that SMEs are confronted with several constraints including financial constraints, time constraints, and expertise constraints.

SMEs are often unable to finance the acquisition and implementation of modern IT solutions [23-24]; In addition to lacking internal capacity, SMEs often find it difficult to access external finance, as the lack of collateral for borrowing makes them avoided by financiers [25]. As a result of this financial constraint, SMEs are often unable to afford the costs of modern hardware

and software, and therefore prefer cheaper solutions that often do not meet their needs [26].

Besides, most of the time, SMEs do not have needed ICT expertise [27-28]. Internally, according to a European Union report [29], the lack of time is a barrier for SME employees to acquire the required skills in terms of technological innovation. Given the lack of internal expertise, SMEs rely on external expertise [30]. The use of external consultants can be useful in several dimensions, e.g., by carrying out the analysis of information system needs, providing software, training users, adapting company procedures to the modules of the IT systems, or configuring the new systems [31]. External experts require payment for their services, which can be a constraint for SMEs that are often unlikely to afford their consultancy fees [32].

Since there is a relationship between information systems skills and IT use [33], the lack of both internal and external skills can be seen as an obvious barrier for SMEs when it comes to IT adoption. From the literature review, the challenges faced by SMEs in adopting technologies are grouped into challenges related to organizational characteristics such as financial resources, internal skills, and user involvement; challenges related to the business environment including the availability of technological infrastructure and the availability of external support.

Materials and Methods

The approach consisted primarily of a literature review to identify the general trend in terms of the most cited ICT adoption challenges. Following this review, we grouped the challenges into four major categories, including software characteristics, business characteristics, availability of infrastructure, and availability of external support (from IT staff). From these groups, we then created a survey questionnaire organized on a Likert scale of 5 to 1 (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree) with each category represented by at least 3 items.

We then surveyed 53 ICT stakeholders, including IT officers, IT consultants, and other ICT stakeholders. Due to the lack of information on their exact number and considering that a number of ICT stakeholders in the Congo still operate informally, the convenience sampling method was applied.

The data analysis essentially consisted of determining the Median and the inter-quartile range. This is because our data are ordinal and therefore the determination of the mean and standard deviation would be inappropriate [34].

Results

Software Characteristics

The results from Table 1 show that most of the respondents indicated that local SMEs do not trust locally developed IT solutions (Mdn=4, IQR=2), concerning the software cost, many respondents (N=30, 56.6% expressed) a total agreement or agreement yet an important num-

ber (18, 34%) expressed a disagreement or a total disagreement. Regarding the question of whether the available software does not meet the local SMEs' needs, the respondents seem to be divided (Mdn=3, IQR=2).

Business Characteristics

The findings in table 2 indicate that the respondents agree that managers do not understand the importance of computerization, that employees lack sufficient IS knowledge, or that companies at the local level do not invest adequately in technology acquisition and implementation (Mdn=4, IQR=1); the similar consensus can be seen concerning the existence of IT departments in local SMEs or the lack of sufficient means to invest in computerized IS. Most respondents agree that these two elements are barriers to computerization (Mdn=4, IQR=2). As for the knowledge of the benefits of IT by the enterprises, a good part of the surveys (32.60.4%) expressed their total agreement or their agreement on the fact that it is a brake to computerization.

Table 1. Software Characteristics

item	N	Median	IQR
The available software are expensive	53	4	3
The software re not customized to the realities of local SMEs	53	3	2
SMEs do not trust local ICT solutions	53	4	2

Infrastructure Availability

Table 3 shows that most of the respondents believe that poor access to the Internet is an obstacle to computerization (Mdn=4, IQR=3), and they seem to agree that the unavailability of equipment is not an obstacle to computerization. With regard to the cost of equipment, opinions seem to be divided. 54% of respondents disagreed or strongly disagreed that the cost of hardware is an obstacle; at the same time, 19 (35%) respondents felt that the cost of hardware is an obstacle to computerization.

The rest of the respondents preferred to remain neutral. The same is true when it comes to

access to electricity; a good number of respondents (22.41.5%) agreed or strongly agreed that it hinders computerization and an equally large number (17.32%) disagreed or strongly disagreed.

Availability of External Support

The results presented in Table 4, relating to the availability of external expertise, indicate that there is agreement that the majority of actors in the Congolese digital sector operate in the informal sector, which is an obstacle to computerization (Mdn=4, IQR=1) and on the other that IT adoption is not constrained by a perceived skill lack or a willingness of local IT specialists. (Mdn=2, IQR=1).

Discussion

Technology adoption has become an essential requirement for companies of all sizes and in all

industries. However, in some countries, businesses face a number of barriers to migrating to computer-based information systems. This is the case for SMEs in North Kivu in the DRC [13].

Table 2. Business Characteristics

Item	N	Median	IQR
The benefits of computerization are not yet understood by business managers	53	4	1
The benefits of technology are not yet known in the local community	53	4	2.5
Employees have very little ICT knowledge	53	4	1
Companies do not have adequate facilities to handle computerization expenses	53	4	2
Companies invest relatively little money in information technology	53	4	1
There is no ICT department in the local companies	53	4	2

Table 3. Infrastructure Availability

Item	N	Median	IQR
Equipment are not available in the region	53	2	2.5
Available materials are expensive	53	3	2
Poor access to electricity is a constraint to computerization	53	3	2
Poor access to the internet is a challenge	53	4	2

Table 4. Availability of External Support

Item	N	Median	IQR
There are no established legal structures for IT specialists	53	4	1
Local IT specialists do not possess adequate competencies to implement ICT solutions.	53	2	1
IT specialists are not ready to assist companies	53	2	1

The digital ecosystem stakeholders in North Kivu in the DRC were questioned about the barriers to computerization and pointed first to the characteristics of local SMEs. Indeed, according to the results of our surveys, SMEs do not know the benefits of technology, their managers are not fully involved in the computerization process, or SMEs do not have the financial resources necessary to face the challenge of having staff who master IT. These obstacles correspond to what we have identified in the literature.

In most information systems studies, the firm characteristics are identified as influencing both adoption and success [7], [21-22], [35]. However, there is one fact that attracts attention: the benefits of technology are not yet known to businesses in DRC. This may be explained by the relatively long period of technological disuse in the

DRC, until very recently when the government decided to prioritize the digital sector [36].

In addition to the characteristics of SMEs, the hardware and software high costs are seen as constraints to computerization. This supports the results of the study we carried out in the town of Beni DRC [13]. This situation can be explained by the country's low level of technological asset investment despite the high level of investments in other assets [37].

The survey results also highlight the fact that most Congolese IT consultants work in the informal sector, resulting in companies having little confidence in locally produced software. Yet confidence in a computer system or its designer is a key factor in choosing IT solutions [38].

The other identified obstacle is the low access to the internet by SMEs. In a report published in

2020 by [39], it appears that only 19% of the Congolese population has access to the internet, a rate that has dropped in 2022 (17.6%) according to the statistical agency Statista [40]. This rate is one of the lowest on the continent, according to the same agency. Internet access had already been identified as a barrier to computerization in a study conducted by [41] in the area of Mbujimayi in south DRC.

Conclusion

This study consisted of identifying the barriers to ICT investment mentioned in the literature and then comparing them with Congolese SMEs' reality. To do this, we interviewed 53 individuals, mainly IT consultants.

The survey findings reveal that SMEs in the DRC face the same barriers mentioned in the literature when it comes to adopting computer-based information systems. These include the company's characteristics including management involvement, the employees' IS knowledge, the financial constraints, the willingness to invest in ICT, the software availability, the companies' lack of trust in local solutions,

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the lack of technological infrastructure including the high cost of hardware and software, and the poor access to the internet. Another perceived barrier to computerization is the number of IT consultants at the local level who operate in the informal sector.

This research is important because it verifies the barriers to computerization identified in the literature in the DRC context. However, as the research has not covered all the issues related to computerization, future research can focus on the government's impact on the adoption of technology. And since it appears that businesses in Congo remain unaware of the benefits of technology, a study of the impact of information systems on organizational performance is worthwhile.

Conflict of Interest

There is no conflict of interest.

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