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The barriers to technology adoption among businesses in the informal economy in Cape Town

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Background: Despite being significant contributors to the economy, informal businesses operate with limited resources. In South Africa, the informal sector is substantial, accounting for approximately 30% of total employment and around 6% of gross domestic product (GDP). These businesses often struggle to adopt and leverage technology constraining their capacity for growth and innovation, ultimately limiting their contribution to economic development and the alleviation of socio-economic challenges.

Objectives: The objective of this study was to investigate the factors that influence the barriers to adopting digital technologies in South Africa's informal economy.

Method: This study adopted a qualitative research approach, using semi-structured interviews and purposive sampling to collect data from 14 informal business owners in Cape Town. Participants provided informed consent and thematic analysis was conducted using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework.

Results: Findings revealed barriers including cash preference, load-shedding, crime and digital incompetency obstructing technology adoption. Despite these hurdles, the potential benefits of digital technology for informal businesses were underscored.

Conclusion: The study suggests untapped potential in enhancing technology adoption among informal businesses through targeted interventions. By addressing identified barriers, such initiatives could significantly bolster the informal economy's impact on South Africa's socio-economic landscape.

Contribution: This research contributes to understanding the complexities surrounding technology adoption in South Africa's informal economy. It offers insights for policymakers, practitioners and stakeholders seeking to promote digital inclusion and economic empowerment within marginalised sectors.

Keywords: digital technology; ICTs; informal economy; informal business; digital technology adoption challenges; technology adoption.

Introduction

Despite the size of the informal economy in sub-Saharan African (SSA), countries have failed to harness its capacity for economic growth (Etim & Daramola 2020). The informal economy is a crucial component of South Africa's economic landscape constituting 19% of the country's total workforce, contributing significantly to employment and livelihoods (StatsSA 2023). Historically marginalised groups have found refuge in this sector, which has become vital for their survival and the nation's economic resilience (Petersen et al. 2019).

The informal economy encompasses economic activities by unregistered businesses operating outside formal regulatory frameworks (Burger & Fourie 2019). Predominantly, these businesses are small-scale and operate as a means of survival because of the lack of formal employment opportunities (Bhatt & Mohan 2021). They face numerous challenges, including inadequate incomes, insufficient resources and limited access to advanced technologies (Bhattacharya 2019), which stifle their growth potential. Moreover, the utilisation of crude digital technologies (Onyima & Ojiagu 2017) further exacerbates the challenges that informal businesses face.

Digital technologies include devices, networks and processes employed to create, store, manipulate and transmit data (Onyima & Ojiagu 2017), such as computers, laptops and smartphones (Vuorikari et al. 2016). Dincă, Dima and Rozsa (2019) state that digital technologies and information and communication technologies (ICTs) are employed to enhance the decision-making procedures of businesses. Emerging technologies such as Artificial Intelligence (AI),

distributed ledger technology (DLT), cloud computing, the Internet of things (IoT), open source software, et cetera, also pose significant potential to transform the informal economy (Ndung'u 2022). For example, mobile payment systems and digital marketplaces have revolutionised informal trade in other regions, illustrating the potential benefits for South Africa's informal economy. Moreover, the global expansion of ICTs can transform informal businesses by promoting growth, competitiveness, and sustainability via improved market access, expense minimisation and expanded enterprise prospects (Mramba et al, 2017). Additionally, ICTs can play a role in promoting economic development by reducing the size of the informal sector (Remeikienė et al. 2022).

However, despite the recognised benefits that digital technologies provide to the informal economy, there is little evidence of their adoption and use by informal businesses (Bvuma & Marnewick 2020b; Nguimkeu & Okou 2021). Barriers such as financial constraints, lack of digital literacy and limited infrastructure prevent these businesses from leveraging technology effectively (Anakpo, Phuthumani & Mishi 2023). To foster digital inclusion in the informal economy, it is imperative to address these factors. In light of the preceding issue, this study seeks to explore these factors and propose solutions to address them. This study focusses on a sample of 14 informal businesses in Cape Town, South Africa. The research question guiding the study was:

What are the factors affecting the adoption of digital technologies in the informal economy?

Objectives

- To execute a literature review to identify suitable models and frameworks to interpret the inadequate adoption and use of digital technologies and ICTs within the informal economy.
- To conduct empirical research to investigate the factors contributing to the inadequate use and adoption of digital technologies and ICTs among informal businesses.
- To make recommendations based on the findings to improve digital technology and ICT adoption and use among informal businesses.

Literature review

This section reviews literature related to the informal economy, digital technology, ICTs and technology adoption frameworks.

The importance of the informal economy to South Africa's economy

The informal economy in South Africa makes significant contributions to employment and economic activity (Musara & Nieuwenhuizen 2020). Employing over 3.2 million individuals, it constitutes 19% of the country's total workforce and contributes approximately 6% to the gross domestic product (GDP) (StatsSA 2023). Despite its substantial impact, this sector remains underutilised, particularly in its potential to alleviate poverty and unemployment. Greater efforts are needed to support and develop the informal sector, such as adopting digital technologies to foster growth and increase its economic impact.

Businesses in the informal economy play a crucial role in generating employment and supporting economic stability (Rogan & Skinner 2017). Evidence presented by Napwanya and Chinyamurindi (2021) highlights the sector's significant contributions to overall economic activity, especially in creating job opportunities. Their study suggests that aspiring entrepreneurs could use the informal economy as a gateway to business, which is particularly relevant given South Africa's high unemployment rates (Adeyemi et al. 2018).

A comprehensive understanding of the informal economy should emphasise its role in job creation, economic development and GDP contribution (Ilavarasan 2019). Moreover, the informal sector is vital in addressing the socio-economic challenges faced by many countries, including South Africa. These challenges encompass crime, poverty, unemployment, inequality and poor living standards (Govender 2016; Pillay 2019; Masipa 2018). Research indicates that the informal economy can mitigate poverty, reduce income disparity and decrease unemployment rates in developing nations like South Africa (Başbay, Elgin & Torul 2018).

Given these contributions, the informal economy is imperative to South Africa's economic health. It promotes economic growth, reduces socio-economic challenges and enhances the country's GDP and employment levels (Medina & Schneider 2021; Nguimkeu & Okou 2020). However, the sector faces barriers that hinder the adoption of technology, which is crucial for further development and maximisation of its potential. Addressing these barriers can unlock new opportunities for growth and enhance the sector's impact on the South African economy.

Challenges in the informal economy

Etim and Daramola (2020) conducted a comparative systematic review to examine the key factors driving informality in South Africa and Nigeria, the obstacles hindering the development of the informal economy and the policy measures aimed at supporting informal sector providers. The authors found that South Africa's informal economy faces challenges such as inadequate social protection, inadequate infrastructure, ineffective government policies, insufficient access to credit, low capitalisation and limited adoption of technology. Infrastructure-related challenges, including inadequate access to electricity and expensive power supplies, are significant barriers. Daramola and Etim (2022) and Mothobi, Gillwald and Aguera (2020) noted that limited infrastructure and high Internet access costs further complicate the situation, affecting the overall

operational capabilities of informal businesses. The lack of sufficient infrastructure support directly impacts the ability to adopt and integrate digital technologies effectively.

Policy and support challenges also play a crucial role as ineffective government policies and inadequate support hinder the growth of the informal economy (Burger & Fourie 2019; Etim and Daramola 2020). For example, the lack of social protection measures exacerbates vulnerabilities, making it difficult for informal workers to benefit from technology-driven advancements. Elaborating on inadequate social protection, it becomes clear that without safety nets, informal workers are less likely to take risks associated with adopting new technologies, which can perpetuate their exclusion from broader economic benefits.

Furthermore, inadequate digital skills and insufficient training opportunities limit the capacity of informal businesses to leverage digital tools. Mramba et al. (2017) identified that low adoption rates and insufficient customisation of ICT solutions across different categories of informal businesses stem from a lack of necessary skills and knowledge to utilise these technologies effectively. Furthermore, limited funding opportunities and insufficient access to credit, constrain the ability of informal businesses to invest in technology and innovation. The low capitalisation of these businesses makes it difficult to allocate resources towards adopting new technologies, perpetuating a cycle of low productivity and limited growth (Daramola & Etim 2022; Mothobi et al. 2020; Mramba et al. 2017). Therefore, these challenges need to be considered when conducting an empirical study on digital technology and ICT adoption in the informal economy.

The importance of digital technologies to the informal economy

Digital technologies are intrinsically revolutionary and widely known for accelerating economic development (Nguimkeu & Okou 2020). Digital technologies can be employed to develop e-commerce platforms, build brands and establish communities of users and customers (Sousa & Rocha 2019). The adoption of digital technologies has enabled several informal businesses to seize formal prospects, thus eliminating the obstacles between informal and formal firms (Onyima & Ojiagu 2017). Moreover, digital technologies could provide access to financial services through mobile apps such as mobile money services (Girollet 2023). As a result, this could increase financial inclusion in informal businesses, which could make the transaction process more convenient and safer (Mbiti & Weil 2016). Additionally, Danquah and Owusu (2021) state that digital technologies can improve the operational efficiency of informal businesses by decreasing search expenses, enhancing supply chain management and improving information access and utilisation. For example, applications such as WhatsApp, X and Instagram can be used to promote products and services to a broader spectrum of customers with minimal expenses (Nguimkeu & Okou 2021).

Furthermore, Dutta, Kar and Guha (2023) conducted an empirical investigation to analyse the relationship between digital technology adoption and firm performance using data from a survey carried out by the World Bank. Their findings indicated that the successful adoption of digital payments helped increase the sales made by informal businesses by 12%–15%. Hence, the benefits of digital technologies are emphasised in the literature. Yet, the technologies utilised by informal businesses, as well as their impact and implications, remain limited (Chen 2016).

The importance of information and communication technologies to the informal economy

There is now a broad consensus that ICTs are significantly influencing economic growth (Mothobi et al. 2020). Businesses in the informal economy are known for being empowered by ICTs (Etim & Daramola 2023). The extensive diffusion of ICTs such as smartphones and other Internet technologies in Africa has presented innovative opportunities for informal businesses (Mramba et al. 2017). These opportunities include obtaining products at reduced prices, penetrating markets (Bvuma & Marnewick 2020a), increasing competition and enhancing social protection (Mramba et al. 2017). Furthermore, ICTs present individuals with the chance to enhance their skills and create their own businesses, especially when they encounter obstacles in securing employment within the formal economy (Ndoya et al. 2023). Makena, Kimwele and Guyo (2015) conducted a study to evaluate the impact ICTs such as the Internet, computers and smartphones have on the performance of informal businesses in Kenya. Their results revealed that smartphones play a vital role in improving the performance of informal businesses by improving access to financial resources, increasing sales, reducing expenses and increasing access to information.

Furthermore, ICTs present individuals with the chance to enhance their skills and create their own businesses, especially when they encounter obstacles in securing employment within the formal economy (Ndoya et al. 2023). In turn, this could assist in decreasing unemployment in the economy. Hence, the use of ICTs facilitates socio-economic growth in the informal economy by promoting market integration and improving access to social resources through readily available information (Mothobi et al. 2020). Despite the significant benefits ICTs provide informal businesses and the informal economy, Mothobi et al. (2020) argue that there is inadequate usage of ICTs, such as mobile phones and the Internet, in Africa's informal economy, and as a result, they cannot reap its benefits. Consequently, several barriers prevent informal businesses from adopting ICTs.

Frameworks for technology adoption

There are several adoption models and frameworks employed to examine the adoption of digital technologies and ICTs. These include, for example, the innovation diffusion theory (IDT), the technology acceptance model (TAM), and

the unified theory of acceptance and use of technology (UTAUT).

Innovation diffusion theory

The IDT seeks to elucidate the process by which new technologies are adopted (Pankomera & Van Greunen 2019). It consists of five characteristics: relative advantage, compatibility, observability, trialability and perceived complexity (Wani & Ali 2015). These characteristics significantly influence the adoption of technology within an organisation (Almaiah et al. 2022).

This model, however, has several limitations that hinder its applicability to the current study. For instance, IDT does not sufficiently explain environmental and organisational factors (Almaiah et al. 2022). These factors include inadequate government policies, inadequate social protection (Etim & Daramola 2020), inadequate wages (Onyima & Ojiagu 2017) and infrastructural challenges (Bvuma & Marnewick 2020b). A study by Etim and Daramola (2023) noted that these factors influence the adoption of technology by informal business owners. Therefore, as the IDT lacks adequate explanations for these factors, it is not suitable for this study.

Technology acceptance model

The TAM was developed based on the Theory of Reasoned Action framework, and its purpose is to understand a user's behavioural intention in adopting new technology (Davis 1989). It comprises two core variables: perceived ease of use and perceived usefulness and two resultant variables: attitude towards use and behavioural intentions (Davis 1989). The model suggests that the decision to adopt or utilise technology, whether it is the intention to adopt or the actual adoption, depends on the ease of use and usefulness of the technology (He, Chen & Kitkuakul 2018). The constructs of this model have been adapted and extended to study the adoption of technology among informal businesses by several authors. For instance, Pipitwanichakarn and Wongtada (2019) investigated the adoption of mobile commerce among street vendors in Thailand by integrating constructs such as trust, entrepreneurial orientation and product differentiation with TAM. Amegbe, Hanu and Nuwasiima (2017) explored the contribution mobile commerce and mobile money have on the growth of small-scale businesses in Ghana by including constructs such as risk, trust and perceived cost-effectiveness with TAM. Furthermore, Bvuma and Marnewick (2020a) combined TAM with the actor network theory to investigate the factors affecting the adoption of ICTs among SMMEs in the township of South Africa. Additionally, van Dieman and van den Berg (2023) used TAM and incorporated constructs of the theory of planned behaviour to understand the perception of spaza shops in the adoption of digital payments. These studies indicate that TAM can be used to study the adoption of technology.

The technology acceptance model, however, has several limitations that would hinder its explanatory power in the context of this study. These limitations are that TAM fails to adapt to the evolving technological landscape and overlooks the role of social influence in the implementation of technology (Skoumpopoulou et al. 2018). A study by Etim and Daramola (2023) indicated that social influence from colleagues and peers played a significant role in increasing individuals' willingness to adopt technology. Therefore, as TAM overlooks social influence, it cannot be used in this study. However, these limitations are accounted for in the UTAUT framework.

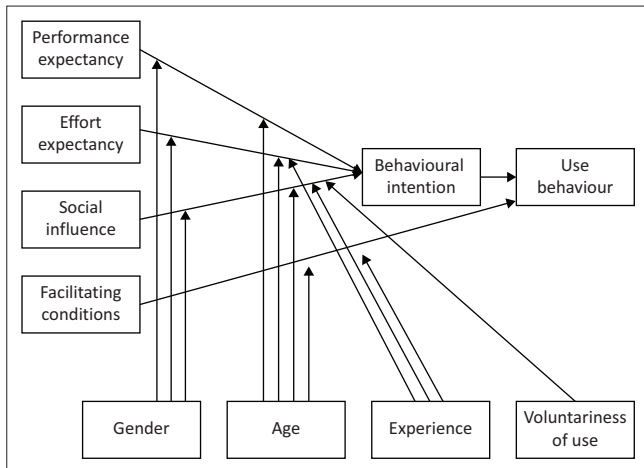### Unified theory of acceptance and use of technology

The UTAUT framework was developed by combining eight existing technology adoption frameworks and theories (Venkatesh et al. 2003). The framework was created to address multiple constraints that are encountered in Information Systems (IS) research presented by frameworks such as TAM and IDT (Upadhyay et al. 2022). In comparison to TAM, the UTAUT framework offers a more comprehensive explanation for technology adoption, with a 70% adoption rate in users' intention to utilise technology (Alsibhawi, Yahaya & Mohamed 2023). Moreover, the UTAUT framework exceeds the performance of the eight technology adoption models, including TAM and IDT, by 70% (Venkatesh et al. 2003). The UTAUT framework comprises four constructs, namely, performance expectancy, effort expectancy, social influence and facilitating conditions that are aimed at explaining an individual's intention to utilise technology (Venkatesh et al. 2003). Additionally, it includes four moderators, namely gender, the voluntariness of use, experience and age (Taherdoost 2018) that influence the constructs.

The UTAUT framework has been extensively used to study the adoption of technology among informal businesses. For instance, Odoom and Kosiba (2020) employed this model to study the adoption of mobile money among informal traders. Additionally, Etim and Daramola (2023) used the UTAUT framework and combined it with two other theories to analyse the readiness of informal businesses to use a web technology portal. In a more recent study, Arendse and Van den Berg (2024) used the UTAUT framework to investigate the barriers to the adoption of digital financial inclusion among informal businesses. Furthermore, several studies conducted in South Africa in various contexts employed UTAUT to study the adoption of technology, for example, Ajani (2023); Bayaga and Du Plessis (2024); Mayayise (2021); and Mashaba and Pretorius (2023). This demonstrates that the UTAUT framework is suitable, reliable and applicable to this study to understand the barriers to technology adoption among informal businesses. The framework and the definitions of its constructs are depicted in Figure 1.

Research design and methodology
Research design

This study followed a case study design that applied qualitative research to a selected case. A case study is used to gain an in-depth insider's view or understanding of a phenomenon (Yin 1994). Case studies have been widely used

Source: Venkatesh, V., Morris, M.G., Davis, G.B. & Davis, F.D., 2003, 'User acceptance of information technology: Toward a unified view', *MIS Quarterly* 27(3), 425–478. https://doi.org/10.2307/30036540

FIGURE 1: The unified theory of acceptance and use of technology.

in IS research for studying the adoption of digital technologies and ICTs (Makiwa & Steyn 2020; Van Dieman & Van den Berg 2023). Van Dieman and Van den Berg (2023) employed case study research to study the adoption of digital payments among spaza shops. Case studies have been validated as an effective qualitative research strategy for gaining in-depth insights into a phenomenon within IS research (Klein & Myers 1999).

One of the main reasons this design type was chosen was because of its capacity to provide the researcher with an in-depth insider's view of the factors that are affecting the adoption of digital technologies among a small sample of informal businesses. Case studies provide the researcher with thick descriptive data (Yin 1994) that can be used to answer the research question. Case study designs are appropriate for exploratory research (Benbasat, Goldstein & Mead 1987). Other qualitative research designs, such as grounded theory and ethnography, were assessed and deemed inappropriate for this research. The grounded theory, for example, does not focus on studying individuals and their day-to-day routines but instead focusses on uncovering a theory (Sarfo et al. 2021). The grounded theory would not have provided an in-depth insider's perspective of the phenomenon. Therefore, a case study design was deemed appropriate.

Unit/s of analysis

The unit of analysis (UOA) refers to the person or thing that is the focus of study in an investigation (Babbie 2015). The UOA type in this study was individuals. Specifically, the UOA was informal business owners located in Cape Town, Western Cape.

Design of the research instrument

The construction of an interview guide enhances the impartiality and reliability of research studies, lending greater credibility and validity to the obtained findings (Kallio et al. 2016).

The interview guide was created based on the UTAUT framework. Each question in the semi-structured interviews was based on a construct from the UTAUT framework created by Venkatesh et al. (2003). This assists the researcher in achieving construct and measurement validity (Mouton 1996). Furthermore, a pilot test was conducted to test the instrument's feasibility. The pilot test aided the researcher in identifying any flaws, constraints or vulnerabilities within the interview design, enabling them to make essential revisions before implementing the study (Kvale 2007). Interview questions that elicited similar responses from the interviewees were either removed or merged, thus removing redundancies in the interview responses.

Data sources, sampling strategies and techniques

A sample of 14 informal business owners in Cape Town constituted the research population or primary source of data for this study. Sampling involves selecting a small portion of a specific population for a research study (Turner 2020). The researchers utilised non-probability sampling that applied purposive sampling. Purposive sampling involves purposefully selecting participants based on their unique qualities and characteristics (Tongco 2007). Purposive sampling is appropriate when the researcher relies on their judgment to select cases that will assist them in answering their research question and achieving their research objectives (Saunders, Lewis & Thornhill 2016). Purposive sampling is frequently employed in case study research when the researcher wants to examine small samples of selected cases that could provide comprehensive insights (Lawrence 2005). In this study, purposive sampling enabled the researcher to select 14 appropriate informal business owners who could answer the research question. Fourteen participants were deemed sufficient for this research, as data saturation was achieved by the 12th interview, and an additional two interviews were conducted to confirm the depth of the insights. The criteria for selecting the respondents were that they had to be citizens of South Africa, over the age of 18 years, who owned informal businesses in Cape Town.

Data collection techniques (research methods)

In this study, semi-structured interviews were used to collect primary data. Interviews are a highly effective method for data collection and have been widely utilised in IS research (Myers & Newman 2007). Semi-structured interviews involve comprehensive discussions where participants are asked predefined open-ended questions (Jamshed 2014). Semi-structured, in-depth interviews offer the researcher the chance to delve deeper into the answers provided by their interviewees, encouraging them to elaborate upon their responses (Saunders et al. 2016). In this study, the semi-structured interviews were conducted using an interview guide composed of 16 open-ended questions. Furthermore, fourteen interviews were conducted face-to-face, lasting approximately 20 min. each. The interviews were conducted in English and recorded using a smartphone. Consent was

requested from all the respondents before the interviews commenced. Data saturation was reached after the researcher conducted 12 semi-structured interviews, as no new data emerged from the respondents at this point (Alam 2021; Creswell 2013; Mwita 2022). This indicated that conducting additional interviews would not have provided new information, confirming that the necessary depth of the data was achieved by the 12th interview.

Data analysis

This study employed a structured approach that applied thematic analysis to examine the data obtained from the semi-structured interviews. The thematic analysis involves identifying patterns or themes in qualitative data (Braun & Clarke, 2006; Maguire & Delahunt 2017). The qualitative data obtained through semi-structured interviews was analysed into themes based on the constructs of the UTAUT model. Stake (1995) stated that to obtain a reliable and valid case study, the quality of the data needs to be ensured. Therefore, to ensure the validity of this case study and the reliability of the data obtained, this study followed the thematic analysis steps proposed by Braun and Clarke (2006). The following procedure was employed to analyse the data:

- Transcribe the interviews and upload them to Atlas.ti. Further, quality checks were performed as the researchers listened to the audio recordings a couple of times during and after they were transcribed.
- Create codes for the transcribed interviews based on constructs in the UTAUT framework.
- Collate the codes into themes and patterns that can be identified when the researcher views the data.
- Classify the themes according to the constructs of the UTAUT framework.
- Write up the findings.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Humanities and Social Science Research Ethics Committee of the University of the Western Cape (reference number: HS21/3/26). No risks were posed to participants and all participants provided informed consent to participate in the research. To ensure anonymity the identities of participants were protected and participation was voluntary.

Research findings and discussions

Table 1 provides an overview of the concepts, categories and themes obtained from the data analysis. These insights from the analysis will answer the following question: *What are the factors affecting the adoption of digital technologies in the informal economy?*

Table 1 depicts the concepts that emerged from the thematic analysis. These concepts were placed into the constructs of the UTAUT model to understand the barriers to technology adoption among informal businesses. The subsequent section discusses each theme in relation to its categories and concepts.

TABLE 1: Overview of the qualitative analysis applying the unified theory of acceptance and use of technology model.

Themes	Category	Concepts
Performance expectancy	Perceived benefits	Increased sales Marketing improvements
	Resistance to change	Cash preference Small-scale resistance
	Transactional impediments	Transactional delays Transactional fees
Effort expectancy	Factors discouraging technology adoption	Digital incompetency Infrastructural challenges
	Perceived ease of use	Technological convenience Similar to smartphones
Social influence	Influence of important others	Social proof Competitive influence
	Opinion of others	Advice Recommendations from others
Facilitating conditions	Advocacy towards technology	Awareness of digital technologies Technological assistance availability
	Financial capital	Lack of funding Focus on survival
	Physical capital	Inadequate facilities Poor technological infrastructure
	Socio-economic barriers	Fear of crime Unskilled employees

Source: Adapted from Jacobs-Basadien, M., Pather, S. & Petersen, F., 2022, 'The role of culture in the adoption of mobile applications for the self-management of diabetes in low resourced urban communities', *Universal Access in the Information Society* 23(2), 743–763. https://doi.org/10.1007/s10209-022-00951-2

Performance expectancy

This theme explores the way the respondents believe that adopting and utilising digital technology leads to improvements in their business operations. The categories that emerged from the data in this theme were perceived benefits, resistance to change and transactional impediments.

Perceived benefits

The perceived benefits refer to the potential benefits attained from using digital technology in informal businesses. The data show that most of the respondents acknowledged the benefits of using technology in their businesses. The first concept in this category is increased sales. The data indicate that the respondents were aware that using technology would grow their business and increase their sales. For example, the respondents stated that if they used card machines in their business, it would help grow their business and increase sales as many people have cards on them and do not carry cash. Furthermore, other respondents stated that using technology would help them retain customers and push up their sales. For instance, respondents stated:

> 'Definitely, it will be [*a*] good opportunity for the business to grow and technology works nowadays.' (32-year-old female) and

> 'A lot of people use a card, not cash anymore, so it will push the sales.' (21-year-old female)

The second concept in this category is marketing improvements. The data indicate that the respondents acknowledged that digital technologies such as mobile phones and social media applications can be used to promote their products. For example, respondents stated that it could help to increase awareness of their business. For instance:

> 'I think it will help a lot especially when it comes to advertising my goods.' (52-year-old male) and

> 'It will put it on social media.' (47-year-old female)

The aforementioned two concepts indicate that these respondents were aware of the benefits that could be attained if they were to adopt and utilise digital technology in their business. Therefore, the perceived benefits category provides a positive impact on the adoption of digital technology. Additionally, similar studies found that the adoption of digital technologies can help businesses grow and improve their productivity (Bvuma & Marnewick 2020b; Van Dieman & Van den Berg 2023).

Proposition 1: Increase awareness of the benefits of digital technologies such as card machines and social media applications for informal businesses through workshops. These workshops should highlight the benefits, such as increased sales, customer retention and marketing opportunities, offered by technology. Findings suggest that promoting the benefits offered by digital technologies could positively impact the adoption of technology.

Resistance to change

Resistance to change is defined as the reluctance portrayed by a person to adopt technology. In this research sample, the data indicated that several factors influenced the respondent's perception of technology adoption in their businesses. As a result, many respondents preferred not to adopt technology.

The first concept that was identified in the data is cash preference. In this research population, it was revealed that most of the respondents prefer to work with cash. This is because the business transactions between the respondents, their suppliers and their customers are cash-based. For example, many respondents indicated that they need the money because they need to buy stock from their suppliers every day, and having to withdraw the money from the bank would hinder their operations. Other respondents indicated that because of the low prices of their items, their customers are less likely to pay small amounts using their bank cards. As a result, they do not think it would be beneficial to them. For instance, respondents stated:

> 'I'm using money every day, if I use a card, then I must go to the bank. I need the cash to buy stuff every day.' (44-year-old male) and

> 'It has been tried but it's no benefit because some people just buy one item. The swipe card machine needs to [*be*] over R50 so it's useless.' (32-year-old female)

Similar to this informal business owner, others expressed comparable opinions that utilising a card machine is not beneficial as their customers only purchase one item, and because of the minimum transaction amount required to make a purchase, which is less than the price of their items, they do not see the benefit of having a card machine in their business. Based on the findings, the concept of cash preference was a barrier to technology adoption in this population. In agreement with these findings, Van Dieman and Van den Berg (2023) found that both businesses and customers prefer to work with cash.

The second notion that was found in the data is small-scale resistance. Small-scale resistance is defined as the reluctance

to adopt technology because of the nature of having a small business. In this study, many respondents stated that they have small businesses, and if they were to adopt technology, they would first need to sell bigger items. In addition, other respondents indicated that they would need to increase the variety of their products if they were to adopt technology.

Transaction impediments

Transactional impediments are defined as the difficulties faced when using digital payments in a business. The data suggest that numerous difficulties exist that influence a respondent's decision to adopt technology. The data indicate that many respondents were aware of digital transactions but refrained from using them because of technical challenges. As a result, this impeded the adoption of technology in this sample.

Two concepts illuminate this finding. The first concept that emerged from the data is transactional delays. The data reveal that the majority of respondents prefer not to use digital transactions as the money does not reflect or comes in two or three dates later. For instance, respondents stated:

> 'I prefer not to at the moment because it comes in after 2 days.' (21-year-old female) and

> 'I have one, but I don't use it, I just do the e-wallets [*electronic wallets*] now, because I did use it and then my money comes in after 60 days.' (27-year-old male)

The second concept about transactional impediments is transactional fees. The data indicate that the respondents prefer not to use digital payments as they will end up losing income because of the transactional fees. For example, respondents stated that if they were to use a card machine, a portion of their income would be deducted, which would reduce their earnings. For instance, a respondent stated:

> 'You pay an amount on every sale that you make, so I'm going lose out.' (47-year-old female)

Similar to this respondent, other respondents expressed comparable views on utilising card machines. These respondents indicated that the transactional fees could have been business profits. Based on these findings, it is evident that transactional impediments are a barrier to technology adoption in this sample.

Proposition 2: The government should work with technological and financial organisations to develop technologies tailored to the specific needs of informal businesses such as spaza shops and street hawkers. These technologies could address the transactional impediments hindering technology adoption. Thus, developing technologies with reduced transactional and service fees is recommended. In addition, efforts to increase awareness of alternative mobile financial technologies such as electronic funds transfers (EFTs) or e-wallets that do not comprise transactional or service fees should be prioritised.

The recommendation is therefore to increase awareness of the benefits through tailored interventions such as workshops to enable a better understanding of the benefits of digital

technologies, which may reduce the resistance to adopting these technologies. Furthermore, the development of tailored solutions and promotion of alternative technologies can have a positive impact on the unique challenges faced by informal businesses and the common barriers observed in similar contexts. As highlighted by Etim and Daramola (2023), similar studies have shown that improved competence, setting goals, reducing perceived difficulty and better control affect an individual's perception of performance expectations.

Effort expectancy

In this study, effort expectancy refers to the way the respondents believe that learning about digital technology and using it in their business will be easy. The categories found in the data for this theme were factors discouraging technology adoption and perceived ease of use.

Factors discouraging technology adoption

The two notions that illuminate this finding are digital competence and infrastructure challenges. In this study, digital incompetency refers to a person who lacks experience, knowledge and competencies in technology and therefore finds it difficult to use. The data suggest that digital incompetency is a prevalent factor that affects the adoption of technology among the respondents. Most of the older respondents lack experience, competencies and skills to use card machines, as they have not used them before. For example, the older respondents stated that they are technologically challenged and computer illiterate. Furthermore, it was discovered that the older respondents lacked knowledge about what digital technology is, as they did not see a mobile phone as a digital technology. For instance, respondents stated:

> 'My phone is ok, but I have never used a Yoco machine.' (52-year-old male),
>
> 'I cannot put it in words because I'm not literate in computers.' (60-years-old male),
>
> 'I'm not good at that. For all these years, I didn't use digital technology [*the respondent has used a phone before*].' (44-year-old male)

With the younger respondents, the data indicate that the younger respondents find technology easier to use. As a result, they have a positive attitude towards technology adoption. For instance, respondents stated:

> 'No, never. I find technology easy.' (21-year-old female) and
>
> 'It's easy to use. If you can use your phone, then you can use this [*machine*]. Because the programmes are the same.' (35-year-old male)

Based on these findings, it is clear digital incompetency is a barrier to technology among the older respondents in this research sample. Similar studies are in agreement with this finding and found the lack of digital skills as a barrier to technology adoption among informal businesses (Mafuwane & Muchie 2022; Anakpo et al. 2023). Other examples from

similar socioeconomic contexts, such as digital literacy programmes in rural India, have shown success in overcoming digital incompetency by providing hands-on training and continuous support (Bhatt 2023).

Furthermore, research suggests that individuals tend to develop a dislike for using technology if they perceive it as complex, regardless of its perceived usefulness (Ozturk et al. 2016). While a significant portion of older respondents lacked digital proficiency, many expressed a positive attitude towards acquiring and utilising technology. The data suggest that these older individuals are open to learning and using technology, viewing it as an opportunity for skill development and self-improvement. For instance, respondents stated:

> 'I am technologically challenged, but if I can learn more about technology, then I will be able to improve myself.' (60-year-old male),
>
> 'If it works, if I see it works then I will give it a try.' (47-year-old female) and
>
> 'Yes, I don't see it as a major challenge. You see the more you do something, the more you will become comfortable with doing it.' (52-year-old male)

This respondent and others stated that learning and utilising technology would not be a significant challenge, as they would get better and become more comfortable with it the more they used it. In light of these findings, it is clear that a positive and adaptive mindset exists among the respondents. The willingness to embrace and learn suggests a favourable attitude towards technology adoption among the respondents.

Proposition 3: Educational initiatives should be implemented and tailored for informal businesses, with a specific focus on the older generation to combat digital incompetency. Such initiatives should equip them with the digital skills required to use technology in their businesses. This article proposes that the increasing availability of digital literacy workshops combined with positive attitudes displayed by informal businesses could increase technology adoption.

The second concept related to factors discouraging technology use is infrastructural challenges. The data indicate that most respondents would experience difficulties using technology in their businesses because of infrastructural challenges. For example, most of the respondents stated they would encounter connectivity, power-related and technical challenges, making it harder to use technology. Based on the findings presented here, infrastructural challenges are a barrier to technology adoption among the respondents. This finding is supported by similar studies that indicated infrastructural challenges such as connectivity and power outages to be a barrier to technology adoption (Anakpo et al. 2023; Bvuma & Marnewick 2020a).

Proposition 4: Informal businesses require technological infrastructure to use digital technology in their businesses. Internet connectivity and power supplies were significant factors affecting technology adoption among informal

businesses. Therefore, the government and other non-governmental organisations (NGOs) should address these technological infrastructural challenges through focussed initiatives to encourage digital technology adoption.

Perceived ease of use

In this research sample, the data suggest that technology would be easy to use and convenient for both businesses and customers. These conveniences have displayed a positive impact on the respondents' perception of technology adoption in their businesses.

The first concept in this category is technological convenience. The data suggest that the respondents were aware of the ease of use and conveniences that digital technology could provide their businesses and their customers. For example, the respondents stated that using a card machine will be safer, more convenient and easier, as people can pay for their items via tapping. For instance, respondents stated:

> 'It will be easy people would just tap and go.' (21-year-old female) and

> 'It's safer and more convenient for you and your customers.' (60-year-old male)

Similarly, other respondents stated that using technology is convenient as they can advertise their products online from home if it rains, and their products are less likely to end up damaged.

The second notion in this category is similar to smartphones. In this sample, the data suggest that respondents would find using a Yoco machine easy to use as it is similar to using a mobile phone. For instance, a respondent stated:

> 'I am comfortable with technology. It is very easy because using this machine is very similar to using a phone.' (35-year-old male)

Literature indicates that if a person perceives technology as beneficial and easy to use, they are more likely to adopt it (Guner & Acarturk 2020). Based on the findings here, this seems to be the case in this research sample as well. For instance, respondents were aware of the benefits that could be attained from using the card machine, and as the interface of the machine is intuitive and user-friendly like their mobile phones, they found it easy to use. As a result, this has a positive impact on the adoption of technology among informal businesses. These findings are supported by Van Dieman and Van den Berg (2023), who found that conveniences offered by technology have a positive impact on technology adoption.

Social influence

Social influence refers to the way the respondents see the opinions and influence of others, like family members and other business owners, as important when they are adopting and utilising digital technology. The categories found in the data for this theme were the influence of important others and the opinions of others.

Influence of important others

In this research population, respondents prefer to use technology if they see it in their surroundings. The first concept that emerged from the data in this category is social proof. Social proof refers to respondents observing other businesses' firsthand experiences with technology before deciding whether to adopt it or not. Based on the data, respondents are more likely to adopt technology if they see other businesses using it. For example, respondents stated:

> 'If I see [others] doing something then I also want to do it.' (52-year-old male) and

> 'If other traders, do it here maybe I will try it.' (47-year-old female)

Based on the findings presented here, social proof plays a significant role in the adoption of technology among the respondents.

The second concept in this category is competitive influence. In this research population, respondents felt compelled to adopt technology if others were to adopt it. There were many reasons for this. Firstly, respondents were afraid of falling behind. Secondly, many respondents felt that they would end up losing their customers. Finally, respondents indicated they would not be at the same level in terms of competition. For instance, respondents stated:

> 'If others are using it, then I do not have a choice. Because I would have to keep up with them.' (52-year-old male)

> 'If other businesses use it, then I must also use it. This is because they are going to take some of my customers.' (44-year-old male)

> 'I would also want to go into it so I can be on the same level in terms of competition.' (19-year-old male)

Based on these findings, competition could be a driver towards technology adoption in this research sample. In agreement with these findings, a similar study found instances where competitive pressures could have a positive impact on technology adoption among informal businesses (Bvuma & Marnewick 2020b).

Opinion of others

In this research population, most of the respondents prefer to seek advice rather than make the decision to adopt technology on their own. This is because respondents prefer speaking to someone with more technology knowledge. For example, respondents stated that decision-making about the adoption of technology is tough. Additionally, other respondents stated that they prefer to seek advice as they do not want to adopt technology if they do not understand how to use it. For instance, respondents stated:

> 'Because the decision-making is tough... I'd rather seek advice from other people.' (19-year-old male) and

> 'I want their opinion how they started and how things were in the beginning, because I won't just start a thing [if] I don't understand what's going on.' (47-year-old female)

Based on the data presented here, the opinions of important others have a significant impact on technology adoption in

this population. The findings suggest that most of the respondents value the opinions of those who are knowledgeable about technology.

The second notion in this category is recommendations from others. The data indicate that recommendations from others about technology adoption are prevalent. The findings indicate that the respondents are more likely to adopt technology when it has been recommended to them.

Facilitating conditions

In this study, facilitating conditions refer to the way assistance is available to the respondents to assist them in adopting and utilising digital technology. The categories found in the data for this theme were advocacy towards technology, financial capital, physical capital and socio-economic barriers.

Advocacy towards technology

Advocacy towards technology is defined as the awareness and support available to encourage the adoption and use of technology. Many respondents were aware of the digital technologies that could be used in their businesses and had support from their friends, family members, neighbours and suppliers.

Five out of the 14 respondents stated that they lacked support and required financial aid, infrastructure, government support, bank support and technical support.

Therefore, based on these findings, the lack of awareness was not a contributing barrier to technology adoption; however, the lack of assistance available to some respondents may have been.

Financial capital

Financial capital refers to the funds informal businesses require to successfully adopt and utilise digital technology in their businesses. The data suggest that many respondents encounter financial difficulties. One of the main reasons for the lack of technology adoption in this sample is that respondents do not possess financial capital. For example, respondents stated that they need to have at least some money in their bank account to purchase technology. Other respondents indicated that they barely make enough money and, therefore, cannot adopt technology:

> 'You need to at least have money in your account to get a Yoco machine. I don't even have money in my account.' (52-year-old male)

The second concept in this category is focus on survival. The data suggest that many respondents are more concerned about being able to sustain their livelihoods than adopting technology. Furthermore, other respondents cited issues related to unstable incomes as a reason for the lack of technology adoption. This suggests that many respondents are operating as a means of survival. In this regard, any

concerns other than earning money to put food on the table on a day-to-day basis are less important. For instance, a respondent stated:

> 'I can't think of anything else. Sometimes we are going through difficult periods where we are just trying to survive.' (52-year-old male)

Based on the findings presented here, it is evident that financial constraints are a barrier to technology adoption in this research population. Most of the respondents experience financial challenges that hinder their ability to adopt and utilise technology in their businesses. These findings are corroborated by several scholars who found the lack of funding to be a factor affecting the adoption of technology among informal businesses (Anakpo et al. 2023; Bvuma & Marnewick 2020a).

Proposition 5: For informal businesses to adopt digital technologies, financial support is required. The findings revealed that a lack of funding was a barrier to technology adoption among the population. Therefore, the government, banks and NGOs should create financial support opportunities to provide informal businesses with the funds required to acquire digital technologies.

Physical capital

Physical capital refers to the infrastructure, such as digital tools, connectivity or power sources, required to support the adoption of digital technologies. The first concept that will provide insight into this category is poor technological infrastructure. Poor technological infrastructure refers to the lack of digital tools like mobile phones, card machines or Internet connections. In this study, the majority of the respondents did not have access to proper technological infrastructure. Although all the respondents had mobile phones, all of them did not have access to other technologies. Similarly, Etim and Daramola (2020) found that the informal economy in South Africa has inadequate technology adoption and poor infrastructure.

The second concept related to this theme is inadequate facilities. The data indicate that many respondents operated in areas with poor facilities, which negatively affected their perceptions of technology adoption. For example, a respondent stated:

> 'We don't have a fixed place to make it secure we have to pack up every time, and I'm worried that the equipment could get wet.' (52-year-old male)

Socio-economic barriers

The first concept that emerged from the data is fear of crime. In this research population, respondents avoid adopting technology because of a fear of crime. For example, respondents stated that if they were to accept card payments and need the money, they would have to withdraw the money, and the automated teller machines (ATMs) are not safe. As a result, they fear they might get

robbed. Furthermore, the respondents who accepted card payments indicated that their customers would show them a payment that was not real. In this regard, it resulted in them not using it anymore. For example, participants stated:

> '…if I the need money, I'm going have to run to the bank to the ATM and that is going to be a danger because ATMs isn't safe.' (59-year-old female) and

> '…the hard part was them showing a payment, but the payment wasn't real.' (19-year-old male)

The second notion related to socio-economic challenges is unskilled employees. The data indicate unskilled employees were a contributing factor to the lack of technology adoption among the respondents. For example, a respondent stated:

> '…the only thing that's stopping me from getting digital stuff is the fact that my uncle also works here, and he doesn't know how the things work.' (25-year-old male)

In summary, the findings revealed several barriers hindering technology adoption among informal businesses. These include a preference for cash, size barriers, transactional impediments, digital illiteracy, inadequate technological infrastructure, inadequate facilities, insufficient support, inadequate financial capital and crime. Additionally, several propositions were formulated to increase technology adoption in the informal economy.

Limitations

The study was conducted with limited time and funding. This restricted the research to a single location with a small sample size. Consequently, the small sample size may not be representative of a larger population. Additionally, only Cape Town was studied, thereby potentially missing different perspectives on technology adoption barriers from other regions. Therefore, future research should be conducted in different regions, examining multiple locations with larger sample sizes. Conducting research in different locations can provide comparative insights. Additionally, the findings of this study are specific to the informal economy in Cape Town and should only be compared to studies of similar settings. Another limitation of this study may be the constructs that were used to understand the barriers affecting technology adoption. Literature indicates that facilitating conditions, performance expectancy, effort expectancy and social influence are not the only factors that affect technology adoption. A study by Restuputri, Refoera and Masudin (2023) highlighted that trust and perceived risk are crucial factors that can be used to understand technology adoption. Hence, further research could add these factors to examine how they affect technology adoption.

Conclusion

This study investigates the barriers affecting the adoption of digital technologies in the informal economy in Cape Town. The impetus for this study stemmed from a gap in the literature concerning the lack of empirical research on the factors affecting the adoption of digital technology among informal businesses. Furthermore, the four constructs of the UTAUT framework were used as a theoretical lens to understand the barriers to technology adoption and use. The findings of this study have revealed various key insights.

The findings highlight that the benefits of using digital technologies in informal businesses were acknowledged by the business owners. For instance, the business owners indicated that digital technologies like social media applications, EFTs and card payments have the potential to increase sales, increase customer satisfaction and help them reach larger target markets. However, while the benefits were acknowledged, the findings highlight several barriers that hindered them from adopting technology, thus preventing them from leveraging their benefits. Among the barriers are a preference for cash, inadequate infrastructure, connectivity issues, digital incompetency, crime and inadequate financial capital.

Therefore, to foster digital inclusion among informal businesses, these barriers need to be addressed. This study posits that there is an opportunity to increase the adoption of technology among informal businesses by providing them with educational initiatives, financial aid and digital technologies that are tailored to their needs. Additionally, by addressing technological infrastructure challenges such as Internet connectivity and power sources, informal businesses can adopt and use digital technologies in their businesses, allowing them to grow and contribute to economic development.

Additionally, this article contributes to the academic body of literature about the informal economy and the barriers to technology adoption among informal businesses. Furthermore, the findings of this study could help the government, NGOs and policymakers better understand the dynamics of the informal economy. As a result, this could increase digital inclusion in the informal economy. Over time, this could potentially narrow the digital divide.

Given the constraints of this article, it is advised that future studies be carried out in diverse areas of Cape Town with a larger sample size to enhance the congruity of the findings. Nevertheless, this research article emphasises the socio-economic benefits of the informal economy and digital technologies and the need to address the barriers affecting their adoption through targeted initiatives to promote digital inclusion in the informal economy.

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Competing interests

Authors' contributions

A.Q.E. conducted the research and wrote an early draft of the manuscript. C.L.v.d.B. conceptualised the study and guided its formulation, validated the results, supervised the project and undertook final production work for the article.

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Data availability

The data that support the findings of this study are available on request from A.Q.E. The data are not publicly available because they contain information that could compromise the privacy of research participants.

Disclaimer

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