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Determinants of ICT adoption and uptake at a rural public-access ICT centre: A South African case study

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The global Covid-19 pandemic has created a heightened sense of awareness of the inequalities that prevail in society. Access to real-time information delivered via broadband internet has become critical for survival. However, the reality of the digital divide implies that some citizens, especially those in far-flung rural areas, are not as fortunate as others to be able to access such information given that internet access at a household level is only a reality across approximately 12% of South Africa. As such, the deployment of public-access ICT centres is still considered to be an important intervention by governments as a digital divide eradication strategy. However, the success of these initiatives is threatened by a lack of understanding of the issues relating to the adoption of ICTs in these communities. Qualitative data were collected via focus groups and the Unified Theory of Acceptance and Use of Technology (UTAUT) was applied as an analytical lens. The findings uphold the independent dimensions of UTAUT in explaining ICT adoption. The findings were also mapped to the Access, Capability and Environment (ACE). It was found that other external factors including those of corruption, training benefits and community exclusion are determinants of ICT adoption in a rural community.

Keywords: Information Communication Technology (ICT), adoption, digital divide, Unified Theory of Acceptance and Use of Technology (UTAUT), Access, Capability and Environment (ACE), public access centre, telecentre, digital divide, rural community

JEL Classification: O33

Introduction

The adoption and use of ICT plays a major role in facilitating poverty reduction and empowering citizens with choices for their own development. Accordingly, a change in the economic and social status of rural people is possible through access to the right knowledge and information (Balogun et al. 2020). According to Ricciardelli (2018) strategies to achieve this include better diffusion of information and the active promotion of community programmes. Importantly, the role of ICT in improving knowledge and human development should also be focused on supporting those development outcomes that are both realizable and sustainable (Lee, Hong, and Hwang 2017). However, ICT projects, especially in rural contexts, are confronted with constraints that threaten sustainability (Sahid Ullah 2016), thus further entrenching the digital divide. Mabila, Van Biljon, and Herselman (2017) link these constraints to a lack of understanding of critical aspects of the interventions such as adoption, the resultant actual usage as well as benefits associated with using ICTs.

The digital divide therefore continues to be a stark reality. The global Covid-19 pandemic of 2020 has accentuated the divide. Now more than ever before, access to real-time information delivered via broadband internet has become critical for survival. However, the reality of the digital divide implies that some citizens, especially those in far-flung rural areas, are not as fortunate as others to be able to access such information. In South Africa, for example, 63.3% of households have at least one member who had access to, or used the internet, anywhere, and only 10.4% of households have access to the internet at home (Statistics South Africa 2019, 57). South Africa is reported to have sharp regional disparity when it comes to internet usage (Adeleke 2021). Access to the internet from anywhere was highest in Gauteng province (74.8%) and lowest in Limpopo province (43.2%). Out of the nine provinces, Northern Cape (54.8%) was one of the lowest in access to the internet from anywhere (Statistics South Africa 2019). Given these relatively low internet penetration rates, the deployment of public access ICT centres is still considered to be an important intervention by governments as a digital divide eradication strategy especially for the poor. This is, in part, due to the continued high cost of access to the internet in the country (Competition Commission South Africa 2019). Research indicates that policymakers at both national and international levels deem ICT to be important in providing opportunities for developing nations to address issues in the area of rural development and poverty alleviation (Baskaran and Muchie 2017). In addition, previous studies also point to the value proposition of providing ICTs via public access such as for example, the significant effect such access has on the hopefulness a citizen has for his or her self, community and country (Uys and Pather 2016). However, the success of these initiatives is threatened by a lack of understanding of the issues relating to the adoption of ICTs in these communities.

In South Africa, government agencies such as the Universal Service Access Agency of South Africa (USAASA), Provincial Governments (e.g., in the Western Cape) and various non-government organizations have attempted to address the digital divide (Mphidi

2016) through the establishment of public access ICT centres. In other parts of the world too, such as the Philippines, shared devices and public access ICT are also prevalent and remain the primary form of access for many young people (Soriano, Cao, and Sison 2018). Despite these efforts and large substantive expenditure from government, there have been widespread reports of failure in respect of sustainability of such centres (Rey-Moreno 2015). Problems in relation to training and outreach and the inclusion of marginalized people in the design of social and economic services are some issues attributed to why public access centres do not significantly transform the communities they serve (Rahman 2016; Kassongo, Tucker, and Pather 2018).

An important consideration in the implementation of such programmes concerns the context in which marginalized communities adopt technology to render the initiatives successful. In light of this, the underlying research problem addressed in this paper, is that despite the continued effort to address the digital divide by deploying public access centres among underserved communities in South Africa, the success of these initiatives is threatened by a lack of understanding in issues relating to the adoption of ICTs in the rural context. In pursuance of a deeper understanding of the underlying problem, the study explored the challenges in relation to the sustainability of public access centres in rural communities. In particular, the study investigated the factors that influence ICT adoption in rural public access centre contexts. The primary investigative question was: How can the public access centre model in the rural context be strengthened to improve the adoption and uptake of ICTs?

The remainder of the paper is organized as follows: A literature review of the salient concepts inherent in the research problem is presented; this is followed by an overview of the research design and methods; the findings are then presented using the UTAUT model as the primary lens of discussion; the paper finally concludes to discuss the important of the findings to the literature and to practice.

Literature review

Given the foregoing, this section of the paper, summarizes the literature in relation to the key concepts that underpin the research problem viz. Public Access Centres, the notion of the use of ICTs for the objective of development; and two key conceptual models viz. UTAUT, and ACE framework that were identified as pertinent to a study on ICT adoption.

Public access centres (PACs)

The objectives of PACs, also known as telecentres, are explicitly to provide internet connectivity and computing resources to marginalized communities and to bridge the digital divide (Uys and Pather 2016). According to Benjamin (2001) and Heeks (2002), PACs are made up of several structural components (human, political and technical) that need to work together in order to achieve a functional telecentre. The lack of synergy among these components often results in poor infrastructure or the deployment of complex technologies which fail to contextualize the provision of ICTs to meet specific needs (Mutula 2010; Bois, Chigona, and Garbutt 2018; Furuholt and Saebø 2018). Access to technology and the use of technology by people of the PAC are important for measurable and non-measurable benefits to be realized (Uys and Pather 2020). Consequently the delivery of PAC services in rural South African communities as well as in other developing countries have suffered from a lack of impact (Attwood et al. 2013). The biggest challenge remains the inability to significantly transform communities, both socially and economically, through PAC-based services.

Challenges of the adoption of public access centres in rural areas

Apart from creating an information society, the public access centre model in the rural context provides communities with an alternative source of information compared to traditional sources such as newspapers (Lee, Hong, and Hwang 2017). The problem with public centre deployments in rural communities has always been the inability to significantly transform the communities they serve, hence the failure reports. Khalil Moghaddam and Khatoon-Abadi (2013) attributes the misalignment to the disregard for the actual factors that relate to the adoption of ICTs in the respective context.

The adoption of technology in the public access centre context has been studied from different contexts. For instance, Sharma and Mishra (2017) studied the influence intermediaries have on the adoption of public access outlets in relation to e-Government services in rural communities. Ulanga (2017) explored role of ICTs in rural areas of Tanzania, by observing users and the sustainability of the telecentres. It was found that the use of ICTs in rural areas in the telecentres are shaped by users' educational level especially for internet and computer. Kassongo, Tucker, and Pather (2018) on the other hand argue that e-government programmes can only be effective once policymakers integrate the needs of the rural people within their design. Furthermore, Sharma and Ray (2019) explored the technology shift to mobile adoption and the financial implications with regards to sustainability of telecentres. Alao, Lwoga, and Chigona (2017) also investigated the telecentre model and determined the pattern of ICT use and impact among women in rural areas. Similarly, Balogun et al. (2020) found that there is a need for ICT education and training in facilities available in a rural sub-Saharan African community. This would ensure that people in rural dwellings effectively and efficiently use ICTs.

ICT Access in South Africa

According to Gomez and Pather (2012), in the South African context, the key to empower the poor and marginalized is to provide them with the necessary resources that will help them in lifting themselves out of poverty. This can only be achieved when research is directed towards understanding the needs of rural people first. Obijiofor (2009) has also identified a strong link between uptake of new technologies and socio-economic growth and development. Bates et al. (2012) state that access to ICT

infrastructure as well as usage and skills is more favourable in poor and rural areas where it has a significant impact but in South Africa, the rural people are the most marginalized. This therefore suggests that rural people do not see the value of home broadband internet service, since it is overshadowed by cost. Furthermore, as part of South Africa's National Development Plan (NDP) 2030 targets, education, training and innovation are highlighted as significant in order to establish and develop life-long capacity and skills among its people (Government Gazette 2014). These targets will assist in making programmes available that are directed at ICT for the under-serviced people to be utilized and sustainable over time.

Furthermore, the government agency USAASA has been criticized for its inability to deliver on its mandate (Gillwald, Moyo, and Stork 2012). Mahlong (2011), for example, highlighted projects such as the development of public access centres which failed. This shows that USAASA was operating without clear guidelines with regard to having a coherent strategy for universal access to ICTs (Gillwald, Moyo, and Stork 2012). In addition, Gillwald, Mothobi, and Rademan (2018) suggest that traditional universal access policies, whose primary focus is on supply-side interventions, are known to create some of the necessary conditions for access and often fall short on the demand side.

Moreover, the barriers that limit meaningful access are often overlooked which also contributes to the digital inequality. Inequality exists not only between people online and offline but also between those who have the skills and financial resources to use the internet optimally and those who do not. Consequently, Gillwald, Mothobi, and Rademan (2018) have found that the key component in achieving universal access and usage is affordability. This is especially evident in the level of internet penetration at PACs in rural communities.

Information and communication technologies for development (ICT4D)
The public access centre initiatives usually seek to assist and support rural people in respect of human development goals. This has been well documented in the information and communication technologies for development (ICT4D) literature which concerns itself with the direct application of information technology approaches in order to reduce poverty within the field of socio-economic and international development (Chao and Yu 2016).

There are many aspects to ICT4D, but in essence all of the research done in ICT4D is about investigating how technologies are used in community contexts, and how they may lead to development. One area of ICT4D is community informatics (CI) which deals with the application of ICT to enable and empower community processes (Ginger 2015). The application of the CI approach has the ability to encourage sustainable public access centre initiatives locally where adoption of ICTs is a problem. According to Gurstein (2014), having public access centres as part of an ongoing community process where services are managed through

local capacity, can be seen as a long-term development process. Therefore, an understanding of local community values coupled with the application of community informatics should be central in deploying public access centres in any community (Mutula 2010). Samuel and Ayeni (2019) propose that perhaps the government should consider a more inclusive approach by providing options such as mobile telecentres for shared ICT facilities in the rural context.

Theories and models in relation to ICT adoption
Technology adoption is defined as the willingness of users to accept and make use of available systems (Davis 1989). It is primarily determined by users' perception of how easy it is to use a system. In seeking to understand ICT adoption, this section reviews a selection of frameworks that have the potential to understand ICT adoption in relation to this study. Two frameworks are selected for review, given they are deemed to have a reasonable alignment with the study's research problem.

Technology acceptance model (TAM)
The technology acceptance model (TAM), as introduced by Davis (1989), is based on the theory of reasoned action (TRA) developed by Fishbein and Ajzen (1975), particularly to explain the acceptance of a user of various technologies (Ngai, Poon, and Chan 2007). TAM gives an understanding of how external variables may have an effect on one's belief system, attitude and intention to use a specific technology (Nasri and Charfeddine 2012).

According to Park (2009), the decision to use a particular technology system is directly or indirectly influenced by the user's behavioural intention and attitude. The TAM is built on collective findings that suggest that technology is dependent on user acceptance and use (Ngai, Poon, and Chan 2007). The value in the application of the TAM is that it allows for external factors to be investigated once found (Hong et al. 2002). Oye, Iahad, and Rahim (2014) have also found a limitation of the TAM, namely the ability to not take into account barriers that prevent a user from adopting a particular technology. Furthermore, an external variable, that considers the differences among individuals, has also received attention over the years in TAM research (Agarwal and Prasad 1999; Hong et al. 2002).

In addition, Nasri and Charfeddine (2012) have also found an external variable which considers the support of technology a user receives and which has shown a positive effect on perceived behaviour control. Technology support and its development can therefore be regarded as important factors to consider where adoption is concerned, and the lack thereof may impede the adoption of ICTs (Nasri and Charfeddine 2012). The support of technology speaks directly to the contribution of government in terms of diffusion of technology within certain areas, thus suggesting that if people living in the rural areas observed a level of support coming from government institutions installing public access centres, they might be more likely to use and adopt ICTs (Tarhini et al. 2016).

Unified theory of acceptance and use of technology (UTAUT)

The UTAUT has been used in many contexts over the years and reported to have yielded diverse results. According to Oye, Iahad, and Rahim (2014), the UTAUT can explain about 70% of technology acceptance behaviour, whereas previous models could only explain 40% (Urumsah 2015). The unified view of acceptance is a combination of eight technology acceptance models (Susilo and Kaufman 2014). These eight models include the Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), the Theory of Reasoned Action (TRA), the Motivational Model (MM), the TAM, the TPB, the Model of PC Utilization (MPTU), the Innovation Diffusion Theory (IDT) and the Social Cognitive Theory (Gupta, Singh, and Bhaskar 2016).

The UTAUT model comprises four determinants of intention and use (Chao 2019). These determinants describe the motivational factors associated with adoption. Venkatesh et al. (2003), who are the seminal authors of UTAUT, describe the determinants as follows:

- *Performance expectancy* – 'the degree to which an individual believes that using the system will help them attain gain in performance' (447).
- *Effort expectancy* – 'the degree of ease associated with the use of the system' (450).
- *Social influence* – 'the degree to which an individual perceives that important others believe they should use the new system' (451).
- *Facilitating conditions* – 'the degree to which an individual believes that organizational and technical infrastructure exist to support use of the system' (453).

Analysis of the application of user acceptance models

Given the problem statement of the study, this section examines technology adoption models, how the models have been applied; key findings thereof; and an assessment of the models' application in understanding the adoption of technology. The purpose of this assessment was to identify a model that appropriately align to a study of ICT adoption in rural public-access centres.

The UTAUT model has been applied in three different problem settings in Table 1. In all three studies it demonstrated strong explanatory power. In one of the assessments above, it is noted that, according to Venkatesh et al. (2003) and Liu et al. (2015), performance expectancy is an important predictor of intention to use ICTs. Conversely, in a different setting, effort expectancy has been found to be the only predictor of intention to use ICTs (Khalil and Al-Nasrallah 2014). The key lesson from these findings is that factors that influence the adoption of technologies are mainly dependent on the environment. The findings reported in Table 1 appear to support the assumption that perceptions of technologies in general are determined by the environment.

As discussed above, the environment ultimately shapes perceptions about technologies. The same result has been found in one of the studies where perceived ease of use is key in intervening variables in technology acceptance. The table also demonstrates that TAM is able to explain user behaviour which can ultimately

assist in developing technology innovations specific to the environment. On the other hand, the findings for TRA suggest that a person's attitude can be influenced by what they believe. A positive attitude towards technology is likely to influence behaviour towards it in a positive manner.

The key result from the assessments above shows that individuals' perceptions are largely shaped by the environment in which they find themselves. This has a huge influence on the attitude of the majority of people. The findings also suggest that attitudes can change over time.

Analytical frameworks for the research

The UTAUT model provides a lens for understanding how a user accepts a newly introduced technology as well as how that perception changes over time with gaining more experience (Akbar 2013). Consistent with the original UTAUT model, this study examines user acceptance in public access centres in a rural context, and how perceptions and adoption decisions change over time.

This theory is deemed relevant to the research problem given the fairly wide number of independent constructs that it comprises. In addition, the UTAUT model is derived from eight other extant models that examine different aspects of behaviour and usage behaviour, thus giving a broader view of the problem being discussed in this paper.

Additionally, Venkatesh, Thong, and Xu (2016) point out that the UTAUT model can be integrated with other theoretical frameworks to study technology acceptance. This study aims to explore the factors that influence the uptake and use of ICTs. The model therefore provided an important foundation to inform the design of the instrument to collect evidence in order to gain an in-depth understanding of the adoption of ICTs.

In light of the research problem, and research question and the analysis of the extant studies (Table 1) the UTAUT model (Figure 1) was selected as the primary lens for the study. The main reason in this regard is because of its ability to encompass a suitable scope of variables for assessing the adoption of technology in the rural public access context.

The UTAUT model, focuses inherently on user perceptions of technology in relation to adoption. However, as concluded in the foregoing section, other areas of the problem domain, especially those in relation to the environment in which public access to ICTs prevail, are equally important to investigate. The ACE framework (Gomez 2010) was developed in response to the question '*What are the information needs and opportunities to strengthen institutions that offer public access to information and communication, especially to underserved communities, and especially through the use of digital ICT?*' It is derived from the Real Access framework (Bridges.org 2005) which is based on South African contexts. This framework was established to comprehend the factors influencing access to ICT (Naicker, Turpin, and van Belle 2020). It was developed as a framework to understand the range of economic, political, educational, infrastructural, cultural, organizational and other factors

Table 1: An assessment of models for user acceptance.

Author, Year, Model	Objective of study	Key findings	Assessment of the application of the model for ICT adoption
Biljon and Kotze (2008), UTAUT	To investigate the influence of culture on mobile phone adoption.	Cultural dimensions influence mobile phone adoption and usage	Belief systems have a vast impact on individuals' decisions. A very strict culture may prevent usage of ICTs. ICTs could also be seen as undermining some cultural practices, in particular towards women, for example.
Schaupp, Carter, and Hobbs (2009), UTAUT	To investigate the acceptance of e-filing by American taxpayers.	The results suggest that performance expectancy and social influence predict behavioural intention. The study also found that effort expectancy was not a predictor of behavioural intention.	Performance expectancy (PE) is an important predictor of intention of use (Venkatesh et al. 2003; Liu et al. 2015). In this context, the convenience associated with using e-fling can be seen as a gain. For example, these taxpayers save time and can work on other things instead. With regard to social influence, those using e-filing are able to influence others to start using e-filing. The result of effort expectancy (EE) indicates that most taxpayers have some training in computers and EE is therefore not a predictor of behavioural intention.
Attuquayefio and Addo (2014), UTAUT	To determine the strengths of predictors for students' intention to accept and use ICT for learning and research.	This study found that effort expectancy was the only variable that had influenced students' behavioural intention to use ICTs available for learning.	Most students have been exposed to ICTs; so, the results in this study are no surprise. Even in terms of adopting ICTs at college this is more likely to happen because the students' school work requires these ICTs to be used.
Chen, Li, and Li (2011), TAM	To understand the past, present and future of the TAM, through a review of 24 extant studies.	The TAM has proven to be a useful theoretical model in helping to understand and explain user behaviour in information system implementation. This can guide researchers to design different user interfaces for different online customers and consequently achieve high user usage in different application areas.	While some studies have consistent results in terms of technology acceptance, other studies have yielded different results. Over time people and technology evolve; thus, behaviour is bound to change. This study opens up three different views of technology acceptance. These views may serve as guidelines in addressing the issues regarding technology acceptance research.
Ngai, Poon, and Chan (2007), TAM	To investigate the adoption of WebCT, among 836 university students.	The findings show that perceived ease of use is key in intervening variables linking technical support and perceived usefulness, attitude and system usage.	Compared to other contexts a university environment comes with technical support, and the need to use technologies contributes a lot to acceptance. In this context, students are forced to accept and use technologies.
Straub, Keil, and Brenner (1997), TAM	To test the TAM model across cultures in three countries.	The results are consistent for two countries, suggesting that the model may not predict technology use across all cultures.	Different cultures have different needs. Some cultures may find that technology enhances their conditions and others not so much. Acceptance is, therefore, based on how useful it is.
Hansen, Møller, and Solgaard (2004), TRA	To predict online consumer behaviour in the buying of groceries.	Strong correlations between attitude evaluation and behavioural intention were found in this study.	Challenges in a new technology can shape the attitude towards it. In this case, the less challenging it is, the more likely it will be to instil a certain behaviour.
Mishra, Akman, and Mishra (2014), TRA	To investigate behaviour for the adoption of green information technology.	The study found that behavioural intention had influenced actual behaviours positively. External factors such as a person's belief could impact their attitude towards adoption of GIT.	A positive attitude towards technology will ultimately influence the behaviour of an individual. A negative attitude toward technology can also become positive over time.

(Continued)

Table 1: Continued.

Author, Year, Model	Objective of study	Key findings	Assessment of the application of the model for ICT adoption
Peslak, Ceccucci, and Sendall (2012), TRA	To explore social networking behaviour.	The study found that attitude towards social networking and subjective norms were positively associated with intentions to use social networking.	Attitude is a strong indicator of a person's behaviour. Perhaps this should first be established in order to get an indication of how individuals will receive new technology.

that affect whether someone truly has 'access' to ICT (Gomez 2010).

The ACE Framework (Gomez 2010) represents the public access to ICT dimensions of access, capacity and environment and is based on the idea that the three dimensions are required to understand the public access to ICT landscape. Gomez (2010, 238) describes each dimension as follows:

- Physical access to venue – has to do with the location of the venue, basic infrastructure as well as operating hours.
- Suitability of the venue – deals with physical safety, universal access, how welcoming the venue is and meeting the needs of those it serves.
- Affordability of venue – has to do with daily costs, sustainability of ICTs, the financial sustainability as well competent services.
- Technology access – refers to the availability of technology, physical access and the appropriateness of technology.
- Human capacity and training – has to do with how capable the PAC staff are to provide support to the communities they serve and whether programmes are available to support local people.

- Meets local needs: relevant content and services – the public access landscape needs to provide relevant services to the local people with content produced in their language.
- Social appropriation – the integration into culture, collaborative work as well as adaptation to suit the local people being the centre of the public access landscape operations.
- Socio-cultural factors – the discrimination against gender, ethnicity and age.
- Political will, legal and regulatory framework – National and regional policies that support the PAC venue, frameworks particular to ICTs being in place, strategies to support the PAC as well as political will from the local government.
- Popular support – stakeholders involved, and the support to improve the PAC.

The ACE framework has been used in other studies of PACs. For example, Naicker, Turpin, and van Belle (2020) evaluated the challenge of sustainability of the public access centre landscape and found other factors not represented in the ACE framework. Pingo (2015) on the other hand applied the ACE framework to determine how to build ICT capacity to build
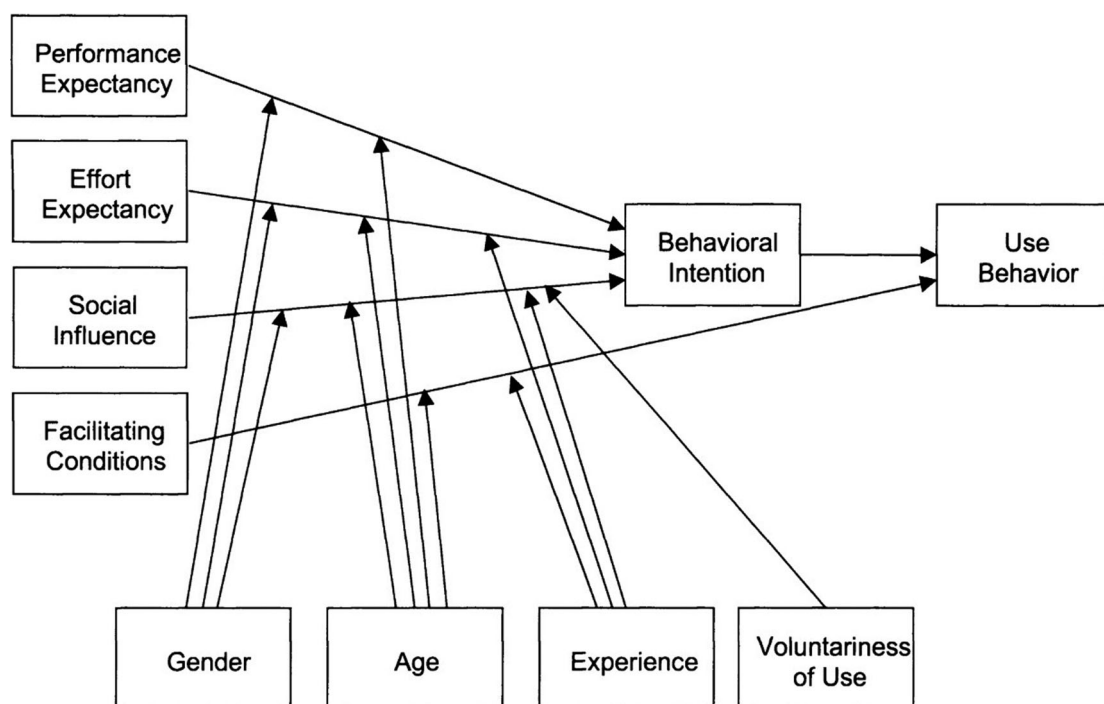

Figure 1: Unified theory of acceptance and use of technology (Venkatesh et al. 2003, 447).

knowledge in access of information in disadvantaged communities.

Research design and methods

The underpinning research design follows the tradition of Case Study design (Yin 2003). A Public Access ICT Centre located in the rural town of Barkley West serves as the selected case. Methodologically the study adopted a qualitative research approach. According to Edmunds and Brown (2012) qualitative research follows a systematic subjective order to draw on situations and life experiences for the purpose of giving them meaning. Focus groups were conducted and they served as a basis for the qualitative data collection and as a method for an in-depth investigation into the adoption of ICTs in public access centres in a rural community.

Overview of Barkly West

The study was conducted in a small rural town called Barkly West in the Northern Cape province (South Africa comprises nine provinces) which is about twenty minutes' drive from the well-known diamond mining town of Kimberley. The rationale for selecting Barkly West as a case to investigate was because it typified a poorly resourced South African community in which issues of access and adoption were prevalent and affected mostly young people.

The estimated population is 58,330 (Statistics South Africa 2015). Furthermore, according to the last national census, 66.31% of the population are aged between 0 and 34 years, with a largely unskilled populace given that only 12.83% have attained a Grade 12 and only 1.64% have post-school qualifications (Statistics South Africa 2011). The municipality had the highest unemployment rate of 39.7% within the district compared to other local municipalities (South Africa 2014).

The majority of the participants indicated that they have no formal computer training even from school level where resources were available. Despite the low computer literacies level in Barkly West, the data we collected indicate that some participants have learned to use devices and the internet on their own. This indicates an interest in learning if the motivation and opportunity arise.

Data collection methods

In pursuance of a deeper understanding of factors that influence the adoption of ICTs in the rural public access context, qualitative data were collected via focus group. The rationale for using focus groups as the preferred method is that they have the ability to exude rich data (Baillie 2019). Furthermore, focus groups generally present an opportunity to glean a comprehensive understanding of people's opinions about their own values and lives (Mack et al. 2005).

Purposive sampling was used to select research participants from among existing community networks including religious organizations and youth employed under the Environment and Public Works Committee (EPWC) project. In addition, participants who attended initial sessions also provided references to others who were knowledgeable about the PAC. Therefore, snowballing sampling was also applied.

A focus group guide was developed and the UTAUT framework (Venkatesh et al. 2003) was used to formulate questions for the focus group discussion session. The UTAUT model's questions were structured around the four key constructs, namely effort expectancy, performance expectancy, social influence and facilitating conditions.

Each focus group lasted about one-and-a-half hours. A total of 11 focus groups were conducted, with sessions having between seven to nine participants in each. The sessions were facilitated by the first author of this paper. In each session, participants were divided in groups of users and non-users of ICTs.

The focus groups discussions were recorded using a voice recorder. In order to avoid problems of bias and validity, as proposed by Denzin (1978) multiple methods were used to capture the participants' perspectives. The process for the focus group was as follows: (i) The facilitator posed a written question on a board; (ii) The individuals were given a chance to record their responses on a response card; (iii) The facilitator collected the response cards and engaged in a plenary discussion; (iv) In the course of the discussion, the facilitator organized the response cards on a flip chart, seeking consensus from the group as to which cards formed a cohesive group (Figure 2); (v) After each discussion the researcher summarized the key points represented by the response cards in order to afford participants an opportunity to correct a point that might have been misrepresented.

The focus groups sample comprised unemployed young people, largely school dropouts, who were not computer literate and who were aged between 18 and 35 as shown in Table 2.

Analysis

The qualitative data analysis involved several steps during which the raw data was systematically reduced into codes and grouped into categories. The categories were represented by the ICT adoption dimensions of the UTAUT model. In the first step, the recordings were listened to, then translated into English (where participants responded in Setswana or Afrikaans) and finally transcribed.

The coding of the categories and concepts was undertaken through the computer-aided qualitative data analysis software Atlas.ti (see Figure 3). As shown in Figure 4, the coding process allowed for categories to link to individual focus group transcriptions. During the coding process the response cards on the flip charts were revisited, and similar concepts were grouped into UTAUT categories. The emergent data concepts were derived from either the focus group transcripts or from the respondent comment cards (see Table 3).

Following on the latter, connections or relationships between categories and concepts started emerging from the coding and the data started showing some direction (see Figure 4). External variables were also identified during this process. Lastly, themes served as the basis for the findings. The themes that developed from analysis was grouped based on the original UTAUT constructs. The original UTAUT model posits that performance expectancy, effort expectancy and social influence are determinants of behavioural intention which in turn
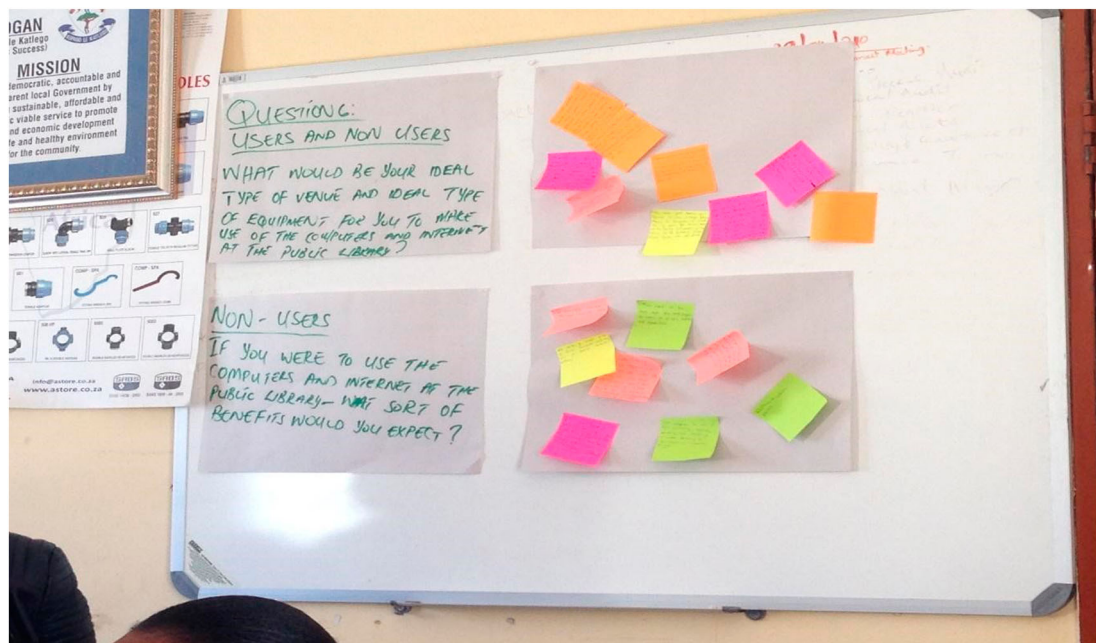
Figure 2: Participants' responses grouped in categories that were agreed to during the focus group.

leads to use behaviour (Zalah 2018). It further states that facilitating conditions are a determinant of use behaviour (Venkatesh et al. 2003). Figure 4 shows the connections or relations between categories based on the concepts identified by participants in the focus groups.

The findings which are reported in the next section draws on the codes which comprised each category.

Ethical considerations

Ethical clearance was granted by the Ethics Committee of the Cape Peninsula University of Technology. Participants received detailed information sheets explaining the purpose of the research prior to their participation. Consent of each participant was via a signed undertaking. All personal details of participants have been kept confidential.

Research findings

The underlying research question that served as the foundational lens for the qualitative analysis was to ascertain factors that influence citizens use or non-use of public access ICT centre in a rural town.

The findings comprise of high-level themes which align to the UTAUT model. The process of coding led

to categorization of the codes which are reflected in the cells in Table 3.

Furthermore, given the conclusion from the literature in respect of the importance of understanding the environment and other contextual issues that are not necessarily related to individual perceptions of technology, the findings were mapped against the ACE framework. The objective of this part of the analysis was to establish a fit between factors identified in Barkly West and the ACE framework (Table 4), and to obtain a deeper understanding of the context of technology adoption.

Discussion of findings

The findings are presented in two sections. In the first section the factors that influence the adoption of ICTs in a rural public access centre as discussed. This discussion is based on the code categories (Table 3), which are a reflection of the overall *consensus* of the focus group discussions. Where it is necessary, we draw on individual quotes from the data which represent a typical viewpoint that was expressed during the focus group discussions. In the second section we present the bigger picture of the PAC landscape using the ACE model as a lens. We propose an extension of the ACE framework based on our findings.

Table 2: Demographics of focus group participants.

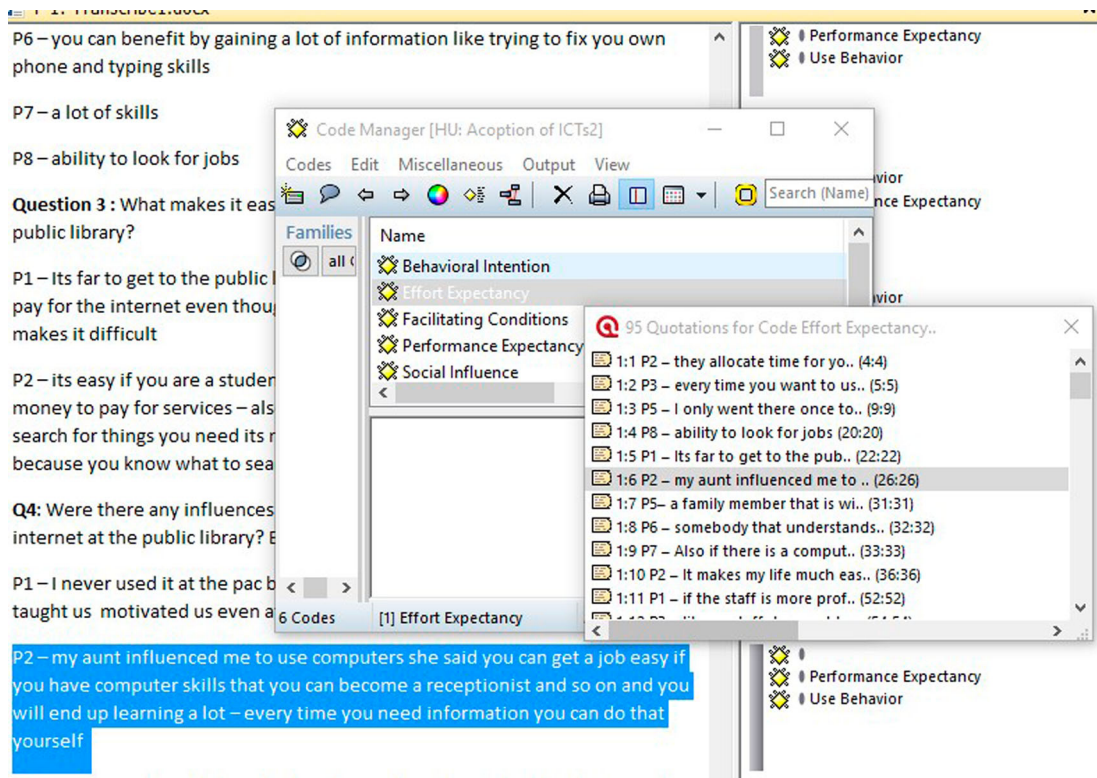|	Variable	Frequency	Percentage
Gender	Male	45	46.9
	Female	51	53.1
Age group	18–26	70	72.9
	27–35	26	27.1
Employment status	Employed	1	1.0
	Unemployed	94	97.9
	Self Employed	1	1.0
Highest Education level	High school	44	45.8
	Post-school	4	4.2
	No formal education	48	50.0

Figure 3: Example of coding process in Atlas Ti.

UTAUT findings

The findings provided insights into the factors that prohibit the adoption of ICTs in a typical rural community. The data provided insight into the dimensions that influence the adoption of ICTs in the selected case. The findings have shown that the low adoption of ICTs can be ascribed to the lack of resources and the way in which the centre is administered and managed. The findings are represented under each of the respective thematic areas.

Performance expectancy

The question posed under this dimension relates to the expectations people have in terms of the role ICTs play in the tasks they undertake in their daily lives and what they expected to gain from using it.

Through the analysis, the data were summarized into two key categories, namely, employability and development.

The main expectation of respondents was that the use of ICTs must improve their ability to find employment. This was demonstrated across the board, given the high unemployment rates in rural towns. For example, one respondent stated:

'*You can get a lot of information from the internet and computers and you can also get access to jobs advertised online.*'
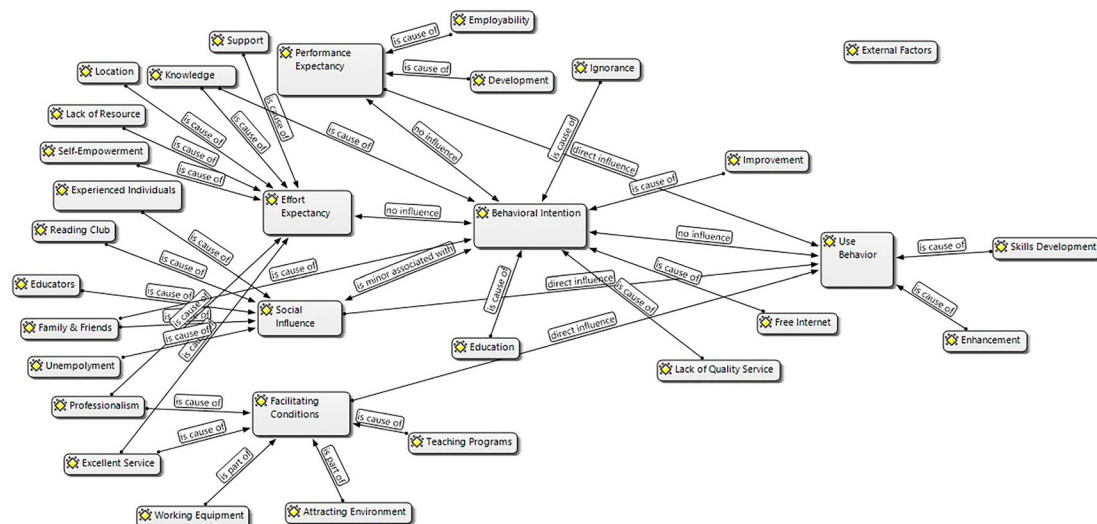

Figure 4. Emergence of connections and relationships between categories and concepts.

Table 3: Themes with categories derived from the data.

Performance expectancy	Effort expectancy	Social influence	Facilitating conditions	Behavioural intention	External factors
Employability	Ease of use	Family and friends	Attracting environment	Self-improvement	Community exclusion
Development	Ease of access	Educators	Excellent service	Family	Corruption
	Lack of resources	Empowerment	Working equipment	Knowledge	Training benefits
	Professionalism	Unemployment	Teaching programmes	Lack of quality service	
		Experienced individuals		Lack of awareness programmes	

The other key category had to do with development. This aspect relates directly to the improvement respondents expects to gain with the continued use of ICTs such as improved education.

Effort expectancy
Respondents were asked to indicate how easy they find using ICTs and reasons for non-use. Four broad categories emerged from the analysis under this theme namely ease of use; ease of access; lack of resources and services, and professionalism.

A common view among respondents for not using ICTs at the PAC had to do with non-exposure to computers. For example, one respondent was cited as saying she was '*too scared*' to use ICTs because '*she might break something*'. Furthermore, respondents expressed their frustration that PAC staff had no knowledge of ICTs and thus exacerbated their ability to access the centre's resources.

Another category that emerged relates to the lack of resources and services at the PAC. Respondents noted that only '*five computers*' were operational and which consequently impedes the opportunity for use. The service provided also received critique with comments such as '*service provided is inconsistent*'. Another concern among the respondents was that PAC staff were unprofessional in dealing with them.

Respondents were also probed about ease of using the computers. The data indicate that ease of use and prior exposure to ICTs were linked. Some respondents suggested that their difficulties in using the computers could be supported if the service was improved since they did not obtain the guidance and assistance from the PAC staff. The analysis found that in this context, minimal support to users was provided at the PAC. There were also cases where participants expressed fear of using ICTs which hindered the overall adoption process.

Social influence
Respondents were asked about who the actors in their lives were who influenced their choices in using ICTs at the PAC. The findings indicate that friends and family; educators; and experienced individuals were key influencers. In addition, respondents were motivated to use the PAC in the hope of being empowered and to enhance their opportunities to seek employment.

A variety of perspectives have been expressed when it comes to influential people in the respondent's lives. In a poor community like Barkly West, young people are mostly at home and surrounded by family and friends. These persons have been identified as 'influential important others. One respondent, for example, commented:

'*My aunt influenced me to use computers she said you can get a job easy if you have computer skills that you can become a receptionist and so on and you will end up learning a lot – every time you need information you can do that yourself.*'

And another commented by saying:
'*My sister influenced me because she used to do a lot of things for me since she was no longer there, I was forced to go to the library because I needed information and things from the library.*'

Educators was also identified as influential others in the lives of respondents. Educators in this context refers to those in the education profession that have contributed positively to the choices made by these young individuals during their schooling years. Accordingly, the evidence shows that educators could substantially influence the decision-making of learners to adopt ICTs at school level. This finding shows an important implication for the adoption process especially with ICT resources available at some schools in Barkly West. One respondent stated:
'*I remember when I was in high school, we had a computer class, but we didn't have any teacher to teach the subject.*'

Important others also include professionals in the field of information technology or those with experience. Influence from those with experience means that respondents can get the needed support since they have limited knowledge of ICTs.

The evidence also shows that unemployment has also influenced respondents to use ICTs at the PAC. They view the use of ICTs as a tool to find new opportunities outside of where they are to deal with unemployment. This following is what one respondent had to say:

'*For someone like me who is not working I am taking advantage of the opportunity to use free internet.*'

Empowerment has also been identified as an influence to use ICTs at the PAC. In this context empowerment refers to the choice of consciously deciding to develop oneself in order to grow. Respondents found ICTs to be an opportunity to empower themselves. One participant who is known in the small town for his love of reading shared his view on ICTs:

Table 4: Mapped factors against ACE variables.

Concepts identified in data	Relevant Access, Capability and Environment (ACE) variables
Physical access to venue	
Unsafe location	Location of venue
Infrastructure unstable	Basic infrastructure (space)
Closes early	Hours of operation
Suitability of venue	
Unsafe location	Physical safety of venue, people and materials
Appealing	Venue as a place people want to go
Irrelevant resources, shortage of learning programmes, no support from staff, inconsistent service	Venue meets local needs and conditions
Access to all, access granted based on personal affiliation, no equal treatment of users	Universal access (differences between venues serving rich and poor)
Costs of operating the venue	
Users generally need money for printing which is a service not provided.	Cost in relation to daily needs
Venue is close to most communities and users can walk there.	
No maintenance	Financial sustainability of venue
No maintenance done on equipment	Sustainability of ICTs
The resources need to be upgraded, computers are slow and not working most of the time	Competent services (including ICTs)
Technology access	
General lack of maintenance of equipment in the PAC	Availability of technology (hardware, software, telecommunications networks, internet services)
No educational programmes, no Microsoft Word or other basic programmes available	Appropriateness of technology
No printing facilities, only five computers in the library	Physical access to technology
Human capacity and training	
Unprofessional and unskilled staff, staff themselves don't know how to use computers and the internet	Level of librarian/ operator training (libraries only)
Staff rude and impatient with users	Operators' attitude to support information needs
Staff attitude keeps people away	Perception of venue
No training provided	Venue offers training in skills to use services (libraries only)
Users have no computer skills	Digital literacy of users (independent of training in venues)
Irrelevant resources	Programmes for underserved populations
Meeting local needs: relevant content and services	
Irrelevant resources, shortage of learning programmes, unskilled staff	Local needs are met (resources, skills and operator capacity)
Insufficient information, content is not focused on people of community	Locally relevant content (meeting local needs)
Content is in English but local languages are Afrikaans and Tswana	Produced in local languages
One public access centre in town	Sharing between venues
Social appropriation	
Limited space available	Space for collaboration
PAC operates in isolation	Integration into culture
No visible progress in this regard	Adapt venue to suit local needs (including ICTs)
Socio-cultural factors	
Collected data show usage is split evenly between males and females	Gender discrimination
Mostly used by black and coloured users; visible discrimination towards these users	Ethnicity discrimination
Collected data show the younger group is 18–26	Age discrimination
Political will, legal and regulatory framework	
No visible support, focus remains on service delivery issues	National and regional economic policies support venues
Non-existent – computers stay broken with no technical support	Legal and regulatory framework particular to ICT
Not clear; the assumption is that the local municipality is in charge	Use/censorship of materials (including ICT) in venues
Not visible	International policies to support venue networks
Not visible to the ordinary people	Coordination of national and local policies
Lack of support from even the local government	Long-term government strategies to support the venue
This has taken a backseat.	Political will for venues
Popular support	
Not enough community people using the PAC, lack of resources influences the decision from local people	Popular support to improve venues (including ICT)
Youth on Community Social media pages	Champion for the cause
Not knowing who is responsible for the PAC divides community members in collaboration.	Involved stakeholders (including NGOs, civil society, community organizations, etc.)
Community exclusion	
Lack of awareness programmes for local people	

(Continued)

Table 4: Continued.

Concepts identified in data	Relevant Access, Capability and Environment (ACE) variables
Political affiliation issues	
Distribution of available resources	
Corruption	
Control of resources/services meant for the local people are in the wrong hands.	
Lack of governance	

'*I was part of a reading club at primary school so that motivated me, my cousins my surroundings, we ended up using the computers and the internet and we also ended up finding computers interesting and we learned to fix them and it became a passion because we enjoyed fixing computers as well*.'

The results showed that family and friends, educators and experienced individuals are important others who influenced participants to use ICTs. Other important factors that influenced the use of ICTs among participants include unemployment and empowerment. These factors indicate that the participants are interested in their own growth and were affected by the high unemployment rate in town and in the country.

Facilitating conditions
Participants were asked about their preferred environment that would influence in their choice to use ICTs at the PAC. Several categories emerged during analysis. These include the physical attractiveness of the centre; excellence of the service provided; availability of skills programmes; and the functioning of the computer equipment.

An important factor that was noted in the decision to start using ICTs at the PAC may be influenced by how appealing and welcoming the venue is. Respondents also regarded teaching programmes as a vital aspect that may encourage more individuals to use the facilities. An excerpt from the discussions demonstrates this:

'*The place needs to create a nice vibe where they follow some sort of programs for instance one day can be used to teach Microsoft word and so on – right now everybody just does whatever there are no educational programs*.'

Another important finding was that of the kind of service being rendered at the PAC. Excellent service may enhance the need to use ICTs at the PAC. A respondent was quoted saying:
'*A better service – library staff needs to be trained too – school kids are assisted by securities – even the books are old and in Afrikaans*.'

Respondents also consider working and available equipment an important factor. Examples from respondents:
'*More equipment in the centre there is about 5 computers in the library*.'
'*The resources need to be upgraded*.'

The findings revealed that the environment and service provided at this rural PAC were an important factor in the uptake and use of ICTs. Unprofessional and unskilled staff were among the factors that detracted users from visiting the PAC.

Behavioural intentions
The objective of the question posed in relation to this dimension was to ascertain the motivating factors that would encourage participants to start using ICTs at the PAC and the reasons for not doing so.

The following categories emerged from the analysis: self-improvement, knowledge, lack of quality service and lack of awareness programmes.

There was a general view from participants of the importance of improving themselves through acquiring more knowledge, through the use of ICTs. Given the limited opportunities the small town has to offer, respondents consider the PAC as an avenue to seek opportunities in the wider environment.

Respondents also expressed the reasons for not using ICTs at the PAC has to do with the lack of quality service. The quality of service provided by the PAC staff is seen to inhibit respondents desire in using ICTs available. One respondent shared this view:

'*The staff attitude was not good so from that day I never went back because I'm still upset*.'

The lack of confidence in their ability to use ICT also emerged. For example, one participant stated that the reason he did not use the centre was because '*he was not educated and had no place at the PAC'*.

Another reason stated was that respondents were not aware of the services on offer at the PAC. The lack of awareness programmes has caused the exclusion of communities in initiatives meant for them. A respondent was quoted saying:

'*I think because of our community or surroundings has affected us in such a way that we don't pay attention to such things – it's not because of ignorance – for a mere fact the mayor opened the library but no schools were invited.*'

ACE framework
To better understand the PAC landscape this study mapped its core findings onto the ACE framework. The study sought to determine the fit between its findings and the public access landscape as described by Gomez (2010) in the ACE framework. The extended framework which we propose enhances our understanding of the public access landscape and presents a unified view of the PAC environment in a typical South African rural town. The PAC landscape in Barkly West has the same challenges as identified in the ACE framework. In addition, two dimensions, namely *corruption* and *community exclusion*, which were identified in this study are proposed as extensions to the ACE framework, based on the findings of this study.

Physical access to venue

This study found that these aspects relating to physical access to the venue are also prevalent at the PAC in Barkly West. One such aspect is that community members are expected to cross a busy road when going to the PAC. This is especially problematic for young school children who would go the PAC alone.

Another challenge was that of the infrastructure being unstable and not safe for everyday use. Access to the PAC is also limited due to the centre closing earlier that what was stipulated as operating hours.

Suitability of venue

The analysis has found that the PAC is also affected by issues relating to the suitability of venue. A major concern is that of the physical venue being unsafe for users interested in using ICTs. The lack of maintenance on the structure has received much critique. Some felt that the venue was not visually appealing from outside while others noted the lack of awareness programmes available at the PAC. Irrelevant resources, shortage of learning programmes were mentioned as things not meeting the needs of the community it serves.

Costs of operating the PAC

A common view among respondents was the lack of maintenance of ICTs in the PAC as they had observed lack of maintenance for more than a year with no intervention. The general view of respondents was that the responsible officials in charge either did not have the financial capacity to devote to the PAC or they were no interested in its success.

Technology access

Respondents mentioned that about five computers were operational, and this created recurring problems as community members never have an opportunity to utilize ICTs. Some ICTs are not fixed timeously due to the centre not having an in-house technician and were reliant on service providers who had to travel from out of the town.

Human capacity and training

The evidence shows that unprofessional PAC staff have been a factor in users' decision to not use ICTs at the centre. In addition, there were no skills development opportunities for both users and PAC staff.

Relevant content and services and social appropriation

Respondents indicated that they did not fully understand the objective of the PAC. This was due in part to a sense of not being able to identify with either content or services that were availed at the centre. The centre has however been used to host some events where local artists have come to together to share art.

Socio-cultural factors

While there were no dominant themes that are associated with socio-cultural factors, it is worth noting that the centre users comprise mainly users of colour i.e., black and coloured users. This could be attributed to the high costs of telecommunications and the fact that persons of colour are largely still low-income earners.

Political will, legal and regulatory framework

A review of government policies indicates that there is political will to create community-based access to ICTs. However, PACs operate in a legal and regulatory vacuum as they tend to be service oriented. The main legal prescript, the Electronics Communications Act, does promote Universal Access to ICTs, which is the role of PACS. At the same time, the legal and regulatory frameworks in South Africa pertain mainly to the provision of the telecommunications networks. However, what is lacking is standard operating procedures and service quality norms to operate a PAC.

Popular support

The conditions in which the PAC operates suggest that improving of the venue has not been a priority for those in charge. Respondents were not clear about who is responsible for the PAC and this in turn has influenced the adoption of ICTs at the centre.

Community exclusion

In a small town like Barkly West initiatives are commonly implemented in a similar manner to how the PAC was started. Similarly, ongoing initiatives from the local municipality involve getting young individuals into apprenticeships so that they are later able to utilize the skills they have acquired to apply for jobs. Most people usually find out about these initiatives after the fact. Therefore, this gives rise to the issue of community exclusion in matters from which they could benefit.

For example, in one focus group, a participant alluded that the PAC did not serve the community, with others nodding their heads in agreement. There were several possible explanations for this result which might be related to how resources were controlled as well as issues surrounding local politics. A participant lamented on the political will and stated his view as follows:

> '*You see in town nothing will ever change, it will not change because it is the ANC* [the majority party in government] *that is in charge.*'

Corruption

Respondents attributed the failure of the PAC to the problem of corruption among government officials in charge of Barkly West. Claims of corruption in Barkly West have been strongly raised by community members in the past but not much has changed. Some participants have expressed their belief that public resources in Barkly West are controlled by a select group of people; thus, the current state of affairs. Accordingly, they stated that, because of the corruption, there is bias and which has resulted in people with no skills being employed to work in the PAC.

This is also evident in the current status of the PAC where the centre has had issues with maintenance for more than a year with no intervention from those in charge. The general view about this is that those in charge '*do as they please*' for their own gain. This

situation has considerably affected the uptake and use of ICTs at the PAC because of the perception participants have of those in charge.

Conclusion and recommendations

The use and uptake of ICTs are considered powerful tools in facilitating poverty reduction and empowering citizens with choices for their own development. This study has investigated the factors that influence the adoption of ICTs in a rural community of Barkly West. The rationale for this investigation was to ascertain factors contributing to the adoption of ICTs in this context in order to better address the issue of digital divide.

The methods employed allowed for in-depth discussions regarding the adoption of ICTs, which also provided a platform for the researchers to further probe responses where clarity was lacking. The UTAUT model dimensions were unpacked and respondents were given the opportunity to discuss them in detail.

The major issue that dominates the findings of this study is concerned with support being provided for the use of ICTs at the PAC. The evidence also shows that rural communities require adequate skills training in order to fully engage with ICTs. The lack of support from the local PAC, and by implication local government, has influenced the low level of adoption and interest.

The findings confirm and uphold the independent dimensions of UTAUT in explaining ICT adoption in the rural problem context. In addition to the UTAUT constructs, the findings indicate that other external factors including those of corruption, training benefits and community exclusion are also key determinants of ICT adoption in a rural community. The latter therefore brings new evidence to the fore in relation to ICT adoption in the South African rural context.

The resultant adoption factors were also mapped to the Access, Capability and Environment (ACE) framework to provide a more detailed understanding of ICT adoption issues. The mapping exercise presented in Table 4 provides a concise set of indicators in terms of the information needs and opportunities to strengthen institutions that offer public access to ICTs. This paper therefore summarizes a range of economic, political, educational, infrastructural, cultural, organizational and other factors that are relevant in ensuring that individuals in rural communities do indeed have meaningful access to ICTs, wherever a public access centre prevails.

The paper therefore advances the body of knowledge in respect of the persistent digital divide and contributes to the ICT4D literature in respect of technology adoption. The findings are also of value to policymakers entrusted with providing affordable internet access to the poor and marginalized in the country.

Disclosure statement

No potential conflict of interest was reported by the authors.

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