




Citizen perceptions of digital transformation in local municipalities: The case of South Africa



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Background: Local municipalities are vital in providing residents, businesses and other stakeholders services. Adopting disruptive digital technologies like predictive analytics, social media analytics, intelligent chatbots, the Internet of Everything and self-serving kiosks in local municipalities promises citizens better and more efficient service. These technologies have the potential to eliminate operational silos and bureaucracy, resulting in cost savings and offering 24/7 service accessibility. However, citizen perceptions of the digital transformation agenda influence disruptive technology adoption in South Africa and deserve further scrutiny.

Objectives: The study examined the effect of facilitating conditions, effort expectancy, price value, perceived privacy, perceived risk, perceived trust and optimism bias on citizens' behavioural intention to adopt and use disruptive technologies in accessing local municipality services.

Method: Underpinned by a quantitative research design and a deductive approach, data were collected from 288 citizens in local municipalities in South Africa to establish the model fit of the proposed model using structural equation modelling.

Results: Effort expectancy, facilitating conditions, price value, perceived privacy, perceived risk and perceived trust positively influenced citizens' intention to adopt e-government in local municipalities in South Africa. Meanwhile, optimism bias and intention to use positively influenced use behaviour in e-government. The structural equation model results confirmed the model's fit. All eight hypotheses were confirmed.

Conclusion: The results of this research offer guidance to policymakers and implementers involved in digital transformation in local government on factors affecting citizens' intention to adopt e-government.

Contribution: The study significantly contributes to digital transformation discourse in local government.

Keywords: local government; disruptive technologies; citizen perceptions; e-government; digital transformation; South Africa.

Introduction

Worldwide, local governments are embracing digital transformation in response to calls for better and more efficient 24/7 public service provision (Scupola & Mergel 2022; Ahn & Chen, 2022). Moreover, the widespread adoption of emerging technologies across societies provides fertile ground for local governments to offer online services (Van Veldhoven & Vanthienen 2022). Terán (2018) defines emerging technologies in three characteristics: creating new industries or transforming the existing ones, creating new investment opportunities and changing the world by offering new benefits and improving people's standard of living. Transforming society is one of the mandated outcomes in democratic states, and digital transformation can be used as a catalyst for achieving this agenda (Sanina, Balashov & Rubtcova 2023). Thus, in this study, the three elements of emerging technologies are combined to create a contextual definition of emerging technologies. Therefore, emerging technologies define digital innovation as enabling societal and organisational transformation. The potential of emerging technologies to transform various spheres of society, such as political and economic, is well-documented by multiple scholars (Castro & Lopes 2022; Lindgren et al. 2019; Van Veldhoven & Vanthienen 2022). Therefore, with governments in developing nations like South Africa undergoing digital government to enhance service delivery, it is essential to investigate citizens' perceptions towards digital transformation. In this study, the terms digital government and e-government are interchangeably used to cover the broad concept of digital transformation in local government.

Success stories in the private sector on adopting and using emerging technologies trigger the government to adopt intelligent government (Androutsopoulou et al. 2019). Mergela, Edelmann and Haug (2019) suggest that citizens already adopting online services offered by private companies have the exact expectations of efficient service delivery when interacting with government systems. Moreover, the rise of digital platform adoption by citizens is one of the major government drivers towards digital transformation (Sanina et al. 2023). However, for most developing nations, there is a gap between citizens' expectations and the actual services rendered to them (Alkrajji & Ameen 2022). To narrow this service expectation gap, some scholars call for digital transformation in all spheres of service provision to all stakeholders (Alkrajji & Ameen 2022; Sanina et al. 2023). The adoption of emerging technologies in governments is in different stages across the globe (Gökalp & Martinez 2022), and this varies according to how they respond to technological advancement. According to Gökalp and Martinez (2022), this could be attributed to governments' efforts and resource allocation towards digital transformation.

Most studies on digital transformation in local government focus on how digital innovations bring efficiencies in internal processes and intergovernmental communication (Adam & Fazekas 2018; Sanina et al. 2023). Similarly, Valle-Cruz (2019) suggests that it is easier for local governments to adopt emerging technologies in the public service delivery system because they are funded from the central treasury. However, on the citizen side, adopting emerging technologies among citizens in developing countries is mainly for personal and essential use and social purposes (Hooks et al. 2022). The adoption rate of emerging technologies among citizens in South Africa is sluggish and suboptimal when performing transactions and higher-order tasks like generating and manipulating online content (Ramirez-Madrid et al. 2024). Thus, more studies are needed to establish citizens' intentions to adopt e-government systems at the local municipality level in South Africa (Abdurahman & Kabanda 2024; Galushi & Malatji 2022).

This study investigates citizens' perceptions of adopting and using specific advanced technologies, such as social media, intelligent chatbots and self-serving kiosks in rural local municipalities. The focus is on understanding citizens' perceptions of the potential impact of these technologies on public service delivery and the factors affecting their adoption of such technologies. Thus, this study seeks to answer the following research questions:

- What are the perceptions of citizens towards digital transformation in local governments?
- Which factors influence citizens' behavioural intentions towards adopting disruptive technologies to access local government services?
- What can governments do to ensure citizens' active participation in digital transformation initiatives and the adoption of disruptive technologies?

The findings of this study will inform policymakers, practitioners, decision-makers and other vital stakeholders

seeking better and more efficient citizen-centric local government service provision through digital transformation.

This article is structured as follows: it begins with a discussion of the literature review and theoretical underpinnings, followed by a conceptual framework and hypotheses. The research methodology follows, leading to the findings, discussions and conclusions.

Digital transformation in local governments

The purpose of local government is to provide administrative duties, supply goods and services to various stakeholders sustainably and safely, and represent and engage citizens in democratic and governance issues affecting their daily lives (Masuda et al. 2022). In today's digital tech-driven world, local governments recognise the urgency of digital transformation to boost operational efficiencies and achieve the set goals (Kuhlmann & Heuberger 2023). Thus, local government digital transformation involves using disruptive technologies smartly to serve residents and various community stakeholders in the best and most sustainable ways possible (Pittaway & Montazemi 2020). Similarly, digital transformation in local government yields efficiencies and effectiveness in public service provision in line with the United Nations' sustainable development goals on social, economic and environmental considerations (Palos-Sánchez et al. 2023). To create a more responsive and citizen-centric digital government, local municipalities should focus on the four driving forces of changing citizen expectations, accelerating technological innovations and having the correct regulatory requirements, cost efficiencies and resource optimisation measures (Tangi et al. 2021).

Citizens have experiences of seamless connection, interaction and transactions with systems from various sectors, such as the banking sector and online shopping apps (Chang & Li 2022). Thus, when citizens hear the discourse of digital transformation in local government, they have similar efficient and seamless service expectations. Local government, therefore, has the mandate to change citizen expectations by providing top-notch digital services that align with citizens' expectations and needs (Chang & Li 2022; David et al. 2023).

Disruptive technologies are at the heart of accelerating technological innovations and digital transformation in local government (Madan & Ashok 2023). Innovative technologies like intelligent chatbots, predictive analytics, smart cities, social media analytics, the Internet of Everything (IoE), queuing management systems and self-serving kiosks have more significant potential to revolutionise public service systems in developing countries (Yigitcanlar, Agdas & Degirmenci 2023). Several scholars suggest that these smart technologies offer the most significant potential to overcome the bureaucracy and operational silos that mar the public service system in most emerging economies (Lekkas & Souitaris 2023; Vogl et al. 2020). Furthermore, by embracing these technologies, local governments become agile and efficient in their internal processes and responding to local communities' needs.

To effectively adopt disruptive technologies in local government, the right regulatory environment and various policies are indefensible (Brunetti et al. 2020). For instance, local governments should adhere to policies on data protection, accessibility and securing transactions to ensure that personal data and sensitive customer information are secure from cyberattacks. These policies should be updated frequently to reflect and align with emerging technologies (ElMassah & Mohieldin 2020). However, for most developing nations, information and communication technology (ICT) policies are often outdated and fail to address trending innovations and meet citizens' public service needs (Wilson & Mergel 2022). Thus, to gain citizens' trust, local governments should adhere to regulatory frameworks and adopt a citizen-centric approach in all digital transformation initiatives.

One of the primary goals for digital transformation in local government is resource optimisation and cost efficiency of operations. Leveraging disruptive technologies in all local government operations and public services through data-driven decision-making yields economies of scale and curbs rampant operational expenses (Deganis et al. 2021). For example, adopting cloud-based solutions such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) will significantly reduce ICT acquisition costs, promote open data access and increase the scalability of local government operations (Golightly et al. 2022). Several scholars suggest that a significant sector of society perceives the local government service system as inefficient and sometimes marred by corrupt deals in areas like tendering (ElMassah & Mohieldin 2020; Sadik-Zada, Gatto & Niftiyev 2022). Thus, by adopting disruptive technologies for sustainability, local governments can maximise their impact on society through cost-effective, efficient operations and high-quality service provision.

The relentless economic lockdowns during the coronavirus disease 2019 (COVID-19) pandemic resulted in digital transformation towards smart governance across many countries worldwide (Hujran et al. 2023). While most developed nations like the United Kingdom, Australia, the United States and Canada quickly adjusted to online services because of their well-established e-government systems, most developing nations struggled (Dammak, Mbarek & Moalla 2023). Thus, it took some time for most government entities in Southern Africa to offer public services fully online because of resource constraints (Dammak et al. 2023). Worse still, citizens' acceptance and adoption of e-government services remained suboptimal because of various factors like the lack of the right skills to use such systems and the exorbitant cost of the Internet needed to access e-government (Munyoka 2020). The momentum in online presence and public service provision gained during COVID-19 continues to expand across various government entities in South Africa (Abdurahman & Kabanda 2024). For instance, the South African Department of Home Affairs Biometric Identification System is one success story now integrated with various systems in the banking sector, police, and correctional services for citizen fingerprint verification. Similarly, the Gauteng

Department of Education's (GDE) Admissions Online System for enrolment of Grades 1 and 8 school-going children across the Gauteng province in South Africa is another digital transformation success story in local government (Parker, Hamann & De Kadt 2021). The GDE systems allocate school places to children based on the proximity of the applicant's residence to the school to minimise traffic congestion in the central business district because of parents dropping their children across the city. Thus, in all these success stories, local government and system designers put much effort into engaging, orienting and buying into citizens' input, suggestions and participation (Biljohn & Lues 2020). Moreover, citizens tended to adopt the GDE system because it is the only way to apply for a school place (Parker et al. 2021). In contrast, in cases like payment of municipality bills and application and renewal of driver's licence where online access to local government is optional, most citizens preferred the 'over-the-counter' services for various reasons. Some citizens cited the lack of skills to use such systems, the exorbitant cost of Internet data bundles required to access online services, and the lack of human-to-human touch of service provision in e-government systems (Abdurahman & Kabanda 2024).

The next section analyses the various theories that underpin this study.

Theoretical underpinnings

The complexity of digital transformation in local government and citizens' subsequent adoption of online services requires a multiple theoretical understanding to study and fully understand the phenomena. Thus, this study draws from the Extended Unified Theory of Acceptance and Use of Technology (UTAUT2), technology-organisation-environment (TOE) framework, the National Institute of Standards and Technology (NIST) Cybersecurity Framework and the affective decision-making theory (ADM) of optimism bias and risk.

The extended unified theory of acceptance and use of technology

The UTAUT2 model posits that an individual's decision to adopt and continuously use technological innovation is influenced by seven determinant variables: performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value and habits (Venkatesh, Thong & Xu 2012). These seven factors are moderated by an individual's age, gender and experience in system use. This study draws the facilitating conditions, effort expectancy, price value, intention to adopt and the use behaviour constructs from the UTAUT2 model.

The National Institute of Standards and Technology Cybersecurity Framework

The NIST Cybersecurity Framework is an all-inclusive set of guiding principles for organisations to identify, protect, detect, respond to and overcome cyberattacks (Hossain et al.

2024). The plausible aspect of the NIST framework is that it can be used by organisations of any size, with or without any cybersecurity plans, to guide and strengthen their cybersecurity controls and resilience. This framework provides the perceived privacy and perceived trust constructs to this study.

The affective decision-making theory

The ADM is a strategic model of choices people must undertake in risky circumstances (Bracha & Brown 2012). The ADM theory states that an individual's decision to use a particular service is based on the interaction between rational and emotional cognitive processes. This interaction results in optimism bias, that is, the conviction that having used a particular system before reduces a user's susceptibility to hazards compared to an ordinary user (Lei, Hu & Hsu 2023). In risky situations, rational thinking guides behaviour, while emotions shape risk perception, leading to an optimistic bias in individuals. Thus, the ADM model provides the perceived risk and the optimism bias construct variables to inform the conceptual model (see Figure 1).

Technology-organisation-environment framework

The TOE framework attests that digital transformation in an organisation is influenced by technological, organisational and environmental contexts (Baker 2012). The technological context focusses on internal and external innovations like disruptive technologies that local governments can adopt to enhance public service provision. Organisational context is concerned with various internal measures, features and resources at the disposal of an organisation required for digital transformation. The environmental context focusses on an organisation's ability to attract and utilise resources, competitiveness, and legal and regulatory matters that affect its competitiveness. Various scholars have established some driving factors related to the technological, organisational and environmental elements influencing digital transformation in local municipalities (Clement, Manjon & Crutzen 2022; Gasco-Hernandez et al. 2022). Thus, the TOE framework provides a rich grounding for understanding the interplay of various factors affecting the adoption of disruptive technologies in local municipalities.

Research model and hypotheses

Figure 1 displays the proposed research model for this study, including seven construct variables influencing citizens' behavioural intentions to adopt technological innovations in local municipalities. These are facilitating conditions, effort expectancy, price value, perceived privacy, perceived risk, perceived trust and optimism bias, which influence behavioural intention to adopt and use disruptive technologies in accessing local municipality services.

According to the model suggested in Figure 1, this study is based on the following hypotheses:

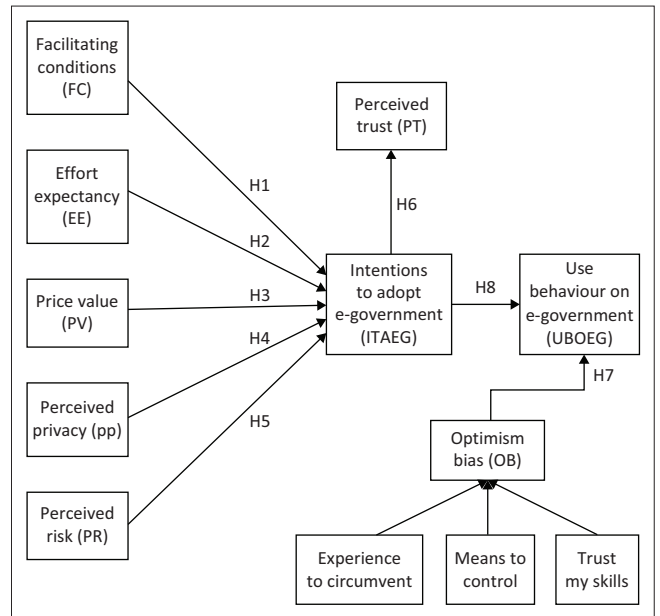


FIGURE 1: Research model for the study.

- H1:** Facilitating condition (FC) positively influences citizens' intentions to adopt e-government (ITAEG).
- H2:** Effort expectancy (EE) positively influences citizens' intentions to adopt e-government (ITAEG).
- H3:** Price value (PV) positively influences citizens' intentions to adopt e-government (ITAEG).
- H4:** Perceived privacy (PP) positively influences citizens' intentions to adopt e-government (ITAEG).
- H5:** Perceived risk (PR) positively influences citizens' intentions to adopt e-government (ITAEG).
- H6:** Perceived trust (PT) positively influences citizens' intentions to adopt e-government (ITAEG).
- H7:** Optimism bias (OB) positively influences citizens' continuous use behaviour on e-government (UBOEG)
- H8:** Citizens' behavioural intention to adopt e-government leads to continuous use behaviour (UBDT).

Research methods and design

This study is underpinned by a quantitative research design and a deductive approach (Bloomfield & Fisher 2019). This study's use of a quantitative research design and a deductive approach aligns with previous research on digital transformation in local municipalities (Batara et al. 2017; Dias 2020). Using self-administered structured questionnaires, quantitative data were collected from 300 respondents from the Mpumalanga province (Ehlanzeni District) and 2 in Limpopo province (Capricorn and Vhembe Districts). Purposive sampling was then used to select five local municipalities from these districts, that is, two under Ehlanzeni District (Bushbuckridge and City of Mbombela), one from Capricorn District (Lepelle Nkumpi) and two from the Vhembe District (Thulamela and Makhado). These districts were selected because they have contrasting economic developments, rural versus urban setups, have an online presence and adopt disruptive technologies at

various stages (Abdurahman & Kabanda 2024). The 300 participants were identified using multistage sampling techniques. Firstly, the purposive sampling technique was used to select the districts and local municipalities. Secondly, a combination of purposive sampling and random sampling techniques was used to identify the final participants for this study based on the individual's previous experience in accessing local municipality services online. The target participants for this study comprised community members from these five municipalities aged 18 years and above who access local government services. A self-administered questionnaire was distributed to 300 participants. These are active people who, by default, are entitled to services from their local government of any form.

The questionnaire included two parts. Section A focussed on demographic questions, and Section B contained five items on a 5-point Likert scale (from completely disagreeing to agreeing) designed to assess the nine elements of the research model presented in Figure 1. The questionnaire was adapted from the United Nations E-Government Survey Databases' (United Nations 2024) set of questions to align with the proposed model in Figure 1. The questionnaire was tested with 20 participants with previous experience using e-government platforms. The final research instrument incorporated feedback from the pilot test.

The data collection was conducted over 10 weeks, involving the five local municipalities. The proposed model was validated using structural equation modelling (SEM) with IBM SPSS AMOS version 29. The SEM enabled a thorough examination of hypotheses by utilising confirmatory factor analysis (CFA) to determine the significance of the relationships between observed and latent variables in the proposed e-government utilisation model, as discussed in the next section.

Ethical considerations

An application for full ethical approval was made to the Research Ethics Social Sciences Committee (RESSC) of the University of Venda. Ethical consent was received with the ethics approval number FMCL/21/BIS/03/1309.

Results

Data cleaning procedures

Following Osborne's (2012) recommendation, the data were carefully examined to detect missing data, address common method bias, and identify and remove any outliers or deviations from univariate normality that may affect the results.

Handling missing data

This step focussed on scrutinising the completed questionnaires for item non-response and erroneous completion by the participants. Out of the 300 collected questionnaires, 288 were used for data analysis. The

remaining 12 were incomplete or erroneously completed and excluded from the analysis. This gave an overall response rate of 96%, which is adequate for quantitative data analysis and aligns with Bougie and Sekaran's (2019) 30% minimum response rate recommendation.

Handling common method bias

Common method bias occurs when a survey leads to inconsistent responses because of its design and wording rather than reflecting the true opinions of the participants (Podsakoff, MacKenzie & Podsakoff 2012). The same questionnaire measured the independent and dependent variables, which might have introduced common method bias. Harman's one-factor test was employed to identify common method variance before conducting exploratory factor analysis, while CFA was utilised for common method variance detection. In Harman's single-factor test, it is suggested that the eigenvalue of the first major component should be below 50% to show no common method bias (Podsakoff et al. 2012). The initial primary element was isolated, explaining only 15.23% of the variability. This shows that the unextracted variance accounts for numerous factors, thus the absence of common method bias.

Dealing with univariate normality

Before statistical analysis, data should be tested for normality and homogeneity to confirm the data distribution of the variables (Knief & Forstmeier 2021). Pearson's initial parameter test for skewness was utilised to determine the normality of the univariate distribution (Cain, Zhang & Yuan 2017). Knief and Forstmeier (2021) suggest that skewness and kurtosis should be used to test univariate normality for a sample size above 300. Thus, it is ideal for this study. Kurtosis measures how much a distribution differs in terms of its peakedness or flatness compared to the normal distribution (Cain et al. 2017). Meanwhile, skewness measures how much a statistical distribution deviates from symmetry around the mean (Cain et al. 2017). A perfectly symmetrical graph has kurtosis and skewness values of zero for a histogram that follows a normal distribution (Cain et al. 2017). The skewness values for this study range from -1.1250 to 1.0250 , while the kurtosis value varies from -0.1310 to 1.0241 . Hence, the kurtosis and skewness values for all constructs in this research fell within acceptable ranges (Kim 2013).

Descriptive analysis

Most of the 288 respondents were females (54.5%). The 26–35 age group was the dominant range, while those aged above 56 years constituted the least (1%). Moreover, 95.5% of the participants said they access the Internet daily, mostly on their mobile phones or from the workplace. The respondents, aged between 25 and 36 years, were the largest group (44.44%) utilising the Internet, followed by the 18–25 years (38.99%). Moreover, 33.3% of participants aged between 26

and 35 years confirmed using online platforms to access various public and private services. Most interestingly, participants above 55 years indicated they are good mobile platform users. Most participants (39.6%) held a university degree, 25.0% had a postgraduate qualification, 14.2% possessed a college diploma, and the rest had either a grade 12 certificate or no formal qualifications.

Measurement model analysis

This study utilised CFA to establish the measurement model and assess how well it aligns with the collected data. Standardised factor loadings, construct reliability and average variance factor were used to evaluate convergent validity (Mardia, Kent & Taylor 2024). Table 1 shows the construct reliability tests for the study. Standardised loadings indicate the degree of connection between items on a scale and a latent variable, with only values higher than 0.50

TABLE 1: Reliability test results.

Constructs	Factor loadings	Construct reliability	AVE
Significance level	≥ 0.50	≥ 0.70	≥ 0.50
Facilitating conditions (FC)		0.897	0.757
FC1	0.85		
FC2	0.88		
FC4	0.90		
Effort expectancy (EE)		0.799	0.689
EE2	0.77		
EE3	0.86		
EE5	0.91		
EE6	0.89		
Price value (PV)		0.799	0.689
PV1	0.77		
PV2	0.86		
PV4	0.91		
Perceived privacy (PP)		0.877	0.555
PP1	0.89		
PP2	0.74		
PP3	0.77		
PP4	0.86		
Perceived risk (PR)		0.769	0.587
PR1	0.86		
PR2	0.79		
PR3	0.81		
PR4	0.85		
Perceived trust (PT)		0.832	0.573
PT1	0.76		
PT3	0.84		
PT4	0.88		
Optimism bias (OB)		0.855	0.638
OB 2	0.86		
OB 3	0.76		
OB 4	0.82		
Intention to adopt e-government (ITAEG)		0.879	0.650
ITAEG 1	0.94		
ITAEG 2	0.76		
ITAEG 3	0.81		
Use behaviour on e-government (UBOEG)		0.895	0.675
UBDT 1	0.89		
UBDT 2	0.92		

AVE, average variance extracted; FC, facilitating conditions; EE, effort expectancy; PV, price value; PP, perceived privacy; PR, perceived risk; PT, perceived trust; OB, optimism bias; ITAEG, intention to adopt e-government; UBOEG, use behaviour on e-government.

included in Table 1 (Hair et al. 2014). Construct reliability was conducted to guarantee that the latent variables within each construct demonstrated internal consistency.

Table 1 displays each construct's reliability coefficients, ranging from 0.708 to 0.885. This indicates that the constructs demonstrated internal consistency as all coefficients exceeded the commonly accepted threshold of 0.70.

The average variance extracted (AVE) was utilised to confirm the convergent validity of the constructs. Table 1 shows that all AVE values scored above the 0.50 rule of thumb (Mardia et al. 2024). This confirms that the proposed model's constructs accounted for over half of the variances in the construct items.

In this study, discriminant validity was conducted to confirm that each construct in the study instrument was distinct from the other constructs and represented the specific phenomena being studied in the structural equation model (Mardia et al. 2024). To assess discriminant validity, this study compares the 'absolute values of correlations between the constructs' with each construct's square root of the AVE (Hair et al. 2014). The criterion is that the square root of the AVE for that construct should always exceed both the AVE and all correlations with other constructs (Rönkkö & Cho 2022). Table 2 shows that the square roots (shaded areas) exceeded the correlations of all other constructs, and this demonstrates satisfactory discriminant and convergent validity for the construct measurements in the survey.

Structural model analysis

This section evaluates the model's overall fit using different fit indices. The Chi-square (χ^2) had a total value of 482.95 with 227 degrees of freedom and $p < 0.05$. The Chi-square over degrees of freedom for the research model was 1.53. Thus, within the 1 and 3 acceptable range (Kenny, Kaniskan & McCoach 2015). This study utilised various indices to assess the overall model fit. The normed-fit index value obtained (NFI) was 0.983, while the comparative fit index (CFI) was 0.904, and the goodness-of-fit index (GFI) equalled 0.942. All three (NFI, CFI and GFI) exceeded the minimum acceptable range of 0.90 (Kline 2023). The Tucker-Lewis index (TLI) obtained was 0.985, while the index of fit (IFI) was 0.972, which is all greater than the 0.95 rule of thumb (Kline 2023). To show excellent model fit, the root mean square error of approximation (RMSEA) value should be lower than 0.08; for this study, RMSEA equalled 0.04. The adjusted goodness-of-fit index (AGFI) value was 0.890, thus above the 0.80 recommendation (Henseler, Ringle & Sarstedt 2015).

Model path coefficients and hypotheses testing

This section evaluates the construct variables' path coefficients to test each proposed hypothesis's significance. A path coefficient is considered significant (at $p < 0.05$ level) if its critical t -value for a standardised regression weight

TABLE 2: Descriptive analysis.

Construct Variable	FC	EE	PV	PP	PR	PT	OB	ITAEG	UBOEG
FC	0.72 [^]	-	-	-	-	-	-	-	-
EE	0.269*	0.86 [^]	-	-	-	-	-	-	-
PV	0.149**	-0.170**	0.79 [^]	-	-	-	-	-	-
PP	-0.108*	-0.252**	-0.199*	0.84 [^]	-	-	-	-	-
PR	0.154**	-0.068	0.455**	0.223**	0.75 [^]	-	-	-	-
PT	0.371**	0.395**	-0.250**	-0.504*	0.486**	0.73 [^]	-	-	-
OB	0.563**	0.412**	-0.353**	-0.476*	0.510**	0.371**	0.81 [^]	-	-
ITAEG	0.466**	0.312**	-0.341**	-0.434*	0.465**	0.444**	0.395**	0.77 [^]	-
UBOEG	0.319**	0.451**	-0.242**	-0.547*	0.403**	0.318**	0.456**	-0.350**	0.85 [^]

FC, facilitating conditions; EE, effort expectancy; PV, price value; PP, perceived privacy; PR, perceived risk; PT, perceived trust; OB, optimism bias; ITAEG, intention to adopt e-government; UBOEG, use behaviour on e-government.

*, Significant at 0.05 level (two-tailed); **, Significant at 0.01 level (two-tailed); [^], Square roots of average variance extracted.

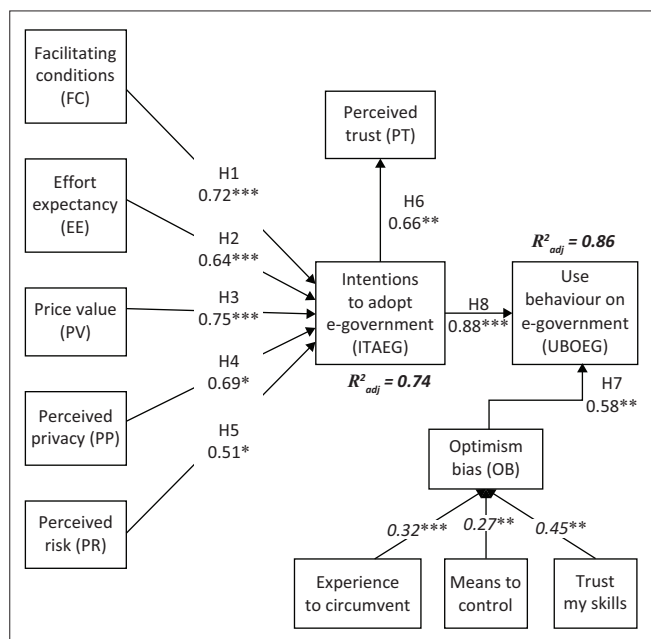
TABLE 3: Path coefficients and hypotheses testing.

Hypothesis	Path	Estimate	s.e.	t	B	p	Hypothesis accepted?
H1	FC → ITAEG	0.72	0.11	7.35	0.66	***	Yes
H2	EE → ITAEG	0.64	0.14	4.31	0.61	***	Yes
H3	PV → ITAEG	0.75	0.20	2.48	0.77	***	Yes
H4	PP → ITAEG	0.69	0.05	7.15	0.64	0.03*	Yes
H5	PR → ITAEG	0.51	0.03	6.83	0.58	0.03*	Yes
H6	PT → ITAEG	0.66	0.14	5.22	0.75	0.01**	Yes
H7	OB → UBOEG	-0.58	0.02	-4.93	-0.54	0.01**	Yes
H8	ITAEG → UBOEG	0.88	0.14	8.25	0.87	***	Yes

Note: Estimate = standard regression weights.

s.e., standard error; p-value, significance level; FC, facilitating conditions; EE, effort expectancy; PV, price value; PP, perceived privacy; PR, perceived risk; PT, perceived trust; OB, optimism bias; ITAEG, intention to adopt e-government; UBOEG, use behaviour on e-government.

*, p < 0.05; **, p < 0.01; ***, p < 0.001.



R^2_{adj} , R-square adjusted.

*, p < 0.05; **, p < 0.01; ***, p < 0.001.

FIGURE 2: Structural model path coefficients.

exceeds 1.96 (Mardia et al. 2024). Table 3 shows that the t-values for all eight hypotheses were above 1.96, with significant values less than 0.05. Based on this criterion, all eight hypotheses were accepted (see Table 3).

Figure 2 illustrates that citizens' utilisation patterns of e-government systems accounted for 86% of the variances among the eight endogenous constructs. This demonstrates that

the suggested model effectively predicts the usage behaviour of e-government systems in South African local municipalities.

Discussion

This research sought to understand digital transformation in local government by examining the impact of facilitating conditions, effort expectancy, price value, perceived privacy, perceived risk, perceived trust and optimism bias on the intention to adopt and use e-government systems by citizens in South Africa. This study proposed eight hypotheses to test the proposed model to reach this goal.

This study found that local governments should facilitate the adoption of digital technologies to access government services online if they create an awareness among citizens of the benefits and capabilities of such services. Digital skills and competence are the key components of digital transformation in local government. Moreover, the findings show that governments should implement various schemes to orient and assist local citizens in effectively using disruptive technologies like social media analytics, mobile platforms, intelligent chatbots and self-serving kiosks; they will most likely not develop some adoption resentments. Such initiatives are bound to reduce citizens' time and effort to learn to use e-government systems. In turn, this goes a long way towards enticing citizens to accept and adopt any digital transformation initiatives in local municipalities by citizens. This finding concurs with previous studies on digital transformation and e-government (Al Sayegh et al. 2023; Venkatesh et al. 2012), which established facilitating

conditions and effort expectancy as strong predictors of behavioural intention.

This research found that the costs associated with mobile data and Internet access can impact citizens' decisions to utilise e-governance in South Africa. Local governments in the Limpopo and Mpumalanga provinces serve customers from rural, farming, peri-urban and urban areas. Government intervention is necessary to regulate Internet prices and ensure affordability for all citizens because of large differences in disposable incomes among people in different areas. This finding concurs with scholars (Chohan & Hu 2022; Kouladoum, Wirajing & Nchofoung 2022) who suggest governments in emerging markets and developing countries in sub-Saharan Africa should develop various programmes and initiatives aimed at the digital and financial inclusion of all citizens.

The findings of this study establish that citizens tend to adopt e-government systems that they trust, perceive as secure, and guarantee the privacy of personal data. With citizens' growing adoption of local e-government systems, governments should hire experienced cybersecurity specialists to deal with and handle cyber vulnerabilities (Hossain et al. 2024). This finding aligns with previous scholars who suggested that citizens tend to transact on e-government systems with a track record of robust security features (Kassen 2022). Thus, governments should invest more in addressing cybersecurity vulnerabilities in e-government.

Optimism bias positively impacted the behaviour of users in a significant way. Although individuals had concerns about privacy, trust and risks with e-government usage, those who felt more tech-savvy with electronic systems were more inclined to use them. The findings of this research align with the practical findings of a study conducted by Weerakkody et al. (2015). One possible reason for this finding could be that as individuals become skilled and comfortable utilising e-government platforms, they no longer see themselves as vulnerable to cybersecurity risks.

The findings of this study establish that a person's intention to adopt local e-government is influenced by their perception of trust, privacy and risk, as well as the effort needed to learn to use the system. Similarly, the government should assist citizens in easing e-government adoption by ensuring they have the necessary skills and resources to adopt. In turn, a positive intention leads to system acceptance and widespread utilisation. This finding concurs with previous studies, which establish behavioural intention as a strong positive predictor of use behaviour in digital government (Faulkner, Jorgensen & Koufariotis 2019; Zahid et al. 2022).

Theoretical and practical implications

This study has implications for both theory and practice. This research adds to the current body of knowledge by explaining the impact of facilitating conditions, effort expectancy, price

value, perceived privacy, perceived risk, perceived trust and optimism bias on citizens' decisions to utilise e-government systems. Optimism bias motivates citizens to continue utilising e-government systems even when they see potential risks. The study has added to the understanding of theory development by suggesting a framework for guiding e-government uptake in South African local government. Furthermore, the suggested model could serve as a launching pad for future research efforts and be combined with other established models to deepen the discourse of digital transformation in local governments.

On the practice frontier, this study underscores that citizens' decisions to adopt digital transformation are influenced by their perceptions and lived experiences of security and trust in e-government. Optimism bias is most effective when citizens are tech-savvy, trust the government, and believe in the security and privacy of e-government systems. Thus, the design and implementation of e-government systems should involve equal input from citizens and governments, emphasising people-driven initiatives.

Conclusion

This study explored how facilitating conditions, effort expectancy, price value, perceived privacy, perceived risk, perceived trust and optimism bias influence citizens' decisions to adopt e-government systems. In the current fast-paced, tech-driven era, digital transformation allows local governments to transform the public sector landscape by ushering in responsive, agile and citizen-centric governance. This is achieved by continuously aligning government strategic goals and disruptive technologies with citizens' expectations and priorities. Survey data were collected from 288 local government customers in two provinces in South Africa to test and refine the proposed model, which integrated the seven latent variables. This study found that digital transformation provides citizens many public service delivery benefits: improved 24/7 public services, data-driven decision-making, enhanced productivity and efficiency, cost savings, and bolstering transparency and accountability. However, because of wide socioeconomic disparities across the urban, peri-urban and rural local municipalities, local governments should pay special attention to these factors if the digital transformation agenda is to succeed. Most customers for rural local municipalities are low- to middle-income members of society who are often financially and technologically constrained. Thus, for digital inclusion through local government digital transformation, governments should pay attention to digitally upskilling local citizens through various training and system orientation. To promote the widespread adoption of e-government by citizens, the government should regulate the cost of Internet access and reduce the uncertainty associated with cybersecurity vulnerabilities. The results of this research can assist policymakers and practitioners in developing digital transformation solutions that focus on the needs of citizens. The research is restricted as it did not investigate the opinions of local government workers on

incorporating new technologies in service provision to enhance community services. This forms the future research direction.

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Competing interests

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Authors' contributions

V.N. conducted the conceptualisation, investigation, data collection and wrote the original article. W.M. supervised the project, reviewed the original article, implemented major revisions, assisted with data analysis and wrote the article based on reviewers' comments. A.K. also supervised the project, rendered validation, and assisted with writing, reviewing and editing.

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Data availability

The data that support the findings of this study are available upon reasonable request from the corresponding author, W.M.

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