

Factors That Affect the Effective Use of E-Government Procedures in Limpopo

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Abstract

The purpose of the survey was to assess and evaluate determinants of the demand for e-government services among public sector employees in Limpopo Province. The survey was based on data gathered from 823 public servants and community-based stakeholders who work on public service delivery at a local community level. The 823 participants of the survey were 5 senior project managers, 5 senior managers working on finance-related issues, 6 Directors and Deputy Directors working on policy and governance-related issues, 4 technical managers, 15 mayors and their assistants, and 788 stakeholders working in the 5 Districts of Limpopo Province (Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg) at various local communities in Limpopo Province (South African National Department of Public Service and Administration, 2022). Quantitative methods of data collection and analyses were used for conducting the survey. Indicators of the use of e-government services were measured based on a composite index developed by the United Nations Department of Social and Economic Affairs (2022) for developing nations. The study found that the perceived demand for e-government services in Limpopo Province was 54.01%. Results obtained from multivariate analysis (ordered logit regression analysis and log-linear analysis) showed that the use of e-government services was significantly influenced by 3 predictor variables. These predictor variables were the need for South African identity document applications and related services, the need for social grant services, and tax-related services.

Keywords

E-Government Services, Public Service Delivery, Limpopo, Multivariate Analysis

1. Introduction

1.1. Introduction and Background to Study

The main aim of the survey was to assess and evaluate determinants of the demand for e-government services among public sector employees in Limpopo Province. The efficient delivery of e-government services is a key indicator of efficiency in the provision of essential public services by the [United Nations Department of Social and Economic Affairs \(2022\)](#). The ability to render electronic, digital or online public services to the people is a highly reliable indicator of efficiency in public service delivery. Denmark has managed to be a global leader in efficient public service delivery by way of using digital and online services for implementing the provision of public service delivery that is tailor-made to municipal residents and ratepayers ([Snow, Hakonsson, & Obel, 2016](#)). The other examples of nations in which public services are provided efficiently by using digital or online services are Canada, the United Kingdom, Singapore, Australia and South Korea ([Manoharan, Ingrams, Kang, & Zhao, 2021](#)). The authors have shown that the efficient use of e-government services enables local municipalities to offer optimal municipal services at an affordable cost. The process is ideal for ensuring the delivery of efficient municipal service delivery and for ensuring accountability to the people.

The theory of reasoned action ([Fishbein, 1979](#)) provides a theoretical basis for the survey. That is, public sector employees must possess the right attitude and behaviour to earn their salaries by working hard and honestly at the workplace. They must be people who take pride in rendering public service to the people. Such employees take pleasure in embracing the use of appropriate technology for rendering essential services to the people. The focus of the study is to assess and evaluate predictors of the use of e-government procedures among public sector employees and community leaders who are responsible for public service delivery in Limpopo Province.

The survey was based on data gathered from 823 public servants and community-based stakeholders who work on public service delivery at a local community level. The 823 participants of the research were 5 senior project managers, 5 senior managers working on finance-related issues, 6 Directors and Deputy Directors working on policy and governance-related issues, 4 technical managers, 15 mayors and their assistants, and 788 stakeholders working in the 5 Districts of Limpopo Province (Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg) at various local communities in Limpopo Province ([South African National Department of Public Service and Administration, 2022](#)).

Studies conducted by [Twala \(2014: p. 159\)](#), [Adedokun and Zulu \(2022: p. 127\)](#) and [Worku \(2022: p. 1321\)](#) on municipal service delivery have found that the ability of local municipalities and Government Departments to offer e-government services to the South African general population has a significant benefit for the national economy. [Khanyile, Nzimakwe, and Mthuli \(2021: p. 973\)](#) have shown that e-government services are essential for ensuring the provision of highly effi-

cient municipal service delivery. Kanyane, Mutema, and Zikhali (2022) have shown that e-government services are a requirement for resolving account-related queries from residents and ratepayers. Surveys conducted by Khale (2015: p. 678) and Khale and Worku (2015: p. 754) in the City of Tshwane have found that e-government procedures are essential for ensuring satisfactory compliance with good governance principles stipulated by King (2019). The key aspects of such principles are accountability to the people, transparency, objectivity and fairness to residents and ratepayers who live and conduct business in South African municipalities. Hsu and Liao (2022: p. 7) have provided a matrix of indicators of accountability to the people at the municipal level. E-government procedures are highly conducive to ensuring adequate compliance with business ethics and professional integrity in the course of municipal service delivery (Fourie & Malan, 2020: p. 3; Harris, 2020: p. 290).

Folly (2021: pp. 355-366) has listed down indicators of satisfactory service delivery in the South African power industry. The author has shown the dire need for promoting competition and restructuring by allowing the private sector to compete fairly and openly with public sector entities such as Eskom. Ferreira (2021) has shown that the use of appropriate technology is a key requirement for discouraging underperformance, corruption and unethical conduct among employees and managers working in public service delivery institutions including local municipalities and state-owned enterprises. Fashoro and Barnard (2021: p. 4) have pointed out that e-government services are vital for ensuring value for money in public procurement and supply chain processes. The use of e-government services is helpful for minimising the cost of public service delivery, and for ensuring the delivery of speedy services to the people.

Dikotla and Legodi (2022: p. 27) and Ede and Jili (2020: p. 51) have shown that e-government services are essential for ensuring speedy municipal services to the people in all economic sectors. Erasmus (2021) and Carmichael (2022: p. 3) have shown that e-government procedures are vital for alleviating the current rate of municipal protests over poor service delivery quality. Bowman (2020: p. 395) has argued that e-government processes are essential for enabling state-owned enterprises to use their budgets according to plan. The annual report published by Eskom (Pty) Ltd. (2021) shows that local municipalities owe about R50 Billion and that the power utility company is struggling to maintain its aging infrastructure due to a lack of funds and specialised skills in engineering and power generation. Andreoni, Creamer, Mazzucato, and Steyn (2022: p. 238) have argued that Eskom could use e-government processes for minimising its existing level of cumbersome bureaucracy and the loss of valuable funds and assets. In this regard, the study conducted by Darsono, Wong, Nguyen, Jati, and Dewanti (2022: p. 69) shows that the use of e-government processes is an essential requirement for ensuring accountability in state-owned enterprises and public service delivery institutions. It follows that it is the duty and responsibility of elected governments and local municipalities to pave the way for the adoption and implementation

of e-government processes at all levels.

Alexander, Runciman, Ngwane, Moloto, Mokgele, and Van Staden (2018: p. 28) have pointed out that accountability is promoted effectively by embracing digital processes that are part and parcel of e-government processes and procedures. The authors have shown that the task of auditors and accountants is made significantly easier by embracing online and digital processes that constitute e-government functions.

Alexander, Berrisford, Nkula-Wenz, Ndhlovu, Siame, Watson, and Zinnbauer (2022) have highlighted the benefit of using e-governance services to the people. Key among the benefits is the deterrence of corruption and the promotion of honesty and professional integrity among civil servants whose duty is to render essential services to people who require the services for survival. The authors have provided examples from Zambia and South Africa to support their arguments. The need to enhance the quality and efficiency of municipal services is paramount in rural regions of Limpopo Province. Rural people living in Limpopo experience socioeconomic obstacles such as poor quality of education, illiteracy, poor health service delivery, unemployment, poor and decaying infrastructure, inefficient distribution of social grants, poverty, unemployment, and lack of economic opportunities. In order to address these socioeconomic obstacles, it is essential to use e-government services by laying out the necessary ICT infrastructure and by providing skills-based training to public servants working in local municipalities.

1.2. Literature Review

Surveys conducted by Thomas (2021), Qhobosheane (2018), Rudin and Sanders (2021), Schoute, Gradus, and Budding (2021), Plantinga and Adams (2021), Porogo (2022) and Porogo and Kalusopa (2021) have shown the dire need for e-government processes and procedures as a means of ensuring value for money in public sector service delivery institutions. The model constructed by Schoute, Gradus, and Budding (2021) has been embraced internationally for minimising the abuse and waste of municipal resources. People living and working in South African local municipalities often protest over poor municipal service delivery. International best practice shows that e-government processes and procedures are highly valuable for rendering services with efficiency at a reasonable cost. The requirements for using e-government processes and procedures are investing in ICT infrastructure and the training of public sector employees on how to use digital technology for rendering service delivery to the people.

The survey by Lancaster (2018: p. 29) shows that e-government processes and procedures are vital for cutting down the operational cost of service delivery to the people without lowering service quality standards. The survey by Klug (2016: p. 41) has shown that e-government processes and procedures are essential for combating corruption and underperformance among public sector employees. Schoute, Gradus, and Budding (2021) have identified a matrix of indicators that

are highly valuable for monitoring and evaluating the efficient delivery of public sector services to the people. The authors have identified common obstacles such as lack of specialised skills, inability to monitor and evaluate the performance of employees, lack of infrastructural capacity, lack of budget, and failure to collaborate with the private sector. In this regard, rural regions and provinces lose much more in comparison with urban regions and city centres. [Yakobi, Scholtz, and Vom Berg \(2022: p. 347\)](#) have pointed out that lack of Information Communication Technology (ICT) skills and infrastructure is a key obstacle to the use of e-government services in all parts of South Africa. It is quite difficult to use or provide e-government services in the absence of the relevant set of ICT skills and ICT infrastructure. Employees who are required to offer e-government services to the public need to be adequately trained on how to use ICT infrastructure, computer programmes and digital equipment. [Tukamuhabwa \(2015\)](#) has shown that the use of digital or online procurement services is highly helpful for keeping, exchanging, auditing and verifying financial records that are related to public procurement and supply chain services in Government Departments. The author has pointed out the need for acquiring appropriate ICT skills and digital machines and infrastructure in order to be able to use e-government procedures effectively. [Tsabedze and Kalusopa \(2018\)](#) have conducted a study in Eswatini and have found that a successful delivery of e-government service depends upon the availability of appropriate funding, technical training and ICT infrastructure. The authors have argued that it is not possible to benefit from e-government services in cases where there is no funding for the purchase of digital equipment and ICT infrastructure as well as commitment for training employees on how to use e-government services effectively. Although e-government services are highly beneficial for effective service delivery and sound planning, they require adequate ICT infrastructure, training, operational budget and trained manpower.

The [South African National Department of Public Service and Administration \(2022\)](#) has introduced Minimum Interoperability Standards (MIOs) for technical standards and processes that need to be followed in the course of rendering e-government services to the people. The Department has introduced a series of policy-related policies between 1994 and 2016 with a view to rolling out e-government services to the people in all economic sectors. A few examples of these policies are the Public Service Act of 1994, the Electronic Communications and Transactions Act (ECTA) of 2002, the Batho Pele Gateway policy of 2004, the Information Society and Development Plan (ISADP) of 2007, the National Development Plan of 2011, the e-Government framework of 2012, the Department of Telecommunications and Postal Services and transfer of e-government mandate from DTSP and SITA of 2014, policies developed by the Provincial Governments of Gauteng and the Western Cape in 2015, the National ICT Integrated Policy White Paper of 2016, the Development of the National e-Government Strategy and Roadmap of 2016. A policy document published by the [South Afri-](#)

can National Department of Telecommunications and Postal Services (2022) has published a policy that governs all aspects of the provision of all e-government services to South Africans. The document indicates that the State Information Technology Agency (SITA) and Government Information Technology Officers Council (GITOC) are tasked with the development of ICT-related infrastructure, capacity building and the training of public sector employees on e-government processes and procedures.

Todd and McCauley (2021) have shown that South Africa faces key challenges in terms of the need to expand and upgrade decaying infrastructure in order to be able to roll out efficient services to the people in areas such as electricity, water and e-government services. Mid-year estimates published by Statistics South Africa (2021) indicate that South Africa has a population of size 59, 906, 330 people. Shava and Mazenda (2021) have pointed out the need for ethical considerations in the provision of public services to the people. The authors have highlighted the need for upholding the Batho-Pele Principle of serving the people with humility, honesty and personal integrity. While e-government services are highly helpful for ensuring efficient service delivery, installing the digital infrastructure required for e-government services and training public sector employees on ICT-related skills is equally necessary (Worku, 2022).

Ngcamu (2019) has shown that the low level of e-government services is caused by lack of awareness about the benefits of digital services, lack of appropriate ICT capacity, inadequate skills in using digital technology among public sector employees and poor leadership. Poor technological infrastructure and the high cost of procurement of digital technology are main barriers to the effective use of e-government services.

Nokele and Mukonza (2021) have shown the benefits of e-government services to the population living in Limpopo Province in areas such as applications for identity documents, birth certificates and marriage certificates. The authors have shown that the main benefits are speedy service delivery and the deterrence of corruption. South Africa has 257 local municipalities in which speedy services are required by all categories of South Africans in various economic sectors. The use of e-government services is highly beneficial for ensuring efficient, affordable and hassle-free services to South Africans. Examples from countries such as Denmark, Singapore and South Korea show that e-government services are strategically highly beneficial to the people.

The survey by Parbanath, Ndebele, Nyide, and Ndlovu (2022) indicates that it is essential to promote highly efficient, reliable and affordable public and municipal services in all local municipalities to minimise protests over poor service delivery. Munyoka (2020) has found that ordinary citizens can be encouraged to adopt e-government processes and processes as a means of reducing the burden of promoting awareness and adherence to municipal bylaws that are helpful for the implementation of e-government processes. Munyoka and Manzira (2013) have shown that it is essential to promote literacy and awareness about the po-

tential benefits of e-government services in all Sub-Saharan African countries. By providing economic incentives to ordinary citizens, it is possible to reduce the cost and bureaucracy of implementing e-governance procedures. A key incentive is the provision of free and highly subsidised education on the use of digital technology among the youth.

Mullon and Ngoepe (2019) have proposed an integrated framework to promote awareness about e-government service delivery and the adoption of digital methods of e-government procedures that are helpful for paying up municipal service delivery fees. The majority of South African local municipalities often fail to pay for electricity services and for the upgrade and maintenance of municipal infrastructure. The provision of incentives is helpful for encouraging people to pay their service fees to local municipalities and power utility companies.

Mulamba (2021: p. 329) and Mpehle and Mudogwa (2020) have shown that it is essential and highly helpful to provide incentives to residents and ratepayers to use digital technology for paying up municipal service fees promptly. A few suitable examples are free training opportunities and the supply of digital equipment and ICT infrastructure to local municipalities. Motepe, Hasan, and Shongwe (2022) have pointed out that the use of digital technology makes it easy to make payments for services rendered by local municipalities and utility companies. Mosweu (2019) has conducted a study in Botswana and has found that the use of digital technology is highly beneficial for promoting awareness about good citizenship and for the promotion of prompt payments of municipal service fees.

Mishra and Geleta (2020: p. 242) have pointed out that e-government procedures are essential for enhancing the level of satisfaction of residents and ratepayers with the quality of municipal service delivery. Municipal protests often result in harm to infrastructure and the loss of employee morale in local municipalities. Anger arising from lack of satisfaction over municipal service delivery is highly volatile and too costly for South African local municipalities. It is possible to use e-government processes for ensuring the delivery of highly efficient municipal services to the people.

Outside South Africa, in the African continent, e-government services are actively used and promoted in Mauritius, Seychelles, Tunisia and Kenya (United Nations Department of Social and Economic Affairs, 2022). The report shows that with relatively meagre financial resources, Kenya has done relatively better than South Africa in terms of using e-government services for public service delivery. The report attributes the difference to a vibrant ICT sector and better collaboration between public and private sector operators. The survey by Kashaija (2022: pp. 41-55) shows that Kenya has managed to roll out e-government services in local municipalities successfully by expanding ICT capacity, installing digital infrastructure, training public servants on the use of digital technology, and promoting awareness education among urban and rural people. The author has shown that Kenya has managed to extend e-government services to people

living and working in Nairobi, Mombasa, Nakuru and Kisumu by way of installing ICT and telecommunications infrastructure and by training public sector employees, community-based stakeholders and entrepreneurs. The experience from Kenya shows that it is highly valuable to work with the private sector and to give incentives to the general population for encouraging people to embrace digital platforms and e-government technology.

Mwangi, Irura, and Makori (2022: pp. 12-18) have shown that e-government services are given a top priority by the Kenyan Government. This is evidenced by the intense collaboration and strategic partnership between public and private sector companies in terms of rolling out digital infrastructure, the training of people working on e-government processes, and the provision of incentives to individuals and businesses using e-government services. The Kenyan Government has adopted a Vision 2030 strategic plan in which it has managed to enhance its efficiency in the collection of tax revenue by using e-government services and procedures.

In Kenya, e-government procedures are used for issuing and renewing identity documents, passports, birth certificates, marriage certificates, job applications and the recruitment of people into the public service. E-government services are used for providing municipal services such as water, electricity, sanitation, waste management, and for monitoring and evaluating the quality of municipal services that are provided to residents and ratepayers. The services are also used for resolving account-related queries from residents and ratepayers at the municipal level and for ensuring compliance with ethical conduct and good governance principles.

1.3. Objectives of Study

The objective of study was to assess and evaluate the extent to which e-government processes are used effectively for rendering routine service delivery in Government Departments in the Province of Limpopo, South Africa.

2. Methods and Materials of Study

The study was based on quantitative data sets gathered from 823 participants working in Limpopo Province. Data was gathered on 36 socioeconomic factors that used for the assessment of the quality of e-government services (the provision of essential public and municipal services by using digital and online methods) by the United Nations Department of Social and Economic Affairs (2022) in all parts of the world. According to the United Nations Department of Social and Economic Affairs (2022), Denmark, Singapore, Canada, the USA, Germany, Australia, the United Kingdom and South Korea are examples of nations in which e-government services are provided efficiently and reliably to the people. The key differential factors are the availability of advanced telecommunications and digital infrastructure, a high rate of literacy, respect for the principles of accountability to the people, adherence to good governance principles and political com-

mitment to uphold the rule of law by public servants and elected governments. E-government services are highly effective and efficient methods of providing essential socioeconomic, health-related and educational services to the general population. Electronic services are easily verifiable, speedy, affordable, and difficult to delay or cover-up. They discourage incompetence and political interference and are difficult to abuse. Electronic services can be provided non-stop to all deserving people. Thus, it is highly desirable for national governments to rely on electronic services to meet service delivery expectations of their populations.

The [South African National Department of Public Service and Administration \(2022\)](#) aspires to render the following essential services to all people living and conducting business in the Republic of South Africa in accordance with the South African Batho-Pele Principle of serving the people with humility and complete devotion, pride and loyalty. The basic moto of the Batho-Pele Principle is to provide all services that are owed to the people efficiently, promptly, and with complete respect, accountability, professionalism, honesty, integrity, dedication and pride. These are all key aspects of good leadership and accountability to the people. The provision of highly efficient and affordable e-government services requires digital infrastructure, low cost of telecommunications, electricity services, high rates of literacy, and the ability to create an economically enabling working environment for business enterprises ([Worku, 2022](#)).

According to the [South African National Department of Public Service and Administration \(2022\)](#), e-government services need to be provided to all people who live and work in South Africa in areas related to identification cards and passports, birth and death registrations, marriage services, postal and telecommunications services, social grant services, safety and security services, primary health care services, educational services, business registration and license renewal services, tax-related services, municipal services involving electricity, water, sanitation, waste removal, municipal rates and taxes, housing services, disaster management and relief services, emergency and rescue services, road and transportation services, license registrations for vehicles, driver's licenses, employment-seeking services, skills-related training services, voter registration services, pension services, poverty alleviation services, information dissemination and awareness services, and infrastructural services. These areas account for the main areas of demand from the public. According to a study conducted by [Van Karnenbeek, Salet, and Majoor \(2021\)](#), the main obstacle to the successful implementation of e-government services in South Africa is lack of computer literacy, poor infrastructure, and lack of efficiency in implementing policies that have been formally endorsed by the South African Government.

The sample size of study was equal to 823. [Table 1](#) shows designations of the 823 participants of study. The 823 participants of research are 5 senior project managers, 5 senior managers working on finance-related issues, 6 Directors and Deputy Directors working on policy and governance-related issues, 4 technical managers, 15 mayors and their assistants, and 788 stakeholders working in the 5 Districts of Limpopo Province (Capricorn, Mopani, Sekhukhune, Vhembe and

Waterberg) at various local communities in Limpopo Province (South African National Department of Public Service and Administration, 2022). Quantitative methods of data collection and analyses were used for conducting the survey. Frequency counts and percentages, two-by-two crosstab analyses, ordered logit regression analysis (Hosmer & Lemeshow, 2013) and log-linear analysis (Agresti, 2018) were used for performing univariate, bivariate and multivariate data analysis. As part of the survey, all available data sets were analysed through the Pretoria-based specialist research institution LEAP (Pty) Ltd. Thus, the survey could be viewed as a census (Levy & Lemeshow, 2013).

Table 2 shows the profile of the 823 participants of the survey. The table shows that the overall perceived level of demand for e-government services was 54.01% by the standards of the United Nations Department of Social and Economic Affairs (2022). About 79.43% of participants displayed satisfactory awareness about the potential benefits of e-government services to the people by the standards of the United Nations Department of Social and Economic Affairs (2022). About 49.75% of participants had access to the internet. About 4.26% of participants used their cell phones for accessing the internet. About 9.98% of participants used an internet café for accessing the internet. About 13.38% of participants had access to the internet at home. About 64.84% of participants used workplace facilities to have access to the internet. About 51% of participants had access to the internet. About 73% of participants were computer-literate. That is, they were capable of using the computer for having access to the internet, read their messages, reply to their messages, and take appropriate actions such as contacting the relevant authorities and seeking appropriate help. These estimates are similar to estimates published by the United Nations Department of Social and Economic Affairs (2022) for developing nations of the world.

Table 3 shows the demographic profile of the 823 participants of the survey. About 12.17% of participants possessed matric-level education. About 8.39% of

Table 1. Designations of participants of survey (n = 823).

Designations of participants and their duties and responsibilities	Number
Mayors and their assistants	15
Senior project managers who are responsible for implementing projects that are duly approved at municipal level	5
Auditors and accountants who are responsible for compliance with financial regulations stipulated by the South African National Treasury	5
Directors and Deputy Directors who are responsible for the implementation of policy and governance-related issues	6
Technical managers who are responsible for providing IT-related support	4
Members of local communities in Limpopo Province who liaise with Government Departments on behalf of their communities in the 5 Districts of Limpopo Province (Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg)	788
Total	823

Table 2. Description of eligible respondents of study (n = 823).

Variable of study	Number (percentage)
Overall perceived level of demand for e-government services by the standards of the United Nations Department of Social and Economic Affairs (2022)	Yes: 444 (54.01%) No: 378 (45.99%)
Perceived level of awareness about the potential benefits of e-government services	Good: 61 (7.42%) Above average: 148 (18.00%) Average: 444 (54.01%) Below average: 104 (12.65%) Poor: 65 (7.91%)
Level of access to the internet	Good: 39 (4.74%) Above average: 54 (6.57%) Average: 316 (38.44%) Below average: 302 (36.74%) Poor: 111 (13.50%)
Source of access to the internet	Cell phone: 35 (4.26%) Internet café: 82 (9.98%) Internet at home: 110 (13.38%) Internet at work: 533 (64.84%) None: 62 (7.54%)
Level of computer literacy	Good: 11 (1.34%) Above average: 316 (38.40%) Average: 272 (33.09%) Below average: 160 (19.46%) Poor: 63 (7.66%)

Table 3. Demographic profile of participants of study (n = 823).

Personal characteristics of participants	Number (percentage)
Highest level of formal education of participants	Doctoral degree: 11 (1.34%) Master's degree: 50 (6.08%) Bachelor's or Honour's degree: 289 (35.16%) Diploma: 303 (36.86%) Certificate: 69 (8.39%) Grade 12 or less: 100 (12.17%)
Age categories of participants	30 years or less: 54 (6.57%) 31 to 40 years: 445 (54.14%) 41 to 50 years: 140 (17.03%) 51 to 60 years: 138 (16.79%) 61 years or more: 45 (5.47%)
Gender of participants	Male: 542 (65.94%) Female: 280 (34.06%)
Race categories of participants	African: 433 (52.68%) White: 232 (28.22%) Coloured: 139 (16.91%) Asian: 18 (2.19%)

them had certificates. About 36.86% of them had diplomas. About 35.16% of them had Bachelor's or Honour's degrees. About 6.08% of them had Master's degrees. Eleven of the 822 participants had Doctoral degrees. About 6.57% of participants had ages of 30 years or less. About 54.14% of participants had ages of 31 to 40 years. About 17.03% of participants had ages of 41 to 50 years. About 16.79% of participants had ages of 51 to 60 years. About 5.47% of participants had ages of 61 years or more. Just under 66% of participants were male, whereas the remaining 34% of participants were female. The majority of participants (53%) were African. The percentage of white participants was 28%. The percentage of coloured participants was 17%. Asian participants accounted for just above 2%.

These estimates are similar to estimates published by the [United Nations Department of Social and Economic Affairs \(2022\)](#) for developing nations.

Table 4 shows statistics for the perceived level of demand for digital or online identity document services. The perceived level of demand for digital or online identity document applications and related services (applying for identity documents, following up on applications, making payments for identity documents, reporting lost identity documents, and reporting changes in addresses and contact details) was 91.24%. The perceived level of demand for digital or online birth registration and related services was 65.45%. The perceived level of demand for digital or online passport and related services was 72.51%. These estimates are similar to estimates published by the [United Nations Department of Social and Economic Affairs \(2022\)](#) for developing nations.

Table 5 shows statistics for the perceived level of demand for digital or online health, water and sanitation services. The perceived level of demand for digital

Table 4. Perceived level of demand for digital identity document and related services (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for digital or online identity document and related services	Good: 17 (2.07%) Above average: 132 (16.06%) Average: 601 (73.11%) Below average: 36 (4.38%) Poor: 36 (4.38%)
Perceived level of demand for digital or online birth registration and related services	Good: 90 (10.95%) Above average: 164 (19.95%) Average: 284 (34.55%) Below average: 195 (23.72%) Poor: 89 (10.83%)
Perceived level of demand for digital or online passport and related services	Good: 11 (1.34%) Above average: 318 (38.69%) Average: 267 (32.48%) Below average: 163 (19.83%) Poor: 63 (7.66%)

Table 5. Perceived level of demand for digital health and water-related services (n = 823).

Type of service required and perceived level of Number (percentage) demand for the service	
Perceived level of demand for digital or online health-related services	Good: 39 (4.74%) Above average: 54 (6.57%) Average: 327 (39.78%) Below average: 305 (37.10%) Poor: 97 (11.80%)
Perceived level of demand for digital or online water-related services	Good: 2 (0.24%) Above average: 60 (7.30%) Average: 407 (49.51%) Below average: 229 (27.86%) Poor: 124 (15.09%)
Perceived level of demand for digital or online sanitation-related services	Good: 17 (2.07%) Above average: 427 (51.95%) Average: 240 (29.20%) Below average: 54 (6.57%) Poor: 84 (10.22%)
Perceived level of demand for digital or online waste management services	Good: 12 (1.46%) Above average: 316 (38.44%) Average: 270 (32.85%) Below average: 159 (19.34%) Poor: 65 (7.91%)

or online health-related services was 51%. Such services entail opening up files, making appointments for physical examination and laboratory tests, making payments for services and medicines, launching account-related queries, reporting current health condition, collecting medical certificates, seeking vaccination, immunisation and primary health care services, seeking maternal and child health services, obtaining health education, and asking for emergency assistance. The perceived level of demand for digital or online water-related services (applying for water services, opening up municipal water accounts, launching account-related queries, reporting water leaks, and asking for emergency assistance) was 57%. The perceived level of demand for digital or online sanitation-related services (applying for sanitation services, opening up municipal accounts, launching account-related queries, reporting sanitation problems, and asking for emergency assistance) was 83%. The perceived level of demand for digital or online waste management services (applying for waste management services, opening up municipal accounts, launching account-related queries, reporting waste-related problems, and asking for emergency assistance) was 73%. These estimates are similar to estimates published by the [United Nations Department of Social and Economic Affairs \(2022\)](#) for developing nations.

Table 6 shows statistics for the perceived level of demand for digital or online municipal electricity services. The perceived level of demand for digital or online municipal electricity services (opening up a municipal electricity account, making

Table 6. Perceived level of demand for digital municipal electricity services (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for digital or online municipal electricity services	Good: 90 (10.95%) Above average: 162 (19.71%) Average: 286 (34.79%) Below average: 195 (23.72%) Poor: 89 (10.83%)
Perceived level of demand for digital or online municipal housing services	Good: 12 (1.46%) Above average: 317 (38.56%) Average: 268 (32.60%) Below average: 160 (19.46%) Poor: 65 (7.91%)
Perceived level of demand for digital or online social grant-related services	Good: 191 (23.24%) Above average: 498 (60.58%) Average: 54 (6.57%) Below average: 36 (4.38%) Poor: 43 (5.23%)

payments for electricity services, launching account-related queries, reporting electricity problems, and asking for emergency assistance) was 65%. The perceived level of demand for digital or online municipal housing services (applying for a municipal house, and following up on a submitted application) was 73%. The perceived level of demand for digital or online social grant-related services (applying for social grants, collecting payments, and launching payment-related queries) was 90%. These estimates are similar to estimates published by the [United Nations Department of Social and Economic Affairs \(2022\)](#) for developing nations.

Table 7 shows statistics for the perceived level of demand for digital or online environmental services. The perceived level of demand for digital or online environmental services is 74%. The perceived level of demand for digital or online education-related services is 62%. The perceived level of demand for digital or online skills-based training services is 50%. These estimates are similar to estimates published by the [United Nations Department of Social and Economic Affairs \(2022\)](#) for developing nations.

Table 8 shows statistics for the perceived level of demand for digital or online disaster and relief management services. The perceived level of demand for digital or online disaster and relief management services is 65%. The perceived level of demand for digital or online emergency and rescue services is 63%. The perceived level of demand for digital or online poverty alleviation services is 54%. The perceived level of demand for digital or online job application services is 74%. These estimates are similar to estimates published by the [United Nations Department of Social and Economic Affairs \(2022\)](#) for developing nations.

Table 9 shows statistics for the perceived level of demand for digital or online postal services. The perceived level of demand for digital or online postal services is

Table 7. Perceived level of demand for environmental services (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for digital or online environmental services	Good: 19 (2.31%) Above average: 357 (43.43%) Average: 231 (28.10%) Below average: 124 (15.09%) Poor: 91 (11.07%)
Perceived level of demand for digital or online education-related services	Good: 401 (48.78%) Above average: 105 (12.77%) Average: 13 (1.58%) Below average: 225 (27.37%) Poor: 78 (9.49%)
Perceived level of demand for digital or online skills-based training services	Good: 37 (4.50%) Above average: 54 (6.57%) Average: 318 (38.69%) Below average: 305 (37.10%) Poor: 108 (13.14%)

Table 8. Perceived level of demand for digital safety and security services (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for digital or online disaster and relief management services	Good: 89 (10.83%) Above average: 73 (8.88%) Average: 377 (45.86%) Below average: 195 (23.72%) Poor: 88 (10.71%)
Perceived level of demand for digital or online emergency and rescue services	Good: 37 (4.50%) Above average: 59 (7.18%) Average: 422 (51.34%) Below average: 231 (28.10%) Poor: 73 (8.88%)
Perceived level of demand for digital or online poverty alleviation services	Good: 85 (10.34%) Above average: 77 (9.37%) Average: 288 (35.04%) Below average: 275 (33.45%) Poor: 97 (11.80%)
Perceived level of demand for digital or online job application services	Good: 12 (1.46%) Above average: 314 (38.20%) Average: 281 (34.18%) Below average: 151 (18.37%) Poor: 64 (7.79%)

74%. The perceived level of demand for digital or online vehicle registration and license services is 73%. The perceived level of demand for digital or online road and transportation-related services is 72%. These estimates are similar to estimates published by the [United Nations Department of Social and Economic](#)

Table 9. Perceived level of demand for digital postal services (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for digital or online postal services	Good: 19 (2.31%) Above average: 355 (43.19%) Average: 233 (28.35%) Below average: 124 (15.09%) Poor: 91 (11.07%)
Perceived level of demand for digital or online vehicle registration and license services	Good: 11 (1.34%) Above average: 316 (38.44%) Average: 273 (33.21%) Below average: 159 (19.34%) Poor: 63 (7.66%)
Perceived level of demand for digital or online road and transportation-related services	Good: 11 (1.34%) Above average: 317 (38.56%) Average: 270 (32.85%) Below average: 161 (19.59%) Poor: 63 (7.66%)

Affairs (2022) for developing nations.

Table 10 shows statistics for the perceived level of demand for digital or online pension payment and related services. The perceived level of demand for digital or online pension payment and related services is 98%. The perceived level of demand for digital or online marriage and related services is 97%. The perceived level of demand for digital or online community awareness programmes is 74%. The perceived level of demand for digital or online death and related services is 97%. The perceived level of demand for digital or online voter registration and related services is 74%. These estimates are similar to estimates published by the *United Nations Department of Social and Economic Affairs (2022)* for developing nations.

Table 11 shows statistics for the perceived level of demand for digital or online methods for enhancing efficiency in tax collection. The perceived level of demand for digital or online methods as a means of enhancing efficiency in tax collection is 90%. The perceived level of demand for digital or online methods for enhancing efficiency in death-related services is 97%. The perceived level of demand for digital or online methods as a means of enhancing voter registration services is 74%. These estimates are similar to estimates published by the *United Nations Department of Social and Economic Affairs (2022)* for developing nations.

Table 12 shows statistics for the perceived level of demand for digital or online methods for deterring corruption and underperformance. The perceived level of demand for digital or online services as a means of promoting accountability to the people is 73%. The perceived level of demand for digital or online services as a means of deterring corruption is 73%. The perceived level of demand for digital or online services as a means of deterring underperformance by

Table 10. Perceived level of demand for digital pension-related services (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for digital or online pension payments and related services	Good: 249 (30.29%) Above average: 545 (66.30%) Average: 13 (1.58%) Below average: 12 (1.46%) Poor: 3 (0.36%)
Perceived level of demand for digital or online marriage and related services	Good: 235 (28.59%) Above average: 547 (66.55%) Average: 18 (2.19%) Below average: 18 (2.19%) Poor: 4 (0.49%)
Perceived level of demand for digital or online community awareness services	Good: 19 (2.31%) Above average: 353 (42.94%) Average: 236 (28.71%) Below average: 123 (14.96%) Poor: 91 (11.07%)
Perceived level of demand for digital or online death and related services	Good: 232 (28.22%) Above average: 546 (66.42%) Average: 21 (2.55%) Below average: 19 (2.31%) Poor: 4 (0.49%)
Perceived level of demand for digital or online voter registration and related services	Good: 19 (11.07%) Above average: 356 (43.31%) Average: 235 (28.59%) Below average: 121 (14.72%) Poor: 91 (11.07%)

Table 11. The use of digital methods for enhancing tax collection (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for digital or online tax-related services	Good: 191 (23.24%) Above average: 498 (60.58%) Average: 54 (6.57%) Below average: 36 (4.38%) Poor: 43 (5.23%)
Perceived level of demand for digital or online death and related services	Good: 232 (28.22%) Above average: 546 (66.42%) Average: 21 (2.55%) Below average: 19 (2.31%) Poor: 4 (0.49%)
Perceived level of demand for digital or online voter registration and related services	Good: 19 (11.07%) Above average: 357 (43.43%) Average: 231 (28.10%) Below average: 124 (15.09%) Poor: 91 (11.07%)

Table 12. The use of digital methods for deterring corruption and underperformance (n = 823).

Type of service required and perceived level of demand for the service	Number (percentage)
Perceived level of demand for promoting accountability to the people by using digital or online services	Good: 12 (1.46%) Above average: 317 (38.56%) Average: 271 (32.97%) Below average: 157 (19.10%) Poor: 65 (7.91%)
Perceived level of demand for deterring corruption by using digital or online services	Good: 12 (1.46%) Above average: 316 (38.44%) Average: 276 (33.58%) Below average: 153 (18.61%) Poor: 65 (7.91%)
Perceived level of demand for deterring underperformance by using digital or online services	Good: 12 (1.46%) Above average: 316 (38.44%) Average: 274 (33.33%) Below average: 155 (18.86%) Poor: 65 (7.91%)
Perceived level of demand for promoting knowledge dissemination by using digital or online services	Good: 18 (2.19%) Above average: 375 (45.62%) Average: 234 (28.47%) Below average: 126 (15.33%) Poor: 69 (8.39%)

public service employees is 73%. The perceived level of demand for promoting knowledge dissemination by using digital or online services is 76%. These estimates are similar to estimates published by the [United Nations Department of Social and Economic Affairs \(2022\)](#) for developing nations.

The survey entailed collecting data on 36 socioeconomic factors that affect the provision of e-government services in the province of Limpopo. Data reduction was carried out by using crosstab tests ([Beh & Lombardo, 2021](#)). The Pearson chi-square statistic was used for ranking the 36 socioeconomic factors in order of importance. [Table 13](#) shows the list of these 36 factors that are associated with the use of digital or online services in order of strength from top to bottom. Factors that are significantly associated with the use of e-government services have large observed chi-square values and small probability values. The table shows that 5 of the 36 factors are significantly associated with the use of e-government services. These 5 factors are the following:

- 1) Identity document applications and related services;
- 2) Social grant services;
- 3) Tax services;
- 4) Poverty alleviation services;
- 5) Electricity services.

Subsequent multivariate analysis was performed by using a stepwise backward elimination procedure with a probability cut-off point of 0.20. The process

Table 13. Order of strength of association of variables with use of e-government services (n = 823).

List of 36 factors associated with the use of e-government services	Observed chi-square value	P-value
Identity document applications and related services	46.4239	0.0000
Social grant services	44.5864	0.0000
Tax services	34.3742	0.0000
Poverty alleviation services	30.8419	0.0000
Electricity services	26.5123	0.0000
Race category	25.5836	0.0000
Birth registration and related services	25.4158	0.0000
Skills-based training services	22.0483	0.0000
Age of respondent	21.8382	0.0000
Health services	21.1931	0.0000
Water services	20.9907	0.0000
Educational services	20.5876	0.0000
Internet access	20.1396	0.0000
Internet source	15.8136	0.0030
Job application services	14.0043	0.0070
Underperformance deterrence services	13.9000	0.0080
Housing services	13.8933	0.0080
Vehicle registration and license services	13.8140	0.0080
Computer literacy	13.5886	0.0090
Accountability promotion services	13.5500	0.0090
Road and transport services	13.4425	0.0090
Waste services	13.2851	0.0100
Corruption deterrence services	13.2163	0.0100
Highest level of formal education	13.1920	0.0220
Passport application and related services	13.0909	0.0110
Awareness promotion services	6.2870	0.1790
Pension services	5.1614	0.2710
Marriage registrations and related services	4.1016	0.3920
Death registrations and related services	3.9606	0.4110
Knowledge dissemination services	1.3607	0.8510
Voting services	1.2960	0.8620
Community awareness services	1.0725	0.8990
Postal services	1.0153	0.9070
Environmental services	0.9981	0.9100
Sanitation services	0.8691	0.9290
Gender	0.8493	0.3570

identified 3 influential predictor variables that are shown in **Table 14** below. The table displays odds ratios, probability values and 95% confidence intervals of odds ratios (Hosmer & Lemeshow, 2013) for the 3 influential predictor variables.

The results displayed in **Table 14** show that the use of e-government services is significantly influenced by 3 predictor variables. These 3 predictor variables are the following:

- 1) Identity document applications and related services;
- 2) Social grant services;
- 3) Tax services.

The odds ratio of the variable “Identity document applications and related services” is 4.08. This indicates that the need for identity documents and related services enhances the demand for e-government services by a factor of 4.08 among the population living and working in Limpopo Province.

The odds ratio of the variable “Social grant services” is 3.69. This indicates that the need for social grant services enhances the demand for e-government services by a factor of 3.69 among the population living and working in Limpopo Province.

The odds ratio of the variable “Poverty alleviation services” is 2.95. This indicates that the need for poverty alleviation services enhances the demand for e-government services by a factor of 2.95 among the population living and working in Limpopo Province.

Standard diagnostic procedures were used for assessing the reliability of the fitted ordered logit regression model. The fitted logit model had the ability to accurately classify 76.69% of observations. A probability value of 0.4104 was obtained from a goodness-of-fit test developed by Hosmer and Lemeshow (2013). This figure of 0.4104 is greater than 0.05 or 5%. This finding confirms that the fitted ordered logit regression model is theoretically reliable.

Log-linear analysis (Agresti, 2018) was used for identifying key predictor variables that significantly influence the level of perceived demand for e-government services. **Table 15** shows that the perceived demand for e-government services was significantly influenced by 3 predictor variables. These 3 predictor variables were the need for identity document applications and related services, the need for social grant services, and the need for tax-related services. These findings were similar to findings obtained from ordered logit regression analysis. Standard diagnostic tests were used for assessing the reliability of the fitted log-linear

Table 14. Odds ratios estimated from ordered logit analysis (n = 823).

Predictors of the use of e-government services	Odds ratio	P-value	95% confidence interval
Identity document applications and related services	4.08	0.0000	(3.81, 4.35)
Social grant services	3.69	0.0000	(3.42, 3.96)
Tax services	2.95	0.0000	(2.68, 3.22)

Table 15. Results obtained from log-linear analysis (n = 823).

Factors associated with demand for e-government services	P-value
Identity document applications and related services	0.0000
Social grant services	0.0000
Tax services	0.0000

model. The tests showed that the fitted model was quite reliable.

3. Discussion of Results

The study has found that the perceived demand for e-government services in Limpopo Province was 54.01%. Results obtained from multivariate analysis have shown that the use of e-government services was significantly influenced by 3 predictor variables. These 3 predictor variables were the need for South African identity document applications and related services, the need for social grant services, and tax-related services.

The annual report published by the [South African National Treasury \(2021\)](#) for the financial year 2019/2020 shows that there are 1.3 million employees working in national and provincial government Departments who were paid R567 Billion in salaries and employee benefits. The annual report published by the [South African National Department of Public Service and Administration \(2022\)](#) for the financial year 2020/2021 shows that 73% of the budget allocated to South African Government Departments at national and provincial levels is used up for paying salaries and employee benefits and that only 27% of the budget is available for providing essential public services to the people. The dire implication is that South African local municipalities are often unable to pay for the maintenance and upgrade of municipal infrastructure in areas such as repairing broken water and sewerage pipes, water storage, purification and distribution systems, electrical substations and power generators, the repair and maintenance of health facilities, educational facilities, roads, street lights and public buildings.

A report published by [Statistics South Africa \(2021\)](#) shows that the South African public sector consists of 2.2 million employees. These are 455,701 national government employees, 1,118,748 provincial government employees, 311,361 local government employees, and 275,851 employees employed by public facilities such as libraries, parks, zoos and education and training institutions. A report published by the [World Bank \(2022\)](#) points out that the South African public sector is weighed down by obstacles such as too many employees, lack of skills that are specific to job descriptions of employees, a skewed distribution of assets, inability to perform adequately, inability to objectively monitor and evaluate the performance of employees, inability to enforce municipal bylaws, lack of accountability to the people, lack of transparency, lack of good leadership, failure to use land optimally, poor implementation of work plans, inadequate property rights, low competition, the political appointment of employees who

lack the ability to perform adequately at the workplace, and the abuse of public resources. Although there have been recommendations to trim the bloated size of the public sector, the size of the public sector has kept increasing steadily since April 1994 due to the employment of black South African employees in the public sector in large numbers and rates.

Tomaselli (2021: p. 4) has pointed out that the main benefit of e-government services in developing nations is mitigating corruption and alleviating under-performance by employees. Digital processes allow clients and customers to demand verification and evidence of service delivery in writing, with copies to all relevant line function managers and stakeholders. The study conducted by Snow, Hakonsson, and Obel (2016) shows that customers and stakeholders often demand evidence of service delivery from municipal employees and that the ability to provide evidence of service delivery is a key indicator of success and achievement in Denmark. Services are rendered digitally, with proper records and evidence. All claims are readily verifiable to the satisfaction of municipal employees and clients alike. No resources are wasted on bureaucratic processes, lengthy telephone calls and long queues. Municipal services that are rendered routinely in smart cities such as Copenhagen in Denmark are a result of investment on ICT infrastructure and skills-based training on how to use digital technology in the course of municipal service delivery.

The survey conducted by the United Nations Department of Social and Economic Affairs (2022) shows that developing nations Such as South Africa must be capable of using Geographic Information Systems (GISs) for enhancing the current level of service delivery. GIS technology is helpful for determining spatial relationships and physical locations. Developing nations do not have a complete and functional GIS system for all local municipalities, especially for rural local municipalities. There is also a shortage of appropriately trained GIS specialists in local municipalities. As a result, vulnerable rural communities are left out often.

Digital transmission enables viewers to receive a much better quality of picture on television. It is much more efficient than analogue transmission. However, it requires the installation of ICT infrastructure and signal processors. Digital transmission has transformed the television industry in South Africa. Digital transmission has enabled viewers to choose from a wide variety of local and international streaming programmes at an affordable cost. Digital transmission has also added value to radio programmes, tele-text programmes, interactive communication and services, interactive games, and the exchange of valuable information among stakeholders.

The survey by Boshoff (2022: p. 14) has identified barriers such as poor decision making processes, reluctance to embracing new ideas and concepts, unhelpful organisational culture, lack of budget for implementing technological change and training, organisational culture that is not willing to accept reasonable risk, lack of ICT skills among public sector employees, inability to expand

ICT and digital infrastructure, lack of commitment for upgrading technical skills and knowledge among public sector employees, and failure to secure and protect public resources. The South African State Information Technology Agency (SITA) is responsible for building the ICT capacity required for providing efficient e-government services in Government Departments. [Abrahams and Burke \(2022\)](#) have pointed out that not enough progress has been made so far in setting the stage for an efficient roll out of e-government services due to lack of ICT skills, shortage of technicians in the ICT field and lack of budget in Government Departments.

Two key areas in which e-government services are highly needed for enhancing efficiency in service delivery areas are the distribution of social grants and the management of South African roads and traffic by using the electronic National Traffic Information System (e-NaTIS). Both functions are highly dependent upon the availability of adequate ICT skills, budget and appropriate infrastructure. [Trent and Joubert \(2022\)](#) have shown that e-government services are not being rolled out due to technical ICT-related difficulties, lack of technical skills, and failure to have employees trained on ICT-related skills. The authors have shown that most of the existing central databases are not easily accessible and user-friendly. The Batho-Pele Principle of rendering public services to the people entails serving the people with humility, dedication and efficiency. In order to make good on this undertaking, it is essential to invest and upgrade the existing ICT infrastructure in service delivery institutions.

4. Conclusion

The study has found that the perceived demand for e-government services in Limpopo Province was 54.01%. Results obtained from the multivariate analysis have shown that the use of e-government services was significantly influenced by 3 predictor variables. These predictor variables were the need for South African identity document applications and related services, the need for social grant services, and tax-related services. The effective use of e-government services can only be achieved by way of ensuring the allocation of adequate budget, enough number of highly skilled ICT and telecommunications engineers and project managers with a proven track record to lead the process. It is also essential to foster collaboration and partnership between public and private sector companies. The study by [Kock and Govender \(2021\)](#) has shown the need for accountability, good leadership and compliance with ethical principles.

Surveys conducted by [Meyer and Overen \(2021: p. 4273\)](#) and [Motepe, Hasan, and Shongwe \(2022\)](#) have shown that a lack of efficiency in service delivery can be effectively addressed by adopting e-government and digital modes of service delivery. In this regard, the key requirement is the promotion of awareness about the benefits of e-government processes, and the task of securing adequate finance for installing ICT infrastructure in local municipalities that are hard-pressed for resources and skilled manpower.

5. Recommendations

In view of the results obtained from the survey, the following recommendations are made to the Limpopo Provincial Government and the South African National Department of Public Service and Administration. The study has shown that it is essential to train public servants who are responsible for providing services to the people on how to use digital technology and e-government applications and processes. The study has also shown the need to invest in the upgrading of ICT infrastructure and to allocate enough operational budgets. The study has shown the need for monitoring and evaluation processes for assessing the level of performance of employees and the quality of services that are provided to people. Accordingly, the following recommendations are appropriate:

- Employees working on ICT-related services should be equipped with appropriate equipment and training opportunities, so that they are capable of rendering services effectively;
- The state of the existing ICT infrastructure should be critically assessed and evaluated to make sure that it is adequate for providing services;
- An investment should be made in the training of employees who are responsible for service delivery to the people; and
- Monitoring and evaluation techniques should be used for ensuring satisfactory performance by all employees who are responsible for providing services to the people.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Abrahams, L., & Burke, M. (2022). *Report on the South African Experience in Open Digital Governance*.
<https://www.wits.ac.za/media/wits-university/research/tayarisha/documents/SA-EU-Dialogue-ODG-SA-experience.pdf>
- Adedokun, T. A., & Zulu, S. P. (2022). Towards Digital Inclusion in South Africa: The Role of Public Libraries and the Way Forward. *Interdisciplinary Journal of Economics and Business Law*, 11, 127-154.
- Agresti, A. (2018). *An Introduction to Categorical Data Analysis*. John Wiley & Sons.
- Alexander, C., Berrisford, S., Nkula-Wenz, L., Ndhlovu, D., Siame, G., Watson, V., & Zinnbauer, D. (2022). Challenges and Opportunities of Curbing Urban Corruption and Building Professional Integrity: Experiences of Planners in South Africa and Zambia. *Habitat International*, 122, 1-13. <https://doi.org/10.1016/j.habitatint.2022.102541>
- Alexander, P., Runciman, C., Ngwane, T., Moloto, B., Mokgele, K., & Van Staden, N. (2018). Frequency and Turmoil: South Africa's Community Protests 2005-2017. *South African Crime Quarterly*, 63, 27-42. <https://doi.org/10.17159/2413-3108/2018/i63a3057>
- Andreoni, A., Creamer, K., Mazzucato, M., & Steyn, G. (2022). How Can South Africa Advance a New Energy Paradigm? A Mission-Oriented Approach to Megaprojects. *Oxford Review of Economic Policy*, 38, 237-259. <https://doi.org/10.1093/oxrep/grac007>

- Beh, E. J., & Lombardo, R. (2021). *An Introduction to Correspondence Analysis*. John Wiley & Sons. <https://doi.org/10.1002/9781119044482>
- Boshoff, T. (2022). Is Service Delivery in South Africa for Sale? *Farmer's Weekly*, 22005, 14-15.
- Bowman, A. (2020). Parastatals and Economic Transformation in South Africa: The Political Economy of the ESKOM Crisis. *African Affairs*, 119, 395-431. <https://doi.org/10.1093/afraf/adaa013>
- Carmichael, T. R. (2022). Is Protest Action in South Africa Bringing Positive Change or Is It Threatening our Human Right to Security? *South African Journal of Bioethics and Law*, 14, 1-13. <https://doi.org/10.7196/SAJBL.2022.v15i1.795>
- Darsono, S. N. A. C., Wong, W. K., Nguyen, T. T. H., Jati, H. F., & Dewanti, D. S. (2022). Good Governance and Sustainable Investment: The Effects of Governance Indicators on Stock Market Returns. *Advances in Decision Sciences*, 26, 69-101. <https://doi.org/10.47654/v26y2022i1p69-101>
- Dikotla, M. A., & Legodi, A. L. (2022). E-Docket System for Improved Administration and Justice Delivery in Selected Limpopo Province Police Stations. *Journal of the South African Society of Archivists*, 55, 27-40. <https://doi.org/10.4314/jsasa.v55i.3>
- Ede, C. I., & Jili, N. N. (2020). Service Delivery with Wanton Protests in Megalopolises, South Africa. *Indexing & Abstracting*, 1, 50-60.
- Erasmus, M. N. (2021). Public Administration in the Fourth Industrial Revolution: Implications for the Practice. *Gender and Behaviour*, 19, 18199-18205.
- Eskom (Pty) Ltd. (2021). *Annual Report for 2019/2020*. Eskom Holdings.
- Fashoro, I., & Barnard, L. (2021). Assessing South African Government's Use of Social Media for Citizen Participation. *The African Journal of Information Systems*, 13, 1-20.
- Ferreira, I. W. (2021). Government Corruption in South Africa. In K. K. Tummala (Ed.), *Corruption in the Public Sector: An International Perspective* (pp. 99-111). Emerald Publishing Limited. <https://doi.org/10.1108/S2053-769720210000034008>
- Fishbein, M. (1979). A Theory of Reasoned Action: Some Applications and Implications. *Nebraska Symposium on Motivation*, 27, 65-116.
- Folly, K. A. (2021). Competition and Restructuring of the South African Electricity Market. In *Local Electricity Markets* (pp. 355-366). Academic Press. <https://doi.org/10.1016/B978-0-12-820074-2.00002-2>
- Fourie, D., & Malan, C. (2020). Public Procurement in the South African Economy: Addressing the Systemic Issues. *Sustainability*, 12, Article 8692. <https://doi.org/10.3390/su12208692>
- Harris, L. M. (2020). Assessing States: Water Service Delivery and Evolving State-Society Relations in Accra, Ghana and Cape Town, South Africa. *Environment and Planning C: Politics and Space*, 38, 290-311. <https://doi.org/10.1177/2399654419859365>
- Hosmer, D. W., & Lemeshow, S. (2013). *Applied Logistic Regression Analysis*. John Wiley & Sons. <https://doi.org/10.1002/9781118548387>
- Hsu, Y. L., & Liao, L. K. C. (2022). Corporate Governance and Stock Performance: The Case of COVID-19 Crisis. *Journal of Accounting and Public Policy*, 41, Article ID: 106920. <https://doi.org/10.1016/j.jaccpubpol.2021.106920>
- Kanyane, M., Mutema, E. P., & Zikhali, T. (2022). Social Accountability in Local Government: Lessons from Vuwani (South Africa) and Gweru (Zimbabwe). *Journal of Public Affairs*, 22, e2581. <https://doi.org/10.1002/pa.2581>
- Kashaija, L. S. (2022). E-Records Management Readiness for Implementation of E-

- Government in Local Authorities of Singida Municipal Council. *Journal of the South African Society of Archivists*, 55, 41-55. <https://doi.org/10.4314/jsasa.v55i.4>
- Khale, S. (2015). Assessment of the Quality of Municipal Services in the City of Tshwane, South Africa. *Journal of Corporate Governance and Control*, 13, 678-695. <https://doi.org/10.22495/cocv13i1c6p6>
- Khale, S., & Worku, Z. (2015). Benefits of Good Corporate Governance Principles: A Study of the City of Tshwane, South Africa. *Journal of Corporate Governance and Control*, 13, 753-770. <https://doi.org/10.22495/cocv13i1c9p1>
- Khanyile, M., Nzimakwe, T. I., & Mthuli, S. A. (2021). Challenges of Innovations in Participatory Governance in uMshwathi Local Municipality in Kwazulu-Natal. *Journal of Public Administration*, 56, 972-985.
- King, M. E. (2019). *The King IV Report on Corporate Governance for South Africa*. Institute of Directors in Southern Africa.
- Klug, H. (2016). Challenging Constitutionalism in the Post-Apartheid South Africa. *Constitutional Studies*, 1, 41-58.
- Kock, Z., & Govender, K. K. (2021). Load-Shedding and the Declining Energy Availability Factor: A Case Study of a South African Power Station. *Mediterranean Journal of Social Sciences*, 12, 128-140. <https://doi.org/10.36941/mjss-2021-0063>
- Lancaster, L. (2018). Unpacking Discontent: Where and Why Protest Happens in South Africa. *South African Crime Quarterly*, 64, 29-43. <https://doi.org/10.17159/2413-3108/2018/i64a3031>
- Levy, P. S., & Lemeshow, S. (2013). *Sampling of Populations: Methods and Applications*. John Wiley & Sons.
- Manoharan, A. P., Ingrams, A., Kang, D., & Zhao, H. (2021). Globalization and Worldwide Best Practices in E-Government. *International Journal of Public Administration*, 44, 465-476. <https://doi.org/10.1080/01900692.2020.1729182>
- Meyer, E. L., & Overen, O. K. (2021). Towards a Sustainable Rural Electrification Scheme in South Africa: Analysis of the Status Quo. *Energy Reports*, 7, 4273-4287. <https://doi.org/10.1016/j.egy.2021.07.007>
- Mishra, S. S., & Geleta, A. T. (2020). Can an E-Government System Ensure Citizens' Satisfaction without Service Delivery? *International Journal of Public Administration*, 43, 242-252. <https://doi.org/10.1080/01900692.2019.1628053>
- Mosweu, O. (2019). Knowledge and Skills Requirements for a Records Manager in Botswana in the Networked Environment. *Journal of the South African Society of Archivists*, 52, 110-132.
- Motepe, S., Hasan, A. N., & Shongwe, T. (2022). Forecasting the Total South African Unplanned Capability Loss Factor Using an Ensemble of Deep Learning Techniques. *Energies*, 15, Article 2546. <https://doi.org/10.3390/en15072546>
- Mpehle, Z., & Mudogwa, R. M. (2020). Utilisation of Digital Central Supplier Database in Enabling Electronic Procurement in the Limpopo Provincial Departments. *Africa's Public Service Delivery and Performance Review*, 8, a356. <https://doi.org/10.4102/apsdpr.v8i1.356>
- Mulamba, K. C. (2021). A Spatial Analysis of Property Crime Rates in South Africa. *South African Journal of Economics*, 89, 329-347. <https://doi.org/10.1111/saje.12279>
- Mullon, P. A., & Ngoepe, M. (2019). An Integrated Framework to Elevate Information Governance to a National Level in South Africa. *Records Management Journal*, 29, 103-116. <https://doi.org/10.1108/RMJ-09-2018-0030>
- Munyoka, W. (2020). Electronic Government Adoption in Voluntary Environments—A

- Case Study of Zimbabwe. *Information Development*, 36, 414-437.
<https://doi.org/10.1177/0266666919864713>
- Munyoka, W., & Manzira, F. M. (2013). Alignment of E-Government Policy Formulation with Practical Implementation: The Case of Sub-Saharan Africa. *International Journal of Economics and Management Engineering*, 7, 3034-3039.
- Mwangi, E. W., Irura, G., & Makori, E. O. (2022). Problems Encountered in Access and Use of E-Government Services in Kenya: Case of Huduma Postal City Square in Nairobi. *International Journal of Multidisciplinary Research and Innovation*, 1, 12-18.
- Ngcamu, B. S. (2019). Exploring Service Delivery Protests in Post-Apartheid South African Municipalities: A Literature Review. *The Journal for Transdisciplinary Research in Southern Africa*, 15, a643. <https://doi.org/10.4102/td.v15i1.643>
- Nokele, K. S., & Mukonza, R. M. (2021). The Adoption of E-Government in the Department of Home Affairs: Unpacking the Underlying Factors Affecting Adoption of E-Government within the Selected Service Centres in Limpopo Province, South Africa. *African Journal of Governance and Development*, 10, 98-117.
- Parbanath, S., Ndebele, I., Nyide, C. J., & Ndlovu, B. (2022). Management Support and Implementation of Electronic Document and Records Management Systems in KwaZulu-Natal (KZN). *Journal of Management Information & Decision Sciences*, 25, 1-17.
- Plantinga, P., & Adams, R. (2021). Rethinking Open Government as Innovation for Inclusive Development: Open Access, Data and ICT in South Africa. *African Journal of Science, Technology, Innovation and Development*, 13, 315-323.
<https://doi.org/10.1080/20421338.2020.1746046>
- Porogo, K. M. (2022). Digital Preservation Regulatory Frameworks for e-Government Infrastructure in Selected Ministries of Botswana. *Journal of the South African Society of Archivists*, 55, 137-146. <https://doi.org/10.4314/jsasa.v55i.10>
- Porogo, K. M., & Kalusopa, T. (2021). A Strategic Framework for Digital Preservation in the Context of e-Government in Botswana Public Service. *Journal of the South African Society of Archivists*, 54, 83-101. <https://doi.org/10.4314/jsasa.v54i1.7>
- Qhobosheane, L. A. M. (2018). *The Impact of Political Interference in State-Owned Companies: A Case Study on SABC* (pp. 1-82). Doctoral Dissertation, University of the Free State.
- Rudin, J., & Sanders, D. (2021). Debt, Structural Adjustment, and Health. In S. Benatar, & G. Brock (Eds.), *Global Health: Ethical Challenges* (pp. 170-181). Cambridge University Press. <https://doi.org/10.1017/9781108692137.013>
- Schoute, M., Gradus, R., & Budding, T. (2021). Drivers of Service Delivery Modes in Dutch Local Government: An Analysis over Time and across Domains. *International Review of Administrative Sciences*, 87, 425-439. <https://doi.org/10.1177/0020852320968906>
- Shava, E., & Mazenda, A. (2021). Ethics in South African Public Administration: A Critical Review. *International Journal of Management Practice*, 14, 306-324.
<https://doi.org/10.1504/IJMP.2021.115107>
- Snow, C. C., Hakonsson, D. D., & Obel, B. (2016). A Smart City Is a Collaborative Community: Lessons from Smart Aarhus. *California Management Review*, 59, 92-108.
<https://doi.org/10.1177/0008125616683954>
- South African National Department of Public Service and Administration (2022). *Annual Report for 2021/2022*.
<https://www.dpsa.gov.za/dpsa2g/documents/institutional/DPSA%20ANNUAL%20REPORT%202021-2022.pdf>

- South African National Department of Telecommunications and Postal Services (2022). *Annual Report for 2021/2022*. https://www.gov.za/sites/default/files/gcis_document/202210/2021-2022-dcdt-annual-report.pdf
- South African National Treasury (2021). *Annual Report for 2019/2020*. <https://www.treasury.gov.za>
- Statistics South Africa (2021). *Mid-Year Estimates for 2021*. <https://www.statssa.gov.za/publications/P03022021>
- Thomas, T. S. (2021). Climate Change and the Green Transition in South Africa. In A. Oqubay, F. Tregenna, & I. Valodia (Eds.), *The Oxford Handbook of the South African Economy* (pp. 1-13). Oxford University Press.
- Todd, I., & McCauley, D. (2021). Assessing Policy Barriers to the Energy Transition in South Africa. *Energy Policy*, 158, 112-123. <https://doi.org/10.1016/j.enpol.2021.112529>
- Tomaselli, K. (2021). Unpacking History, Unpacking Corruption, and Unpacking Media Analysis: Some Recent Books on the South African Media. *Communication*, 47, 1-19. <https://doi.org/10.1080/02500167.2021.1895241>
- Trent, N. M., & Joubert, J. W. (2022). Logistics Sprawl and the Change in Freight Transport Activity: A Comparison of Three Measurement Methodologies. *Journal of Transport Geography*, 101, Article ID: 103350. <https://doi.org/10.1016/j.jtrangeo.2022.103350>
- Tsabedze, V., & Kalusopa, T. (2018). Towards a Framework for e-Records Readiness in Support of e-Government in eSwatini. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives*, 37, 39-68.
- Tukamuhabwa, B. R. (2015). Antecedents and Consequences of Public Procurement Non-Compliance Behaviour. *Journal of Economics and Behavioural Studies*, 4, 34-36. <https://doi.org/10.22610/jeb.v4i1.300>
- Twala, C. (2014). The Causes and Socio-Political Impact of the Service Delivery Protests to the South African Citizenry: A Real Public Discourse. *Journal of Social Sciences*, 39, 159-167. <https://doi.org/10.1080/09718923.2014.11893279>
- United Nations Department of Social and Economic Affairs (2022). *United Nations E-Government Survey 2022*. <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2022>
- Van Karnenbeek, L., Salet, W., & Majoor, S. (2021). Wastewater Management by Citizens: Mismatch between Legal Rules and Self-Organisation in Oosterwold. *Journal of Environmental Planning and Management*, 64, 1457-1473. <https://doi.org/10.1080/09640568.2020.1829572>
- Worku, Z. (2022). A Qualitative Enquiry of Obstacles to Adequate Performance among Municipal Employees. *Specialusis Ugdymas*, 2, 1321-1329.
- World Bank (2022). *The World Bank in South Africa*. <https://www.worldbank.org>
- Yakobi, K., Scholtz, B., & Vom Berg, B. W. (2022). An Expert Review of the Social Media Analytics Framework for Citizen Relationship Management. *Digital Transformation for Sustainability*, 1, 347-367. https://doi.org/10.1007/978-3-031-15420-1_17