The Influence of Infrastructure on the Organisational Performance of Informal Sector SMEs

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Abstract

Small and medium size entities (SMEs) play a pivotal role in the economy contributing to gross domestic product, reducing unemployment and stimulating entrepreneurial activities. Especially informal sector SMEs since it is assumed that the informal sector absorbs surplus employees from the formal sector. The purpose of the research was to investigate the impact of infrastructure considering electricity, water supply and sanitation facilities on the organisational performance of informal sector SMEs. The rationale for the study is premised on the supposition that the external business environment subsuming infrastructure is a functional prerequisite to encourage entrepreneurship and stimulate economic growth.

A quantitative research methodology based on secondary data obtained from Statistics South Africa was implemented. Statistical analyses were performed on a sample comprising of 1658 participants. The statistical model was tested using a pluralistic approach consisting of correlation analysis, structural equation modelling and multiple regression analysis. Results indicated that water and sanitation facilities statistically significantly affected annual turnover and debt negatively. Electricity or power supply did not yield a statistically significant result, however 68.4% of the sample indicated access to power supply. A forestated could be used in future as a comparison point to determine the impact of loadshedding on SME performance.

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1. Introduction

1.1. Background

Small and medium sized enterprises (SMEs) are keystone in the development of a country in terms of contributing to gross domestic product (GDP), reducing unemployment and poverty as well as stimulating entrepreneurial activity (Sitharam & Hoque, 2016). It is extrapolated that SMEs constitute 91% of formal business entities in South Africa, contribute between 52% and 57% of GDP and the job creation opportunities are estimated at about 61% (Kalane, 2015 citing Abor & Quartey, 2010). Moreover, SMEs generate 55% of all employment in South Africa (Ramukumba, 2014). SMEs are a significant actor in the economic and social advancement of a nation (Zafar & Mustafa, 2017). Van Staden (2022) further explains that SMEs can be considered an essential part of the economy based on the contribution thereof to GDP and improvement of the general populace living standard. Furthermore, SMEs foster development of entrepreneurship, industry and the rural economy (Love & Roper, 2013; Ramukumba, 2014).

Referring to the rural economy, Ligthelm (2006) noted that most informal sector research in the South African context underscore informal entities operating primarily in rural areas. Etim and Daramola (2020) reflecting on previous research opine that the informal sector for the most part consist of unpaid employees in family enterprises, casual wage employment, home-based workers or service providers and street vending. Informal sector SMEs in South Africa encompass micro- or small enterprises that began as personal or family self-employment, focusing on production, processing and cross-country trading (Jayeolo, Sidek, Owoeye & Kazeem, 2020). Within the sub-Saharan context including South Africa the informal sector contributes approximately 20% to GDP (Medina, Jonelis & Congul, 2017). Furthermore, the informal sector constitutes an estimated 17% of total employment (Burger & Fourie, 2019). As such, Ligthelm (2006) postulates that the informal sector is pivotal ascribed to the potential role thereof in providing employment opportunities for the unemployed.

The importance of the informal sector is premised on the supposition that it absorbs surplus employees from the formal sector during economic downturn, howbeit the theoretical underpinning for the foretasted has largely been absent (Burger & Fourie, 2019). Given the high unemployment rate within the South African context, it stands to reason that creating employment opportunities for the unemployed is imperative. As such, Van Staden (2022) notes that South Africa has an alarming high unemployment rate of 27.1% which is intensified by chronic skills shortages. Hence, creating a conducive environment for informal sector SMEs has been a priority. Ajide (2020) opines that addressing the infrastructure gaps and fostering entrepreneurial activity are keystone to reduce African unemployment, stimulating productivity towards achieving inclusive development.

1.2. Problem Statement

Sitharam and Hoque (2016) note that the development rate of SMEs in the South African context is low, with an average of 50% failing to expand and or develop. Moreover, the failure rate is high. As such, Olawale and Garwe (2010) indicated that the SME failure rate of 75% is of the highest internationally. Van Staden (2022) confirms that an access of 70% of SMEs fail within three years from establishment. Kalane (2015) opine that the high failure rate of SMEs diminishes the sector's ability to meaningfully contribute to job creation, economic growth and poverty reduction. Cacciotti and Hayten (2015) expound that several factors impede SMEs success.

SME growth, development and survival largely depends on the business environment consisting out of internal and external factors (Jankowić, Mihajlović & Cvetković, 2016). First mentioned is related to human resources and business management, including for example human capital, organisational culture and organisational structure (Đuričić, 2013). Other internal factors subsume managerial competency, skills endowment, access to finance and technological capabilities (Sitharam & Hoque, 2016). The external environment refers to the aggregated milieu consisting of economic, social, political, legal and technical factors, which are deemed beyond organisational control and theoretically can influence organisational performance (Jankowić et al., 2016). Vlados and Chatzinikolaou (2019) suggest that the external social and economic symbiosis are examined ascribe to the influence thereof on organisational progress but cannot directly be controlled by said organisation. None withstanding, various external factors, *inter alia*, competition, globalisation, economic markets, crime, corruption, labour and regulations tentatively influence organisational performance (Olawale & Garwe, 2016), of which infrastructure is probably currently of fundamental concern.

Infrastructure factors, such as electricity or power supply, water, sanitation facilities and transportation have been identified as critical factors in economic development and are directly linked to organisational performance (Sitharam & Hoque, 2016, citing Okpara & Kabongo, 2009). Olawale and Garwe (2010) postulate that numerous developing economies are characterised by a deplorable state of basic infrastructure. More specifically related to the problem investigated in the research reported on, for SMEs to reducing unemployment and poverty at the same time stimulating entrepreneurial activity an enabling environment is needed (Schoeman & Saunders, 2018). Previous authors further expound that regular power outages also termed loadshedding in the South African context is threatening SMEs organisational performance and can have a detrimental effect on economic growth (Schoeman & Saunders, 2018).

Considering the above, a paucity of studies investigates the influence of infrastructure factors on SME performance in general and specifically in the informal sector. Kowo, Sabitu and Popoola (2018) conducted a study underscoring the impact of the external business environment on organisational performance in Nigeria focusing specifically on the frozen fish market. Results revealed that the

external environment significantly impacts organisational performance. However, the study excluded infrastructure as variable and underlined the economic and political landscape. Similarly, the conducted research was not demarcated to the informal sector. Schoeman and Saunders (2018) investigated the impact of power outages on SMEs in the City of Johannesburg focusing specifically on the retail sector. Saunders (2022) investigated aspects related to the business environment emphasising export propensity. Thus far a study investigating specifically the impact of infrastructure on SME performance in the informal sector could not be identified. To support SMEs in the informal sector towards ensuring sustainability a comprehensive understanding of the factors that might influence organisational performance is necessary.

1.3. Research purpose

The purpose of this study is to investigate the impact of infrastructure subsuming electricity, water supply and sanitation facilities on the performance of SMEs in the South African informal sector. The study adopts three measures of performance, *inter alia*, annual turnover, net profit and debt from borrowing. In sequence, the key constructs will be elaborated on, whereafter a hypothesised model will be illustrated and research hypotheses developed. Thereafter, the research methodology and the quantitative results will be presented. The managerial implications and conclusions will lastly be specified.

2. Literature Review

Organisational performance can be influenced by internal and external factors (Bakotić, 2016), which is the underling supposition of the research reported on. The following section will underscore the three main variables, viz. informal sector SMEs, organisational performance and infrastructure.

2.1 Informal sector SMEs

The informal sector consists of private unincorporated enterprises restricted in terms of the number of employees and incapable of constituting as a separate legal entity independent from proprietorship (Willians, 2013). As such, the informal sector includes micro- or small enterprises originated as family or self-employed commerce highlighting production, processing, and cross-country trading (Jonck & Nwosu, 2022, citing Jayeolo, Sidek, Owoeye & Kazeem, 2020). In the context of the research reported on, the informal sector was defined in accordance with registration and number of employees. Thus, employers, own-account employees and unpaid household employees, whose SMEs were not registered for VAT or income tax, were deemed informal sector SMEs (Statistics South Africa, 2017: 11).

2.2 Organisational performance

Organisational performance can be defined as the level of productivity the organisation achieve towards attaining its goals, increasing organisational resources, meeting customers' needs and improving internal processes (Zumitzavan, 2022). Widyastuti, Ferdinand and Hermanto (2023) citing previous

authors define organisational performance as the success of organisational units in realising predetermined strategic goals by means of measuring expected behaviour, for example in terms of turnover or sales, growth and profit. Mafini and Pooe (2013) reflecting on the corpus of knowledge defined organisational performance as organisational outputs as measured against intended goals and objectives. Various approaches can be utilized to measure organisational performance, *inter alia*, financial indicators, customer base, internal processes, innovation and learning perspective (Mafina & Pooe, 2013).

Rasula, Vuksic and Stemberger (2012) explained that the financial perspective considers the organisations' implementation and execution of the strategic intent and the contribution thereof to the bottom-line. Financial indicators used to measure organisational performance subsume revenue or turnover, costs, profit margins, cash flow, operating costs to mention a few. The customer perspective underscores the value proposition of the organisation towards generating sales and customer satisfaction. Indicators used include customer satisfaction surveys and market share (Rasula et al., 2012). The internal process perspective can also be termed operational performance which ascertain effectiveness, efficiency, productivity, and compliance with rules and regulations (Khalid & Nusari, 2020). However, organisational performance cannot completely relinquish financial measures (Britzelmaier & Schlegel, 2011). In the research reported on the financial approach was operationalised.

2.3 Infrastructure

Various dimensions of the business environment influence organisational performance (Aterido, Hallward-Driemeier & Pagés, 2009). As such, the business environment consists out of external and internal factors which theoretically could either positively or negatively affect business results (Janković et al., 2016). Specifically, an efficiently organised external environment is a functional prerequisite to motivate entrepreneurship and to attract investors to stimulate economic growth and to sustain current enterprises (Litavniece & Znotina, 2015). Kowo et al. (2018) concur that the external business environment can either impede or foster entrepreneurial activity in a country. Previous research found that the external business environment did not influence enterprises favourably in Serbia (Janković et al., 2016).

Cant and Wiid (2013) reflecting on the corpus of knowledge noted that economic variables (i.e., inflation, interest and exchange rates), crime, taxes and the market environment are exogenous or external challenges affecting SMEs. Litavniece and Znotina (2015) investigated the external business environment in terms of political influences, economic conditions, socio-cultural forces, technological factors, environmental aspects and regulatory conditions. Sitharam and Hoque (2016) noted that the external environment encompasses competition, globalisation, regulations, macro-economic factors (i.e., inflation and interest rates), crime and corruption. Olawale and Garwe (2010) expound that the

external business environment consists of the economic environment, markets, crime, corruption, labour, regulations and infrastructure.

Infrastructure includes aspects, such as electricity, water supply, sanitation facilities and transportation which are critical and directly linked to SME success (Okpara & Kabongo, 2009). Physical infrastructure within the entrepreneurial ecosystem context is deemed a resource endowment (Stam & Van de Ven, 2021). More specifically, physical infrastructure is considered a key enabler for economic interaction and entrepreneurship (Audretsch, Heger & Veith, 2015). Similarly, Ajide (2020) noted that infrastructure plays a significant role in entrepreneurial activity. Olawale and Garwe (2010) identified infrastructure, especially poor electricity and water supply, as statistically significant adverse factors that influenced newly registered SMEs in the Eastern Cape Province. Sitharam and Hoque (2016) revealed that 70% of SMEs in KwaZulu Natal indicated that electricity supply affects organisational performance. Research conducted by Ajide (2020) has shown that electricity, water and sanitation facilities had a statistically significant influence on entrepreneurial start-ups in Africa.

2.4 Theoretical framework

The study is partially underpinned by the theory of contingency (Khalid & Nusari, 2020) alongside the modernisation perspective (Huang, Xue & Wang, 2020). The theory of contingency proposes that organisations should adopt operating procedures, such as financial indicators based on the conditions and circumstances currently prevalent in the absence of a one-size-fit-all best-case scenario (Khalid & Nusari, 2020). Thus, the approach to determining organisational performance should be tailormade for the organisation in accordance with the current status-quo. Moreover, the modernisation perspective recommends that the pivotal role of the informal sector in the economy should be highlighted requiring a need to conduct research regarding SMEs operating in an informal economy (Jonck & Nwosu, 2022).

Principally, the theoretical underpinning of the reported research is the entrepreneurial ecosystem theory. Stam and Van den Ven (2021) noted that there appears to be an absence of a shared definition of an entrepreneurial ecosystem. Nonetheless, an entrepreneurial ecosystem consists of prerequisite elements to sustain entrepreneurship in a demarcated area towards achieving productive entrepreneurship (Stam & Van den Ven, 2021). Productive entrepreneurship is deemed the output of the entrepreneurial activity, which is produced by resource endowments, *inter alia*, physical infrastructure, demand, intermediaries, talent, knowledge, leadership and finance (Stam & Van den Ven, 2021). The entrepreneurial ecosystem appears to be congruent with the business environment consisting of internal and external factors. Figure 1 graphically depicts the conceptual underpinning of the research study.

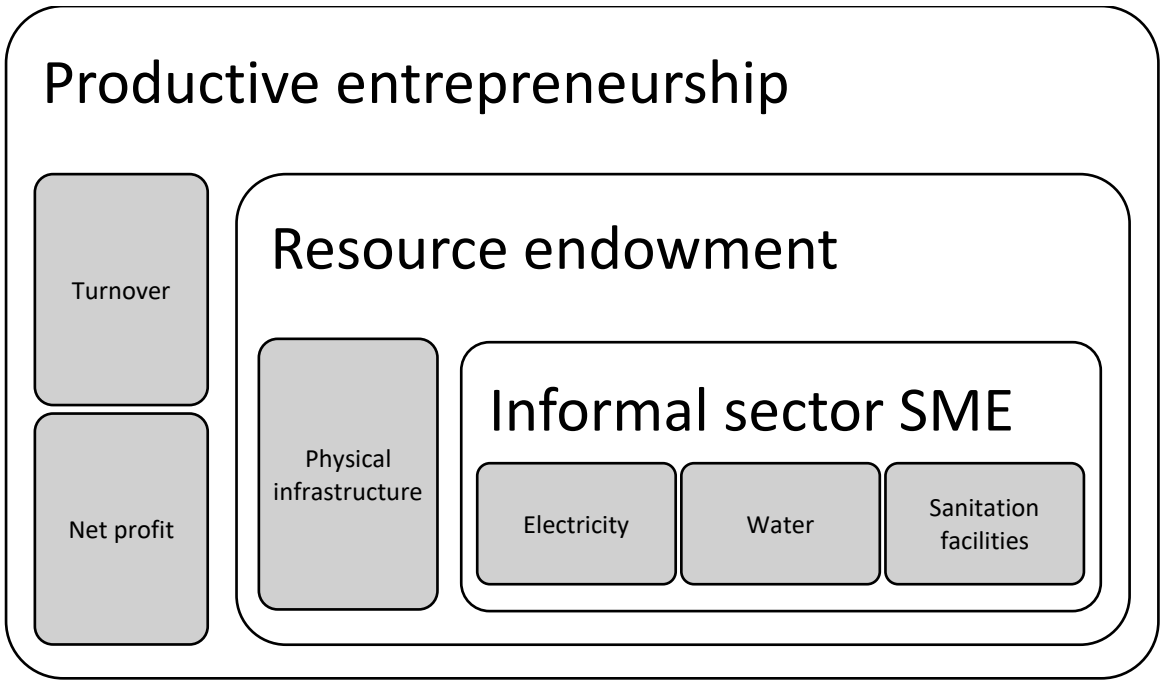

Figure 1: Conceptual underpinning
Source: Adapted from Stan and Van den Ven (2021: 813)

2.5 Hypothesised model

The primary objective of the research reported on include investigating the impact of external infrastructure factors, notably electricity, water supply and sanitation facilities on organisational performance of SMEs in the South African informal sector. SMEs performance was measured in terms of annual turnover, net profit and debt from borrowing. Table 1 provides an indication of the indicators measured, whereas Figure 2 graphically depicts the hypothesised model.

Table 1: Indicators of infrastructure factors and SMEs performance

Variable	Indicator	Reference	Indicator measurement
Physical infrastructure	Electricity	Okpara and Kabonga (2009)	Availability of electricity
	Water supply		Type of water source
	Sanitation		Sanitation facilities
	Transportation		Not measured in this study
SMEs performance	Annual turnover	Widyastuti et al. (2023)	Sales, sales volume, increase revenue
	Net profit		Potential return, profit growth
	Debt from borrowing	Lusimbo and Muturi (2016)	Loans from various sources, for example family and friend, credit societies and moneylenders

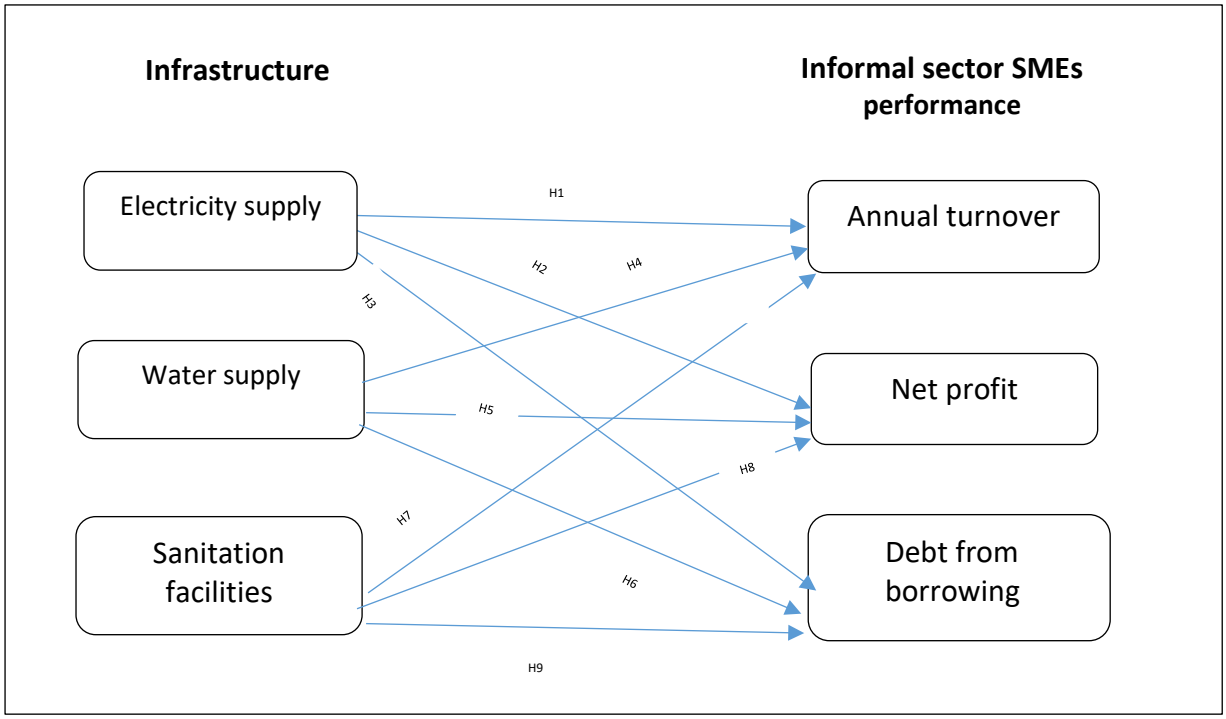

Figure 2: Hypothesised model with infrastructure and organisational performance
Source: Authors' own construction

3. Research Methodology

Secondary data analysis as the research approach was implemented in the study based on an open-source dataset downloaded from the Statistics South Africa repository. Pederson, Koval and Vingilis (2022) define secondary data as information that was gathered by an alternate party other than the original user and or for purposes other than those originally intended. Sources of secondary data subsume census data or data collected by government departments, such as Statistics South Africa (Pederson et al., 2022). Johnston (2014) expound that secondary data analysis can be deemed a systematic research procedure based on applied stages encompassing hypothesis development, identification and evaluation of the nominated dataset as well as computing statistical analyses.

Pederson et al. (2022) concur that hypotheses should be constructed on theoretical arguments or as suggested by a review of empirical studies and after considering data quality statistical analyses should be performed bearing in mind a 5% or 1% margin of error referring to the hypotheses falsely found to be statistically significant. Downloading a dataset from a government department deemed a reputable source necessitates reviewing the dataset specifications, such as, the questionnaire, recent publication and access conditions. Explicitly, the dataset must be a case-by-variable data matrix permitting further statistical analyses typical of a quantitative research methodology (Jonck & Nwosu, 2022). The study adopted a quantitative research method. Quantitative research pursues obtaining accurate and reliable measures that allow for statistical analysis (Queirós, Faria & Almeida, 2017). As such, quantitative research underscores objectivity and is appropriate when quantifiable measures of variables can be

collected, and inferences made from sample data extrapolated to the population. Moreover, structured procedures and data collection instruments are espoused (Queirós et al., 2022).

The Survey of Employers and the Self-Employed (SESE) was used to collect quantitative data. Specifically, data gathering was conducted by Statistics South Africa with results made available in 2019. The justification for using the identified dataset can be attributed to three main arguments. Firstly, the dataset is described as comprehensive, which implies that it covers a wide range of variables and provides detailed information on the study's focus, namely SMEs in the South African informal sector that are not registered for Value Added Tax (VAT).

A comprehensive dataset allows for a thorough analysis of the research objectives and provides a rich source of information for drawing meaningful conclusions. Secondly, the dataset utilized has not yet been superseded by more current data. Hence, the dataset reflects the most recent information available on the target population providing timely insights into the challenges faced by the sample. Thirdly, the justification for using the dataset is linked to the need to establish a base line or comparison point to evaluate the impact of infrastructure, notably electricity supply or the alternative against. By utilizing this dataset as a baseline or reference point, researchers would be able to assess how power outages also termed loadshedding has affected SMEs by comparing the findings to more recent data when published. This comparative approach allows for a better understanding of the changes and trends over time and aids evaluating the specific impact of power outages on the SMEs in question.

The SESE, a South African Household-based measuring instrument, is a survey tool used to gather comprehensive data on small and medium-sized entities (SMEs) operating in the informal sector. This survey specifically targets SMEs that are not registered for Value Added Tax (VAT) with the aim of providing evidence-based findings related to these entities. The SESE consists of 83 items or questions that cover various aspects of informal sector SMEs, including operations, general information, costs, expenditure, capital, transport, business registration and financial inclusion.

The specific variables that were reported on in the study subsume electricity availability (i.e., is electricity available at the main site form where the business is operated?), main source of water, access to toilet facilities, turnover (i.e., in the last 12 months, how much money came into the business through sales or services offered before deductions?), debt from borrowing (i.e., does the business currently have any debt from loans?) and net profit (i.e., how much money did the business make in the last calendar month after deductions?). In addition to the core questions about the SMEs, the SESE also includes a biographical section. This section collects information from participants about their gender, age, educational level, location and other relevant demographics. This additional information contributes to understanding the characteristics and demographics of the SME owners or co-owners participating in the survey (Statistics South Africa, 2019).

The sampling technique used in the SESE survey is purposive non-probability sampling. Purposive sampling involves deliberately selecting participants based on specific criteria or characteristics (Etikan, Musa & Alkassim, 2016). In this case, the inclusion criteria for the survey participants were ownership or co-ownership of an SME that is not registered for Value Added Tax. The final sample size for the SESE survey implemented by Statistics South Africa consisted of 1658 participants who met the inclusion criteria (Statistics South Africa, 2019). These respondents were selected purposively to ensure representation from SMEs in the South African informal sector that were not registered for VAT.

The sample characteristics are presented in Table 2 and shows the sample consisted out of n = 1658 participants which could be divided into male (n = 844; 50.9%) and female (n = 814; 49.1%) gender categories. The overwhelming majority was black African (n = 1541; 92.9%) participants with a mean age of 43 years and six months and a standard deviation of 12.451. Most of the participants were residing either in Limpopo (n = 364; 22%) or in Gauteng province (n = 322; 19.4%). With reference to academic qualification, most of the sample had secondary formal schooling (n = 1374; 82.9%). Lastly, most of the participants were either married (n = 638; 38.5%) or have never been married (n = 577; 34.8%).

In the study, the researcher utilized the Statistical Package for the Social Sciences (SPSS) version 28 to conduct statistical analyses after cleaning the dataset. Descriptive statistics were computed to provide a profile of the sample and determine measures of central tendency, which are indicators of the central propensities of the variables (McCallaghan, Jackson & Heyns, 2019). To examine the nexus between the measured variables, the researcher used Pearson product-moment correlation analysis. The results of the correlation analysis were interpreted using established criteria, where a correlation coefficient of 0.1 indicates a small effect, 0.3 indicates a medium effect and 0.5 indicates a large effect (Pallant, 2011). Statistical significance was set at either the 99th percentile ($p \leqslant 0.01$) or the 95th percentile ($p \leqslant 0.05$).

In order to further explore the relationships among the variables, structural equation modelling (SEM) was performed using IBM SPSS Amos version 28. SEM allows researchers to test and estimate statistical models and explain the variance in the data (Ramlall, 2019). Prior to conducting the SEM analysis, the researcher assessed the model fit using several indices. The model fit was evaluated using the comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardized root means square residual (SRMR) and the root mean square error of approximation (RMSEA). Mostly, a good fit is indicated if the RMSE and SRMR are equal to or less than 0.08, and the CFI and TLI are equal to or greater than 0.90 (Van Lill & Taylor, 2022). To isolate the impact of individual variables, multiple regression analysis was performed. The researcher made use of a combination of descriptive statistics, correlation analysis, multiple regression analysis and SEM to analyse the data and test the proposed statistical model. The specific criteria for interpreting the results and determining the model fit were also mentioned, highlighting the thresholds for statistical significance and acceptable fit indices.

Table 2: Sample biographical and demographic characteristics

Variable	Level	N	%	Cumulative %
Gender	Male	844	50.9	50.9
	Female	814	49.1	100
Population group	African / Black	1541	92.9	92.9
	Coloured	44	2.7	95.6
	Indian / Asian	21	1.3	96.9
	White	52	3.1	100
Province	Western Cape	82	4.9	4.9
	Eastern Cape	192	11.6	16.5
	Northern Cape	18	1.1	17.6
	Free State	117	7.1	24.7
	KwaZulu-Natal	225	13.6	38.2
	North-West	105	6.3	44.6
	Gauteng	322	19.4	64.0
	Mpumalanga	233	14.1	78.0
	Limpopo	364	22.0	100
Age	Younger than 20 years	8	0.5	0.5
	Between 20 and 29 years	220	13.3	13.8
	Between 30 and 39 years	427	25.8	39.5
	Between 40 and 49 years	457	27.6	67.1
	Between 50 and 59 years	387	23.3	90.4
	60 years and older	159	9.6	100
Academic qualification	Secondary formal schooling	1374	82.9	82.9
	Technical qualification	13	0.8	83.7
	Diploma / degree	125	7.5	91.2
	Honours degree	4	0.2	91.4
	Postgraduate qualification	7	0.4	91.9
	Other	135	8.1	100
Marital status	Married	638	38.5	38.5
	Living together	213	12.8	51.3
	Widow / widower	165	10.0	61.3
	Divorce / separated	65	3.9	65.2
	Never married	577	34.8	100

Source: Authors' own construction

3.1. Hypotheses

The following hypotheses were formulated for the study:

H_1: Electricity availability statistically significantly influences informal sector SMEs' annual turnover.

H_2: The variance in net profit of informal sector SMEs in the South African context can statistically significantly be attributed to electricity supply.

H_3: Electricity supply statistically significantly impacts debt accumulated due to borrowing.

H_4: Water supply statistically significantly influences annual turnover of informal sector SMEs.

H_5: The variance in net profit of informal sector SMEs in the South African context can statistically significantly be attributed to availability of water.

H_6: Water supply usage statistically significantly impacts debt accrued due to borrowing.

H_7: Sanitation facilities statistically significantly influences annual turnover of informal sector SMEs.

H_8: The variance in net profit of informal sector SMEs in the South African context can statistically significantly be attributed to sanitation facilities.

H_9: Sanitation facilities statistically significantly impacts debt accrued due to borrowing.

3.2. Ethical considerations

Secondary coded deidentified data were examined in the reported research. Thus, since deidentified coded data was used no human or animal interaction occurred. Furthermore, the dataset employed was made available on the Statistics South Africa electronic repository adhering to the POPI Act requirements.

4. Results and discussion

The primary purpose of the research was to investigate the nexus between infrastructure, *inter alia*, electricity, water and sanitation facilities and organisational performance of SMEs not registered for value-add tax. To provide context to the results portrayed successively, Table 3 illustrates findings from the descriptive analysis.

Table 3 shows that 68.4% (n = 825) of the sample indicated that they do have electricity supply, while 22.1% (n = 267) do not have access to electricity. In terms of water, 30.2% (n = 364) of the sample had tap water on site or in the structure (n = 309; 25.6%), while 6.6% (n = 80) indicated no access to water supply. Relating to sanitation facilities, 37.8% (n = 456) of the sample had a flush toilet on site, on the

other had 13.8% representing 167 participants had no form of sanitation facilities. The remainder selected various forms of sanitation facilities, such as a bucket toilet (n = 10; 0.8%) or a pit latrine with (n = 178; 14.8%) or without (n = 191; 15.8%) ventilation.

Table 3: Descriptive statistical results

Variable	Level of the variable	n	%
Electricity	Yes	825	68.4
	No	267	22.1
	Not applicable	114	9.8
Water supply	Piped (Tap) water in structure	309	25.6
	Piped (Tap) water on site	364	30.2
	Public tap/shared tap with others	237	19.7
	Borehole on site	23	1.9
	Borehole off-site	10	0.8
	Rainwater tank on site	13	1.1
	Flowing water/stream	26	2.2
	Dam/Pool/Stagnant water	4	0.3
	Well	4	0.3
	Spring	8	0.7
	Other	41	3.4
	No water access	80	6.6
	Not applicable	87	7.2
Sanitation facilities	Flush toilet on site	456	37.8
	Flush toilet off-site	95	7.9
	Chemical toilet	12	1.0
	Pit latrine with ventilation pipe	178	14.8
	Pit latrine without ventilation pipe	191	15.8
	Bucket toilet	10	0.8
	None	167	13.8
	Other	6	0.5
	Not applicable	91	7.5
Annual turnover	Between R0 and R199 000	1074	97.8
	Between R200 000 and R399 000	19	1.7
	Between R400 000 and R599 000	2	0.2
	R600 000 and more	3	0.3
Net profit	Between R0 and R49 999	1650	99.5
	Between R50 000 and R99 999	7	0.4
	Between R150 000 and R199 999	1	0.1
Debt from borrowing	Between R0 and R49 999	188	94.9
	Between R50 000 and R99 999	5	2.5
	Between R100 000 and R149 999	1	0.2
	More than R200 000	4	0.5
Origin of debt	Loans from banks	12	6.2
	Loans from friends and relatives	150	76.90
	Loans from credit societies / ‘stokvel’	10	5.1
	Loans from moneylenders	16	8.2
	Other	7	3.6

Source: Own compilation

Reflecting on the financial indicators, most SMEs in the informal sector reported a turnover of less than R199 999 (n = 1074; 97.8%) and a net profit below R49 999 (n = 1650; 99.5%). In terms of debt from

loans excluding expenses, most SMES reported debt less than R49 999 (n = 188; 94.9%). Considering the origin of debt from borrowing, 76.9% (n = 150) of the sample utilized loans from friends and relatives, followed by loans from moneylenders (n = 16; 8.2%), loans from commercial banks (n = 12; 6.2%), loans from credit societies and or 'stokvel' (n = 10; 5.1%) and 3.7% of the sample representing 7 respondents selected other.

Table 4 presents the descriptive results of the variables examined in this study. A closer inspection of the results discloses that the mean scores for sanitation facilities was within the negative range, whereas electricity and water supply as well as the financial indicators were within the positive range. Thus, just above the median values respectively.

Table 4: Descriptive results and measure of central tendency

Variable	Mean	Median	STD
Electricity	1.41	1.00	0.657
Water	4.01	2.00	4.012
Sanitation facilities	3.69	4.00	2.653
Annual turnover	1.03	1.00	0.224
Net profit	1.01	1.00	0.101
Debt – borrowing	1.12	1.00	0.597

Source: Own compilation

Table 5 presents the calculated correlations that were used to determine the nexus between the measured constructs in the reported research. Correlation analysis is a statistical method that examines the relationship between two or more variables and provides a measure of their linear association.

Table 5: Pearson product-moment correlation with basic services and performance indicators

Variable		1	2	3	4	5	6
1	**Electricity**	1					
2	**Water**	0.506	1				
		0.000**					
3	**Sanitation facilities**	0.507	0.688	1			
		0.000**	0.000**				
4	**Turnover**	-0.046	-0.079	-0.095	1		
		0.184	0.023*	0.006**			
5	**Net profit**	-0.023	-0.034	-0.027	0.062	1	
		0.428	0.237	0.357	0.041*		
6	**Debt – borrowing**	-0.116	-0.125	-0.168	0.066	0.319	1
		0.151	0.122	0.037*	0.461	0.000**	

Source: Own compilation; *p ⩽0.05; **p ⩽0.01
r = 0.10 to r = 0.29 small effect; r = 0.30 to 0.49 medium effect; r = 0.50 to r = 1.0 large effect

Review of the results presented in Table 5 reveals that water supply had a large statistically significant correlation on the 99th percentile with electricity (r = 0.596; p = 0.000**). Similarly, sanitation facilities had a large statistically significant association with electricity (r = 0.507; p ≤ 0.000**) and water usage (r = 0.688; p ≤ 0.000**) on the 99th percentile. Annual turnover had a small negative association with

water supply (r = -0.079; p ≤ 0.023*) and sanitation facilities (r = -0.095; p ≤ 0.006**). Thus, as basic services increase there would be a decrease in annual turnover. This is to be expected since basic services are deemed operational costs or expenses and would decrease annual turnover. Net profit similarly reverted a small statistically significant relationship on the 95th percentile with annual turnover (r = 0.062; p = 0.041*). Debt from borrowing had a medium positive statistically significant correlation with net profit on the 99th percentile (r = 0.319; p = 0.000**) and a small negative association with sanitation facilities (r = -0.168; p ≤ 0.037*) on the 95th percentile.

To determine how much of the variance in the performance indicators could be explained by infrastructure facets multiple regression analysis was performed with results presented in Table 6. The water supply was statistically significantly and predicted annual turnover. It was found that 7.9% (β = -0.079) of the variance in annual turnover can be attributed to water supply and or services. The nexus was negative thus as water services increase there would be a decrease in annual turnover. Similar results were reverted for sanitation facilities. More specifically, 9.5% (β = -0.095) of the variance in annual turnover can be attributed to the availability of sanitation facilities. Once again, the relationship was negative. Moreover, 16.8% (β = -0.168) of the variance in debt from loans or credit facilities can be attributed to sanitation facilities. Based on the results presented the fourth (H4), seventh (H7) and nineth (H9) hypotheses were accepted, whereas the other hypotheses can be rejected.

Table 6: Hypothesis testing by means of multiple regression analysis

Hypothesis		**R**	**R^2**	**F**	**B**	**T**	**P**
H_1	Annual turnover ← electricity	0.046	0.002	1.771	-0.046	-1.331	0.184
H_2	Net profit ← electricity	0.023	0.001	0.627	-0.023	-0.792	0.428
H_3	Debt ← electricity	0.116	0.014	2.082	-0.016	-1.443	0.151
H_4	Annual turnover ←water supply	0.079	0.006	5.224	-0.079	-2.286	0.023*
H_5	Net profit ← water supply	0.034	0.001	1.401	-0.034	-1.184	0.237
H_6	Debt ←water supply	0.125	0.016	2.420	-0.125	-1.556	0.122
H_7	Annual turnover ←sanitation	0.095	0.009	7.538	-0.095	-2.745	0.006*
H_8	Net profit ←sanitation	0.027	0.001	0.849	-0.027	-0.921	0.357
H_9	Debt ←sanitation	0.168	0.028	4.426	-0.168	-2.104	0.037*

Source: Own compilation
*p ≤0.05; **p ≤0.01

Finally, to examine the hypothesised statistical model SEM was performed including determining the goodness-fit indices using SPSS Amos version 28. Results reverted an acceptable minimum fit [Chi-square = 1233.89; p = 0.000; df = 6; chi-square / degreed of freedom (CMIN/DF) = 205.649; normed fit index (NFI) = 0.012; Tucker-Lewis's index (TLI) = -2.499; comparative fit index (CFI) = 0.000; root mean square error of approximation (RMSEA) = 0.351]. An explanation of the results revealed that the TLI value exceeded 0.90, representing a good fit (see, for example Fitong Ketchiwou et al., 2022

reflecting on previous authors). Considering that the Chi-square test is typically an appropriate fitness indicator for sample sizes less than 400 ($n \leq 400$) (Stone, 2021) and the sample in this study was n = 1658, the usefulness of the Chi- square model fit indicator is inadequate. Notwithstanding the achievement of a minimum fit, it was concluded that SEM could be utilised to test the model. However, to mitigate against the previous mentioned, pluralistic methods over a single method were utilised (Kline, 2016), for example using SEM in conjunction with multiple regression analysis (Table 6). Pursuant to verifying the model fitness, the estimates of the proposed statistical model were calculated (Table 7).

Table 7: SEM estimates for the proposed default model

SEM modelling	Estimate	S.E.	C.R	P
Annual turnover ← electricity	0.000	0.012	-0.016	0.987
Net profit ←electricity	-0.001	0.004	-0.183	0.855
Debt from borrowing ← electricity	-0.011	0.071	-0.163	0.871
Annual turnover ← water supply	-0.002	0.002	-1.002	0.316
Net profit ← water supply	0.000	0.001	-0.119	0.905
Debt from borrowing ← water supply	0.017	0.012	1.512	0.131
Annual turnover ← sanitation	-0.006	0.003	-1.931	0.053
Net profit ← sanitation	-0.001	0.001	-1.182	0.237
Debt from borrowing ← sanitation	-0.065	0.017	-3.791	0.000**

Source: Own compilation

*p ≤0.05; **p ≤0.01

The results displayed in Table 7 above indicated that out of the 9 hypotheses only one were statistically significant whilst 8 were non-significant. Though, since only minimum model fitness was achieved multiple regression analysis was used to test the hypotheses. Nonetheless, sanitation facilities statistically significantly influenced debt from borrowing (β = -0.168; p ⩽ 0.037**). Figure 3 graphically demonstrates the results of the SEM modelling, presented in Table 7, confirming the statistical model that underpinned the research reported on.

The results presented indicated that water and sanitation facilities negatively impacted annual turnover and debt. This could be expected since municipal tariffs are considered an operation cost. The findings of the current study support previous research conducted in Serbia. Specifically, the mentioned study found that the external business environment did not influence enterprises favourably in Serbia (Janković et al., 2016). The study also partially confirms research by Olawale and Garwe (2010) which indicated that infrastructure, especially poor electricity and water supply, statistically significant influenced newly registered SMEs in the Eastern Cape Province negatively.

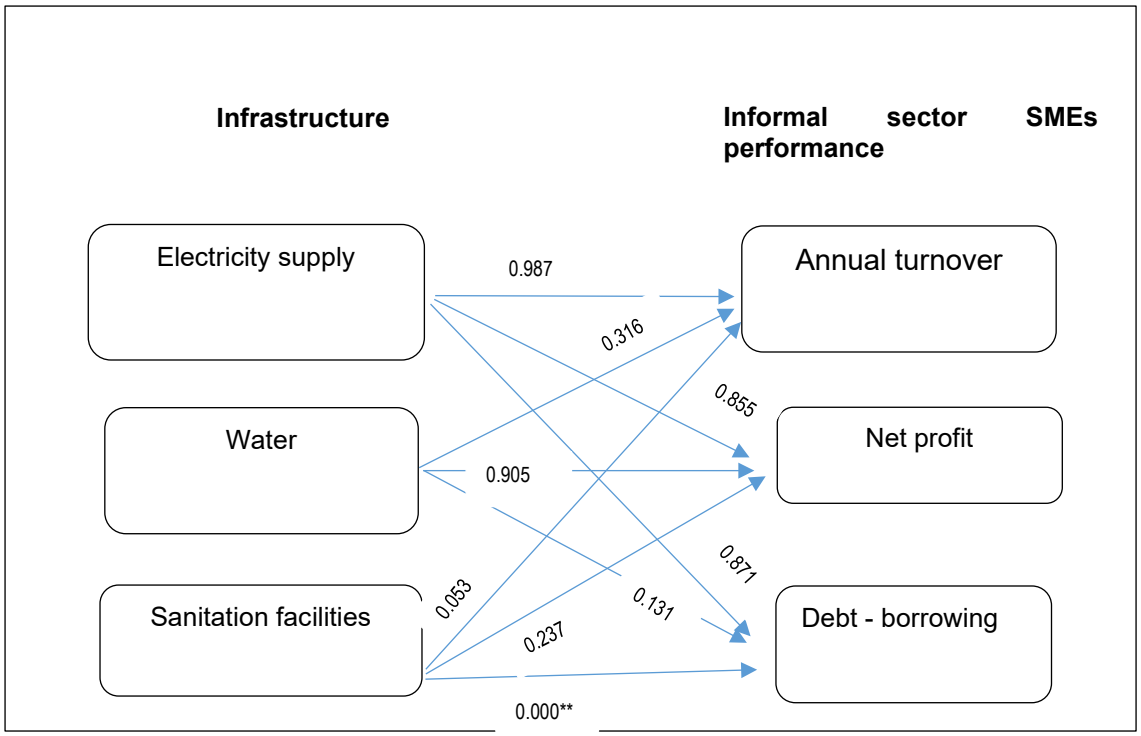

Figure 3: Statistical model with infrastructure and organisational performance
Source: Authors' own construction

The reported research only found a negative nexus between water supply and annual turnover. On the other hand, research results by Ajide (2020) showed a statistically significant positive influence relating to electricity, water and sanitation facilities on entrepreneurial start-ups in Africa, which was refuted by the reported research. Moreover, Sitharam and Hoque (2016) revealed that 70% of SMEs in KwaZulu Natal indicated that electricity supply affects organisational performance. The previous research result was refuted by the reported research. This should also be understood considering 68.4% of the sample indicated access to electricity supply. Foretasted is deemed a reference point and in future can be compared to data gathered during periods characterised by power outages or loadshedding.

5. Managerial Implications

The study advances knowledge by providing empirical evidence on the impact of infrastructure, on the performance of informal sector SMEs. In this case, the pending electricity crisis serves as a context for investigating this relationship. By examining the effects of infrastructure, such as basic services, on SMEs' performance the research provides valuable insights into how access to and reliability thereof can influence the financial outcomes of SMEs in the informal sector. The findings of the research have practical implications for policymakers involved in supporting informal sector SMEs. By demonstrating the empirical impact of basic services, under the ambit of infrastructure, on SMEs' performance, the research provides evidence to inform policy decisions and interventions aimed at improving access to reliable and affordable services for businesses in the informal sector. The findings of the study support the recommendation put forward by Etim and Daramola (2020). Last mentioned authors recommended

increased infrastructure support is required to enable informal sector SMEs to succeed subsuming constant reduced rate electricity supply, technological support by creating internet hotspots to mention a few (Etim & Daramola, 2020). Reduced rate water and sanitation facilities should be considered which in the South African context is part of municipal tariffs. Similarly, Olawale and Garwe (2010) recommended reliable power and water supply should be provided in rural and urban areas to support newly registered SMEs.

6. Conclusions, Limitations and Future Research

The purpose of the research was to explore the nexus between infrastructure and SMEs financial performance in the context of the South African informal sector. Results revealed that both water supply and sanitation facilities statistically significantly influenced the financial performance of informal sector SMEs. The research reported in the paper contributes to the body of knowledge in several significant ways, specifically focusing on SMEs in the informal sector within a developing nation context. The paper highlights that the informal sector has often been neglected in research endeavours, despite its importance as a significant contributor to the economy. By focusing on SMEs in the informal sector, the research fills a gap in the literature and brings attention to this vital sector that is often overlooked in academic studies enhancing entrepreneurial research.

The foretasted contributes to a more comprehensive understanding of economic dynamics and the role of informal enterprises. The following recommendations should be considered based on the results presented, namely improved infrastructure development, public-private partnerships, formalisation and empirical research. Specifically, interventions should focus on developing and maintaining essential infrastructure in areas where informal sector SMEs are prevalent. Moreover, the informal sector should be included in the national infrastructure development agenda. Foster collaboration between government and the private sector to invest in infrastructure development. The informal sector needs to be formalised in terms of maintaining an informal sector SME registry at local government level. Lastly, conduct empirical studies to improve understanding of the challenges faced by informal sector SMEs to design targeted interventions and evidence-based policy development.

Limitations that ought to be considered when reading the findings. Statistical analysis was performed on a secondary dataset downloaded from the Statistics South Africa repository and as a result subject to suppositions contained in the statistical release (P0276). Results assume that participants provided an authentic account of the SMEs financial state. The application of a non-probability sampling strategy might influence the external validity of the study as well as the findings. Data were collected pre-COVID-19 and could be used as a comparison point to determine the impact of power outages on SME performance. Future research endeavours should focus on investigating the longitudinal impact of power outages and external factors, such as transportation or access road quality on SME performance indicators in the informal sector.

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