THE ROLE OF BUSINESS INCUBATION PROGRAMMES ON THE PERFORMANCE OF SMALL AND MEDIUM ENTERPRISES IN SOUTH AFRICA

HELPER ZHOU (Ph.D.) [1]* and ROBERT WALTER DUMISANI ZONDO (D Com.) [2]

[1, 2] Department of Entrepreneurial Studies and Management, Durban University of Technology.
Email: [1]21752005@dut4life.ac.za / helperzhou@gmail.com (*Corresponding Author), [2] DumisaniZ@dut.ac.za
ORCID: [2]http://orcid.org/0000-0003-0214-860X

Abstract

Research has shown that Small and Medium Enterprise (SMEs) play a pivotal role in socio-economic development of countries across the globe. In recent years, business incubation programmes have gained popularity to address the perennial challenge of SME failure in South Africa. However, there have been very limited studies to empirically assess the impact of incubation in South Africa. To address this gap, this study utilised dataset, comprising 387 incubated and non-incubated firms to assess the impact of business incubation of performance. The originality of our study lies in valuable insights we established relating to the impact of incubators on SME performance. Utilising Generalised Least Squares technique in R, the study revealed that incubation has a positive impact on SME performance. Further to that the results revealed differing attributes between the incubated and non-incubated cohorts. It was recommended that the government should invest into incubation programmes to drive sustainable SME performance. Further to that, the heterogeneity between the two cohorts demands a shift from a "one size fits all" approach to supporting SMEs in South Africa.

Keywords: business incubation, incubated firms, non-incubated firms, SME performance, small and medium enterprise, SMEs, South Africa

INTRODUCTION

Various studies have shown that small business failure remains one of the perennial challenges faced by various countries especially developing ones (Msimango-Galawe & Hlatshwayo, 2021). In developing countries, the failure of Small and Medium Enterprises (SMEs) presents a deep-rooted quandary as this complex challenge has entrenched knock-on effect onto other societal challenges like unemployment, poverty and inequality (DeTombe, 2015). Ncube and Zondo (2022) noted that small businesses are key drivers of local economic development. In South Africa, SMEs have received substantial support aimed at assisting them achieve long term survival (Zhou, 2022). Other studies (Bureau for Economic Research, 2016; Fatoki, 2014; Rens et al., 2021) have also indicated that despite significant ongoing government support, the majority of SMEs fail in less than three years of operation. This is corroborated by Dludlu (2021), charging that since the dawn of democracy, small businesses in South Africa continue registering very poor performance despite significant support running into billions of Rands that has been invested into the SME sector. Another study by Zhou et al. (2021) established that South African SMEs are experiencing diminishing returns to scale, and this may be due to a myriad factor which require customised, and data driven intervention. This shows that there is still a lot to be done to realise the "optimistic story" as the National Development Plan (NDP)

calls it, of creating 11 million jobs in South Africa, with 90 percent of these attributable to the SME sector (DSBD, 2014; Hewitt & van Rensburg, 2020; National Planning Commission, 2011).

Invariably, to reap potential socio-economic dividends from sustainable SME performance, incubation support model which is premised on the need to support SMEs through customised interventions over a certain period of time have been proposed (Msimango-Galawe & Hlatshwayo, 2021; Zhou & Gumbo, 2021b). Around the world, business incubators have become a common mechanism through which tailor-made entrepreneurial support is deployed (Allahar et al., 2016; Almeida et al., 2021; Nicholls-Nixon & Valliere, 2021). Consequently, significant resources have been devoted to assessing through empirical studies the role of business incubators in SME success (Lose & Tengeh, 2015; Msimango-Galawe & Hlatshwayo, 2021). Even in developed countries, incubators have become commonplace and having evolved over the years are now widely considered as effective mechanism to both inspire and drive innovation-based entrepreneurship (Almeida et al., 2021; Hou et al., 2020; Rathore & Agrawal, 2021). The government and various other stakeholders are now heavily investing in business incubation as a strategic game changer in addressing SME mortality rate in emerging economies (Rathore & Agrawal, 2021; Ssekiziyivu et al., 2021).

However, despite their growing popularity the effectiveness of these incubators remains questionable (Simango, 2022). Some studies questioned the efficacy of the current incubation model in South Africa (Hewitt & van Rensburg, 2020). It has been noted that the lack of comparative data leaves the role and impact of incubators vague due to limited empirical studies on this area (Msimango-Galawe & Hlatshwayo, 2021; Stephens & Lyons, 2022). As such to address this gap, this paper aimed to shed light on the impact of incubators on SMEs performance in South Africa. In the main, utilising data from incubated and non-incubated firms, we established and compared the attributes of these two groups. It's expected that the government and other key stakeholders will utilise this study to appreciate the impact of incubators in driving SME performance. The rest of the paper is structured as follows, literature review, methodology, results, and discussion as well as conclusion.

LITERATURE REVIEW

This section unpacks the challenges faced by SMEs in South Africa. In the main it elaborates on the adverse impact of the country's regulatory framework, lack of technical skills among SME owners, lack of access to markets, limited funding support and information asymmetry. The discussion on the government's various interventions finally concludes this section.

The Challenges faced by SMMEs in South Africa

Small Business development remains one of the most important features for socio-economic development across many countries. The invaluable role of small and medium-sized businesses in socio-economic development have been established in literature and the sector is viewed as the 'engine of the economy' not only in South Africa but globally (Garatsa & Dlamini, 2021; Ngibe & Lekhanya, 2019; Zhou & Gumbo, 2021a). According to D'imperio (2015) SMEs

constitute about 90% of firms and provide more than 50% of employment worldwide. In emerging economies, formal SMEs contribute up to 40% of national income (GDP), and this is much higher when informal SMEs are accounted for (International Finance Corporation, 2019). SMEs are key in driving economic development and should thus be harnessed to drive innovation and employment creation, especially in developing countries (International Finance Corporation, 2019; Ngibe & Lekhanya, 2019). The International Trade Centre (2018) indicated that SMEs contribute to the Sustainable Development Goals (SDGs) through job creation, innovative activities and spurring competition which results in quality products to the benefit of the broader economy.

Sadly, despite their importance, SMEs continue to perform poorly (Dludlu, 2021; Zhou et al., 2021) in South Africa. Extant literature shows that SMME poor performance owes to myriad of challenges (Herrington & Coduras, 2019; Herrington & Kew, 2016; International Finance Corporation, 2019). Previous studies have indicated that the South Africa regulatory environment is inhibiting to the operations of SMEs (Bureau for Economic Research, 2016; Herrington & Kew, 2016; Small Business Project, 2014). Leboea (2017) highlighted that the South African labour market is highly regulated with a greater level of market rigidity which makes it difficult for SMEs to recruit and retain qualified staff. A report by Small Business Project (2014) indicated that on average South African SMEs spend R216 000 a year in tax compliance requirements. This in turn impacts SMEs' appetite to comply with any regulatory requirements as this becomes more of a problem than an incentive to their operations. Ngcobo and Sukdeo (2015) found that government policies and laws are largely inhibitory to SME operations, as these firms spend considerable resources attending to government imposed administrative requirements. Unavoidably this makes the regulatory environment complex and burdensome for small businesses who have limited resources to ensure compliance (Mtshali et al., 2017). This finding is supported by a recent study (Zhou & Gumbo, 2021b) establishing that formal (Pty) limited registration adversely impacts SME performance in South Africa. Ayandibu and Houghton (2017) noted that the business environment in the country is generally hostile to SMMEs which in turn negatively impacts their operations and thus limited survival chances. (Soni et al., 2015) noted that compliance requirements especially relating to turnover tax are poorly understood by SME owners, which unfortunately exposes them to the risk of receiving punitive non-compliance fines from the South African Revenue Services (SARS). This implies that to enhance their chances of survival SMEs need support to navigate the current strenuous regulatory landscape.

Another challenge impacting the performance of SMEs is lack of technical skills, which as per the study by Herrington and Kew (2016) owes to the quality of education in South Africa. This aspect is crucial with Lekhanya (2016), observing that lack of technical skills among entrepreneurs is positively correlated with SMEs failure rate. However, contrary to these studies the Allan Gray Orbis Foundation (2017) study observed that compared to other Sub-Sahara African countries, South African entrepreneurs are more innovative. The study concedes though, confirming that whilst considered good in the region, the country's education still requires significant improvement, especially to inject a drive for sustainable entrepreneurship. Herrington and Coduras (2019) also weighed in, asserting that compared to

its peers (Brazil, Russia, India, and China), South Africa ranks low on entrepreneurial education which impacts the country's entrepreneurial activity. The country is the lowest on this aspect among Brazil, Russia, India, China South Africa (BRICS) countries (Herrington & Kew, 2016). Related to this challenge is the issue of poor infrastructure which tend to impact on the Research and Development (R&D) activities of South African SMEs. Mabotja (2018) asserted that poor infrastructure is one of the top-ranking reasons hindering SME growth in South Africa. This challenge has huge implications on local small enterprises as they tend to be less innovative compared to those in developed countries. In developed countries infrastructure is not only advanced but availed to SMEs through various means like science and technology parks, incubators, and business parks (Almeida et al., 2021; Freire et al., 2022), which in turn boost their performance.

Numerous studies also found that lack of markets exacerbates the perennial poor performance by SMEs in the country (Ayandibu & Houghton, 2017; Herrington & Kew, 2016; OECD, 2017). Mahohoma (2018) also noted that lack of access to markets remains one of the fundamental drivers behind subdued SME performance. In response to market opportunity challenge for SMEs, the government introduced various initiatives, key among them being the preferential procurement or set asides schemes (DTI, 2017; Zhou, 2022). Despite the introduction of such noble initiatives, SMEs continue to struggle (Bureau for Economic Research, 2016). This raises the concern as to whether market access opportunities are the main challenge or rather the quality of the products being supplied by SMEs. Zhou (2022) indicated that to date the government has invested billions of rands aimed at providing SMEs with access to markets, but still the sector continues to register lagging performance (Dludlu, 2021; Zhou et al., 2021). Some studies have charged that South Africa is dominated by necessity driven entrepreneurs and this impacts on their ability to provide innovative and quality products to ensure sustainable supply of the same which then would impact positively on their performance (Herrington & Kew, 2016; International Finance Corporation, 2019). Structured support especially focusing on promoting R&D will be crucial in ensuring that SMEs provide new and disruptive products in the market and thus require less mechanistic government intervention to access customers.

Funding access opportunities remain another big problem impacting SME performance in South Africa (International Finance Corporation, 2019; Mtshali et al., 2017). OECD (2017) reports revealed that South Africa's low ratio of SME financing relative to overall private sector financing is out of the norm. Mahohoma (2018) corroborated this, establishing that limited access to finance, remains one of the entrenched barriers to SMEs' growth propensity in the country. The study noted that in most cases, SMEs fail to access funding support due to misalignment between their needs and funders' risk appetite. This is supported by Banking Association of South Africa (2018) report, which established a funding gap of up to R386 billion mainly due to a mismatch between bank's funding requirements and the SMEs' compliance readiness. Essentially the report indicated that funding is available, but SMEs are not fully compliant to access it. Cele (2015) confirmed this, highlighting that SMEs, especially those in rural areas have found the whole application process to be problematic and thus have ceased to seek funding support from mainstream financial institutions. Various studies (Mtshali

et al., 2017; Ngcobo & Sukdeo, 2015; Soni et al., 2015) found that due to onerous application process, majority of SMEs even in urban areas rely more on their savings than external funding in their operations. This strengthens the view that SMEs require customised support to enhance their chances to access funding opportunities and drive the growth of their enterprises.

Finally, one of the dominant challenges in literature relating to the performance of SMEs in South Africa is centred on access to information (Cele, 2015; Mtshali et al., 2017; Ngcobo & Sukdeo, 2015). Research indicates that SMEs are largely unaware of critical information which is important for their businesses, and this may include, government tenders, grant funding, enterprise development among other opportunities (International Finance Corporation, 2019; International Trade Centre, 2018; Mtshali et al., 2017). IMBADU (2016) however indicated that SEDA continues to try and share information with SMEs across the country regarding various opportunities. Despite such positive efforts, the challenge is that SEDA does not have a comprehensive database with SME information. This was noted by International Finance Corporation (2019) report which bemoaned the current fragmented nature of data on the SME sector in South Africa. In this digital age, information is everything and without it, businesses' chances of survival are significantly reduced. Implying that with access to information, an SME can be more agile in responding to and consequently seizing market opportunities ahead of competitors.

The preceding discussions showed that SMEs are faced with various challenges, and these have a crippling effect on the sustainability of SMEs. This in turn negate the sector's potential to contribute significantly to job creation, reduced unemployment, and poverty alleviation in South Africa. Hewitt and van Rensburg (2020) noted that due to mainly these and other challenges, black owned SMEs declined by 5.7% to 27.8% between 2015 and 2017. Research also indicates that South African SMEs are predominately micro and survivalist, as marked by their stagnation or increased closure within short spaces of time post establishment (Tembe, 2018). Without affordable tailor-made support, the SME sector will continue to experience turbulence due to high entry and exit rates. Furthermore, the outbreak of the Covid-19 pandemic has worsened the performance of SMEs not only in South Africa, but globally (Bartika et al., 2020; GEN 22 On Sloane, 2020). According to GEN 22 On Sloane (2020) more than 57 000 SMEs were affected by the pandemic shedding in excess of 42 000 jobs.

Resultantly the government has been exploring means to effectively assist SMEs accelerate their recovery and growth. This is crucial for the government as the failure of SMEs especially post Covid-19 has led to unprecedented unemployment levels (Statistics South Africa, 2021). To effectively address these challenges, there is need for well-thought scientific interventions to revive and sustain the growth of SMEs in the country. Among other proposed solutions, small businesses incubation programmes have been elevated as potentially effective avenues to provide high impact SME support (Ayatse et al., 2017; Hewitt & van Rensburg, 2020; Msimango-Galawe & Hlatshwayo, 2021). For example, Freire et al. (2022) noted that in order to address the high rate of small firms in Brazil, the government adopted technology-based business incubators. In 2014 the DTI charged that, the SME failure rate of 80% within first years owed to limited incubators in the country (DTI, 2014). The department quipped that the

country needs more incubators to assist and ensure that the SME sector reaches its potential in driving job creation and socio-economic growth. This assertion creates an impression that incubated SMEs perform better thus survive longer than non-incubated firms. However, there is no empirical study in the South African context that has been conducted to investigate this claim. In the next section we thus reviewed the role of incubators in addressing the current challenge of high small business failure in South Africa.

The role of Business incubators on the performance of SMEs in South Africa

The concept of business incubation started around 1958 in the United States of America (USA) and has evolved enormously since then (Hewitt & van Rensburg, 2020; Rathore & Agrawal, 2021). Msimango-Galawe and Hlatshwayo (2021) averred that business incubators became more dominant in the 1960s courtesy of government support to stem continued firm failure and thus drive economic development especially unemployment. Ramar et al. (2020) noted that business incubators became more popular, especially in developing countries in the late 1990s as various SME sector stakeholders sought means to assist them through funding and technical advice to get their new ideas off the ground. As per Rathore and Agrawal (2021), the use of business incubation model has since gained prominence and now spreading all over the world. In the previous two decades the model has been used extensively in developing countries to support SMEs as well as upscale survivalist enterprises into sustainable firms (Ayatse et al., 2017; Rathore & Agrawal, 2021; Simango, 2022). Freire et al. (2022) explained that the incubation concept has evolved over the years and its now centred on networks or linkages through facilitation, mediation, and brokerage, to help beneficiaries build their legitimacy, access to new resources and access to pertinent information. Traditionally incubators have been viewed in terms of a building housing start-up or emerging companies, however many incubators have gone 'virtual', as some incubators now provide support to small businesses that are located off-site (Stefanović et al., 2008). Rathore and Agrawal (2021) noted that business incubation is an umbrella term covering all types of incubators. They may range from product or sector specific to generic incubators, however their point of convergence is the intention to help and support entrepreneurs to survive in their most vulnerable stages and ultimately achieve sustainable growth (Simango, 2022).

Whilst the external environment has been found to be marred with increasing obstacles, as per the consulted literature above studies show that through this type of support model, SMEs can be able to achieve sustainable growth (DTI, 2014; Lose & Tengeh, 2015; Stefanović et al., 2008). Business incubators are critical in supporting new business growth, by acting as the strategic platforms to stimulate innovation and provide linkages to financial institutions and market access opportunities for SME products (Hou et al., 2020; Stephens & Lyons, 2022). Demonstrating their importance, Ramar et al. (2020) contended that incubators are programmes established to step up the development of entrepreneurs through customised support. The study further found that the central theme of a business incubator is promoting the development of local innovative businesses. This aligns with Al-Mubaraki and Busler (2013) submission, elucidating that business incubators are socio-economic programs aimed at providing the

specialised support to start-up firms. The support includes coaching, mentorship, and other forms of development to accelerate their growth and thus long-term survival (Simango, 2022).

Through business incubation, SMEs are provided with business management skills, access to funding, flexible and low-cost infrastructure, access to information and other administrative support service (Allahar et al., 2016; Ayatse et al., 2017; Stefanović et al., 2008). Through business incubation SMEs are provided with impactful value-adding support to facilitate their success and thus mitigate potential failure (Tembe, 2018). Various other studies (Almeida et al., 2021; Ramar et al., 2020; Rens et al., 2021; Ssekiziyivu et al., 2021) also adduced that business incubators play important which in the main, including networking, compliance support, human resources management skills, provision of necessary facilities, facilitation of an enabling operational environment. The preceding literature shows that business incubators provide solutions to some of the fundamental challenges that have been found to be deleterious on the performance and hence survival of SMEs in South Africa.

Consequently, there has been increased level of interest in empirically establishing the role of business incubation both across academic circles and policy makers especially in developing countries (Stephens & Lyons, 2022). Previous researchers claimed that business incubators in developing countries are not as impactful as they should be especially in terms of injecting innovation and creativity among SMEs (Hewitt & van Rensburg, 2020; Lose & Tengeh, 2015). Msimango-Galawe and Hlatshwayo (2021) mentioned that the prevailing failure rate among SMEs does not reconcile well with the claims of high success rates among incubated SMEs in South Africa. This is supported by previous studies indicating that business incubation did not significantly contribute to the improved sales and employment growth of beneficiaries regardless of the time spent in the program (Ayatse et al., 2017; Simango, 2022). This according to Stephens and Lyons (2022) may be because government support programmes like incubators are not properly matched to the actual needs of the individual beneficiary. Hewitt and van Rensburg (2020) study on South African incubators raised questions on their efficacy in supporting SMEs and recommended for more research to establish their impact, if any, on beneficiaries' performance. These concerns provide an impetus for empirical studies to establish the impact of incubation on SME performance. This is also in line with Lose and Tengeh (2015) submission raising a similar concern that despite increased investment into incubation support programmes, their impact on SMEs lacks empirical investigation, in the South Africa context. As such this study aims to contribute to this ongoing discourse by using the data from incubated and non-incubated SMEs to establish if the incubation programmes have impact on the former cohort.

METHODOLOGY

Marking a departure from previous studies particularly within the South African context, this study adopted a positivistic methodological paradigm. The primary intention was to establish if incubation programmes positively impacts SMEs, thus implying that non-incubated firms are at a disadvantage. As such to answer the study's primary research question, data from incubated and non-incubated firms was gathered from the Small Enterprise Development

Agency (SEDA). The agency is responsible for the running of various government funded incubation programmes across the country. The data covered a total of 387 SMEs in South Africa. KwaZulu-Natal made up majority of the SMEs (64.6%), followed by Gauteng (16.3%), Mpumalanga (11.6%) and Eastern Cape (7.5%). Non-incubated firms made up majority (82.6%) whilst incubated firms made up the rest of the SMEs in the dataset. Incubated firms had been under this support programme for three years up to 2021. Non-incubated firms' data was from the applicants who responded to the call for the 2022 incubation programme. The data was for 2021 period and covered the following features, sales revenue, owner's year of birth, owner's gender, geographic area, total number of employees, firm registration year and registration type, disability status and sector. The table below shows the distribution of firms based on various categorical variables.

Table 1: Sample Distribution by Categorical Variables

Categorical variables	Non-incubated	Incubated
Male	51.7%	57.4%
Female	48.3%	42.6%
Disabled	8.4%	4%
Urban based	57.2%	50.7%
Rural based	42.8%	49.3%
Registration	90.3%	89.6%
Manufacturing	13.1%	26.9%
Construction	16.8%	20.9%
Agriculture	10.0%	6.0%
Services	42.5%	34.3%
Other sectors	17.5%	11.9%

Response variable

Following previous studies (Phillipson et al., 2019; Zhou, 2022) sales revenue was used as the proxy for firm performance. Whilst these studies were carried out using non-incubated firms, Tembe (2018) noted that sales revenue is deemed an appropriate metric to measure the performance of incubated SMEs. Sales revenue provides a good indication of the quality of support a firm has received and thus act as a proxy of a firm's sustainable performance. In line with these studies, annual sales revenue was used as the response variable in this study.

Independent Variable

Explanatory variables were made up of both categorical and quantitative nature and some were further processed to allow for further analysis. Incubation status (Inc) was coded as 1for those under incubation programme and 0 for non-incubated firms. Owner's age (Owner_Age) was coded as the difference between 2021 and year of birth. Owner's gender (Gen) was proxied by 1 for female and 0 for male SME owners. Total number of employees (Tot_emp) was the total number of workers for both incubated and non-incubated firms in 2021. SME's age (SME_Age) was coded as the difference between 2021 and year of registration. Type of

registration (Reg) was defined as 1 for limited liability (Pty Ltd) companies and 0 for other. Location (Loc) was proxied by 1 for urban based (i.e., located within metropolitan areas) and 0 for those based in rural areas. Disability status (Disab) was defined by 1 for entrepreneur with disabilities and 0 otherwise. One-hot encoding was used to convert SME sectors into an analysable format with Other_sectors serving as the anchor variable.

Data Analysis

The following table presents descriptive statistics covering the continuous variables from the dataset. Following Curran-Everett (2018) the variables were first log transformed to address the problem of outliers.

Table 2: Descriptive statistics for SMEs continuous variables

Variables	Non-incubated		Incubated	
	Mean	Standard Deviation	Mean	Standard Deviation
Owner_Age	3.55	0.29	3.61	0.25
Sales	10.44	4.09	12.32	1.70
Tot_emp	1.13	0.96	1.6	0.86
SME_Age	1.21	1.01	1.41	0.93

The descriptive statistics shows that generally incubated SME owners are marginally older than their non-incubated counterparts. This may be due to that fact that the incubation onboarding criteria required some operational history which is generally lacking to younger entrepreneurs who may as well be starting up and thus operating in survivalist mode. This fact is best captured by the varying average sales revenue between two cohorts, with incubated firms demonstrating higher sales level and low standard deviation. The increased sales revenue invariably influences the SMEs recruitment levels (Pauka, 2015; Zhou & Gumbo, 2021b) and this is reflected in higher employment levels, again with low standard deviation between the two groups. The analysis also showed that the prospective applicants' firm age was less than that of the incubated firms. This finding may explain the reason for their application as research (Hou et al., 2020; Msimango-Galawe & Hlatshwayo, 2021) indicates that incubation is important for young firms because they lack among other things, networks, and resources to drive sustainable growth. However, it is important to note that the descriptive statistics only provides informal insights on the impact of incubation and contrasting attributes between incubated and non-incubated firms. In this light the next section provides an empirical model that was adopted to establish the impact of incubation programmes on SME performance.

Empirical Analysis

In order to answer the primary question for this research, a set of three regression models were fitted and these are specified as per Equations 1, 2 and 3. Model 1 is the main one which was fitted using the dataset containing both incubated and non-incubated firms. The main interest was on β_1, the coefficient of SME incubation status (Inc) whilst others ($\beta_1 \dots \beta_9$) are coefficients for other variables and ε_{it} is the error term. This simply means that should the β_1 coefficient be significant and positive then incubation support will be having positive impact

on SME performance, whilst significant and negative β_1 implies a negative effect of the incubation programme. However, should the β_1 coefficient be not significant, then it will be concluded that incubation has no impact on the performance of SMEs in the country. The accompanying Models 2 and 3 were fitted as supplementary to shed more light on the role of incubation, by establishing whether SMEs in these cohorts have significantly different attributes. For these models β_0 is the intercept whilst $\beta_1 \dots \beta_8$ are coefficients for the SME attributes and ε_{it} is the error term. All models were fitted using R Software for Statistical Computing version 4.1.2 (R Core Team 2021).

$$Model\ 1(All): LN(Sales) = \beta_0 + \beta_1 Inc + \beta_2 Gen + \beta_3 Disab + \beta_4 Loc + \beta_5 Reg \quad (1)$$
$$+ \beta_6 Sector + \beta_7 LN(Owner_{Age}) + \beta_8 LN(Tot_{Emp})$$
$$+ \beta_9 LN(SME_{Age}) + \varepsilon_{it}$$

$$Model\ 1(Non_{inc}): LN(Sales) = \beta_0 + \beta_1 + \beta_1 Gen + \beta_2 Disab + \cdots \quad (2)$$
$$+ \beta_8 LN(SME_{Age}) + \varepsilon_{it}$$

$$Model\ 3\ (Inc): LN(Sales) = \beta_0 + \beta_1 Gen + \beta_2 Disab + \cdots \beta_8 LN(SME_{Age}) + \varepsilon_{it} \quad (3)$$

Since the dataset is cross-sectional, Ordinary Least Squares (OLS) was selected as the ideal model following previous studies (Masenyetse, 2017; Panda, 2015) to fit the above three models. However, the diagnostic tests using Breusch-Pagan test and base plots in R suggested that heteroscedasticity and the problem of correlated errors was present in all the three regression models, implying that the OLS estimator could not give the best linear unbiased estimator (BLUE) for the β-coefficients. To address this challenge as suggested by Perugachi-Diaz and Knapik (2017), the Generalised Least Squares (GLS) model was adopted to estimate the β-coefficients. In essence the GLS estimator transformed the linear regression model. This implies that with the GLS model, β-coefficients were obtained with a transformed version of the OLS, which can be presented as per equation (4).

$$\beta_{GLS} = (X^T \Sigma^{-1} X)^{-1} X^T \Sigma^{-1} y \quad (4)$$

Where Σ is a positive definite covariance matrix containing (non-) constant variances on the diagonal and one or more covariances not being equal to zero on the off diagonals. As such using the $nlme$ library in R, all the three models were then fitted using the GLS technique. The model outputs are discussed under the next section focusing on results and discussion.

RESULTS AND DISCUSSION

The table 3 below shows the empirical analysis results using the GLS technique as per the specified Equations (1), (2) and (3).

Table 3: GLS results on incubated vs non-incubated SMEs

Variables	Model 1	Model 2	Model 3
B_0	8.999946*** (1.0235138)	8.514990***(1.2114665)	11.330153*** (0.7320903)
Inc	1.443558*** 0.4996320		
Tot_Emp	0.000848 (0.0011191)	0.000820 (0.0012063)	0.124072***(0.014274)
Owner_Age	0.030976* (0.0180531)	0.038018**(0.0208019)	0.006332 (0.0146434)
Loc	0.043966 (0.3560536)	0.032132 (0.4243143)	0.124363 (0.2436491)
Gen	-0.088003 (0.3569636)	0.060767 (0.4224007)	-0.175153 (0.2564932)
Disab	-1.559041 (1.0284618)	-2.057845* (1.1636668)	0.718528 (0.9917078)
SME_Age	0.199760*** (0.0339858)	0.218272***(0.0412906)	0.049318** 0.0231533)
Construction	1.498792** (0.6117933)	1.767324**(0.7247837)	0.237126 (0.4318354)
Agriculture	0.082155 (0.7309237)	0.355038 (0.8394559)	-0.897595 (0.5815044)
Manufacturing	0.869246 (0.6349098)	1.394936* (0.7742774)	-0.761174* (0.4161610)
Services	-0.203512 (0.5198520)	-0.066328 (0.6011642)	-0.602468 (0.3976131)
Pty_reg	-1.108037*(0.6131488)	-1.239852 (0.7350677)	-0.068796 (0.3928709)
Obs	387	320	67
Phi	0.05623425	0.04768	-0.09219
RSE	3.456497	3.717031	0.927316
AIC	2093.738	1780.007	219.2854

Heteroskedasticity-robust standard errors in parentheses, ***significant at 1% level of significance, ** significant at 5% level of significance, *significant at 10% level of significance

The results from the combined model show that incubation support has a positive impact on the performance of SMEs in South Africa. The results indicates that incubated SMEs' sales performance is 1.4 times better than that of their non-incubated counterparts at 1% significance level. This finding is in line with previous studies (Almeida et al., 2021; Lose & Tengeh, 2015; Tembe, 2018) showing that incubated firms tend to perform better compared to their non-incubated counterparts. This is mainly because these firms have access to customised business support services, such as networking, access to market and mentorship opportunities which non-incubated SMEs may not have access to such services which are usually expensive.

The combined traits of both non-incubated and incubated were further analysed based on Model 1. The results revealed that owner's age (at 10% significance level), SME age (at 1% significance level) and operating in the Construction sector (at 5% significance level) positively impacts the performance of SMEs in South Africa. The result on entrepreneurs' age (at 1% significance level) shows that older entrepreneurs' firms perform better compared to their youth owned counterparts. This may be because with age, entrepreneurs would have gained significant experience and forged strategic networks to drive their firm's performance. The finding aligns with some previous studies (Zhou & Gumbo, 2021b), but also contrary to some (Amran, 2011; Essel et al., 2019) which established either a negative impact or no effect of this driver on SME performance.

The positive relationship between SME performance and operating in the Construction sector (at 5% significance level), may be reflective of the increased investments into various infrastructural development initiatives by the government into the sector (DTI, 2017). Importantly, the government through Preferential Procurement Regulations mandated that

black owned enterprises should benefit through set asides schemes (DTI, 2019). The positive impact of SME age on SME performance aligns with the liability of newness model, which claims that compared to older firms, younger firms are at the higher risk of failure. This is mainly because the later lacks resources and track record in the market compared to the former. Finally, Model 1 also established that Pty registration (at 10% significance level) negatively impacts the sales performance of SMEs. These findings reflect the extent of regulatory burden which comes with formal private (Pty) limited registration on South Africa for SMEs. Various studies have established this disturbing relationship and there are growing calls for the government to attend to this challenge (OECD, 2017; Small Business Project, 2014; Zhou & Gumbo, 2021b).

Next, the varying attributes between non-incubated and incubated firms were analysed as per Models 2 and 3, respectively. The analysis showed that these two groups have significantly varying attributes which reflects the moderating effect of incubation on SME performance. For incubated firms as per Model 3, it was noted that employees (at 1% significance level) positively impact on performance. This implies that with more workers, an SME would be able to improve its turnover, but this is not the case for non-incubated SMEs, as per Model 2. In contrast, owner's age (at 5% significance level) has a positive impact on non-incubated SMEs' performance, whilst this had no effect on the incubated cohort. This shows that without tailor-made and affordable support, the entrepreneur's experience plays a crucial role in driving the company forward. Disability status (at 10% significance level) was found to be having a negative impact on non-incubated SME whilst the same factor had no effect for the incubated group. This may be because under incubation, SME owners receive customised support and those with disabilities are also provided with pertinent information aimed at supporting designated groups which includes them.

For non-incubated firms, operating in the construction sector (at 5% significance level) had superior sales performance compared to those operating in other sectors, however this had no effect for those under the incubation programme. Another contrasting attribute was for manufacturing SMEs, operating in this sector positively impact performance for non-incubated (at 10% significance level) and for the incubated group at the same significance level this had a negative impact. This finding may be indicative of the need for sector-based incubators targeting manufacturing SMEs. The only common feature between the two cohorts, whilst at different levels of significance, was company's age and this had a positive effect on sales performance for both incubated (at 5%) and non-incubated (at 1%) SMEs. This finding highlight that despite the role of incubation support, experience in the market plays an important role in driving sales performance and thus survival prospects for SMEs.

CONCLUSION

The results showed that indeed, incubation programmes have a significant and positive impact on the performance of SMEs in South Africa. These findings provide hope to the South African government which has elevated this type of support in a bid to accelerate the sustainable growth of SMEs. The study findings give credence to submission by the DTI (2014) call for increased

rolling out of incubators in order to improve SMEs' sustainable performance. It is clear that incubators can play a role in ameliorating the challenge of continued SME failure, as studies show that the main reasons of failure are mainly due to lack of entrepreneur's experience, poor business management practices and lack of funding. Msimango-Galawe and Hlatshwayo (2021) highlighted that the effectiveness of incubation programmes directly means socio-economic benefits to the government. This is mainly because sustainable performance of SMEs as per the NDP goals sustainably addresses the tripartite challenge of unemployment, poverty, and inequality. In addition, to promote innovation and high-growth firms, business incubators should be utilised in South Africa so as to reduce the current high rates of micro and survivalist enterprises (Bureau for Economic Research, 2016; Tembe, 2018)

The contrasting attributes of incubated and non-incubated SMEs show that, via incubation the government can address the currently unemployment levels which have been worsened by the Covid-19 pandemic. Freire et al. (2022) shows that South Africa's BRICS counterpart, Brazil has greatly benefited from the various incubation programmes to address unemployment and spark economic development. Another important finding was the moderating role of incubation in minimising the need for both entrepreneur's and SMEs' experience to drive performance. In a country in which youths are encouraged to start businesses, this finding shows that through incubation the government and other stakeholders can ensure that youths owned enterprises are sustainable. The main concern however was that incubated manufacturing SMEs were at a disadvantage compared to SMEs operating in other sectors in the country. This requires a careful review of the support type being offered to SMEs in this sector. Potentially sector specific incubators may be explored to ensure adequate support for SMEs operating in this sector.

Overall, based on our findings, the South African government and other private sector players are strongly encouraged to adopt business incubation to drive SME sustainable performance. Key to note is the need for the government to devise customised interventions which aligns to the unique needs of incubated and non-incubated firms as their requirements significantly differ. Through effective incubation programmes, the country's NDP objectives of having SMEs contributing 90% to total employment by 2030 may well be within reach.

STUDY LIMITATIONS AND RECOMMENDATIONS

This study established the role of incubation programmes support on SMEs performance in South Africa. However, there are some limitations worthy noting, chief among them being that the study sample was not necessarily fully representative of all SMEs in South Africa as majority of the participants were based in KwaZulu-Natal province. Notwithstanding this challenge, it's noteworthy that KwaZulu-Natal is the second largest province in the country and these results bears important implications for the province as it also aims to leverage incubation models to revive the struggling SME sector. It's recommended that future studies should consider utilising data that is more representative of all the nine provinces in South Africa.

In this study, we relied on cross-sectional data, which fails to capture time varying nature of SME performance. However, despite this limitation, previous studies (Amran, 2011; Hyder & Lussier, 2016; Panda, 2015) have shown that this type of dataset can provide insight into a given phenomenon of interest and thus assist policy makers and other stakeholders in crafting relevant actions in the SME sector. This is even more pronounced since there has been no study to the best of our knowledge that has performed this comparative analysis. Finally, it is recommended that future studies utilise panel data to establish the role of incubation on SME performance over a longer period.

References

1. Al-Mubaraki, H. M., & Busler, M. (2013). The effect of business incubation in developing countries. European Journal of Business and Innovation Research, 1(1), 19-25.

2. Allahar, H., Brathwaite, C., Roberts, D., & Hamid, B. (2016). The emergence of business incubators as entrepreneurship development tools: A small country experience. International Journal of Economics, Commerce and Management, 9, 623-643. https://www.researchgate.net/profile/Candace_Brathwaite/publication/308304432_The_Emergence_of_Business_Incubators_as_Entrepreneurship_Development_Tools_A_Small_Country_Experience/links/57e2ee5008aecd0198dd82d5/The-Emergence-of-Business-Incubators-as-Entrepreneurship-Development-Tools-A-Small-Country-Experience.pdf

3. Allan Gray Orbis Foundation. (2017). South Africa ranked one of Africa's top entrepreneurial nations. https://www.allangrayorbis.org/entrepreneurship-blog/effect/south-africa-ranked-one-africas-top-entrepreneurial-nations/

4. Almeida, R. I. d. S., Pinto, A. P. S., & Henriques, C. M. R. (2021). The effect of incubation on business performance: A comparative study in the Centro region of Portugal. Revista Brasileira de Gestão de Negócios, 23, 127-140.

5. Amran, N. A. (2011). The effect of owner's gender and age to firm performance: a review on Malaysian public listed family businesses. Journal of global business and economics, 2(1), 104-116. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.460.2132&rep=rep1&type=pdf#page=108

6. Ayandibu, A. O., & Houghton, J. (2017). External forces affecting Small businesses in South Africa: A case study. Journal of Business Retail Management Research, 11(2), 49-64.

7. Ayatse, F. A., Kwahar, N., & Iyortsuun, A. S. (2017). Business incubation process and firm performance: an empirical review. Journal of Global Entrepreneurship Research, 7(2). https://www.econstor.eu/bitstream/10419/196982/1/878734139.pdf

8. Banking Association of South Africa. (2018). Hurdles faced by financial institutions in financing small and medium enteprises (SMME).

9. Bartika, A. W., Bertrandb, M., Cullenc, Z., Glaeserd, E. L., Lucac, M., & Stantonc, C. (2020). The impact of COVID-19 on small business outcomes and expectations. *PNAS*, *117*(30). https://doi.org/https://doi.org/10.1073/pnas.200699111

10. Bureau for Economic Research. (2016). the small, medium and micro enterprise sector of South Africa. http://www.seda.org.za/publications/publications/the%20small,%20medium%20and%20micro%20enterprise%20sector%20of%20south%20africa%20commissioned%20by%20seda.pdf

11. Cele, C. R. T. (2015). SMME access to funding: challenges experienced by SMMEs in uMzimkhulu Municipality

12. Curran-Everett, D. (2018). Explorations in statistics: the log transformation. Advances in physiology education, 42(2), 343-347.

13. D'imperio, R. (2015). Growing the global economy through SMEs (Edinburgh Group, Issue. http://www.edinburgh-group.org/media/2776/edinburgh_group_research_-_growing_the_global_economy_through_smes.pdf

14. DeTombe, D. (2015). Handling societal complexity. In A Study of the Theory of the Methodology of Societal Complexity and the COMPRAM Methodology. Springer.

15. Dludlu, J. (2021). Policy madness: SA's industrialisation policies have slowed economic growth. *Daily Maverick* https://www.dailymaverick.co.za/opinionista/2021-04-22-policy-madness-sas-industrialisation-policies-have-slowed-economic-growth/ [Record #192 is using a reference type undefined in this output style.] [Record #578 is using a reference type undefined in this output style.] [Record #194 is using a reference type undefined in this output style.]

16. DTI. (2019). Financial Assistance (Incentives). Department of Trade and Industry. http://www.thedti.gov.za/financial_assistance/financial_assistance.jsp

17. Essel, B. K. C., Adams, F., & Amankwah, K. (2019). Effect of entrepreneur, firm, and institutional characteristics on small-scale firm performance in Ghana. Journal of Global Entrepreneurship Research, 9(1), 55.

18. Fatoki, O. (2014). The causes of the failure of new small and medium enterprises in South Africa. Mediterranean Journal of Social Sciences, *5*(20), 922-927. http://www.mcser.org/journal/index.php/mjss/article/view/3816

19. Freire, C. D., Neto, M. S., & Moralles, H. F. (2022). Technology-based business incubators: the impacts on resources of startups in Brazil. International Journal of Emerging Markets. https://www.emerald.com/insight/content/doi/10.1108/IJOEM-08-2020-0900/full/html

20. Garatsa, C., & Dlamini, B. (2021). Factors Influencing the Adoption and Implementation of Customer Relationship Management Strategies by Small and Medium Enterprises in KwaZulu-Natal. International Journal of Entrepreneurship, *25(2),* 1-18.

21. GEN 22 On Sloane. (2020). *COVID-19 impact on South Africa's SMMEs*. https://www.22onsloane.co/wp-content/uploads/2020/11/COVID-19-Impact-on-South-Africa-SMMEs-April-2020-22-ON-SLOANE.pdf

22. Herrington, M., & Coduras, A. (2019). The national entrepreneurship framework conditions in sub-Saharan Africa: a comparative study of GEM data/National Expert Surveys for South Africa, Angola, Mozambique and Madagascar. Journal of Global Entrepreneurship Research, 9(1), 60 -66.

23. Herrington, M., & Kew, P. (2016). Global Entrepreneurship Monitor-South African Report 2015/16: Is South Africa heading for an economic meltdown.

24. Hewitt, L. M., & van Rensburg, L. J. J. (2020). The role of business incubators in creating sustainable small and medium enterprises. The Southern African Journal of Entrepreneurship and Small Business Management, 12(1), 9.

25. Hou, B., Hong, J., & Yang, Y. (2020). Geographical aggregation and incubator graduation performance: the role of incubator assistance. European Journal of Innovation Management.

26. Hyder, S., & Lussier, R. N. (2016). Why businesses succeed or fail: A study on small businesses in Pakistan. Journal of Entrepreneurship in Emerging Economies, 8(1), 82-100. https://doi.org/10.1108/JEEE-03-2015-0020 [Record #164 is using a reference type undefined in this output style.]

27. International Finance Corporation. (2019). the unseen sector: A report on the MSME opportunity in South Africa. https://www.ifc.org/wps/wcm/connect/2dddbf2b-bd44-4965-a7bf-b71475602649/2019-01-MSME-

Opportunity-South-Africa.pdf?MOD=AJPERES&CVID=mxxxHod

28. International Trade Centre. (2018). Promoting SME Competitiveness in Africa: Data for de-risking investment. http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Africa_SME%20web.pdf

29. Leboea, S. T. (2017). The factors influencing SME failure in South Africa. University of Cape Town].

30. Lekhanya, L. M. (2016). Determinants of survival and growth of small and medium enterprises in rural KwaZulu–Natal. University of the Western Cape]. http://etd.uwc.ac.za/handle/11394/5569

31. Lose, T., & Tengeh, R. K. (2015). The sustainability and challenges of business incubators in the Western Cape Province, South Africa. Sustainability, 7(10), 14344-14357.

32. Mabotja, L. L. (2018). Is South African Manufacturing SMMEs Ready for the Fourth Industrial Revolution? Journal of Education and Vocational Research, 9(2), 20-26. https://ojs.amhinternational.com/index.php/jevr/article/view/2798

33. Mahohoma, T. (2018). The impact of entrepreneurial competencies on the performance of SMEs in the eThekwini Municipal Region, KwaZulu-Natal, South Africa http://openscholar.dut.ac.za/handle/10321/3145

34. Masenyetse, R. F. (2017). Firm Growth, Survival and Productivity in South Africa. University of Cape Town]. Cape Town. https://open.uct.ac.za/handle/11427/27099

35. Msimango-Galawe, J., & Hlatshwayo, E. N. (2021). South African business incubators and reducing the SME failure rate–A literature review. Problems and Perspectives in Management. https://doi.org/10.21511/ppm. 19(2).2021.16

36. Mtshali, M., Mtapuri, O., & Shamase, S. P. (2017). Experiences of black-owned small medium and micro enterprises in the accommodation tourism-sub sector in selected Durban townships, KwaZulu-Natal. African Journal of Hospitality, Tourism and Leisure, 6(3), 130-141. [Record #172 is using a reference type undefined in this output style.]

37. Ncube, T. R., & Zondo, R. W. D. (2022). Entrepreneurial Attributes responsible for Small and Medium Enterprise Growth in South Africa: Small and Medium Enterprise Owners' perspectives. INTERNATIONAL JOURNAL OF SPECIAL EDUCATION, 37(3).

38. Ngcobo, S., & Sukdeo, R. (2015). Challenges facing SMMEs during their first two years of operation in South Africa. Corporate Ownership and Control, 12(3), 505-512.

39. Ngibe, M., & Lekhanya, L. M. (2019). Innovative leadership in South African manufacturing Small Medium Enterprises within KwaZulu-Natal. Journal of Contemporary Management, 16(2), 300-330. https://doi.org/10.35683/jcm19034.37

40. Nicholls-Nixon, C. L., & Valliere, D. (2021). Entrepreneurial logic and fit: a cross-level model of incubator performance. International Journal of Entrepreneurial Behavior & Research.

41. OECD. (2017). OECD Economic Surveys: South Africa. www.oecd.org/eco/surveys/economic-survey-southafrica.htm

42. Panda, D. (2015). Growth determinants in small firms: drawing evidence from the Indian agro-industry. International Journal of Commerce Management, 25(1), 52-66.

43. Pauka, K. (2015). How does Part-time Work Affect Firm Performance and Innovation Activity? https://www.econstor.eu/handle/10419/123473

44. Phillipson, J., Tiwasing, P., Gorton, M., Maioli, S., Newbery, R., & Turner, R. (2019). Shining a spotlight on small rural businesses: How does their performance compare with urban? Journal of rural studies, 68(3), 230-239.

45. Ramar, M. N., Muthukumaran, C., Manida, M. M., Nandhini, M. B., & Parkavi, M. C. (2020). Role of Business Incubation Centres in Promoting Entrepreneurship with Special Reference to Tamilnadu. Technology, 68(34), 34.

46. Rathore, R. S., & Agrawal, R. (2021). Performance indicators for technology business incubators in Indian higher educational institutes. Management Research Review.

47. Rens, V., Iwu, C. G., Tengeh, R. K., & Esambe, E. E. (2021). SMEs, Economic Growth, and Business Incubation Conundrum in South Africa. A Literature Appraisal. Journal of Management and Research, 8(2), 214-251.

48. Simango, S. S. (2022). Examining the impact of business incubation on the growth of tourism SMMEs: The case of Pilanesberg Business Incubator Programme. University of Cape Town]. Cape Town.

49. Small Business Project. (2014). Examining the challenges facing small businesses in South Africa (1). SBP. http://www.sbp.org.za/uploads/media/SBP_Alert_-_Examining_the_challenges_facing_small_businesses_in_SA_01.pdf

50. Soni, P., Cowden, R., & Karodia, A. M. (2015). Investigating the characteristics and challenges of SMMEs in the Ethekwini Metropolitan Municipality. Nigerian Chapter of Arabian Journal of Business and Management Review, 62(2469), 1-79. https://platform.almanhal.com/GoogleScholar/Details/?ID=2-74057

51. Ssekiziyivu, B., Mwesigwa, R., Kabahinda, E., Lakareber, S., & Nakajubi, F. (2021). Strengthening business incubation practices among startup firms. Evidence from Ugandan communities. Journal of Enterprising Communities: People and Places in the Global Economy. [Record #539 is using a reference type undefined in this output style.]

52. Stefanović, M., Devedžić, G., & Eric, M. (2008). Incubators in developing countries: development perspectives. 2nd International Quality Conference,

53. Stephens, S., & Lyons, R. M. (2022). The changing activities of business incubation clients: an Irish case study. Journal of Science and Technology Policy Management.

54. Tembe, F. (2018). Business incubators and SMMEs performance in South Africa. Wits]. Johannesburg. http://wiredspace.wits.ac.za/bitstream/handle/10539/27777/Faith_Final_Research%20Report.pdf?sequence=1

55. Zhou, H. (2022). The influence of key risk drivers on the performance of SMMEs in the maunfacturing sector in KwaZulu-Natal. Durban Univeristy of Technology]. Durban

56. Zhou, H., Dash, G., & Kajiji, N. (2021, 11-12 May). Artificial Intelligence Function Mapping to Calibrate the Determinants of SMME Performance. Virtual African Finance Association Conference, http://www.africagrowth.com/AFJ_conference_abstracts.pdf

57. Zhou, H., & Gumbo, V. (2021a). Key performance drivers of small enterprises in the manufacturing sector in KwaZulu Natal province, South Africa. International Journal of Entrepreneurship, 25(3), 12.

58. Zhou, H., & Gumbo, V. (2021b). Rural-urban comparison of manufacturing SMMEs performance in KwaZulu Natal province, South Africa. African Journal of Development Studies, 11(1), 7-31. https://doi.org/https://doi.org/10.31920/2634-3649/2021/v11n1a1