



**The influence of key risk drivers on the performance of SMMEs in the  
manufacturing sector in KwaZulu-Natal**

by

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## ABSTRACT

Small Medium and Micro Enterprises (SMMEs) have been shown to be key contributors to sustainable socio-economic development, constituting more than 90% of private sector enterprises around the world. Inevitably, many developing countries continue to explore means aimed at enhancing the performance of small enterprises. However, despite the implementation of various interventions the failure rate of SMMEs in South Africa particularly KwaZulu-Natal (KZN) is disturbing, reaching up to 80% in the first year of operation. As such, to contribute to addressing this challenge, the study adopted a novel approach to establishing and modelling manufacturing SMMEs performance drivers. Utilising a unique three-year panel dataset, key risk drivers were established and modelled via R software version 3.6.3. To achieve the study objectives, a series of independent but related papers were carried out and these make up the main chapters of this thesis. The first chapter provided the background to the study. The second chapter explored the characteristics of manufacturing SMMEs based in KZN province. The findings showed the complexity of firm performance, indicating the heterogeneity between rural and urban based SMMEs. The next chapter, harnessing Stochastic theory aimed to establish whether SMMEs' growth performance followed a random walk. The theoretical model was rejected, thus providing a basis for the claim that firm performance is a function of certain risk drivers. Armed with findings from the previous papers, the investigation of key drivers impacting the sales and growth performance of manufacturing SMMEs ensued. The fourth chapter, harnessing the Penrosian and strategic management theories established key drivers of SMMEs' performance. The fifth chapter concerningly, revealed that SMME owners in the manufacturing sector are largely not aware of the impact of established drivers on their enterprises' performance. In the next chapter, a total of five machine learning algorithms were evaluated of which Artificial Neural Network and Support Vector Machines were identified as the best algorithms for SMME sales and growth predictive modelling, respectively. The two algorithms informed the development of a dedicated machine learning application for SMMEs that's being commercialised through the DUT Technology Transfer and Innovation Directorate.

**Keywords:** *KwaZulu Natal; Machine Learning; Manufacturing; Performance; SMMEs*

## DECLARATION

I, Helper Zhou declare that this thesis entitled “**The influence of key risk drivers on the performance of SMMEs in the manufacturing sector in KwaZulu-Natal**” is my own unaided work and has not been previously submitted for academic examination towards any qualification. Furthermore, it represents my own opinions, ideas and not necessarily those of the Durban University of Technology. I further declare that all the sources cited or quoted are acknowledged and indicated as per the comprehensive list of references.

Date: 14 December 2021

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Date: 14 December 2021

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## **DEDICATION**

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## ACRONYMS AND ABBREVIATIONS

AIC	Akaike Information Criterion
ANN	Artificial neural networks
BER	Bureau for Economic Research
CEO	Chief Executive Officers
CIPC	Companies and Intellectual Property Commission
CTM	Centre for Technology Management
DTI	Department of Trade and Industry
ECM	Error Component Model
ERM	Enterprise Risk Management
ESD	Enterprise and Supplier Development
EU	European Union
FE	Fixed Effects
FEVD	Fixed Effects Vector Decomposition
FGLS	Feasible General Least Squares
GDP	Gross domestic product
GDPR	Gross Domestic Product per Region
GEM	Global Entrepreneurship Monitor
GLS	Generalised Least Squares
GVA	Gross value added
ICT	Information and Communication Technology
IPAP	Industrial Policy Action Plan
JSE	Johannesburg Stock Exchange
KZN	KwaZulu-Natal
LED	Local Economic Development
LPE	Law of Proportionate Effect
MAE	Mean Absolute Error
MASE	Mean Absolute Scaled Error
MDAE	Median Absolute Error
MES	Minimum efficient scale
MSE	Mean Squared Error
NASB	National Small Business



NDP	National Development Plan
NEF	National Empowerment Fund
NSBA	National Small Business Association
NYDA	National Youth Development Agency
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PGDP	Provincial Growth and Development
PLM	Passive Learning Model
PMI	Purchasing Manager Index
RBV	Resource-based view
RE	Random Effects
REWB	Random Effects Within-Between
RMSE	Root Mean Squared Error
ROA	Return on Assets
ROE	Return on Equity
RSS	Sum of Squared Residuals
SADC	Southern African Development Community
SAMAF	South African Micro-Finance Apex Fund
SARS	South African Revenue Services
SBA	Small Business Association
SEDA	Small Enterprise Development Agency
SEFA	Small Enterprise Finance Agency
SME	Small, Medium Enterprise
SMME	Small, Medium, Micro Enterprise
SVM	Support Vector Machines
TIKZN	Trade and Investment KwaZulu-Natal
TIPS	Trade and Industrial Policy Strategies
UK	United Kingdom
VAT	Value Added Tax

# CHAPTER ONE: INTRODUCTION TO THE STUDY

## 1.1 Background on SMMEs Role in Emerging Economies

The strategic role of small, medium and micro enterprises (SMMEs)<sup>1</sup> remains of utmost importance in social-economic development, all over the world, because of their unarguably entrenched part in addressing some pressing socio-economic challenges (Herrington and Kew 2016: 8; Herrington and Coduras 2019: 22). Various studies have enumerated on the invaluable role played by the small businesses sector (Yusuf and Dansu 2013: 77; Herrington and Kew 2016: 8). The sector makes positive contribution through employment generation, improving people's standard of living through income generation, which is critical for many countries. The sector has also been tagged as the central driver of innovation and export growth (OECD 2009: 6; Provincial Treasury 2017: 65; Govuzela and Mafini 2019: 1). According to the Edinburgh report, SMMEs constitute the highest number of businesses globally, and are highly labour absorptive (D'imperio 2015: 8). B20 Cross-Thematic Group (2017: 1) maintained that the SMME sector forms a critical pinnacle for nearly every country around the world, generating between 50% and 70% of employment opportunities and income. The sector forms a perfect ecosystem with large corporates and fosters a culture of disruptive innovation (Mukorera 2014: 48; D'imperio 2015: 7).

SMMEs are regarded as important even in developed economies because of their socio-economic contributions. They account for 50% of the labour force in the private sector in OECD countries and constitute 99% of private enterprises in the European Union (EU) (OECD 2009: 6). Just like in the developed world, small businesses are important economic role players in developing economies (Shangase 2016: 42; OECD 2017: 41). Formal SMEs in developing countries across Africa and Asia contribute between 46% and 80% of total employment, and these statistics are significantly higher when informal SMEs are accounted for (D'imperio 2015: 9). In Asia, the small business sector is seen as one of the strategic conduits through which economic transformation from resource dependency into knowledge based economic models

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<sup>1</sup> This is the South African definition of small enterprises or businesses which in other countries are called Micro, Small and Medium Enterprises (MSMEs) (IFC 2018). In this study the acronyms SMME and SME refer to the small enterprises and will be thus used interchangeably.

can be achieved. The sector significantly contributes towards Gross Domestic Product (GDP) growth (Moorthy et al. 2012: 224; Hyder and Lussier 2016: 95). A study by (Moorthy et al. 2012: 224) established that 99.2% of all business establishments in 2010 in Malaysia were small and medium enterprises (SMEs), which confirms their fundamental role in a country's economic development. The important role played by SMEs in improving exports which in turn improve the country's trade balance cannot be overemphasised (Moorthy et al. 2012: 224; Yusuf and Dansu 2013: 80; Deepa and Annamalai 2018: 83). Around the African region, the sector provides employment opportunities for vulnerable groups like the poor and women (Okpara 2011: 157; Lekhanya 2015: 413; International Trade Centre 2018: 2).

In South Africa, SMMEs are not only viewed as a means through which innovation, economic growth and employment creation can be achieved (Gumede 2000: 7; Herrington and Kew 2016: 5), but small enterprises are regarded as an effective avenue through which apartheid legacy patterns of business ownership can be redressed (NPC 2011: 140). Small businesses have been found to be central not only in economic but most importantly social development in rural areas which are normally excluded from active economic activities (Bhorat et al. 2018: 2). Owing to their less complicated operations, SMMEs can operate and survive using rudimentary industrial infrastructure, thus serving as avenues for industrial dispersal as well as rural development (Yusuf and Dansu 2013: 80).

South Africa's National Planning Commission (2011: 141) echoed the same sentiments, asserting that SMMEs are crucial in providing shock absorbers to the extreme poverty levels in the country (Gumede 2000: 9). New and expanding firms especially in developing countries like South Africa, intercept high unemployment levels through self-employment and serve as rungs on the economic advancement ladder (Lekhanya 2015: 413; Small Enterprise Development Agency 2018: 10; International Finance Corporation 2019: 9). This research is aligned with previous studies, charging that growth and survival of small firms strengthens the private sector's role of acting as an 'engine of growth' (Felipe 1998: 465; Hermelo and Vassolo 2007: 4; Klapper and Richmond 2011: 33).

The evidence confirms the importance of small businesses in any economy, with EDGE (2013: 13) contending that SMMEs are key economic drivers owing to their

distinctive advantage compared to large firms (Umjwali 2012: 38). The operational model of small-scale enterprises allows them to innovate faster through efficient managerial tendencies and less bureaucratic hurdles (EDGE 2013: 13; B20 Cross-Thematic Group 2017: 1). IMBADU (2016: 2) concurred, arguing that SMMEs can drastically change the direction of any country's economic growth trajectory because of their latent ability to drive economic activity across various strategic sectors like manufacturing, that are key to contributors to GDP growth (Rijkers, Söderbom and Loening 2010: 1280).

The existence of small enterprises in all economic sectors signifies their indispensable role in driving economic growth (Muriithi 2017b: 38). The International Trade Centre (2018: 2) pointed out that the long-term dividends of investing in SMEs are significant and will positively impact the well-being of a society. This agrees with submission by D'imperio (2015: 8) that if well nurtured, SMMEs can become the engine that drives developing countries' sustainable economic performance. Implying that countries and regions that promote entrepreneurship and small businesses stand to benefit in the long term, as small enterprises play a significant role in industrial development (Deepa and Annamalai 2018: 83; Roopchund 2020: 587).

Inevitably, many studies around world have focused on how to promote entrepreneurship with the focus being primarily centred on formation of SMMEs (Geroski 1995: 435; Stam et al. 2008: 4; Kerr, Wittenberg and Arrow 2014: 7). Various stakeholders were thus interested in ways to promote the creation of conducive environments for firm formation and not much attention was given to the subsequent performance and long-term survival of these small businesses (Gumede 2000: 25; Peltoniemi 2013: 224; Leković and Marić 2015: 12; Muriithi 2017b: 39; Deepa and Annamalai 2018: 84). This is in spite of the fact that firm exit results in higher job destruction rates compared to firm entry (Klapper and Richmond 2011: 43). Research shows that the post-entry experience for the majority of small enterprises is tougher than expected, because of various risk drivers from both the external and internal environments (Ilojev and Kwanum 2012: 156; Mano et al. 2012: 467; Gupta, Guha and Krishnaswami 2013: 10; D'imperio 2015: 5; International Finance Corporation 2019: 85).

Evidence, even in the developed countries, shows that SMME failure rates have been disturbingly high, reaching up to 90%, during the initial ten years of operations (Nemaenzhe 2010: 4; Mukorera 2014: 59; Löfsten 2016: 88). The high failure rate in the SMME sector is common in emerging countries like Malaysia with thousands of small businesses closing between 2010 and 2014 (Moorthy et al. 2012: 224; Deepa and Annamalai 2018: 84). A study by Muriithi (2017b: 40) noted that about a third of Ugandan SMEs fail within a year of establishment and small firms in Chad experience a 65% mortality rate. In comparison to both developed and emerging countries, South Africa's failure rate is even more staggering, ranging between 70 to 80% during the first year of operation (EDGE 2013: 6; Fatoki 2014: 922; Muriithi 2017b: 40).

This bearish trend by South African SMMEs seems to directly threaten the very hope of economic development and social prosperity, as SMMEs are generally tagged to be well positioned to significantly contribute to such (International Finance Corporation 2019: 109). Clearly, as argued by the National Planning Commission (2011: 141), the extent of the weakening SMMEs sector is disconcerting, especially considering that the sector provides an important pillar for economic development, employment creation and poverty alleviation. Yusuf and Dansu (2013: 87) maintained that, while SMEs have great potential for economic development, their real contribution remains subdued due to various risks and uncertainties which hamper their success (Adegbite et al. 2007: 74; Olawale and Garwe 2010: 737; Okpara 2011: 166; Mano et al. 2012: 467; Deepa and Annamalai 2018: 84). According to Lekhanya (2015: 417) and Herrington and Kew (2016: 3), SMMEs need well thought-out support interventions to strengthen their contribution towards employment creation, equality and economic growth in developing countries.

Concerningly, limited research on key challenges faced by the SMME sector has adversely impacted the development of structured support interventions to enhance SMME performance (Yoshino 2011: 105; Lekhanya 2016b; Muriithi 2017b: 39; Deepa and Annamalai 2018: 84; Zhou and Gumbo 2021b). In fact, Gupta, Guha and Krishnaswami (2013: 12) articulated that there is fragmented research on various risk drivers SMMEs grapple with, especially in different geographical locations (Zhou and Gumbo 2021d). Previous studies established a need to ascertain the effect of both external and internal variables which are the sources of risk on the performance and

growth path followed by SMMEs (Coad, Segarra and Teruel 2016; Zhou and Gumbo 2021d). It is quite clear that despite an increased research volume on SMMEs, there still a lack of a dedicated model, linking various risk drivers to performance in order to inform agile decision-making by these important but also vulnerable enterprises (Wiklund, Patzelt and Shepherd 2009: 351)

In light of the preceding backdrop, it is clear that proper understanding of the variables which affect small businesses performance and sustainable growth could be invaluable for developing countries (Hermelo and Vassolo 2007: 4; Moreno, Zarrias and Barbero 2014: 373; Panda 2015: 62). This is because appreciation of key risk drivers will allow for the development of informed government policies and strategies to enhance sustained development and growth of SMMEs throughout their life cycle (Klapper and Richmond 2011: 33; National Planning Commission 2011: 142; Filho et al. 2017: 15). Various researchers have argued that by establishing key risk drivers of SMMEs' performance, governments can develop bespoke interventions that speak to the very needs of each of the enterprises (Mukorera 2014: 160; Muriithi 2017b: 44; Zhou and Gumbo 2021b). This is more needful now, given the findings by various studies on the danger of assuming a homogeneous SMME sector which is largely not the case owing to the nature of small firms (Gumede 2000: 11; Bigsten and Gebreeyesus 2007: 817; Gupta, Guha and Krishnaswami 2013: 10; Small Business Project 2014: 4; Zhou and Gumbo 2021d: 21).

## **1.2 Context of the Research**

The concept of small firm performance has gained prominence in recent years (Richard et al. 2009: 719; Yoshino 2011: 18; Leković and Marić 2015: 10; Pauka 2015: 1; Coad et al. 2016: 225; Lekhanya 2016b: 413; Zhou and Gumbo 2021b: 4). These studies noted the need for understanding factors behind SMMEs' failure or success as this is crucial to the sustainable growth and stability not only of individual businesses but the global economy as well (Deepa and Annamalai 2018: 84). Klapper and Richmond (2011: 33) and Okpara and Kabongo (2009) emphasised the importance of firms' performance studies especially in emerging economies as they necessitate understanding of the impact of macroeconomic and internal factors on SMMEs. Similarly, Dunne and Masenyetse (2015: 17) echoed these assertions,

indicating that appreciating factors behind firm performance is vital for industrial development by allowing for the adoption of pertinent interventions.

Appreciating key performance drivers is important for improving not only small firms but overall economic performance and growth (Yusuf and Dansu 2013: 87; D'imperio 2015: 35; Phillipson et al. 2019: 238). This was further supported by various studies (Okpara and Kabongo 2009; Okpara 2011; Filho et al. 2017) contending that since SMMEs are a critical poverty alleviation tool, understanding the factors underpinning their performance and survival patterns plays a central role in informing the development of relevant policies. Such informed policies could be central in ensuring pertinent support for small business growth which, in turn, will boost economic growth in developing countries (Gupta, Guha and Krishnaswami 2013: 12; Muriithi 2017b: 44; International Finance Corporation 2019: 109). Understanding of SMMEs key risk factors impacting SMMEs performance is important, as already noted by a plethora of studies, postulating that these enterprises are the engine of the economy (Herrington and Kew 2016: 3; B20 Cross-Thematic Group 2017: 1).

Voulgaris, Agiomirgianakis and Papadogonas (2015: 15) established that small firms are flexible job creators even under economic crisis conditions. Studies by Klapper and Richmond (2011: 38) and Kerr, Wittenberg and Arrow (2014: 12) indicated that the closure of small firms results in the highest rates of job destruction. The studies confirmed that SMMEs form an important and integral part of the economy, as their failure strongly hurts the economy than does large companies. In the same vein, Umjwali (2012: 58) charged that SMMEs especially in the South African manufacturing sector have a higher employment propensity than big companies, further indicating how instrumental SMMEs are in addressing key challenges like unemployment, poverty and inequality hurdles. The sector contributes around 57% to South Africa's national GDP, constituting 60% of national employment and is forecasted to create up to 90% of total jobs by 2030 (Kongolo 2010: 2288; National Planning Commission 2011: 119; SARB 2015: 5; IMBADU 2016: 2).

Besides job creation and other fundamental contributions, the sector is central in fostering innovation and improving the South Africa's trade balance (Gumede 2000: 10; Kongolo 2010: 2288). Studies show that the sector contributes 20% of all South African exports, something that is central in driving longer term and sustained

economic growth (Worku 2013: 67). This contribution by the sector further provides the incentive to conduct studies that enhance the support for SMMEs through identification of relevant performance drivers (Lekhanya 2016b: 112; Muriithi 2017b: 44; Deepa and Annamalai 2018: 84). The importance of such studies cannot be underestimated because they ensure that the support programmes by various governments meant for the SMME sector are not in vain (Hermelo and Vassolo 2007: 4). In his study on South African SMMEs, Lekhanya (2015: 417) noted the general disconnect between the government and sector needs, which negatively impacts on the sector's potential to making meaningful socio-economic contributions. This aligns with other studies showing that at least 54% of small businesses fail within their first year of operation in the country (EDGE 2013: 6; Worku 2013: 76; Fatoki 2014: 922). This finding was further corroborated by (DSBD 2014: 3) highlighting that only 37% SMMEs survive beyond four years, and a meagre 9% survive beyond 10 years in South Africa.

The Global Entrepreneurship Monitor (GEM) survey also established that South Africa is experiencing a higher rate of SMME discontinuation and has one of the lowest established business rates in the world, ranking 53 out of 60 economies (Herrington and Kew 2016: 32). This reconciles well with the (EDGE 2013: 4) report that showed that, compared to other emerging economies like China, India and Indonesia whose small businesses contribute 90%, South African SMMEs contribute only 55% to employment. The study further pointed out the concerning lower level of entrepreneurial intent in the country, which is further exacerbated by ageing SMME owners, with 43% of manufacturing SMMEs owners being more than 50 years old. The performance of the South African SMME sector has been disappointing, with formal SMMEs registering a paltry 1% growth between 2008 and 2015 and 3% when informal enterprises are included (Bureau for Economic Research 2016: 16). KwaZulu-Natal was the culprit, as more than 27% of the formal enterprises closed during the same period. A study by Small Enterprise Development Agency (2018: 10) showed that the SMMEs in the country fell by 4% between 2016 and 2017, KwaZulu-Natal Province lost 14% of its SMMEs.

The declining SMME trend coincides with the worst economic performance the country has ever seen. The country is riddled with a chronic unemployment rate of 29% (more



than 55% among the youths), pervasive poverty levels and widening inequality as shown by the country's 0.69 Gini coefficient, which is one of the highest in the world (Statistics South Africa 2019; World Bank Group 2020). The World Bank Group (2020) established that poverty levels in the country continue to increase, as shown by an uptick from 16.8% to 18.8% of the people who live on less than \$1.9 (about R30) per day between 2011 and 2015. According to the Industrial Development Corporation (2016: 15), South Africa experienced negative growth in the first quarter of 2016 and compared to its peer economies was expected to record the worst deficit-to-GDP ratio up to 2019 due to subdued manufacturing sector exports.

This poor performance is mainly due to the decline of SMMEs in the manufacturing sector, which fell by 0.5% to 9% between 2017 and 2018 thus impacting aggregate output and export performance (Small Enterprise Development Agency 2018: 15; 2019: 17). These statistics are a huge cause for concern as a study by Kerr, Wittenberg and Arrow (2014: 14) showed that small enterprise failures result in high job destruction rates. The study concluded that without proper and well-informed interventions to support SMMEs, the government's plans of driving employment through the sector may be misplaced. This reality threatens the cornerstone of the National Development Plan's tripartite objective of reducing unemployment, poverty and inequality through a thriving SMME sector that was anticipated to grow the economy by 5.4% per year through to 2030 (National Planning Commission 2011: 122). The prevailing SMMEs trajectory paints a gloomy outlook for South Africa's "optimistic new story as the NDP phrases it.

The performance of the SMME sector presents a deep-rooted quandary for the South African government as the SMMEs sector is unarguably the lifeblood of the economy. South Africa cannot afford to ignore the implications of this negative trend in the SMME sector given its salient role in the country's socio-economic development contributions. Research has already shown that the sector is critical in taking South Africa forward, with Worku (2013: 79) positing that it is impossible to sustainably grow the country's national economy without simultaneously achieving sustained growth in small and medium businesses. As expected, the South African government remains committed to the development of the small business sector, having over the years initiated various

policies to support SMMEs through a myriad of interventions (EDGE 2013: 4; DTI 2019; Zhou and Gumbo 2021c: 8).

The DTI introduced a support scheme in the form of Black Industrialist Scheme, meant to support and boost black-owned manufacturing SMMEs (DTI 2015). In 2014, the South African government launched a dedicated SMMEs (and cooperatives) development ministry, becoming the central and driving force towards the attainment of the NDP goals (National Planning Commission 2011: 140). The ministry's goals are centred around economic transformation, inclusive economic growth and job creation (DSBD 2020). Furthermore, through strategic initiatives like the Industrial Policy Action Plan (IPAP), the country remains committed to achieving a sustainable economic development through the manufacturing sector. This further place emphasis on the importance of the manufacturing SMMEs due to their innovative capacity and job creation propensity (Umjwali 2012; Herrington and Kew 2016: 4; DTI 2017: 5). In 2017, the government effected the Preferential Procurement Regulations meant to ensure that 30% of government contracts are set aside for SMMEs in order to improve their growth through improved market access (DTI 2017: 23).

However, as Lekhanya (2015: 417) posits, in spite of huge support by government for SMMEs, there seems to be a glaring disconnect between SMMEs' needs and various interventions available to them. This mismatch leads to a deteriorating rate of discontinuation of small businesses in the country (Worku 2013: 76; Chilya et al. 2015: 224). The need for further examination as to what could be behind this poor performance of small enterprises especially in the manufacturing sector in the country is pronounced. Some studies have since suggested that in order for the government to deal with this, there is need for the introduction of pro-SMME sector policies (Klapper and Richmond 2011: 33; National Planning Commission 2011: 140; Herrington and Kew 2016: 3).

Several studies argue that targeted and effective policies can only be crafted after establishing key risk drivers and their impact on SMMEs sustainable performance (Iopev and Kwanum 2012: 151; Yusuf and Dansu 2013: 87; Shangase 2016: 93; Deepa and Annamalai 2018: 84; Mabotja 2018: 25; SBI 2018: 1). It has also been argued that lack of understanding of various risks and poor management systems by SMMEs worsen their plight notwithstanding increasing government support (Iopev and

Kwanum 2012: 151; Yusuf and Dansu 2013: 87). Some studies have shown that by understanding key performance drivers first, it becomes easier to align government intervention support and policies focusing on the sector (Mahohoma 2018: 77; Roopchund 2020: 594). This aligns with Lekhanya (2016b: 112) highlighting the importance of appreciating key characteristics of SMMEs in KZN in order to align various government policies.

### **1.2.1 A Focus on KwaZulu-Natal Province**

KZN Province accounts for 20% of the national population with close to 11 million residents and contributing 16% to the country's GDP. Agriculture, trade and accommodation, manufacturing and construction are the province's key economic sectors which make up the 25% of the provincial output (Real Economy Bulletin 2016: 1-4; Small Enterprise Development Agency 2019: 18). According to TIKZN (2013: 8), the province is strategically positioned, with two of the busiest ports in Africa and an increasing industrialisation level in the country. The province has ten district municipalities: Amajuba, iLembe, Harry Gwala, Ugu, uMkhanyakude, uMgungundlovu, uMzinyathi, uThukela, King Cetshwayo and Zululand. eThekweni is the only metropolitan municipality in the province. KZN's main economic hubs are eThekweni, Amajuba, uMgungundlovu, King Cetshwayo and iLembe.

The smaller towns contribute less than 30% to the gross value added (GVA). The logistics, manufacturing and tourism sectors are among the leading sectors compared to other provinces in the country (KwaZulu Natal PPC 2017). As per the recent Provincial Growth and Development (PGDP) report (KwaZulu Natal PPC 2019: 48) there is a low success rate of start-up entrepreneurial activity and SMMEs in the province, resulting in limited employment opportunities, especially for youth and women. The PGDP further noted that youth-owned businesses are adversely impacted by various internal and external risk drivers, and this could be attributed to lack of a systematic framework to inform futuristic planning for SMMEs. The study by the Real Economy Bulletin (2017: 12) highlighted that the share of formal SMMEs in the province had declined for the eight years leading up to 2015, while informal and survivalist enterprises had substantially increased.

The increasing rate of survivalist or necessity driven SMMEs has failed to address key challenges in KZN province. A study by Statistics South Africa (2018: 12) has shown that the province is grappling with serious unemployment challenges of 21.8% and 40.9% for both official and expanded unemployment rates respectively. The current unemployment and poverty levels makes job creation an urgent priority in the province (KwaZulu Natal PPC 2019: 12). The outbreak of Covid-19 has since worsened the province's challenges, especially of unemployment (Bruwer, Hattingh and Perold 2020; GEN 22 On Sloane 2020). Statistics South Africa (2021) has shown that due to Covid-19 the province's unemployment has since gone up to 30.5% and 46% for official and expanded rates respectively. The KZN provincial strategy indicated its awareness of the need for proper harnessing of SMMEs in driving economic growth to ensure sustainable employment creation and significantly reduce poverty and inequality (KwaZulu Natal PPC 2019: 31). Much emphasis is placed on the manufacturing sector due to its labour absorptive capacity (Provincial Treasury 2017: 60).

The manufacturing sector is one of the leading sectors in KwaZulu Natal, contributing 15% to the provincial economy and more than 19.2% to the GDP (TIKZN 2013: 14). This aligns with Real Economy Bulletin (2016: 4), claiming that manufacturing is the largest real economy sector in the province and contributes 22% to the national manufacturing sector output. Given this massive contribution by the sector, the provincial government confirmed its commitment to implementing pertinent SMMEs support strategies in the manufacturing sector. These interventions are aimed at red-tape reduction, creating an enabling environment and promotion of SMMEs within catalytic projects (KwaZulu Natal PPC 2012: 13). As part of the interventions to support the manufacturing firms, with the major focus on black-owned enterprises, in 2016, KZN firms in the manufacturing sector received more than R690 million through various sector support incentives (Real Economy Bulletin 2016: 6).

Despite all the spirited efforts by the provincial government to ensure that the manufacturing industry grows, research show that the sector is struggling, registering a meagre 1% growth rate from 2011 to 2014 (TIKZN 2013: 14; DTI 2017). The province is grappling with colossal socio-economic challenges primarily due to the subdued manufacturing sector which if well managed can contribute immensely to the growth

of provincial and national economies (Herman 2016: 1982; KwaZulu Natal PPC 2019: 188). The trends show that the sector generally shrank as a share of the provincial economy, with employment nosediving during the seven years to 2015. The sector employed only 38% of the working-age population which is 2% less than the national average and 22% below the international norm which is around 60% (Real Economy Bulletin 2016: 4).

KwaZulu Natal PPC (2017) claimed that the province is not keeping pace with international developments due, inter alia, to a stifled manufacturing base that negatively impacts the province's global competitive position. The trends in the manufacturing sector have worsened the province's economic plight. KZN Provincial Treasury (2017: 75) pointed out the glaring inability by the provincial economy to create employment and reiterated the need for pragmatic and well-informed strategies to address this hurdle. Various external drivers were cited as the major economic risk variables impacting firms in the sector in KwaZulu Natal, exacerbated by the lack of structured systems as attested to by high SMME failure rate in the province (Bureau for Economic Research 2016: 16; Provincial Treasury 2017: 71).

### **1.2.2 Problem Statement and Objectives of the Study**

As already noted, the South African government appreciates that SMMEs play a pivotal role in economic development because of the sector's ability to reduce unemployment, poverty and inequality (National Planning Commission 2011: 144; International Finance Corporation 2019; Zhou and Gumbo 2021b). SMMEs in the manufacturing sector are key to achieving this, with an average employment ratio of 4.26 compared to large companies' 2.56 per R1 million of income (Umjwali 2012: 38). To realise the positive impact of manufacturing SMMEs in KZN, there is need for the provincial government to provide informed support aimed at small-scale manufacturers (Industrial Development Corporation 2016: 18; Provincial Treasury 2017: 69; Ngibe and Lekhanya 2019: 2). The need for practical interventions is urgently required as South African SMMEs in the manufacturing sector declined by a disturbing 24.8% between 2008 and 2015 (Bureau for Economic Research 2016: 19). This therefore dents the hope of arresting runaway unemployment, poverty and inequality rates. The report further showed that of the nine provinces in the country,

KZN Province was the most affected experiencing a 10.7% drop in manufacturing SMMEs during the same period (Bureau for Economic Research 2016: 19).

Inevitably, various studies not only in South Africa, but around the globe have been conducted to identify risk factors impacting small businesses' operations (Bellone et al. 2008: 767; Klapper and Richmond 2011: 40; Okpara 2011: 163; Hiatt and Sine 2014: 778; Arasti 2011: 7495; Voulgaris, Agiomirgianakis and Papadogonas 2015: 27; Megaravalli 2017: 130). Noteworthy is that these performance drivers from other countries are closely related with those identified in the South African context, particularly in KZN (Kongolo 2010: 2293; Nemaenzhe 2010: 194; Worku 2013: 77; Bureau for Economic Research 2016: 7; Lekhanya 2016b: 181; Shangase 2016: 88; Ayandibu and Houghton 2017: 58; Mahohoma 2018: 74). However, despite these findings, manufacturing SMMEs continue to experience diminishing returns to scale around the country (Bureau for Economic Research 2016; Dlodlu 2021; Small Enterprise Development Agency 2019, 2021; Zhou, Dash and Kajiji 2021).

Review of literature also showed that due to data limitations (International Finance Corporation 2019; Zhou and Gumbo 2021c) majority of studies that have been conducted in KZN province (Ayandibu and Houghton 2017; Mahohoma 2018; Ngibe and Lekhanya 2019) relied on cross-sectional analyses. Concerningly, this type of analysis fails to control for omitted variables and cannot capture micro-level dynamics, compared to panel data analysis (Davies 1994; Zhou and Gumbo 2021b). Further to that, despite the ubiquity of these studies on the SMME sector, there is a lack of affordable sector specific predictive tools developed to assist primarily SMMEs and key stakeholders in developing data driven decisions. The impact of Covid-19 on the sector (Bruwer, Hattingh and Perold 2020; GEN 22 On Sloane 2020) have since amplified the need for predictive models that can help SMMEs to effectively anticipate and respond to uncertainty. With effective predictive tools, key stakeholders will be in an ideal position to devise pertinent interventions to ensure that the sector is resilient to such shocks (Bruwer, Hattingh and Perold 2020).

As such in light of this glaring gap, the study harnessed longitudinal data to establish key performance drivers for SMMEs in KZN province. Unlike previous studies, a confirmatory analysis was conducted to establish the extent to which SMMEs are aware of the identified performance factors. This is expected to be of interest to both

practitioners and various SMME ecosystem players, especially policy makers who have been largely relying on studies utilising the former data type to develop sector interventions. Finally, the study harnessed identified risk factors to develop performance predictive model using advanced machine learning techniques. It's anticipated that the predictive model will play a critical role in the SMME sector, especially in KwaZulu Natal's manufacturing sector by providing a basis for effective strategic planning and risk management.

### **1.2.3 Research Aims and Objectives**

Considering the preceding backdrop, this study aims to identify key external and internal drivers with significant impact on the performance of SMMEs in the manufacturing sector in the KZN Province. The study appreciates that the identified key drivers are also the source of performance uncertainty from which both risk and opportunity stems (COSO 2016: 67). The following are study objectives:

#### **Primary objective:**

- ✓ To identify and model key risk drivers influencing the performance of SMMEs in the manufacturing sector in KZN Province.

#### **Secondary objectives:**

- ✓ To explore the main characteristics of manufacturing SMMEs in KZN Province
- ✓ To establish various factors that influence the performance of SMMEs in the manufacturing sector in KZN Province
- ✓ To investigate SMMEs' awareness of identified key risk drivers impacting their performance and adopted intervention strategies
- ✓ To develop performance predictive model using machine learning techniques for SMMEs in KZN Province
- ✓ To outline viable recommendations to improve SMMEs' sustainable performance in KZN Province

### **1.3 Contributions of the Study**

The study contributed to the existing body of knowledge in as far as the performance of SMMEs is concerned, specifically zooming in on KZN's manufacturing sector. Employing a rich dataset, the study implicated advanced econometric models to empirically assess theoretical models that have not been tested within the context of KZN province. These theoretical models have critical implications for both practitioners and policy makers alike. Firstly, the study was the first in KZN province to test the locational theory, by comparing the performance of urban versus rural SMMEs in the manufacturing sector. The findings are key in revealing the extent of homogeneity or lack thereof among SMMEs located across different geographical locations in the province. Secondly, this study was also the first to empirically test Gibrat's Law of Proportionate Effect (LPM) and Jovanovic's Passive Learning Model (PLM) among KZN manufacturing SMMEs. The findings provided in-depth insights on SMMEs' growth dynamics and hence appreciating the evolution of KZN manufacturing industrial structure.

Thirdly, the study sets apart itself from previous research by conducting a confirmatory analysis to assess the extent to which SMMEs are aware of identified internal and external factors impacting their performance. This finding had profound implications for various stakeholders in the SMME sector who devise interventions largely based on surveys rather than panel data-based analyses. Finally, considering the relevance and impact of fourth industrial revolution (4IR), the study identified machine learning algorithms that can be used to harness risk drivers to inform the development of a sector specific performance predictive model. The predictive model which is the first of its own in KZN can be used by SMMEs and other stakeholders to inform effective plans and support interventions respectively.

### **1.4 Limitations of the Study**

The study was carried out in KZN Province's manufacturing sector, whilst the findings thereof and the predictive model can be applied across the country and possibly other regions, this caveat should be noted. Also, it is noteworthy that SMMEs in the region have small capacity in terms of trade volume and exposure to the general South African manufacturing sector in comparison with businesses that operate in Gauteng



province, which is the South African economic hub. It is therefore recommended that future studies be extended into other economic sectors in the province and to manufacturing SMMEs in Gauteng the biggest province and also across South Africa in general. Key to note also is that this study relied on panel data which covered certain features but excluded other traditional factors like access to finance among others and thus it's recommended that future studies should utilise data covering this and any other additional features.

### 1.5 Definition of Terms

This section defines main terms and concepts that were used in this study.

**Manufacturing sector:** This is an economic segment in which business organisations mainly use various establishments like mills, plants or factories to transform materials or components into new products either for consumption or as input into other processes. It is normally referred to as the secondary or production sector and is often categorised into light and heavy subdivisions (DTI 2017).

**Predictive Model:** A predictive model is a product of advanced statistical or machine learning techniques to analyse historical information used to predict future outcomes (Hyder and Lussier 2016: 96; Kalechofsky 2016: 4; Sekban 2019: 2). This is a broad overview of various interlinked components supporting a defined approach to attain a specified result (Lussier 1995: 17). In its essence, it is a guide that can be adjusted to varying circumstances or conditions by removing or adding some items. The construction of the predictive model or framework involves identifying factors with significant impact on performance, which are then harnessed using machine learning techniques for prediction purposes.

**Risk and performance drivers:** Risk drivers are various internal and external environment variables which impact the operations of the company positively or adversely and are also referred to as performance drivers in this study. Internal factors generally include elements like entrepreneur gender, age, human capital, business assets, size, and firm age. On the other hand, macroeconomic factors include economic indicators like inflation, exchange rates, imports and unemployment rates (Yusuf and Dansu 2013: 86; Mukorera 2014: 31-35). The interchangeability of the terms risk drivers and performance drivers are aligned with enterprise performance

management perspective which indicates that variation in performance emanates from internal and external factors. By characterising these factors as risk drivers, SMMEs will need to appreciate the complexity of key variables impacting performance and thus formulate appropriate interventions to minimise poor performance (COSO 2016: 24).

**Small Medium and Micro Sized Enterprises (SMMEs):** These are enterprises which are not at the same level as corporates or established large businesses in the country. The terms small business, small enterprise and SME are generally used interchangeably with the acronym “SMMEs”. According to the Banking Association of South Africa (2019), the National Small Business Amendment Act (26 of 2003) classified a manufacturing business with 200, 50, 20 and 5 employees as medium, small, very small and micro enterprises, respectively.

**SMME Performance:** SMME performance in the context of this research relates to the continued operations as marked by both sales revenue and year-on-year growth. Performance is the resultant effect of internal processes in the development of a firm marked by improved quality and higher sales revenue. As such annual sales and year on year growth were used as measures of performance in this study, given the need by local SMMEs to improve their market share in both local and foreign markets (Rhyne 1986: 427; Olawale and Garwe 2010: 730).

## **1.6 Research Assumptions**

Research assumptions are generally accepted non-testable declarations or presuppositions about the study and are harnessed as valid at a certain point within a discipline (Nemaenzhe 2010: 31). The peculiarity of research assumptions is that they are postulations thus not testable hypotheses and propositions of the research as they precede it. For this study, it was assumed that the panel data used for modelling was accurate and representative of the SMME sector in KZN. The methodological assumptions were that (i) manufacturing SMMEs challenges emanate from both internal and external sources, and they can be quantified to allow for model building; (ii) all survey participants understood the questions and truthfully responded to them as opposed to providing inaccurate answers.

## **1.7 Ethical Considerations**

Ethics form part of a philosophical underpinning which encapsulates both noble and accepted manner of doing things be it in a community or research field. This ensures that the researcher does not exploit or manipulate the participants during the process. In order to achieve this, the researcher ensured that all considerations were strongly centred on protection of participants and insurance of good faith during the study, as charged by (McNiff and Whitehead 2011: 96). Since the research involved sensitive financial information from SMMEs, the researcher received a letter of consent (Annexure B) from the data provider, McFah Consultancy. A letter requesting SMME owners to participate in the survey was drafted and shared with all respondents through McFah Consultancy (Annexure C) who completed the questionnaires (Annexure D). The letter clearly stated that participation was voluntary, and participant(s) were free to opt out should they deem it necessary. Furthermore, to achieve anonymity and confidentiality participants were not requested to share their company/personal details but only to provide information relevant to study.

## **1.8 Organisation of the Study**

**Chapter 1:** Introduces the background and general overview of the study, problem statement and research objectives, contributions of study and ethical considerations.

**Chapter 2:** Explores the characteristics of SMMEs in the manufacturing sector in KZN and how they relate to performance, using panel data.

**Chapter 3:** The growth distribution of SMMEs is explored and Gibrat's Law and Jovanovic's Passive Learning Model were specifically tested on KZN manufacturing SMMEs.

**Chapter 4:** As a sequel from the previous chapters, various theoretical perspectives on SMME performance were explored, and key drivers impacting performance were empirically established.

**Chapter 5:** In this chapter, the level awareness of key risk drivers by SMME owners was investigated and current management strategies used by KZN manufacturing SMMEs were explored using follow-up survey data.

**Chapter 6:** Five supervised machine learning techniques were assessed using panel data, and two ideal predictive models for sales and growth performance were recommended based on predictive potency.

**Chapter 7:** This is the final chapter in which conclusions, discussions, and recommendations for further research were made.

## **CHAPTER TWO: CHARACTERISTICS OF SMMEs IN THE MANUFACTURING SECTOR IN KZN PROVINCE<sup>2</sup>**

### **2.1 Introduction**

The continued failure of Small Micro Medium Enterprises (SMMEs) in the manufacturing sector remains of concern around the world given the socio-economic implications of such a phenomenon. Various studies have noted the importance of conducting local studies using panel data to identify the behaviour of various firm characteristics and their relationship with performance over time (Teruel-Carrizosa 2006: 84; Coad 2007: 76). Gumede (2000: 4) bemoaned lack of continuous data as the major hindrance to analysing performance of SMMEs in South Africa. From the literature reviewed, it was noted that there is no published research focusing on KZN manufacturing SMMEs using panel data. It thus remains important for SMMEs and relevant stakeholders in KZN to establish the main characteristics of these enterprises and how they relate with performance in order to inform effective policy development and sectorial support interventions. The current research fills this gap on firm performance by using KZN-based manufacturing SMMEs' longitudinal data for the period between 2015 and 2017.

### **2.2 Definition of SMMEs**

There is no internationally accepted definition of small and medium-sized businesses as evidenced by a variety of criteria adopted as countries and businesses use their own judgement in defining small enterprises (Mukorera 2014: 76; Roopchund 2020: 586). These varying definitions are generally based on total or net worth, annual turnover, value of products, fixed investment or number of employees (OECD 2009: 6; Hunter 2011: 86; Gupta, Guha and Krishnaswami 2013: 4; Sitharam and Hoque 2016: 7). Some countries prefer to group small businesses into three categories (very small, small, and medium or micro, small, and medium) while others just have two

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<sup>2</sup> A paper based on this chapter was published as a journal article: Zhou, H. and Gumbo, V. 2021. Rural-Urban comparison of manufacturing SMMEs performance in KwaZulu Natal province, South Africa. *African Journal of Development Studies (AJDS)*, 11 (1): 7-33.

categories of small and medium only. This has resulted in authors from different countries coming up with different definitions of small enterprises as per the classification and guidelines adopted by their governments (Yusuf and Dansu 2013: 78). These differences in SMMEs definition can even be local, across industries and individual researchers (Yusuf and Dansu 2013: 78). The EU classifies an entity with less than 50 employees as small and an entity with less than 250 but more than 50 employees as medium.

The EU categorisation is aligned to that of the United Kingdom, in which a small enterprise has a turnover of £5.6 million, employing around 50 staff while a medium enterprise turns over £22.8 million per annum with the same staff compliment as per the EU classification (Mukorera 2014: 77). In Japan, SMEs in the manufacturing sector are those businesses employing below 300 people with an invested capital below 100 million Yen. In the United States, the Small Business Administration department defines an SME as a business employing 1500 employees and depending on the business type with a turnover of \$0.75 to \$29 million (Gupta, Guha and Krishnaswami 2013: 5). In Nigeria, an enterprise with a staff complement of more than 10 but less than 300, with a total capital employed ranging between N1.5 and below N200 million is classified as an SME (Iopev and Kwanum 2012: 152). In Mauritius, an entity with annual turnover of Rs 10 million and employing fewer than 10 workers is classified as an SME as per the country's small enterprises authority (Roopchund 2020: 586).

In the South African context, the definition of SMMEs may be given in several ways, with firm size namely, the turnover bands or number of employees being some of the key classification criteria. A registered firm with less than 250 employees and a turnover of between R150 000 and R5 million is classified as an SMME by Standard Bank of South Africa (Ayandibu and Houghton 2017: 50-51). Dunne and Masenyetse (2015: 8) adopted more of a research-based approach in their classification of SMMEs in South Africa, a company with less than R0.1 billion turnover was classified as a small and medium-sized firm as one with net sales of between R0.1 to R5 billion. A study by the International Finance Corporation (2019: 22) on the South African SMME sector pointed to the lack of clarity on the definition of enterprises of different sizes and formalisation in the sector. The SEDA adopts a broader definition of SMMEs including those which are formally registered, non-Value Added Tax (VAT) registered

and informal organisations. These enterprises can have different ownership types, ranging from family-owned businesses employing more than 100 people to informal, self-employed, survivalist enterprises.

The development of a standard definition in South Africa started in 1995 through the “*National Strategy for the Development and Promotion of Small Business in South Africa*” White Paper, the sector was understood to be broad and diverse with challenges, survival and growth prospects varying significantly across its different segments. The White Paper classified small businesses into four main categories; survivalist, micro, small and medium-sized enterprises and henceforth the abbreviation “SMMEs” and general term “small business” was adopted to refer to this diversified sector (Real Economy Bulletin 2017: 19). The National Small Business Act (NASB) (102 of 1996) which was later amended to Act 26 of 2003 defines small businesses based on a set of certain characteristics. The Act defines small enterprises according to four main categories which are, sector, class size, number of paid employees, and turnover. The figures were set in 1996, revised in 2003 and most recent update was in 2019 to cater for inflation (Banking Association of South Africa 2019) as per the table below:

Table 1: Manufacturing SMMEs definition

<b>Sector or subsector as per the Standard Industrial Classification (SIC) classification</b>	<b>Size or class of enterprise</b>	<b>Total employees</b>	<b>Total annual turnover</b>
<b>Manufacturing Sector</b>	Medium	51 - 250	<= R170 m
	Small	11-50	<= R50 m
	Micro	0-10	<= R10 m

Source: DSBD 2019:11

Table 1 above shows the diversity of the small enterprises sector in South Africa. However, the DSBD has been criticised for failing to align the South African definition of SMMEs with international best practice (Real Economy Bulletin 2017: 23). This has resulted in various stakeholders, including government departments and, worse still, some small businesses not adopting the current definition or categorisation of SMMEs. It’s thus key that the government through the DSBD explore and implement means to ensure widespread adoption of the new definition. The next section explores the

SMME landscape in the country, with an interest on SMMEs in the manufacturing sector in KZN province.

### **2.3 Socio-Economic Impact of SMMEs in South Africa**

Over the years, the invaluable role of small and medium-sized entrepreneurs in socio-economic development have been highlighted, with the sector being tagged as the 'engine of the economy' not only in South Africa but globally (Felipe 1998: 465; Jamali, Voghouei and Md Nor 2014: 79; Ngibe and Lekhanya 2019: 2). The sector has been recognised as the backbone and foundation stone for economic development owing to its socio-economic contribution through employment growth, positive trade balance and fostering entrepreneurship (Gupta, Guha and Krishnaswami 2013: 3-4; Herrington and Coduras 2019: 2). Other studies have argued that, just like large corporations, small enterprises play a pivotal role in industrial and economic development through innovative activities, employment creation as well as contribution to the GDP (Jamali, Voghouei and Md Nor 2014: 79; Dunne and Masenyetse 2015: 2; Herrington and Kew 2016: 9).

The South African Reserve Bank (SARB (2015: 6) contended that small enterprises leverage on their agility and hunger to lead in innovation as testified by the success of Silicon Valley entrepreneurs. Their flexibility positions them as strategic drivers of social and economic development particularly in rural settings. SMMEs, unlike large corporates, can survive on less complicated infrastructure which in turn incentivises them to employ more people than large firms (Yusuf and Dansu 2013: 80). Research shows that small enterprises are more labour absorptive than large organisations. A study by Umjwali (2012: 38) on the South African manufacturing sector shows that micro sized enterprises (4.84), small-sized (3.14), and medium enterprises (2.03) have a very high average employment ratios per R1 million income, compared to large enterprises (0.58). This submission dovetails with Herrington and Kew (2016) recommendation to the South African policy makers to prioritise the introduction of reforms that would enable the growth of the SMME sector. The study noted that these enterprises contribute significantly to job creation, economic development and equal income distribution.



The change of fortunes for the country's economic growth clearly lies within the potential of the SMME sector as these businesses have the ability to revive and sustain economic growth (National Planning Commission 2011: 141; IMBADU 2016: 2; Zhou and Gumbo 2021d: 8). The National Planning Commission (2011: 140) placed its hope of changing apartheid legacy patterns in SMMEs as it is through them that real economic transformation can be achieved. In recognition of the role played by the sector in the local economy, the Presidency established the Ministry of Small Business Development aimed at exploiting the potential small businesses have in unlocking opportunities and achieving inclusive economic growth and sustainable employment (DSBD 2014: 2; Bureau for Economic Research 2016: 6). Recent studies established that SMMEs continue to be leaders in job creation providing at least 55% of formal employment opportunities in the country (Real Economy Bulletin 2017: 1; Small Enterprise Development Agency 2021: 15). According Sitharam and Hoque (2016: 12), an estimated 5.9 million SMMEs were responsible for more than 11.6 million jobs in South Africa. However, the major concern is that only about 20% of these SMMEs are officially registered with the Companies and Intellectual Property Commission (CIPC).

The National Planning Commission (2011: 141) charged that the SMME sector is an important element to address socio-economic development and the tripartite challenges of poverty, inequality and unemployment. The commission warned that without a thriving SMME sector the country would be vulnerable to social instability. Some studies have indicated that SMMEs bring social benefits which can be seen in different forms like competition and thus minimise monopolistic behaviours by large firms (Soni, Cowden and Karodia 2015: 38; Ncube 2016: 28). As such it is clear that there is a need for interventions to address any potential challenges that may stifle the performance and survival of small enterprises (Soni, Cowden and Karodia 2015: 76; Zhou and Gumbo 2021d: 24). In that regard, the informed intervention by the government and other pertinent institutions in the SMME sector can accrue positive results. Inevitably, in trying to respond to various challenges faced by small enterprises the trio of national, provincial and local government have since devised various interventions to stem the failure of SMMEs in the country as highlighted on Table 2.

## **2.4 Role of Government in SMME Development**

In order to enhance the role of small enterprises in economic development, many governments across the globe develop various policies and incentives to boost them (Teruel-Carrizosa 2006: 40; Worku 2013: 71; Herrington and Kew 2016: 45; Herrington and Coduras 2019: 10). Other developing economies, like Pakistan, have established dedicated bodies to help promote entrepreneurship through SMME-related policy formulation and access to finance facilitation (Hyder and Lussier 2016: 84). While it is not the government's direct responsibility to start and operate new businesses, they have a role to ensure that key fundamentals are in place to promote entrepreneurship. Governments should therefore create conducive environments through enhanced reforms and regulations that promote ease of doing business and minimise unnecessary red tape (Herrington and Kew 2016: 48). Teruel-Carrizosa (2006: 40) argued that governments can consciously or otherwise create policies that increase or even decrease market concentration. Certain government decisions like tax policies can influence small businesses' profitability through income exemptions. Also, selective subsidies have been found to be key significant drivers of the market structure, at times even resulting in the disappearance of efficient firms that did not receive subsidies.

The main implication is the need for informed and locally relevant government support programmes to effectively improve small firms' performance without adversely impacting other firms in the market (He and Yang 2016: 73). Fatoki (2014: 924) acknowledged that failure or success of small enterprises can be affected by the country's governance and institutional structures, as it requires government intervention to deal with external challenges like crime, corruption, skills shortages and property rights. Some governments have resorted to incubation centres through which entrepreneurs receive tailor-made private and public support (Allahar et al. 2016: 633). This type of support which is normally administrative and financial modifies firms' distribution in the market. The resultant modification can be positive if supported firms are efficient and negative if they are not. The latter can be disastrous in the long term as incubated firms can temporarily increase their potential efficiency and push out efficient firms not being supported thus adversely impacting on aggregate productivity (Teruel-Carrizosa 2006: 40-41; He and Yang 2016: 89).

To avoid this challenge, government support should not be generalised but rather empirically driven. Before the development of various SMME support schemes, pertinent stakeholders should invest some effort in appreciating the diversity and complexity of the sector. It is important to recognise that different companies have different sets of needs; hence, government interventions and policies should recognise the heterogeneity of small firms and avoid the “one-size-fits-all” approach (Small Business Project 2014: 4; Zhou and Gumbo 2021d: 23). The support should be administered in such a way that it does not generate negative externalities and jeopardise the survival chances of other firms without access to the same support (He and Yang 2016: 89). However, other researchers (Howell 2015: 1870) found that firms that did not receive any government subsidies ended up being more efficient than those that did. The study indicated that subsidies instead of helping, may end up creating a moral hazard as they cease to be more innovative and rely on “free” government support to fund operations.

The South African government in order to unlock the socio-economic impact of small enterprises, established the Small Business Development ministry aimed at raising the status of these pivotal economic role players (DSBD 2014). The department is meant to drive entrepreneurship growth in the country, with a dedicated budget of approximately R1 billion per annum (SARB 2015: 5; South Africa 2018: 19). Through this ministry, the government aims to develop regulatory and economic policies to improve SMMEs access to infrastructure, energy and other related support interventions. The intended result is radical economic transformation through entrepreneurship and a culture of innovativeness in the country (DSBD 2014: 6; IMBADU 2016: 4). The South African government is aware of its role in creating an environment that minimises the cost of doing business and boost business growth. In 2014 the government ring fenced R847 billion for infrastructural development over a three-year period, the main focus was on freight and energy provision. Through this and many other interventions of sort, the government anticipates enormous impact on the development of SMMEs, especially with regard to ease of doing business and market access (SARB 2015: 7)

Given the alarming rate of unemployment, poverty levels and inequality, the South African government has over the years, post the apartheid era developed a plethora

of policies, strategies and programmes with the aim of promoting SMMEs through an enabling environment (Bureau for Economic Research 2016: 5). The Small Business Development ministry through its agencies like SEDA and Small Enterprise Finance Agency (SEFA) aim to enhance the survival and growth of SMMEs in a volatile and uncertain environment (IMBADU 2016: 3). Table 2 below shows some of the government policies, strategies and programmes meant to support and boost the performance and sustainable growth of SMMEs particularly those in the manufacturing sector in South Africa:

**Table 2: South African Government SMMEs Support initiatives**

Support Programme	Description	Source
NDP, 2011	Promotion of small businesses and cooperatives through regulatory compliance cost reduction and coordinated support provision. The plan aims to achieve this by creating an enabling environment for SMMEs (including start-ups) to set up and expand their operations, thereby employing more people.	(National Planning Commission 2011: 40; South Africa 2018: 18)
B-BBEE AMENDMENT ACT, 2013	The Act aims to address the systematic exclusion of formerly disadvantaged groups from participating in the mainstream South African economy. Through this scheme at least 51% black-owned SMMEs receive Enterprise and Supplier Development support from established corporates. Benefitting SMMEs receive both financial and non-financial support.	(South-Africa 2014; DTI 2015: 9)
Preferential Procurement Policy Framework Act (PPPFA)	This provision which is aligned to B-BBEE and stipulates a preference point system for procurement of public sector goods/services. The main intention is to strengthen survival and growth of black-owned SMMEs. There are two main scoring reference point systems; 80/20 for contracts between R30 000 and R50 million and 90/10 for contracts above R50 million, with which 20 points for the former and 10 for the latter are allocated to the bidder as per their B-BBEE status level.	(DTI 2015: 9; National-Treasury 2017)
Black Industrialist Policy (BIP), 2015	The programme was launched to improve and promote the rate of black-owned business start-ups, their survival or growth trajectories. This forms part of the government's broad industrialisation initiatives to enhance and transform the production base and inject vibrant entrepreneurial activity into the economy. The main focus for the scheme are black-owned manufacturing enterprises meant to enable them to access finance and market opportunities locally and abroad.	(DTI 2015: 7)

<b>Support Programme</b>	<b>Description</b>	<b>Source</b>
SEDA	This is the one of the Small Business Development agencies mandated to roll out the government's small business strategies, design and execute a standardised national delivery framework for SMMEs development. The main support includes capacity building and subsidised support to improve small firms survival and growth.	(DSBD 2014; Bureau for Economic Research 2016: 7)
SEFA	This was formed after Khula Enterprise Finance Limited and South African Micro-Finance Apex Fund were merged, to cater for small businesses in need of financial support of up to R3 million. The organisation provides term loans, revolving loans, asset finance, bridging finance and working capital funding for SMMEs.	(Bureau for Economic Research 2016: 6)
National Youth Development Agency	The agency was formed with the primary purpose of helping South African youths of ages between 14 and 35 years to start new enterprises and to finance existing youth-owned small businesses.	(Bureau for Economic Research 2016: 6)
Technology and Innovation Agency (TIA)	This agency is mandated to provide support which enable technological innovation and enhance the competitiveness of South African businesses globally. A dedicated focus is also given to SMMEs especially those inclined to technological activities or in the Information Technology and Communication (ICT) industry.	(Bureau for Economic Research 2016: 6)
National Empowerment Fund (NEF)	Formed with the purpose of offering both financial and non-financial support to South African black empowered businesses. The scheme provides seven different types of funding; namely Women Empowerment Fund, Imbewu Fund, uMnotho Fund, Rural and Community Development Fund, Arts and Culture Venture Capital Fund, Tourism Fund and the Strategic Projects Fund. The Strategic Projects Fund is aimed at helping to assisting small businesses aligned with the government's Industrial Policy Action Plans and New Growth Path of which the manufacturing SMMEs are targeted beneficiaries.	(Bureau for Economic Research 2016: 6; NEF 2020)

<b>Support Programme</b>	<b>Description</b>	<b>Source</b>
Export Marketing and Investment Assistance Scheme (EMIA):	This is meant to provide marketing assistance to South African manufacturing enterprises, including SMMEs, to create new and grow export markets. One of the key objectives of the scheme is to ensure optimal use of SMMEs in contributing towards growth of South African economy.	(DTI 2017: 12; 2019)
Manufacturing Competitiveness Enhancement Programme (MCEP)	The scheme provides two facilities: The first is called working capital facility of up to R30 million at a fixed 6% p.a interest rate for a four-year term. The other is called Industrial Policy Niche Projects Fund meant to support businesses involved in new projects with potential to create employment and increase exports through diversified manufacturing output.	(DTI 2017: 11; 2019)
IDC (IDC)	The institution which was launched in 1940 and owned by the South African government is mainly tasked to provide funding to a number of selected sectors which includes various manufacturing sub-sectors. The main intention is to ensure availability of finance for emerging SMEs and black industrialists so as to facilitate economic transformation. Between 2013 and 2017, IDC approved R68 billion in funding support, of which 45% of the supported business were in the manufacturing sector.	(DTI 2017: 12; IDC 2019)

**Source: Own compilation from literature**

Table 2 shows that the South African government recognises the need to promote small enterprises and has invested significant resources to support their survival and growth aspirations. Through these interventions the government aims to unlock SMMEs' growth potential by using dedicated organisations like SEDA, among others, to effectively implement small enterprise development policies (Nemaenzhe 2010: 135). Besides the use of these agencies, the government appreciates that sustainable economic growth through vibrant SMMEs requires a multi-stakeholder approach; hence the need for harnessing input from civil society, academia and the private sector (South Africa 2018: 18). This approach will enhance the quality of support these critical enterprises will access in dealing with uncertainty and finding ways of navigating past turbulence which characterises the business environment (Shiferaw 2009: 581; IMBADU 2016: 3). Previous studies indicate that these dedicated support programmes though not enough, do make huge contributions towards SMMEs performance and survival (Worku 2013: 71). As per data from Stats SA, SMMEs across different sectors received incentives totalling R10 492 000 000 between 2015 and 2017. Figure 1 below shows the distribution of government incentives (log transformed) for SMMEs in various economic sectors.

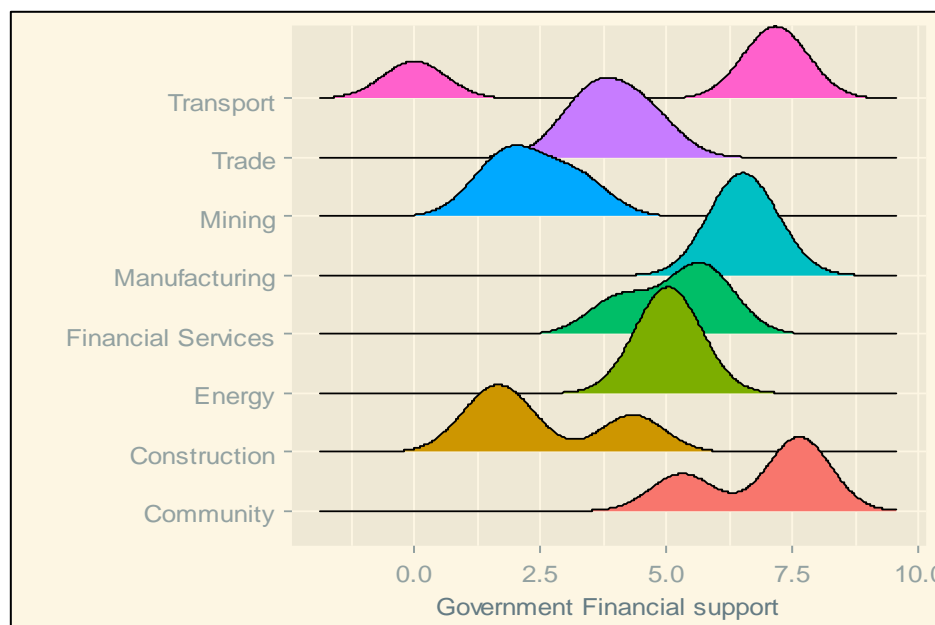


Figure 1: Government subsidies and incentives for SMMEs

(Source: Stats SA, Own calculations)



The analysis indicates that SMMEs in the manufacturing sector which received 20.29% of the total support from the South African government were among the top three industries to receive incentives and subsidies meant for SMMEs between 2015 and 2017. The sector trailed behind community services (41.22%) and transport, storage and communication (24.83%). This reflects the South African government's commitment to promoting active participation of SMMEs in order to ensure a vibrant manufacturing sector that has the ability to significantly contribute towards economic development and importantly employment creation (Ngibe and Lekhanya 2019: 2). The manufacturing sector especially leveraging on SMMEs is regarded as one of the critical drivers of GDP growth and mass scale employment owing to the sector's high economic multipliers (Felipe 1998: 465; DTI 2017: 24). South Africa aims to ensure that SMMEs in the manufacturing sector receive adequate support to ensure that they meaningfully contribute to employment creation especially in rural areas (National Planning Commission 2011: 228)

While this spirited effort by the government is applauded, research reveal that South African SMMEs continue to struggle, with a failure rate of between 50 and 60% within the first year of operation (Worku 2013: 67; Ncube 2016: 57). The sector continues to face hostile a business environment, including unique internal and complex external challenges (Small Business Project 2014: 1). This concerning trend is not only unique to South Africa but other countries like Malaysia which leads in provision of various SMME support programmes but is still grappling with limited entrepreneurial activity and small business failures (Moorthy et al. 2012: 224; Herrington and Kew 2016: 41). Despite various forms of support the SME sector in Pakistan just like in South Africa continues to struggle. Some studies have placed emphasis on the need for development of interventions which enhances entrepreneurs' understanding of various sources of risks and possible ways of dealing with such (Hyder and Lussier 2016: 84). The SMME failure rate reflects those challenges faced by the sector not only in South Africa, but globally are dynamic and requires more than mechanistic top-down interventions from the government to SMMEs. The obstacles bedevilling the sector requires firstly an understanding of the attributes of SMMEs. Some studies have charged that small firms are heterogeneous and therefore interventions should be customised to their varying needs as captured by their characteristics (Sitharam and Hoque 2016: 1; Ayandibu and Houghton 2017: 58; Zhou and Gumbo 2021d: 21).

## 2.5 SMMEs Role in the Manufacturing Sector

The role of small enterprises in the manufacturing sector has become of interest to both academics and practitioners. This is mainly due to the strategic role played by the manufacturing sector as a wealth creation avenue around the globe (DTI 2017: 24; Ngibe and Lekhanya 2019: 2). The sector has high economic multipliers owing to its value addition linkages to both primary and tertiary sectors of the economy (Buyinza 2011: 3; Umjwali 2012: 15). The sector is also regarded as a fundamental economic development driver, especially in the sub-Saharan region in which value added per worker in the sector is higher than other sectors like agriculture and services (Van Biesebroeck 2005: 547). The manufacturing sector has always been the foundation for sustainable economic development owing to its high economic multipliers emanating from linkages to both the upstream and downstream economic sectors (DTI 2017: 5). The South African government has identified the manufacturing sector as one of the six core pillars to drive the country's economic growth trajectory.

The government envisaged that in excess of 80 000 jobs would be created in the sector by 2020 with the country's IPAP indicating that the sector would be harnessed as the fulcrum around which employment creation in all other sectors will be centred (Small Enterprise Development Agency 2012: 17). Klapper and Richmond (2011: 35) study on African firms found that the manufacturing sector, which made up 17% of the sample created 46% of total employment, compared to the services sector which had 50% representation but only provided 37% of employment. Central to the growth of the manufacturing sector are small enterprises which have been widely acknowledged as engines of the economy especially in terms of employment creation (Klapper and Richmond 2011: 35). A study by Rijkers, Söderbom and Loening (2010: 1280) showed that the manufacturing sector in sub-Saharan Africa is dominated by small enterprises which, owing to their agility, are able to enhance the industry's role in economic diversification beyond the agricultural sector. Studies on manufacturing firms globally, highlight that SMMEs are leaders in job creation, thus *ipso facto*, job destruction when they close operations (Kerr, Wittenberg and Arrow 2014: 13; Voulgaris, Agiomirgianakis and Papadogonas 2015: 37).

In South Africa, manufacturing SMMEs have been recognised for their contributions in product innovation and providing a support base for large manufacturing enterprises

(Small Business Project 2014: 2). The South African government noted the role played by the manufacturing sector underpinned by the participation of SMMEs in driving innovation. Developed countries like the United States, Japan and Singapore have leveraged on the sector to sustainably grow their economies (National Planning Commission 2011: 94). The KZN Provincial-Treasury (2017: 50-51) highlighted the role the manufacturing sector plays in the country’s current account deficit through the production of exportable goods. A study by Umjwali (2012: 38) showed that small firms have the highest employment intensity compared to large firms in the manufacturing sector. Figures 2 and 3 below show the annual turnover and total employment contribution of SMMEs in various sectors. Manufacturing was one of the key sectors in terms of both sales and employment contribution between 2015 and 2017, showing the significant role played by the sector compared to other sectors in the country.

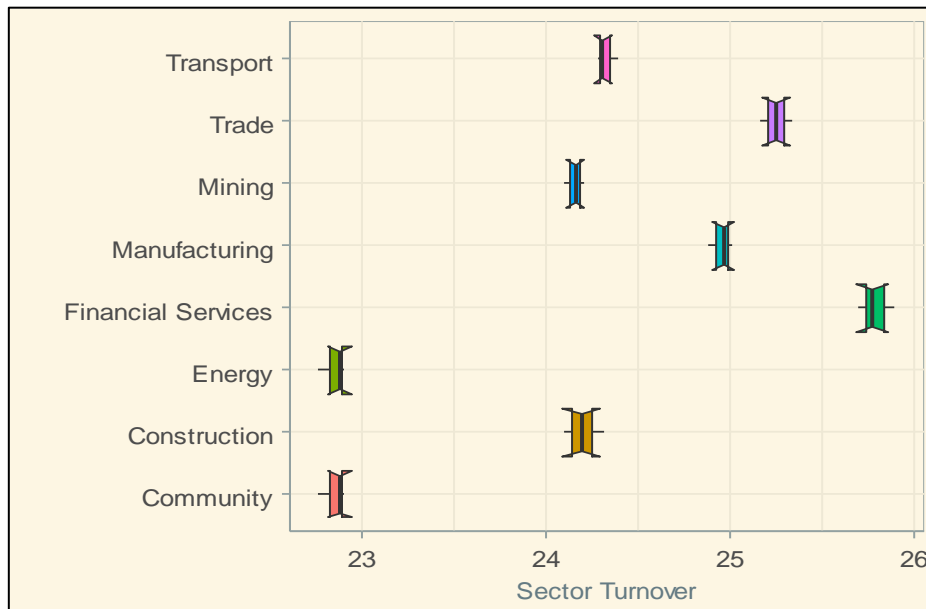


Figure 2: SMME Turnover contribution by sector between 2015 and 2017

(Source: Stats SA, own calculations)

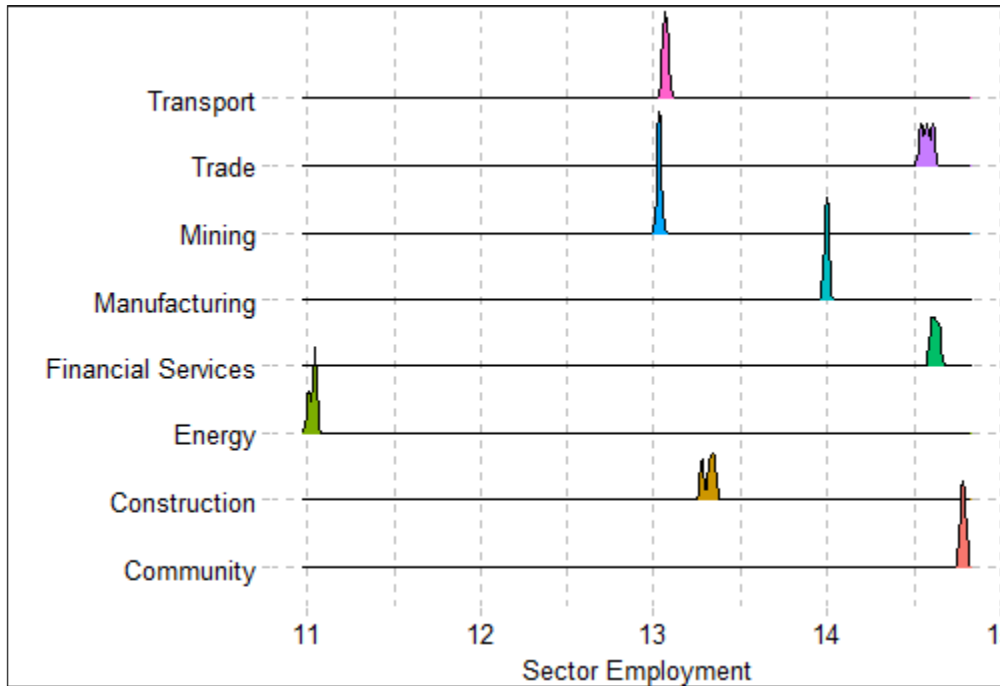


Figure 3: SMME employment contribution by sector between 2015 and 2017

(Source: Stats SA, own calculations)

The analysis from the above figures shows that the manufacturing SMMEs play a critical role in the national economy constituting 15.73% and 12.22% of the total turnover and employment respectively, between 2015 and 2017. The socio-economic contributions of manufacturing SMMEs in South Africa is quite encouraging given that compared to other sectors these enterprises constitute a meagre 9% of total enterprises in the country (Small Enterprise Development Agency 2019: 17). With such a substantial contribution, the sector remains a focal point of most economic growth policies not only in South Africa but across various emerging economies (Bigsten and Gebreyesus 2007: 813; Provincial Treasury 2017: 42). The important role of SMMEs in contributing towards the growth of the manufacturing sector remains precariously under pressure as the industry continues to face headwinds (Provincial Treasury 2017: 35).

The level of SMME sector development in the African region and specifically sub-Saharan Africa is very subdued. The main cause has been attributed to poor infrastructure, institutional barriers and political instability (Klapper and Richmond 2011: 35; Mano et al. 2012: 467). These drivers negatively impact on the survival and growth of the sector. Buyinza (2011: 25) contended that small firms in the

manufacturing sector in the Eastern African region continue to grapple with higher failure hazard rates. The study attributed the poor performance of SMEs to a combination of both internal and external factors which, if not properly dealt with, can negatively impact on the region's economic growth. The poor performance of the sector is not unique to other countries but is also a feature in South Africa. The country continues to face a high failure rate of SMMEs especially in the manufacturing sector (Worku 2013: 76; Bureau for Economic Research 2016: 19) resulting in the sector performance worsening over the years. Figure 4 below shows that the manufacturing together with mining and electricity sector contribution to the national real GDP between the periods 2000 and 2018 has substantially declined. Between these two periods, the manufacturing sector contribution sharply decreased by 2.5% down to 0.3%.

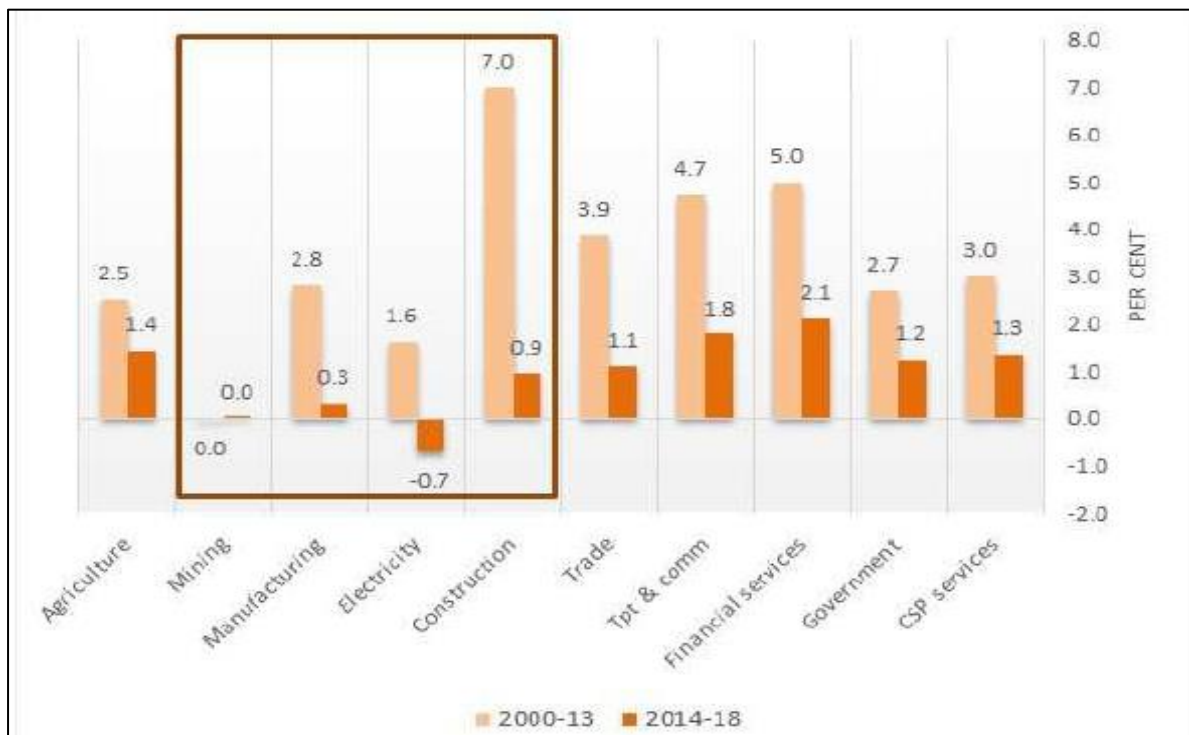


Figure 4: SA economy average GDP growth by industry, 2000-13 vs 2014-18

(Source: Small Enterprise Development Agency 2019: 8)

The above findings by the SEDA align with Bureau for Economic Research (2016: 8) submissions, charging that manufacturing SMMEs in the country are struggling owing to a myriad of internal and external drivers. The South African manufacturing sector performance confirms the continued struggle of small enterprises in the sector. In

2009, the sector's GDP contributions plummeted by close to R31 billion, contracting by 10.4% and losing in excess of 200 000 formal and informal job opportunities (Umjwali 2012: 19). Various studies show that manufacturing SMMEs are generally on a downward trend in the country (DTI 2017: 23), declining by more than 24% between 2008 and 2015 (Bureau for Economic Research 2016: 19), which in turn negatively impacted the industry whose contribution to GDP continues to deteriorate (Umjwali 2012: 11). This poor performance has also adversely impacted various other key economic indicators like employment and trade balance (KwaZulu Natal PPC 2017: 50-51). The manufacturing sector labour force contracted by 11.3% losing 150 000 employment opportunities between 2000 and 2010 (Umjwali 2012: 26).

Besides these challenges, what is concerning is the lack of dedicated studies in the African region on manufacturing firms' performance and growth patterns to assess the efficacy of various interventions and most importantly inform policy development (Shiferaw 2009: 572). In order to revive the growth of the sector in the country, there is a need for careful assessment of key risks militating against performance and survival to ensure design and deployment of impactful interventions (Adeyele and Omorokunwa 2016: 4). This is far more critical for South Africa as TIKZN (2016: 25) established that exporting manufacturing SMMEs have very low survival rates and about 25% are not able to survive beyond a year. This trend requires policy makers to harness empirical research to improve the business and investment environment especially for small enterprises in the manufacturing sector. KZN is one of the provinces that aims to promote the growth and development of SMMEs in manufacturing. The manufacturing sector in the province is a fundamental driver of economic growth and the sector contributes 22% to the national manufacturing output (Ncube 2016: 14; Real Economy Bulletin 2016: 1). In this regard, it is important to explore the role of SMMEs in the manufacturing sector in KZN Province.

## **2.6 SMMEs in KwaZulu Natal Manufacturing Sector**

The KZN economy is the country's second largest, contributing 16.5% to the National GVA and for seven years from 1995, the province contributed more than 16% to the national GDP. The province's economic base is diverse owing to its strategic positioning. KZN is home to Durban and Richards Bay which are the continent's largest and busiest seaports, making it one of the top provinces in the country's level

of industrialisation with the third highest export propensity compared to other provinces (TIKZN 2013: 8; KwaZulu Natal PPC 2017: 26). KZN Province is the second after Gauteng, contributing more than 21% to the national manufacturing value added (Small Enterprise Development Agency 2012: 29). The province is largely driven by the manufacturing sector which contributes almost a quarter to the provincial economy (TIKZN 2013: 14). The manufacturing sector in KZN contributes the highest proportion (12.5%) of employment to the total national manufacturing sector employment ahead of Western Cape (12.1%) and Gauteng (11.8%) (Provincial Treasury 2017: 61).

Through this sector, KZN Province aims to promote inclusive and sustainable economic output in order to achieve economic growth and importantly sustainable job creation. According to KwaZulu Natal PPC (2017: 26), this goal also ties into the national objective of fostering inclusive economic growth (National Planning Commission 2011: 38). This national outcome is centred on promotion of labour absorbing sectors like manufacturing to achieve international competitiveness through expansion of the production base and increased net exports. The provincial strategy further aims to leverage on the performance of manufacturing SMMEs in growing international trade share. *Ipsa facto*, the manufacturing sector is at the core of the provincial government's plan. The sector already generates 15% of employment and contributed more than 19% to the Gross Domestic Product by Region (GDPR) for four years up to 2010 in the province (TIKZN 2013: 14). The continued growth of the manufacturing sector is critical for KZN given that the province has the second highest poverty level of 22.7% in the country (Statistics South Africa 2017: 64). As a labour absorbing sector, the manufacturing industry has the potential to contribute towards poverty alleviation through employment and firm ownership among formerly disadvantaged groups (Provincial Treasury 2017: 61).

Regardless of the challenges in the manufacturing industry, the performance of SMMEs in the sector presents huge potential if well supported. TIKZN (2016: 26) reported that manufacturing small and medium-sized firms in KZN are responsible for 91% and 84% of the exports respectively, compared to their peers in the agricultural and mining sectors. Without doubt, these SMMEs have been found central in fostering diversification through innovation in the province, thus providing a strategic platform for integrated national, regional and international growth (Lekhanya 2015: 413). KZN

is reliant on the sustainability of SMMEs in the manufacturing sector in order to realise its vision of becoming the gateway into the country and Southern Africa. These firms are fundamental in ensuring a vibrant manufacturing sector through which inclusive economic growth can be realised given its linkage with and spill-overs onto other sectors (KwaZulu Natal PPC 2017: 35). It is through small enterprises in the sector that growth beyond primary sectors such as mining, and agriculture can be achieved. Research has shown that SMMEs in the manufacturing sector are pivotal in attracting investment given their potential for growth (Rijkers, Söderbom and Loening 2010: 1279).

Despite the trailblazing role played by SMMEs in the manufacturing sector, these enterprises continue to struggle. This is reflected partly by the continued poor performance of the manufacturing sector, registering a meagre 1.5% growth for ten years from 2005 to 2015 (Provincial-Treasury 2017: 42). Real Economy Bulletin (2016: 2) claims that the sector generally regressed and its contribution to the provincial economy declined over the previous ten years due to a myriad of challenges. In KZN, the sector's GDP contribution nosedived by 3.4% to 15.8% between 2010 and 2011, a sign that more needs to be done to address this unsettling decline (TIKZN 2013: 14) especially given that the sector is labour absorptive, hence the main route through which stubbornly high provincial unemployment can be addressed. Already, 50% of the province's population lives in impoverished rural regions, which is 20% higher than the national average and worse than Gauteng and the Western Cape, which are other comparable manufacturing hubs (Real Economy Bulletin 2016: 1).

The sector declined by a further 0.3% in 2017 thus causing decline in employment numbers in the province (Provincial-Treasury 2017: 61). The province's share of employment compared to the national manufacturing sector declined by one per cent to 20% between 2012 and 2016 (Real Economy Bulletin 2016: 4), something which has exacerbated the national unemployment problem which now exceeds 27% and 53% among the youth (OECD 2017: 14). The continued struggle of SMMEs is highly correlated with the manufacturing sector's downward trend. Small enterprise in the manufacturing sector continues to decline over time, with the province being home to just more than 10% of the manufacturing SMMEs population in the country (Real Economy Bulletin 2017: 12). Over the years, the province has been grappling with low



entrepreneurial activity and subdued small enterprise success due to various risk drivers which emanates from both internal and external environments (TIKZN 2013: 14; Provincial-Treasury 2017: 42).

The trend has led to various labour-absorbing manufacturing sub-sectors like furniture, textiles and clothing remaining stagnant over the previous years (Shangase 2016: 43; KwaZulu Natal PPC 2017: 46). This trend threatens the economic heartbeat of KZN as small businesses closure connotes diminishing production output, job losses, adverse trade balance and potential medium- or long-term disappearance of certain sub-sectors. Research by TIKZN (2018: 20) shows that between 2010 and 2016, the manufacturing sector had the highest rate of disinvestment (53.7%) in the province, with the closest being the services sector at just above 18%. Noteworthy also is that more than 71% of these closing manufacturing firms were based in the eThekweni Metropolitan, the most urbanised region in the province. The indications are clear that most of the disinvesting firms in the manufacturing sector are small to medium enterprises which fell by 24.8% in the province from 2008 to 2015 (Bureau for Economic Research 2016: 19), resulting in significant employment decline in the manufacturing sector during the same period (Real Economy Bulletin 2016: 3).

This presents a gloomy outlook for the province's job creation, diversification and innovation prospects through SMMEs (Provincial Treasury 2017: 20). Consequently, the province has seen an exponential increase in non-taxable survivalist informal businesses without much contribution to the economy (Real Economy Bulletin 2017: 2). This may result in the province's primary objective of employment creation through the manufacturing sector (KwaZulu Natal PPC 2012: 11) bearing limited results. In order to achieve the 2030 vision of being the gateway to South Africa and the rest of the South African Development Community (SADC) region, KZN needs to establish and address the main risk drivers impacting SMMEs. Identification of these drivers will lead to structured and pertinent support for these enterprises, and hence strengthen their contribution to the mainstream economy (KwaZulu Natal PPC 2017: 46).

The nature of the manufacturing sector presents 'low hanging fruit' for the province to exploit in pursuit of its various socio-economic objectives. A study by TIKZN (2018: 5) showed that it is more expensive to attract or create new businesses which can only create between 10% to 20% of new jobs compared to between 60% and 80% created

by existing firms. The provincial government should empirically establish and attend to internal and external factors impacting small-scale manufacturers in order to improve their sustainability. To appreciate these drivers, there is need to explore and appreciate the characteristics of SMMEs in the manufacturing sector. By appreciating key SMME characteristics important and subtle patterns are noted and this is key in developing testable hypotheses for further empirical investigation through advanced statistical techniques. The next section explores some of the key SMMEs attributes and through graphical analysis, these characteristics were used in the development of further empirical investigations in the next chapter.

## **2.7 Characteristics of Manufacturing SMMEs in KZN**

In this section, the statistical profile of manufacturing SMMEs in the province is explored. An overview of the sector is given through various graphical presentations and accompanying implications attached to it. The study used panel data from McFah Consultancy, a Durban based business accounting and tax specialist advisory company focusing on small businesses. The panel data spanned three years from 2015 to 2017. All SMMEs in the data set were formally registered and in compliance with the South African Revenue Services (SARS) for VAT and thus fit within the official definition of the sector in the country (SEDA 2019). The firm level data was only from the manufacturing sector, covering ten district municipalities as well as eThekweni, the only metropolitan municipality in the province. The data covered 191 SMMEs in the manufacturing sector.

### **2.7.1 Distribution by Geographical Location**

Figure 5 below shows the distribution of manufacturing SMMEs across various geographical locations in KwaZulu Natal Province.

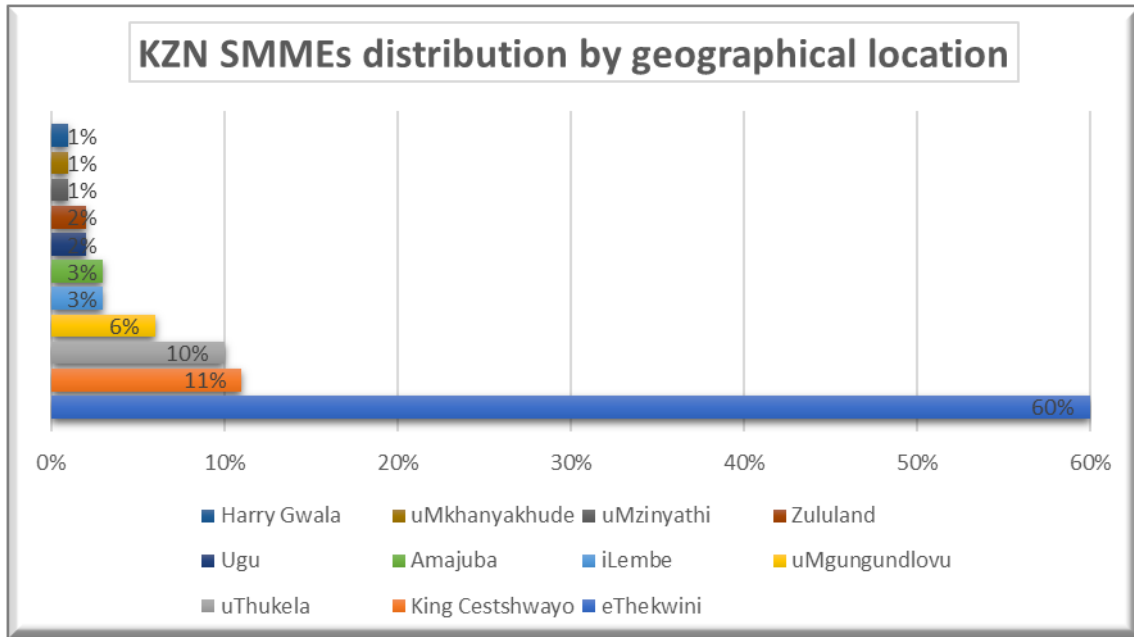


Figure 5: KZN SMMEs distribution by geographical location

The above graphical presentations shows that 61% of the manufacturing SMMEs were urban based, situated in eThekweni Metropolitan municipality and 39% were rurally based across the ten district municipalities in the province. The SMMEs from the other provinces were distributed as follows; King Cetshwayo (11%), uThukela (10%), uMgungundlovu (7%), iLembe (3%), Amajuba (3%), Ugu (2%), Zululand (2%), uMzinyathi (1%), uMkhanyakude (1%) and Harry Gwala (0%). These findings align with a study by the International Finance Corporation (2019: 40) establishing that 59% and 41% of the SMMEs in KZN are based in urban and rural areas, respectively.

## 2.7.2 Owner Characteristics

This section explores the characteristics of the individuals who own the manufacturing SMMEs in the province. The attributes explored here, are the entrepreneur's gender and age.

### 2.7.2.1 SMME owners' gender

The participants by gender as per Figure 6 showed that just more than 73% of the participants were male, while 27% were female.

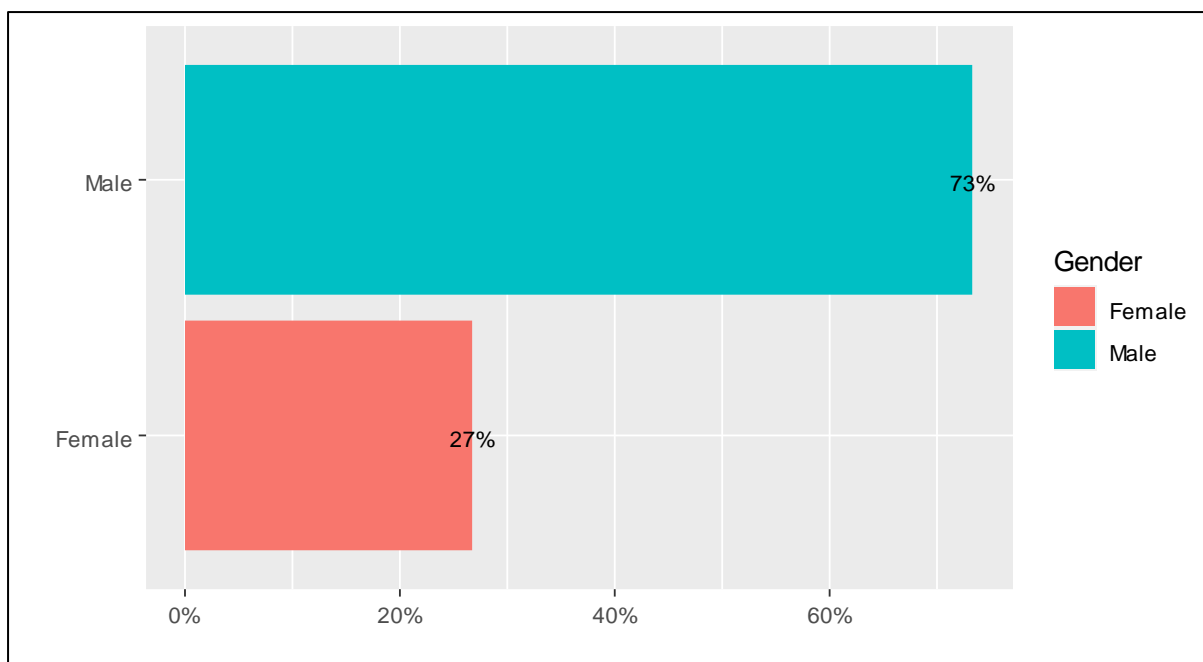


Figure 6: Owners Gender

The analysis shows the glaring disparity of firm ownership across gender lines in KZN Province. This ownership pattern is not unique to KZN Province but is closely related to the national set-up. Borat et al. (2018: 12) established the similar ownership pattern of SMME ownership across the country. A study on KZN based SMMEs by Ayandibu and Houghton (2017: 57) also showed that 60% of the enterprises were male-owned and women owned just 40% of small enterprises. This finding reconciles well with the assertion that ownership is more skewed in favour of men in sectors like manufacturing, construction and transport (Ncube 2016: 73).

#### 2.7.2.2 Owners age distribution

Figure 7 below shows the histogram of SMME owners' ages with a blue normal distribution overlay. The histogram shows that the entrepreneur's age is skewed to the right showing that majority of SMMEs owners are aged between 40 and 50 years which is further confirmed by the mean age of 44.9 years.

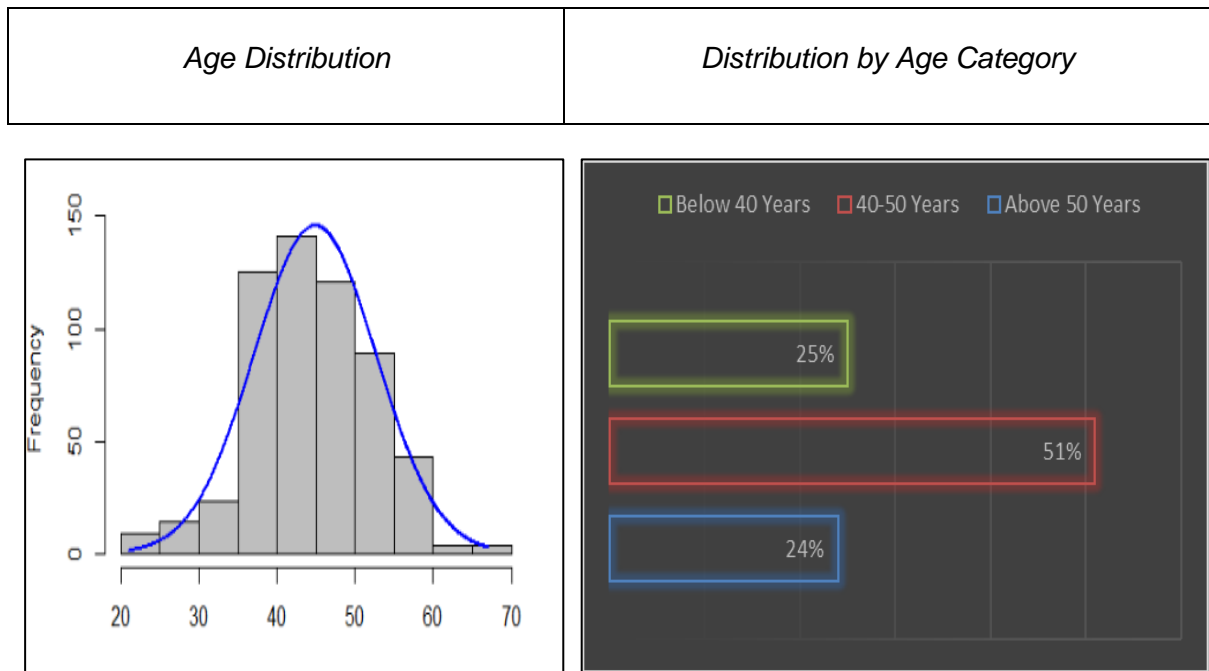


Figure 7: Owners age distribution

The analysis shows that youths as would be preferred by the government are not actively involved in entrepreneurship. The recent findings by the Small Enterprise Development Agency (2019: 14) on the distribution of South African SMME owners confirms this finding in the province. The study established that majority of SMME owners are aged between the ages of 45 and 49 and this was attributed to accumulated experience and capital to establish viable business ventures. This clearly shows that age is a fundamental driver of business ownership and the management thereof. However, findings by Ayandibu and Houghton (2017: 57) are different from the above analysis. In their study, they found that majority of SMME owners in KZN Province were aged between 31 and 40 years.

### 2.7.3 Firm-Specific Characteristics

In this section, internal attributes of SMMEs are explored. These firm-specific characteristics in the data set were annual sales, total assets, permanent employees, temporary employees, SMME age, Website use, Digital marketing use and Registration type.

### 2.7.3.1 Legal status

Figure 8 below shows that majority of the manufacturing SMMEs in KZN Province are limited liability (Pty Ltd) registered and the remainder had other forms of registration but were still in compliance with SARS and the CIPC.

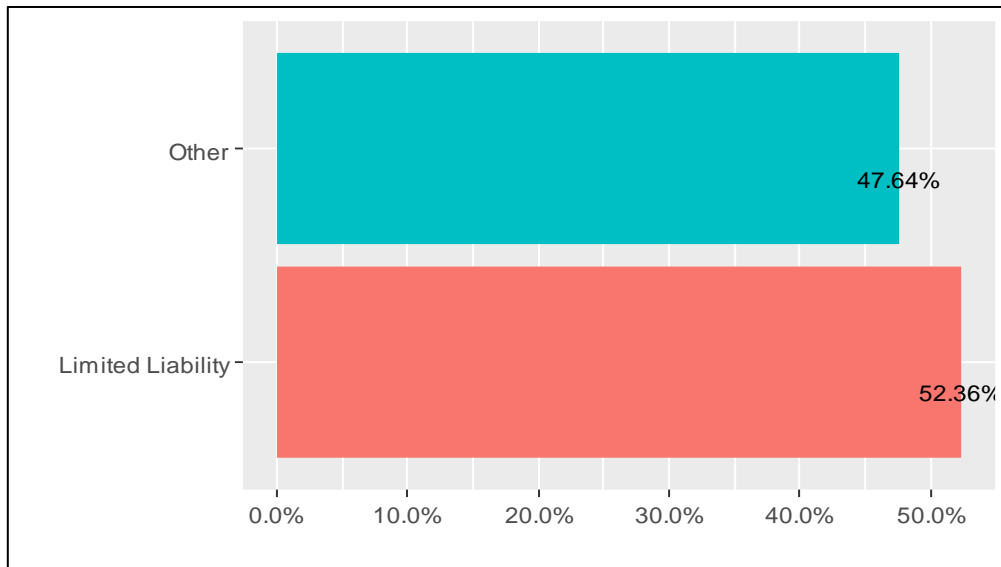


Figure 8: Legal Status

In a study of SMMEs in the Eastern Cape province, Fatoki and Asah (2011: 178) established the importance of limited liability incorporation as this enhanced the enterprise's chances of debt funding. It is thus encouraging to note that the majority of SMMEs in KZN have a legal status that increases their chances of accessing funding, which is one of the key requirements for business growth (Fatoki and Asah 2011: 179). These results differ from those by Adegbite et al. (2007: 11) on Nigerian small-scale enterprises, in which the majority operated as sole proprietors. The study cited the challenge of limited liability registration was rooted in cumbersome processes and high incorporation costs.

### 2.7.3.2 Website

Based on Figure 9, 69% of the SMMEs in the manufacturing sector have a functional website in the province. Considering the growing rate of adoption and use of online communication and marketing mediums in different forms like websites (Camilleri 2018: 21), it seems clear that KZN SMMEs have also embraced this technology tool.

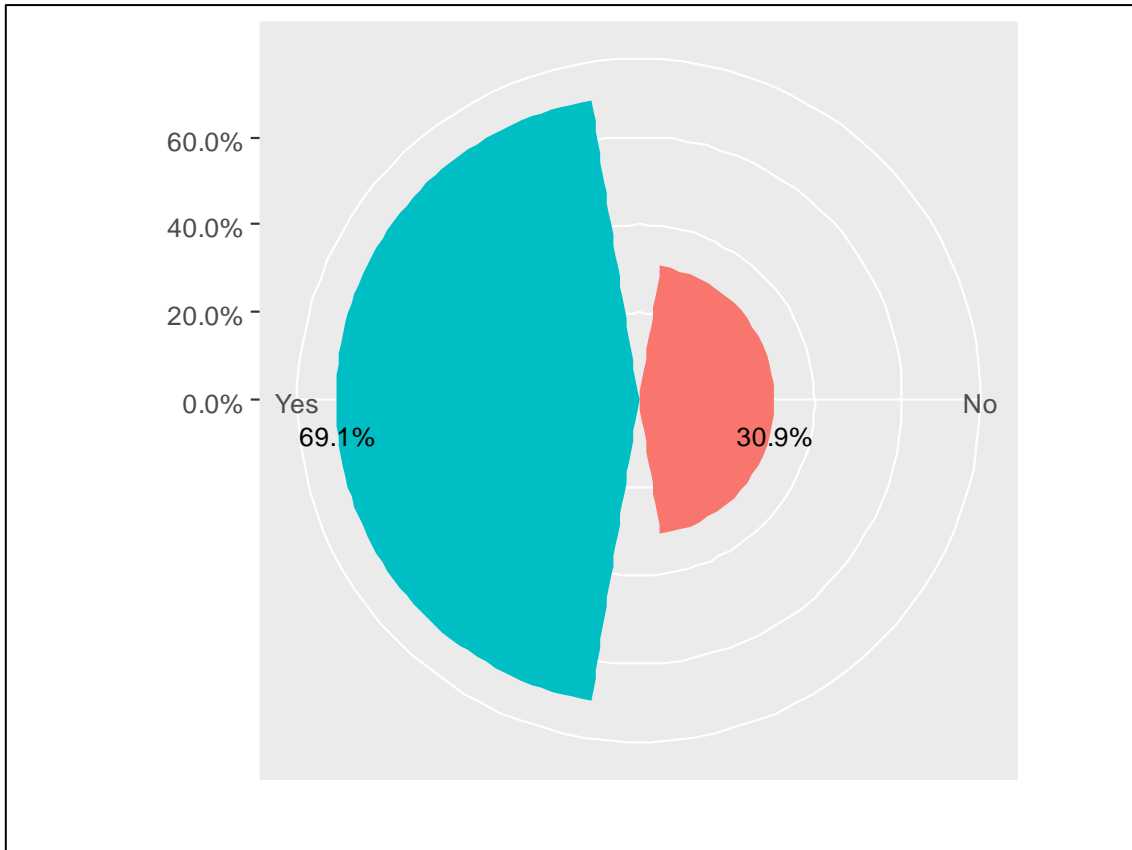


Figure 9: Website use

A website plays an important role in ensuring that the company maintains an online presence. Research has shown that through the use of websites, SMMEs are able to ward off competition and entrench customer loyalty (Pistol, Epure and Bucea-Manea-Țoniș 2016: 128). Some findings indicated that manufacturing firms with functional websites generally perform better compared to their counterparts (Buyinza 2011: 24).

### 2.7.3.3 Digital marketing

Figure 10 below shows that, unlike website use, very few SMMEs in the province use a digital marketing medium, with only about 18% harnessing various social media platforms for marketing purposes.

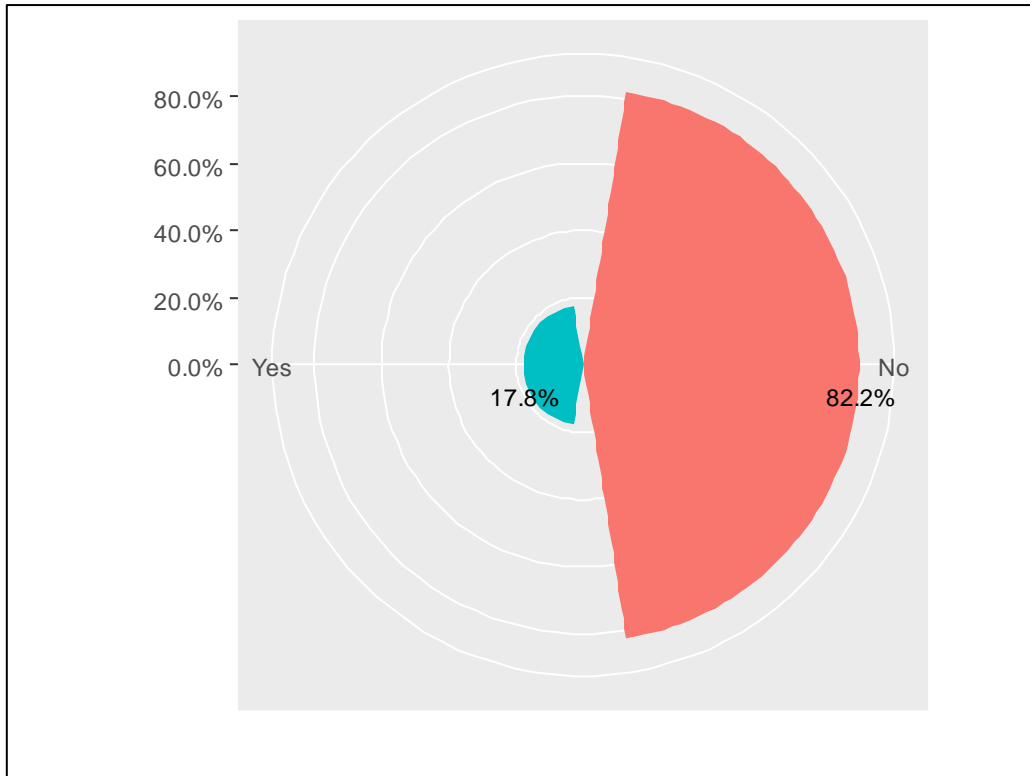


Figure 10: Digital Marketing

Given the exponential growth in e-marketing activities, digital marketing is not optional but a fundamental business performance driver with potential to influence the company's survival prospects in the long term (Jobs and Gilfoil 2014: 235; Pistol, Epure and Bucea-Manea-Țoniș 2016: 129). Digital marketing through various platforms like Face Book, Twitter and Instagram among others could be key for small-scale manufacturing enterprises in KZN to engaging clients and developing customised products which speak to customer specific needs. Digital marketing is crucial in strengthening competitive advantage and thus growing market share (Olawale and Garwe 2010: 731). Limited use could be due to lack of resources and limited knowledge (Pistol, Epure and Bucea-Manea-Țoniș 2016: 129; Chimucheka, Dodd and Chinyamurindi 2018: 10) as some of the digital tools are nascent especially in developing countries like South Africa.

#### 2.7.3.4 Total assets

Figure 11 below shows the distribution of manufacturing SMMEs in KZN Province. The SMMEs' total assets are negatively skewed. Based on the analysis below, majority of SMMEs fall under the small-sized and closely followed by the micro category.



Research shows that manufacturing enterprises require substantial investment in assets in order to drive their operations. It is important that SMMEs in the province continue to invest in assets as these are crucial in driving performance (Bhorat et al. 2018: 20). Other studies highlighted the importance of assets in enhancing organisational performance, as they have a direct impact on sales (Gupta, Guha and Krishnaswami 2013: 3).

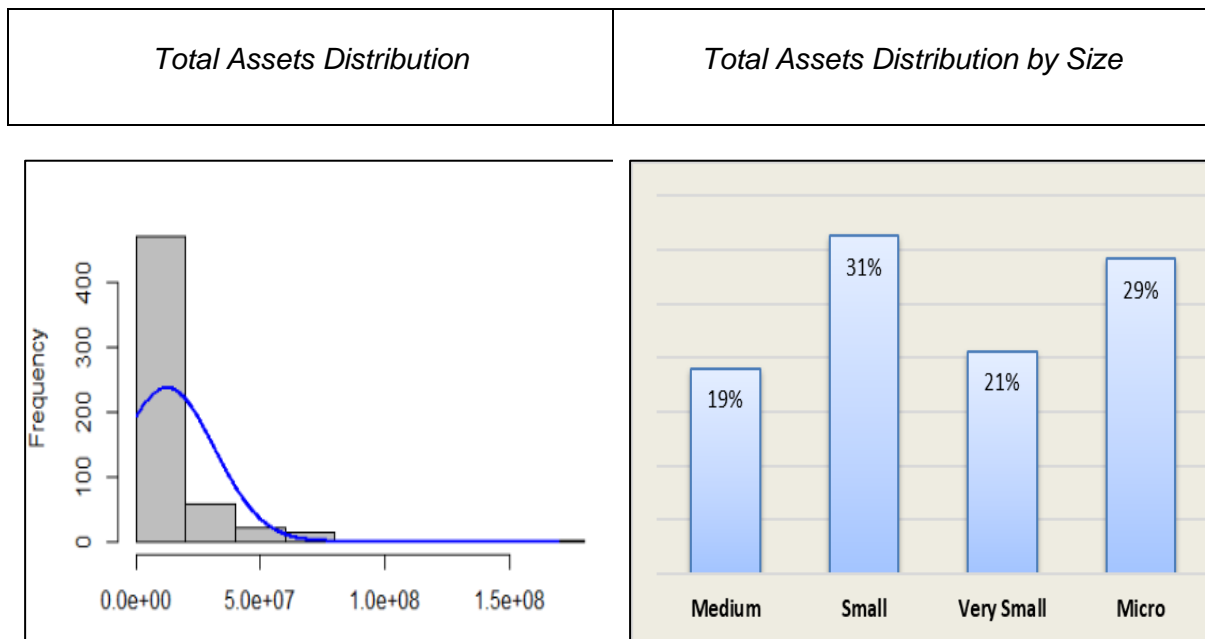


Figure 11: Total assets

### 2.7.3.5 Total employment

From Figure 12 below the participants were largely composed of SMMEs with few employees. The majority of the SMMEs fall in the micro-sized category closely followed by the very small and small-sized enterprise. When employment is harnessed as a measure of firm size, the medium-sized category constituted only 4% of the total number of participating SMMEs.

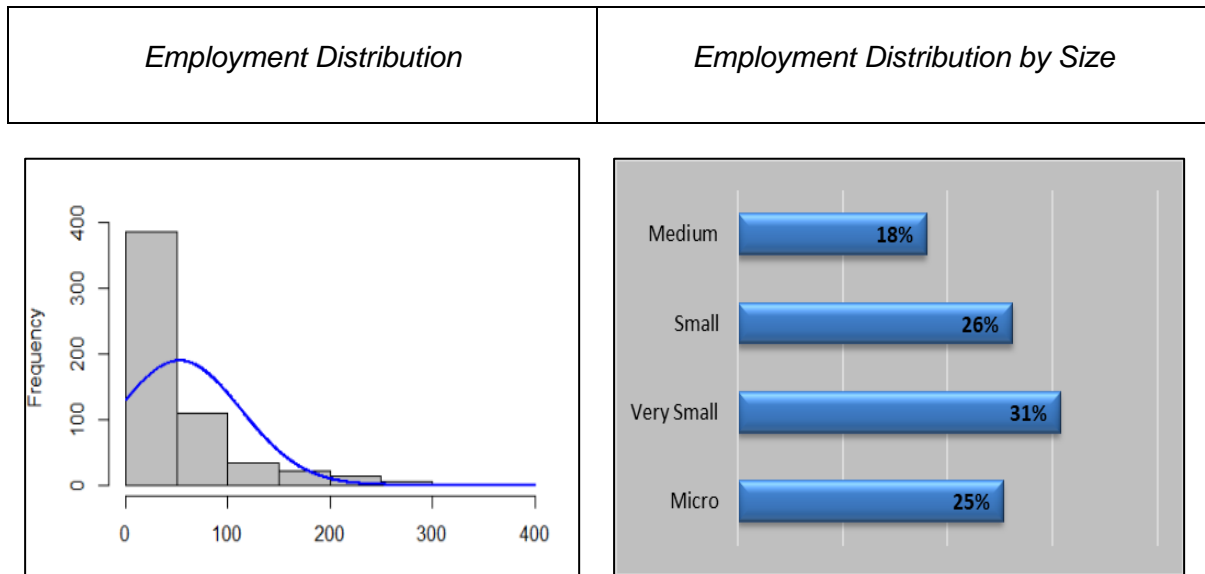


Figure 12: Total employment

The above trend shows that the majority of employment is provided by the SMMEs in the smaller-sized categories which decrease with an increase in size. These findings relate with previous findings on the manufacturing sector across the country. A study by Laljit (2006: 38) painted a related picture establishing a concave relationship between employment and SMME size. The study indicated that smaller-sized categories employed fewer workers which increased with size before plateauing and then decreasing in size again. A study by Umjwali (2012: 37), contrary to our findings, showed a convex relationship between employment performance and size, implying that employment is initially higher for small-sized categories before decreasing as firm size increases and then increases again with size. The concave relationship established above could be indicative of the increasing mechanisation investments undertaken by firms as they evolve. Coupled with the challenge of onerous labour laws in the country, SMMEs are more likely to resort to automation than use of labour which

creates both direct and opportunity costs (Small Business Project 2014: 3). This simply means that as SMMEs grow and thus accumulate increased financial resources, they seek alternatives to labour which do not impact their operations negatively.

### 2.7.3.6 SMME Age

The following Figure 13 shows the distribution of the age of SMMEs in the province. The negative skewed distribution as per the depiction on the left of Figure 12 shows that the majority of SMMEs are still young. Disaggregated analysis by category confirms this, with the majority of firms being aged between 5 and 15 years.

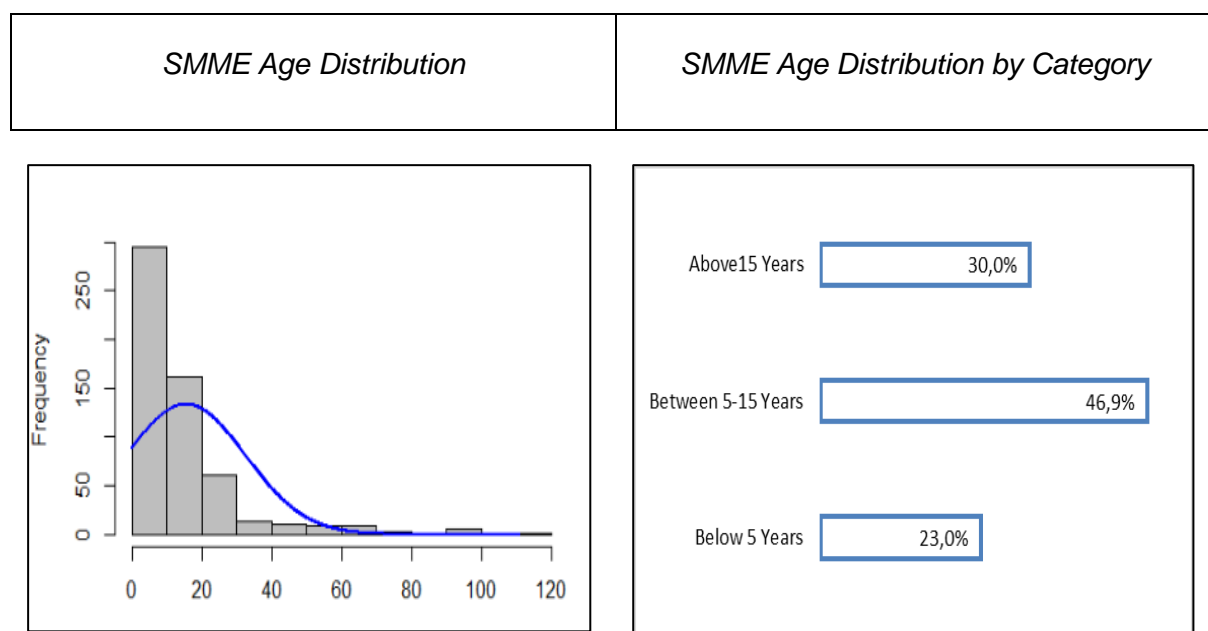


Figure 13: SMME age distribution

The above analysis shows that KZN-based manufacturing SMMEs are young, which could be indicative of the high failure rate in the sector (Nemaenzhe 2010: 17; Fatoki 2014: 926). The results are closely related with a previous study on KZN SMMEs in the clothing and textile manufacturing sub-sector (Laljit 2006: 39). The quarterly survey by the Small Enterprise Development Agency (2019: 15) showed that the majority of small enterprises are aged below 10 years. The study also indicated a net decrease for very young and old firms. This shows that start-up and mature enterprises in the SMME sector tend to perform poorly. Interesting to note was that the age characteristics of KZN SMMEs are related to the performance of SMMEs in countries that are marred by high levels of civil and political turbulence as in Columbia (Hiatt and

Sine 2014: 18). Compared to some developed countries (Yasuda 2005: 4), the average age for KZN-based small enterprises is very low and reflects the complexities of the local terrain they navigate which results in a high failure rate. This is confirmed by Lekhanya (2016b: 110) study on KZN SMMEs in which 86% of the participating SMMEs were aged below 8 years.

### 2.7.3.7 SMMEs Sales Distribution

Figure 14 below shows the sales for the SMMEs in KZN over the three-year period from 2015 to 2017. The analysis indicates that the majority of the participants fall under either the small or very small-sized category.

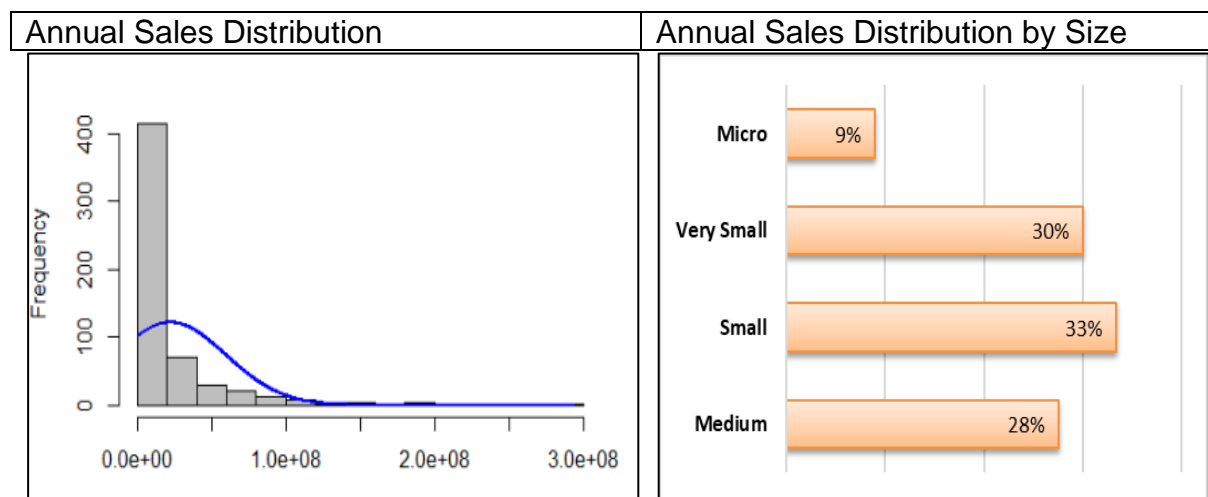


Figure 14: Annual sales

Compared to the national average for all SMMEs and specific to the manufacturing industry, KZN-based SMMEs in the manufacturing sector have significantly higher sales levels (Bureau for Economic Research 2016: 19). However, a study by Small Enterprise Development Agency (2019: 23) showed that the majority of the SMMEs in the country belong to the very small size category, which is different from the above analysis, as the majority of SMMEs are micro-sized. Sales play a critical role in the growth and long-term survival of enterprises. Various previous studies have also noted the importance of sales as a key measure of organisational success (Mahohoma 2018: 66). Unlike employment, sales growth contributes to organisational wealth through increased market share (Coad et al. 2016: 7; Phillipson et al. 2019: 231). In this light, it is important that SMMEs appreciate how various internal factors impact on their performance as proxied by annual sales. Such an understanding will ensure that

entrepreneurs focus on important organisational attributes with an impact on their ability to generate sales.

#### **2.7.4 The Moderating Effect of Location on the Performance of SMMEs in KZN**

A review of literature shows that there is limited research on how the firm's geographic region influences the relationship between sales performance and various other internal drivers (Audretsch and Dohse 2007: 80; Huggins, Prokop and Thompson 2017: 358). Audretsch and Dohse (2007: 80) argued that notwithstanding the stylised facts produced by Gibrat's LPE and the industry dynamics theoretical views on the role of firm-specific characteristics and industry factors on firm performance, locational aspects have received inadequate attention in these studies. A firm's geographic location has a significant influence on performance and survival especially for small-sized enterprises. This moderating effect of location on firm performance can be traced back to the seminal work of Alfred Weber (1908). Through the lenses of classical locational analysis, Weber (1908) acknowledged the geographical fixation of input resources, which explains why different types of firms are located in different locations (McCann 1998: 17).

In showing the growing interest in the role of location on firm performance, Rijkers, Söderbom and Loening (2010: 1278) argued that this burgeoning interest is a manifestation of the impact geographical location has on both small and large organisations' ability to generate sales. McCann and Folta (2011: 107) asserted that the selective effect of location is captured by the varying spatial disparities in economic output based on geographical environments in which firms operate. Firms strategically located close to suppliers and buyers tend to register increasing sales levels and improved profits than those located far away from the same (Olawale and Garwe 2010: 731). In their study of Ethiopian manufacturing SMMEs, Bigsten and Gebreeyesus (2007: 814) noted that, alongside other factors, location had an effect on firm performance. A study on East African manufacturing entities by Buyinza (2011: 24) established that performance had an impact on firm performance and survival. Some studies have argued that urban-based firms demonstrate a healthy dynamism compared to their rural counterparts, which in general tend to struggle in accessing markets, quality inputs and skilled labour (Bigsten and Gebreeyesus 2007: 814; Rijkers, Söderbom and Loening 2010: 1291).

As such, it is important to establish how location moderates the relationship between firms' sales performance and various internal characteristics. Previous studies recommended the need for more research on the influence of location on small firms' performance, (O'Farrell and Hitchens 1988: 1377; McCann and Folta 2011: 122) as this will be critical in devising interventions that are locationally based. This is more needful in South Africa, as the country is transitioning from apartheid, a political system which promoted spatial division (Ayandibu and Houghton 2017: 49). The system forced most indigenous people into barren rural areas in which economic activity was at most insignificant and SMMEs' growth prospects were limited. These peripheral underdeveloped regions, which were known as distressed areas or Bantustans under apartheid, had the highest levels of poverty and unemployment (Lawrence and Rogerson 2019: 144). This set-up meant that local enterprises had limited demand and could not access lucrative local and international markets. Arokium (2010: 47) contended that the South African market structure is marred by significant unequal access to basic services owing to the firms' geographic location.

Findings by (Bomani and Derera 2018: 158) paint a concerning picture, as entrepreneurs in rural areas claimed that their geographical location had a negative effect on their ability to generate sales that can enhance growth and continued survival. However, since the dawn of democratic rule in 1994, the government has made strides in trying to reverse the apartheid legacy through increased development of hinterland areas (National Planning Commission 2011: 44). As such, using the same dataset from McFah Consultancy, graphical analysis is adopted to check how SMME internal characteristics relationship with sales performance is dependent on geographical location. In this study, urban-based SMMEs are those with operations in eThekweni metro and rural-based SMMEs are those operating across the ten district municipalities which are predominantly rural. This to the best of the researcher's knowledge is the first study to embrace locational theory to compare the sales performance of urban versus rural based manufacturing SMMEs in KZN province.

### **2.7.5 SMMEs Sales Distribution and Performance.**

To begin with, a comparison of the sales distribution and performance between rural and urban enterprises over the three years between 2015 and 2017 was conducted. The graphical analysis as per Figure 15 below shows that there is a marginal

difference between the distribution and performance of urban compared to rural based enterprises in KZN.

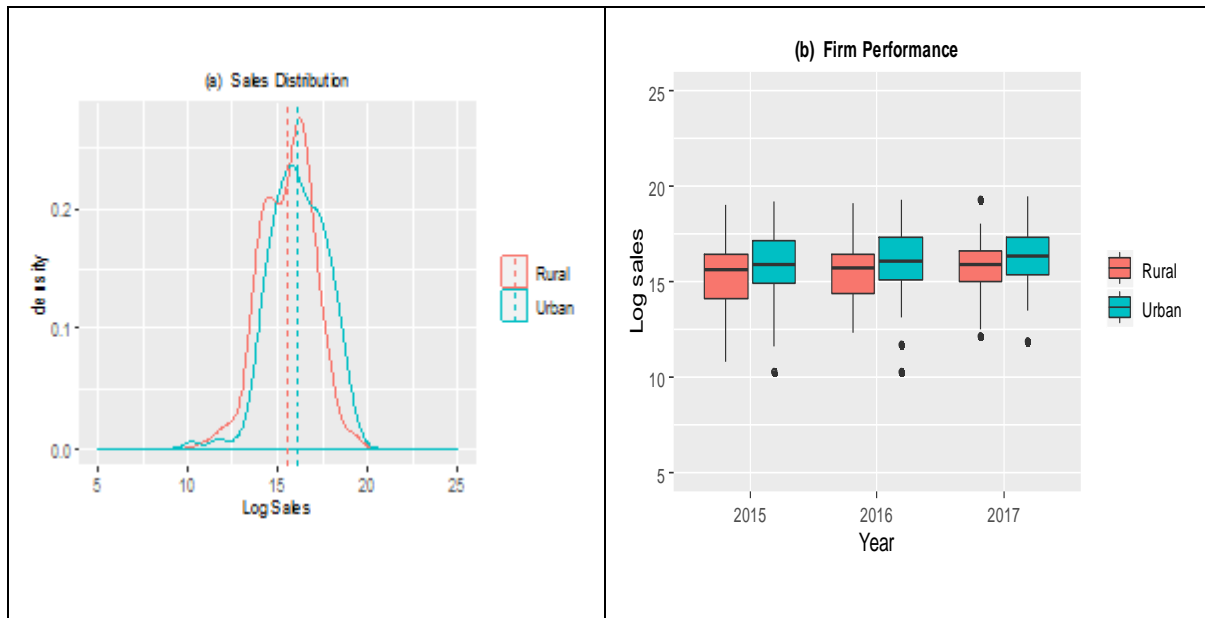


Figure 15: Sales distribution and performance based on SMMEs' location

The analysis above as per Figure 15 (a) shows that the distribution of the sales of both rural and urban-based SMMEs depicts an approximately normal distribution, with both the median and mode being close to mean sales. Figure 15 (b) highlights that urban-based firms performed slightly better than their rural counterparts over the three years between 2015 and 2017. In the next sections, the association of various internal drivers and sales performance was assessed.

#### 2.7.5.1 Employment and sales performance

Figure 16 shows the relationship between log of sales and log of total workers for both eThekweni and rural-based SMMEs in KZN Province. The analysis shows a somewhat positive relationship between SMME employment and sales performance in the province across urban and rural geographic regions. For small staff complements, there is a glaring difference between SMMEs across the two locations, which disappears for higher employment levels. For urban firms, the relationship between sales and employment level is inverse and the trend quickly attenuates with increased number of workers and eventually turns positive. On the other hand, rural based firms

show a sharp positive relationship between sales and few numbers of workers, and the trend then temporarily oscillates around positive and negative relationships for different number of workers before exhibiting a positive association with sales.

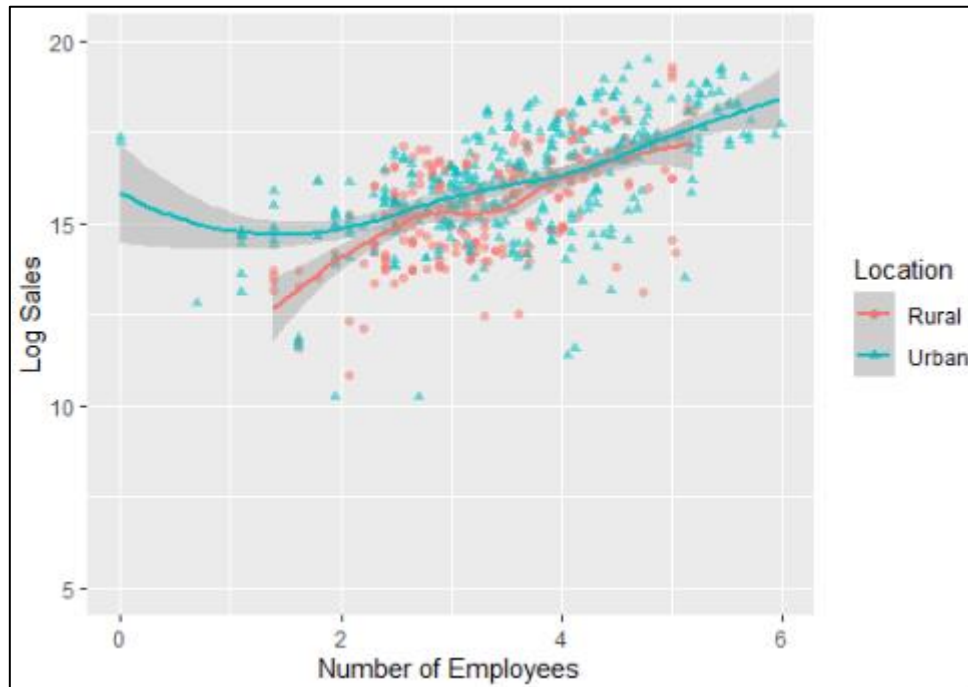


Figure 16: Employment vs sales performance based on SMMEs' location

The above analysis points to the fact that urban and rural based enterprises sales performance relates differently to their employment levels. This analysis aligns with previous findings on the differences between rural and urban labour effect on firm performance (Puga 2002: 7; McCann and Folta 2011: 104)

#### 2.7.5.2 Total assets and sales performance

Figure 17 below reveals the relationship between total assets and sales for SMMEs based in the rural and urban regions. The analysis as per the above Figure 17 shows a positive relationship between total assets and sales for both SMMEs in eThekweni metro and rural regions in the province. Rural-based SMMEs however exhibit a spread-out convex relationship between sales and total assets, with urban enterprises showing a firm positive trend between the two.



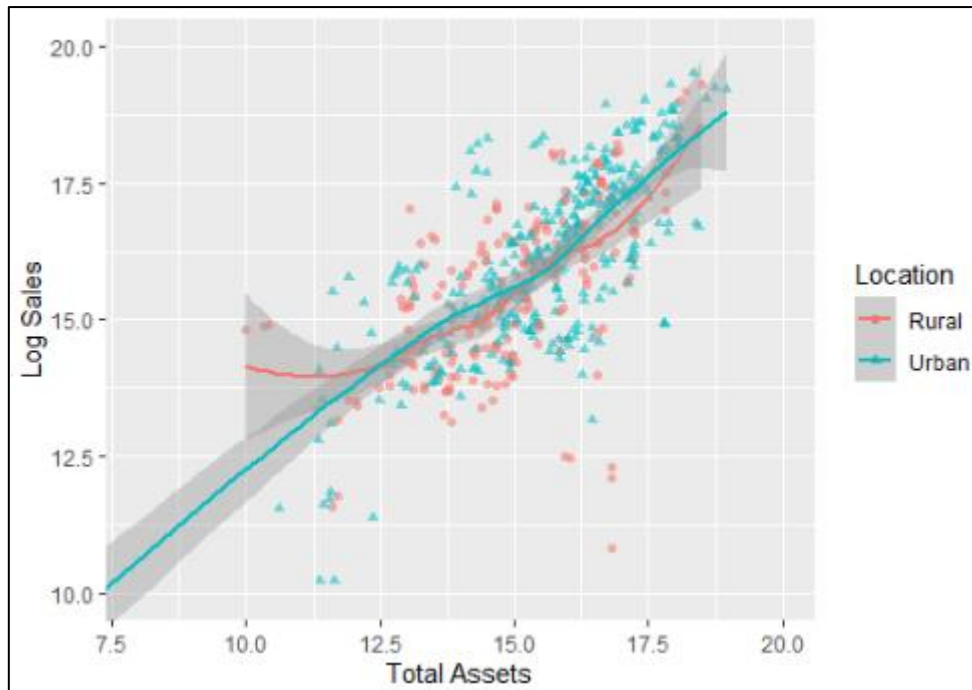


Figure 17: Total assets vs sales performance based on SMMEs' location

The above assessment shows that as rural-based firms increased assets in the initial stages, this negatively impacted on sales performance, but the trend improved and turned positive though volatile with more assets. For firms with an increased asset base, the positive relationship is clear, with urban-based firms showing marginally higher sales for the same amount of assets compared to their counterparts. The trend provides support for some of the findings in literature, indicating the positive impact of assets on performance (Maggina and Tsaklanganos 2012: 113; Al-Ani 2013: 177).

### 2.7.5.3 Firm age and sales performance

Figure 18 below depicts the relationship between the duo of log of firm age and its squared version against log of sales for both urban and rural based SMMEs. SMME age as per the graphical visualisation shows that age and sales performance have a non-linear concave relationship despite firm location and it is clear from this analysis, that the rate of concavity differs by firm location. The analysis also shows that before they reach 30 years, young firms in eThekweni Metro have higher sales levels for the same age compared to those in rural regions. In later years, a more inverse relationship between sales and age emerges and is more pronounced for urban-based firms.

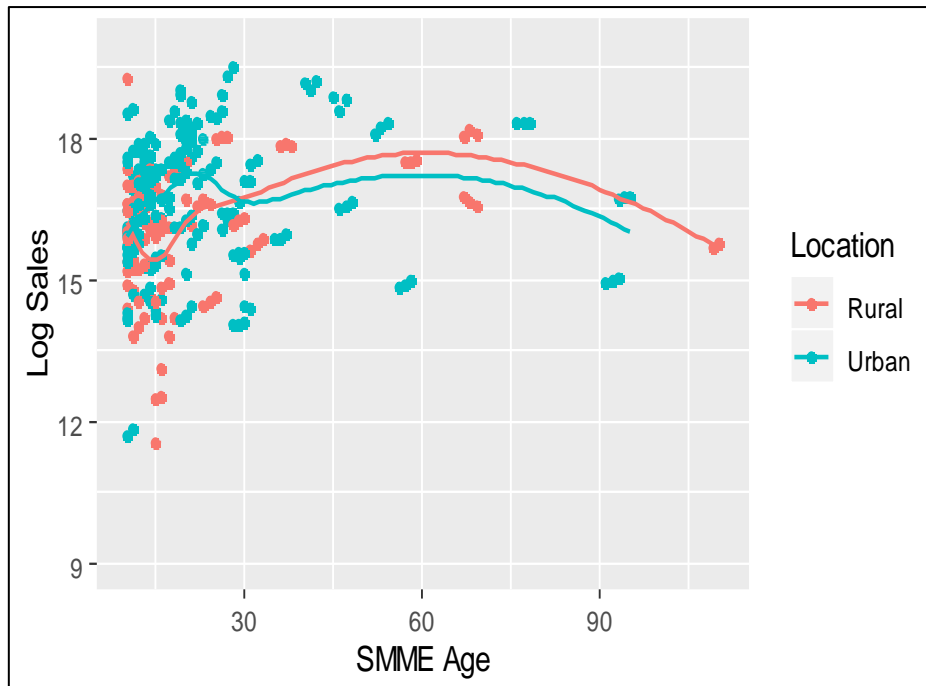


Figure 18: Firm age vs sales performance based on SMMEs' location

The analysis also indicates that SMMEs in KZN experience a real senescence problem which is more pronounced for firms based in the urban than those in the rural areas. This trend could be due to rigidities and inertia due to the liability of old age (Loderer and Waelchli 2010: 20; Coad et al. 2018: 7). This finding aligns with the submission by McPherson (1995: 34) asserting that because of various factors like competition, among other risk drivers, SMMEs based in urban and rural areas experience different closure rates.

#### 2.7.5.4 Productivity and sales performance

The analysis as per Figure 19 portrays a positive relationship between SMME labour productivity and sales performance. In line with other studies, labour productivity was measured as the log of sales per employee (Roca-Puig, Beltrán-Martín and Cipres 2012: 11; Zhou and Gumbo 2021d: 16). The graphical depiction reflects a positive relationship between SMME productivity and annual sales performance. However, the analysis shows that urban-based firms are quick to improve their levels of labour productivity, while rural-based SMMEs' productivity levels do not improve as fast to match turnover levels. This implies that urban-based enterprises are more effective in terms of labour use than those based in the rural regions across the province.

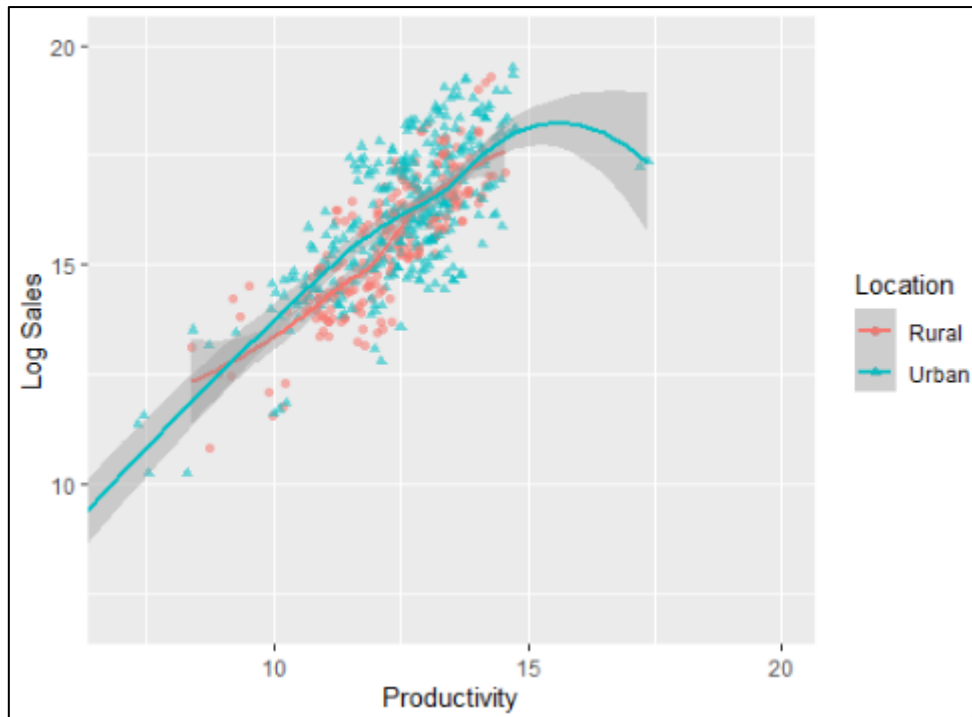


Figure 19: Productivity vs sales performance based on SMMEs' location

The results confirm that labour productivity, especially for lower sales levels, is moderated by the SMMEs' geographic location. It was noted that, as sales increase there is convergence between both rural and urban-based labour productivity levels. This could be indicative of how urban-based firms, regardless of sales levels, benefit from their location, which is endowed with specialised skills. On the other hand, their rural counterparts, especially those with lower turnover (like start-ups) are largely faced with the problem of access to skilled labour, which seems to improve with performance. Extant literature highlighted that rural-based small enterprises struggle with access to adequate skills, which inevitably results in lower productivity levels for given level of performance (Puga 2002: 7; Bomani and Derera 2018: 151). However, as sales increase, urban firms' productivity levels take a dip, implying that as firms based in eThekweni Metro grow, they tend to be less efficient.

#### 2.7.5.5 Website use and sales performance

The graphic analysis using boxplots as per Figure 20 shows the relationship between website use and sales performance for both rural- and urban-based enterprises. The indications are that there is a marginal difference between firms that have functional websites and those without in terms of their sales performance, despite location.

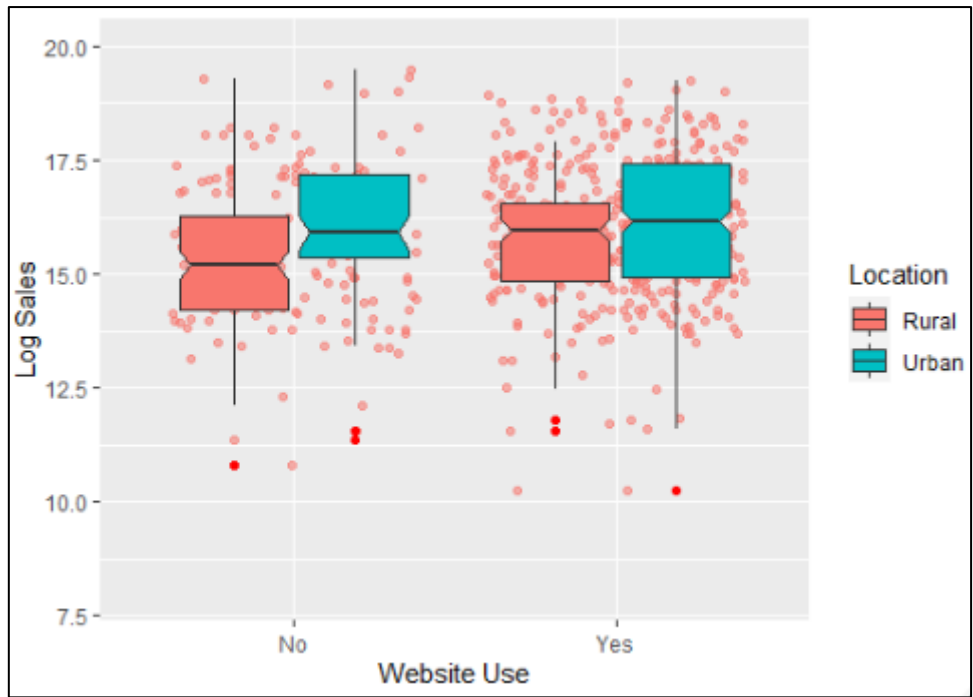


Figure 20: Website use vs sales performance based on SMMEs' location

From the analysis, the moderating effect of location is more pronounced among SMMEs without functional websites. Manufacturing firms based in eThekweni with functional websites have marginally higher sales levels compared to those in the rural district municipalities in the province. Use of websites seems not to accrue significant benefits for either urban or rural SMMEs. However, a common trend seems to emerge, with firms in either geographic location running functional websites having a relatively positive skew while those without have a tenuous negative skew in terms of sales performance. Prima facie, this analysis provides some support for claims that website use enhances the company's sales performance (Parsons 2013: 28). However, as asserted by (Williamson, Parker and Kendrick 1989: 921), there is need to assess sales performance using empirical techniques which go beyond data exploration to ascertain if website use has a significant and positive impact on the performance of SMMEs in rural and urban areas.

#### 2.7.5.6 Digital marketing use and sales performance

Figure 21 below shows the relationship between use of digital marketing and sales performance for SMMEs based in eThekweni metro and those in the other ten district municipalities. The analysis shows that there is some difference, albeit tenuous,

between enterprises using digital marketing platforms in the province. The difference in terms of sales performance is noted between firms without digital media platforms, as urban-based firms seem to have higher sales levels compared to those in rural regions.

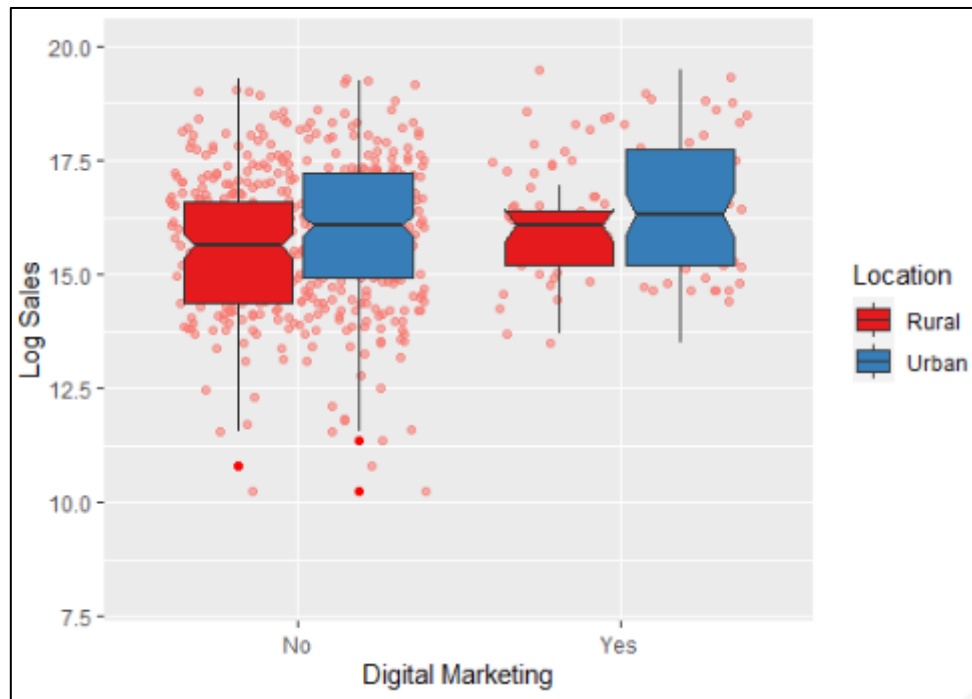


Figure 21: Digital marketing use vs sales performance based on SMMEs' location

Interestingly, both rural-based enterprises with digital marketing tools and urban-based SMMEs without digital marketing mediums tend to perform similarly, even though the latter have significant variability in their sales distribution. A positive relationship is noted between sales performance and digital marketing use especially for rural-based enterprises while the effect is almost insignificant between urban SMMEs. This trend may be indicative of previous findings that SMMEs need trained employees to benefit from the use of various ICT tools (Ngibe and Lekhanya 2019: 20). Further analysis using other techniques to assess the impact of digital media use on sales performance for SMMEs in general and across urban and rural locations is thus needed.

#### 2.7.5.7 Legal status and sales performance

The analysis as per Figure 22 below depicts the relationship between SMME registration and sales performance across the urban and rural regions. From the

analysis above, limited liability registered firms in urban areas perform relatively better than those in the rural areas. Rural-based firms have limited sales variability compared to their limited liability registered urban counterparts. The trend is reversed for SMMEs with other forms of registration, with rural-based firms having a higher degree of sales variability.



Figure 22: Legal Status vs sales performance based on SMMEs' location

The visualisations as per Figure 22 also reveal that there is an insignificant difference in terms of sales performance, between liability registered rural firms compared to urban firms with other types of legal status. Key to note was that the difference is noticeable between limited liability urban firms compared to their rural counterparts with other forms of registration. For urban-based firms, there is a trend suggesting a positive relationship between sales levels and limited liability registration but for those in rural areas the difference is ambiguous. Various studies have noted the negative impact of limited liability registration on performance (Adegbite et al. 2007: 11; Small Business Project 2014: 2) and this warrants further assessment on how SMME legal status affects performance.

## **2.8 Conclusion**

This chapter detailed the role of SMMEs in South Africa and zoned in on KwaZulu Natal manufacturing firms. The importance of grounding research into the local context was highlighted in order to allow for generalisation of results. The varying SMME definitions adopted across regions and stakeholders even in the South African context was also noted and the confusion this brought to both stakeholders intending to provide support to the sector and the entrepreneurs. The socio-economic contribution by the small enterprises in the manufacturing and other sectors was also discussed. The positive performance of SMMEs was found to be critical in driving economic development and contributing towards employment creation both at national and provincial level.

It was also noted that the South African government has devised various financial and non-financial interventions targeted at the SMME sector. The continued struggle of the small manufacturing firms was noted in spite of various interventions by the government and the need for in-depth analysis on key drivers on SMME performance was elaborated. The characteristics of the SMMEs in the manufacturing sector were explored using panel data from McFah Consultancy for the three years between 2015 and 2017. The relationship between SMME characteristics and sales performance was assessed for internal variables, with the analysis showing some contrasting differences between firms based in eThekweni metro and those in the other ten district municipalities in KZN. A study based on this chapter showed some significant differences between urban and rural based firms (Zhou and Gumbo 2021d: 21). Having explored the characteristics of SMMEs relating to sales performance, the next chapter assessed the growth attributes of these enterprises in the province.

## **CHAPTER THREE:**

### **GROWTH DISTRIBUTION OF MANUFACTURING SMMEs IN KZN PROVINCE<sup>3</sup>**

#### **3.1 Introduction**

The important role of SMMEs in driving socio-economic development has inexorably led to a plethora of enquiries on the growth process of these enterprises as various stakeholders seek solutions to the sector's poor performance (Nemaenzhe 2010: 4; Moorthy et al. 2012: 224; Fatoki 2014: 922; Machado 2016: 419). To date, various theories that explain firm growth patterns and how such relate to size have been postulated (Yasuda 2005: 6; Achtenhagen, Naldi and Melin 2010: 297; Machado 2016: 419; Filho et al. 2017: 2; Zhou and Gumbo 2021a: 2). However there are limited studies in developing countries in this area (Zhou and Gumbo 2021c: 145). This is concerning because firm growth has an immense impact on the country's economic performance. As such, this study harnesses, Gibrat's LPE which assumes a stochastic growth process (Geroski 1999: 12; Geroski 2005: 131; Malepe 2014: 7; Masenyetse 2017a: 35) and lifecycle theory which postulates a deterministic growth path (Churchill and Lewis 2000: 3; Agarwal and Gort 2002: 185; Shirokova 2009: 78; Cao et al. 2011: 470; Graham 2018: 16) to appreciate KZN manufacturing SMMEs growth dynamics.

#### **3.2 Role of Theories in Small Business Growth Research**

Theory is an important framework for both observation and understanding as it shapes both perception and the way we perceive things. It is through theoretical lenses that academics and practitioners have a structured understanding of how certain aspects of the social world work and the drivers thereof (Carpiano and Daley 2006: 564; Neuman 2014: 57). According to Madara and Katana (2016: 109), theories allow researchers to establish the link between the abstract and the concrete. Theory is a generalised statement that plays a critical role in explaining why a problem is happening and ascertaining where effective interventions should be applied (Neuman 2014: 9; Sunday 2015: 8). The importance of theory in research was also emphasised by Creswell (2014: 86), asserting that theories play a fundamental role in the

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<sup>3</sup> A paper based on this chapter was published as a journal article: Zhou, H. and Gumbo, V. 2021. The role of size and age on firm growth: Evidence from manufacturing SMMEs in KwaZulu Natal province, South Africa. *African Journal of Inter/Multidisciplinary Studies (AJIMS)*, 3 (2021): 144-160.



formulation of hypotheses which specify the extent of interaction among variables and helps in explaining or predicting phenomena that happen in the world.

Nemaenzhe (2010: 37) articulated that theoretical models can be derived from three main sources: previous empirical studies; past experiences (which in the main includes actual behaviour observations, attitudes or possibly other phenomena); and other theories providing an alternative perspective for analysis. This view ties with Madara and Katana (2016: 110) who also claimed a tripartite theoretical viewpoint whose three pillars are a theoretical paradigm, theoretical lenses and adaptation. The broad range of sources from which theories can be driven shows the immense role they play in research. Sunday (2015: 7) articulated that theory provides a basic framework and concomitant concepts as well as directing the researcher to important questions. Sunday further contended that theory enhances the researcher's appreciation of variables' interconnectedness and broader significance of data. This view concurs with Neuman (2014: 56), positing that theoretical models provide systematic explanations as to why things happen and offers insights and direction for further inquiry. Colquitt and Zapata-Phelan (2007: 1281) also established that through theoretical lenses, important variables to a social reality are identified, their interrelation is explained and conditions under which they should or not relate are ascertained.

The role played by theories in explaining the complexity of organisations remains invaluable (Astley and Van de Ven 1983b: 245), as testified by the burgeoning theoretical pluralism in organisational literature that has helped researchers consider novel aspects relating to organisational life, thus enhancing their critical enquiry on the subject (Colquitt and Zapata-Phelan 2007: 1281). It is clear that theories occupy a critical position in advancing research (Bello and Kostova 2012: 539). Neuman (2014: 58) avowed that, besides sharpening the researcher's mind, theories play a pivotal role in helping others to read and understand one's research. This assertion aligns with Achtenhagen, Naldi and Melin (2010: 296) observation, that firm growth studies are fragmented owing to lack of clear theoretical underpinning to both, drive research and guide interpretation of findings. This shows that in order to understand small business performance and long-term survival, theorisation should go beyond the surface and delve into the underlying structures that explain relationships and

integrate neighbouring concepts as well (Colquitt and Zapata-Phelan 2007: 1285). This requirement demands that theories provides both a starting point and basis for investigating SMME performance, as owing to their nature, they play a transversal role in the society, thus drawing interest from all and sundry (Resende, Cardoso and Façanha 2015: 1256).

### **3.2.1 Small Business Growth Theories**

A review of literature shows that while firm growth theories abound, much of the research focuses on large enterprises as compared to small firms (O'Farrell and Hitchens 1988: 1366; Miller 2015: 2). Wiklund, Patzelt and Shepherd (2009: 351) acknowledged that there is little known about firm growth due to the fragmented approach to researching this phenomenon. They blamed this on the archaic approach to researching firm growth, as noted with limited reconciliation between different theoretical perspectives, which in turn leads to the lack of any sort of commonly agreed framework on this important subject (Achtenhagen, Naldi and Melin 2010: 297; Filho et al. 2017: 2). Limited investigation of various theories using the empirical data attest to this challenge. It thus remains important to review and empirically test some of theories with a particular focus on developing countries like South Africa as the majority of firm growth models have been tested in developed countries (Hermelo and Vassolo 2007: 4). To address this gap, the two parallel growth theoretical perspectives are explored – lifecycle and Gibrat's LPE theories. The latter, owing to its malleability, is then tested on KZN manufacturing SMMEs, and the results form the basis for any possible further investigations.

### **3.2.2 Life Cycle Model**

The life cycle model is one of theories that has been largely embraced to inform small business growth research endeavours (Dodge and Robbins 1992: 28; Churchill and Lewis 2000; Chen, Cao and Wang 2010: 470; Filho et al. 2017: 5). Theory attempts to elucidate the development process of companies from formation until the decline stage. The central assumption is that organisations, like organisms, evolve from one stage to another (Agarwal and Gort 2002: 185; Shirokova 2009: 78; Cao et al. 2011: 470; Graham 2018: 16). Dodge and Robbins (1992: 28) and Albuquerque et al. (2016: 5) further explained that the lifecycle model assumes systematic occurrence of

regularities in organisational development that can be easily categorised into discrete phases (Gupta, Guha and Krishnaswami 2013: 1). This submission implies that the organisational growth process is deterministic (Lester, Parnell and Carraher 2003: 340; Farouk and Saleh 2011: 4). Past research shows that there are various versions of the lifecycle stages, with some researchers identifying up to ten different stages while others limiting them to just three (Dodge and Robbins 1992: 28; Churchill and Lewis 2000: 4; Cao et al. 2011: 6424; Filho et al. 2017: 5).

The model assumes that all organisations pass through determined sequential stages (Lester, Parnell and Carraher 2003: 430; Shirokova 2009: 78). Greiner’s model (1972) has been widely accepted of the 104 lifecycle stages models published between 1962 and 2006 and has been adapted by various studies (Lester, Parnell and Carraher 2003: 340; Levie and Lichtenstein 2010: 329; Miller 2015: 6-7). The model, like many others, claims that organisations pass through five stages (Churchill and Lewis 2000: 4; Shirokova 2009: 68-69; Cao et al. 2011: 6424). The transitions are driven by what Greiner termed “periods of substantial turbulence”. If companies fail to address the properly, they will likely fail or stagnate (Farouk and Saleh 2011: 6; Miller 2015: 7). However, in stark contrast to the “Greiner 1972 model, Churchill and Lewis (2000: 6-9) assumed that business transitions from one stage to another are actively driven by their desire for growth. The model asserts that failure to manage growth objectives properly along the lifecycle may result in linear retrogression back to the survival stage before ultimate failure. Some models claim that both organisational growth and structure complexity are the key indicators of business transitions from one stage to the next (Shirokova 2009: 67). The variety on the definition of stages is reflected by different researchers subjectively postulating their own stages of firm growth as shown on Table 3 below.

**Table 3: Comparative Review of Lifecycle Stages Models**

<b>Model Stages</b>	<b>Number of stages</b>	<b>Source</b>
Birth, Adolescence, Maturity	3	Lippitt and Schmidt (1967)
Creativity, Direction, Delegation, Coordination, Collaboration	5	(Greiner 1972)

Fantasies, Investments, Definitions, Experiments, Predetermining efficiency, Free choice of structure, Basic integrity, Stage Liberal order	10	(Torbert 1974)
Proof of Principle/Prototype, Model Shop, Start-Up/Volume Production, Natural Growth, Strategic Manoeuvring	6	Galbraith (1982)
Entrepreneurial, Collectivity, Formalisation, Elaboration of Structure	4	Quinn and Cameron (1983)
Birth, Growth, Maturity, Revival, Decline	5	Miller and Friesen (1984)
Birth or early growth, Middle of life, Organisation maturity	3	Schein (1985)
Inception, High Growth, Maturity	3	Smith, Mitchell, and Summer (1985)
New Venture, Expansion, Professionalisation, Consolidation, Diversification, Integration, Decline	7	Flamholtz (1986)
Inception, Survival, Growth, Expansion, Maturity	5	Scott and Bruce (1987)
Existence, Survival, Success, Take off, Resource Maturity	5	Churchill and Lewis (1987)
Conception and Development, Commercialisation, Growth Stability	3	Kazanjian (1988)
Start Up, Expansion, Consolidation, Revival, and Decline	5	Hanks (1990)
Creation, commercialisation, growth, maturity	4	Hanks et al. (1993)
Formation, Early growth, Later growth, Stability	5	Dodge and Robbins (1992)
Courtship, Infancy, Go-go, Adolescence, Prime, Stability, Aristocracy, Salem City, Bureaucracy, Death	10	Adizes (1999)
Existence, Survival, Success, Revival, Decline	5	Lester, Parnell and Carraher (2003)
Existence, Survival, Success, Renewal, Decline	5	Lester (2003)
Birth, Growth, Maturity, Decline/renewal, Death	5	Hoy (2006)
Start-up, Growth, Formalisation	3	Shirokova (2009)
Genesis, Existence, Survival, Formalisation, Readaptation, Stability, Decline	7	Albuquerque et al. (2016)
Genesis, Existence, Survival, Growth	4	Filho, et al. (2017)

Source: Own compilation from literature review

As can be seen from previous studies, the growing popularity of the organisational lifecycle stages concept is quite extensive. The model was harnessed as researchers attempted to investigate firm growth process (Bellone *et al.* 2008: 754; Shirokova

2009: 66; Filho *et al.* 2017: 5). Given the importance of firm performance, such increasing interest by various researchers is expected. Shirokova (2009: 67) contended that lifecycle stages can be used by both researchers and practitioners to explain and anticipate changes that will eventually happen in the organisation. Dodge and Robbins (1992: 27) corroborated this assertion, indicating that enhanced understanding of the small businesses' evolution process and drivers thereof is needed to inform effective support intervention strategies necessary for survival and growth. Table 3 shows that the most used lifecycle models have between four and five stages, that can be taken as birth, growth/expansion, maturity, decline and death (or renewal). Cao *et al.* (2011: 6424) claimed that of all the enterprise's lifecycle stages, the decline stage is more crucial than the others and the stage is indicative of the company's inability to deal with various internal and external challenges.

However, various researchers have disputed the validity of this deterministic growth process (Farouk and Saleh 2011: 4) as firms do not necessarily pass through definitive phases (Miller and Friesen 1984: 1178; Hanks 1990: 9) in a traditional biological sense from which the model is adapted (Lester, Parnell and Carraher 2003: 340). Critiques of this theory claim that firm growth process is non-linear, companies are heterogeneous, and that change is too continuous to be artificially divided into discrete stages (Farouk and Saleh 2011: 4; Miller 2015: 6). The assumption that businesses survive and grow in an organismic nature lacks empirical validity and this theoretical view can thus be difficult to test (Levie and Lichtenstein 2010: 321). Theory has also been criticised for its simplistic assumptions which have been found to be difficult for generalisation beyond the limited context in which it was formulated (Miller 2015: 3). Noteworthy is the submission by Levie and Lichtenstein (2010: 334) that some of the lifecycle growth phenomenon proponents admitted lack of deterministic growth sequence of firms when tested using longitudinal data (Miller and Friesen 1984: 1177; Gupta, Guha and Krishnaswami 2013: 3).

Another challenge stems from the lack of a commonly agreed number of stages which firms go through (Shirokova 2009: 70) and more so, there is no clear reason and theoretical basis for different stages in the lifecycle model (Levie and Lichtenstein 2010: 322). As has been highlighted, this makes the theoretical model more subjective and difficult to empirically investigate. Farouk and Saleh (2011: 5) established various

conflicting results and lack of universally agreed stages to satisfactorily explain firm growth, especially among SMMEs. Some studies criticised the lifecycle model as being over-simplified and disregards the unpredictability of various factors impacting firm performance (You 1995: 453; Geroski 1999: 12; Hart 2000: 241; Stam 2010: 132). In their conclusion, Levie and Lichtenstein (2010: 321) submitted that the lifecycle stages model has hit a 'dead end' and it needs to be abandoned for other alternatives that can better explain this complex phenomenon (Machado 2016: 429). To address this, various researchers have adopted the stochastic theory as it can be easily verified unlike the lifecycle theory (Teruel-Carrizosa 2006: 26; Coad 2007: 2; Hermelo and Vassolo 2007: 6). To guide our quest in understanding the growth process of SMMEs in KZN, we thus turn to Gibrat's LPE.

### **3.2.3 Gibrat's Law of Proportionate Effect**

Theoretical model which was introduced by Robert Gibrat in 1931 (O'Farrell and Hitchens 1988: 1369; Stam 2010: 130; Malepe 2014: 7) asserts that all firms have the same growth likelihood regardless of size, implying that firm growth rate is path dependent (Geroski 1999: 5; Stam 2010: 130). Random events result in firms' size divergence and increased market concentration, but their growth prospects will remain the same (Bentzen, Madsen and Smith 2012: 938). Gibrat's LPE charges that the growth rate of the firm is independent of its current size and that size and growth show no heteroscedasticity (Bigsten and Gebreyesus 2007: 815; Nassar, Almsafir and Al-Mahrouq 2014: 267). The underlying assumption of the model is that firm's initial stock of resources contracts or expands in response to stochastic shocks and exit occurs when stock drops below a minimum threshold (Bentzen, Madsen and Smith 2012: 937). This ties with Levinthal (1991: 400), one of the main researchers to explore how random walk theory explains firm survival. Levinthal made two assumptions: that firm growth follows stochastic pattern; and that firm survival is dependent on resources to absorb shocks experienced by the business.

Against the backdrop of ongoing firm exit from the markets in less than twelve months, Agarwal and Gort (2002: 184) rhetorically asked, ...if this was nothing but random shocks? which influence businesses survival. Interestingly, as if responding to their question on their study of United Kingdom (UK) new ventures, Coad et al. (2016: 218) charged that business survival is a function of random shocks. The implication of

Gibrat's LPE theory is that stochastic shocks are independent and identically distributed (i.i.d), thus the log size of the measure follows a normal distribution with mean ( $\mu$ ) and variance ( $\delta^2$ ) (Masenyetse 2017a: 35). This implies that factors which influence firm growth are complex and there is no systematic pattern of firm growth across different firm sizes, as the growth rate distribution is the same for all enterprises of different sizes (You 1995: 453; Geroski 1999: 12; Teruel-Carrizosa 2006: 57). This means, as strongly argued by Geroski (2005: 131) that firm growth rate is a function of idiosyncratic shocks which are inherently unpredictable and have a permanent effect on its size.

Essentially the theoretical model implies that growth is not a function of any structural organisational or environmental characteristics, but rather of random exogenous changes (Stam 2010: 131). Geroski (1999: 4) claimed that these random shocks occur primarily because: (i) companies may not know *what* will happen but know when it will occur or (ii) companies know what will happen but do not know *when* it will happen. This implies unpredictability of random shocks influencing firm growth. The model claims that these unexpected idiosyncratic shocks leave a permanent mark on each individual firm in the market (Geroski 1999: 4; Farouk and Saleh 2011: 3). The overarching implication is that growth rate is similar for firms of different sizes as the latter has no effect on the former (Dunne and Hughes 1994: 117). Owing to its tractability, Gibrat's LPE has been adapted by various researchers (Sutton 1997: 43; Teruel-Carrizosa 2006: 131; Coad et al. 2016: 2). Jovanovic (1982) extended Gibrat's Law with the PLM also known as *theory of "noisy selection"*, which placed added emphasis on firm age, thereby extending Gibrat's LPE to include this additional variable (Jovanovic 1982: 649; Teruel-Carrizosa 2006: 115; Nunes, Viveiros and Serrasqueiro 2012: 459).

Jovanovic posited that firms learn and improve their performance through operational experience in the market (Malepe 2014: 8). The suggested model assumed that information gained through experience is used in strategic decision-making, like whether to expand or not (Renski 2011: 474). Jovanovic argued that each entity's cost curve is subject to its specific shocks that are randomly distributed, and over time, individual firms learn about the impact these shocks have on their efficiency (Hart 2000: 239). Theoretical model concludes that firms which experience positive shocks

tend to survive and increase in size while those to which shocks are not favourable may stagnate, decline, or even exit the market (Jovanovic 1982: 649). It is anticipated that firm age has inverse relationship with growth for the model to be satisfied (Evans 1987: 577; Dunne and Hughes 1994: 131; Özar, Oezertan and İrfanoğlu 2008: 333). The model also posits that growth variance is higher in younger and smaller firms due to their lack of experience in the market (Bigsten and Gebreeyesus 2007: 816). Unlike the lifecycle stages theory, various researchers have noted that stochastic growth theory, either in its narrow or extended form, has greatly contributed to providing insights on firm growth performance (Geroski 1999: 12; Van Biesebroeck 2005: 551; Teruel-Carrizosa 2006: 26; Stam 2010: 130; Farouk and Saleh 2011: 3).

Some researchers (Hermelo and Vassolo 2007: 4; Panda 2015: 54) confirmed that many theoretical models that have been developed on firm growth lack validation, with the exception of Gibrat's Law which remains one of the most recognised and empirically tested theories (Coad 2007: 46; Hermelo and Vassolo 2007: 4). (Coad *et al.* 2016: 3) stated that the random walk worldview offers plausible approximations to real world realities, with meaningful theoretical predictions that can be tested through structured hypotheses. Bigsten and Gebreeyesus (2007: 816) highlighted that Jovanovic's PLM offers important empirically testable hypotheses on firm growth. Consequently, various studies have tested Gibrat's Law and its extended version by Jovanovic. The results are mixed as some accepted while others have failed to find evidence for both Gibrat's LPE and the PLM (Nassar, Almsafir and Al-Mahrouq 2014: 267). It is also noteworthy that the majority of these studies were conducted in developed countries, thus leaving a gap for more studies on the area in developing countries like South Africa. A review of studies on the stochastic theory was conducted and summarised in the Table 4 below.

The review of empirical literature shows that Gibrat's Law has been extensively tested, with the majority of studies focusing on its narrow version and a few others considering the extended version by Jovanovic (Malepe 2014: 8). Studies have also shown that the LPE has been accepted mainly in Europe and the United States albeit with sporadic instances of rejection as well (Teruel-Carrizosa 2006: 85; Malepe 2014: 8). Generally, all studies that have been carried out in Africa and Asia have rejected Gibrat's Law either in part or wholesale (You 1995: 454; Van Biesebroeck 2005: 551;



Teruel-Carrizosa 2006: 85; McPherson 1996: 267). Other studies contended that Gibrat's Law only holds when small firms are past minimum efficient scale (MES) (Stam 2010: 130; Bentzen, Madsen and Smith 2012: 938). There is also an argument that even in cases where the LPE seems to be confirmed, this might be due to omitted variables or measurement errors (Sutton 1997: 46).

**Table 4: Review of Empirical Literature on Gibrat's Law**

Study	Country	Period	Sample size	Size measurement	Main Result
<b>Africa</b>					
McPherson(1996)	South Africa	-	244	Employees	LPE rejected/PLM accepted
	Swaziland	-	277	Employees	LPE rejected/PLM accepted
	Lesotho	-	599	Employees	LPE rejected/PLM accepted
	Botswana	-	206	Employees	LPE rejected/PLM accepted
	Zimbabwe	-	345	Employees	LPE rejected/PLM accepted
Malepe (2014)	South Africa (Western Cape)	2007-2013	410	Employees /sales	LPE rejected/PLM partially accepted
Malepe (2014)	South Africa (Gauteng)	2007-2013	1106	Employees /sales	LPE rejected/PLM partially accepted
Masenyetse (2017a)	South Africa	2000-2010	1236	Sales	LPE rejected/PLM rejected
Bigsten and Gebreeyesus (2007)	Ethiopia	1996-2003	5542	Employees	LPE rejected/ PLM partially accepted
Page and Söderbom (2012)	Ethiopia	2001-2002	263	Employees	LPE rejected
Teal (1998)	Ghana	1992-1999	263	Employees/sales	LPE rejected
Sleuwaegen and Goedhuys (2002)	Ivory Coast	1989-1994	185	Employees /sales	LPE rejected
Nkurunziza (2005)	Kenya	1992-1999	224	Employees	LPE rejected
Masenyetse (2017)	South Africa	2000-2010	860	Sales	LPE rejected
<b>Asia</b>					
Almsafir et al. (2015)	Jordan	2009-2011	31,894	Sales	LPE rejected
Zhang et al.(2009)	China	1997-2003	570	Total Assets	Mixed Results
Shanmugan and Bhaduri (2002)	India	1989-1193	1568	Sales	LPE rejected
Goddard, Wilson, and Blandon (2002)	Japan	1980-1996	443	Assets	LPE rejected
Al-Mahrouq (2006)	Jordan	1988-2003	-	Employees / Capital	LPE rejected
Aslan (2008)	Turkey	1985-2003	103	Net Assets	Mixed Results
<b>Latin America</b>					
Alvarez and Vergara (2006)	Chile	1979-1999	11644	Employees	LPE rejected
Estevez (2007)	Brazil	1998-2002	7689	Employees	LPE rejected
Ribeiro (2007)	Brazil	1996-1999	5745	Employees	LPE rejected
<b>Europe</b>					
Hart and Oulton (1999)	UK	1989-1993	29 000	Employees	LPE rejected

<b>Study</b>	<b>Country</b>	<b>Period</b>	<b>Sample size</b>	<b>Size measurement</b>	<b>Main Result</b>
Fariñas and Moreno (2000)	Spain	1990-1995	1971	Employees	LPE accepted
Becchetti and Trovato (2002)	Italy	-	3033	Employees	LPE accepted for large firms, rejected for small firms
Lensink, van Steen and Terken (2005)	Dutch	1995-1999	811	Employees	LPE accepted
Fujiwara et al. (2008)	45 European Countries	1992-2001	260 000	Assets /employees	LPE accepted
Daunfeledt et al. (2010)	Sweden	1998-2004	288 757	Revenue Number of employees	LPE rejected
Al-Demir (2011)	Spain	2000-2009	379	Assets	LPE rejected
<b>North America</b>					
Choi (2009)	USA	1992-2001	823	Number of employees	LPE accepted
Acs and Armington (2001)	USA	1994-1995	6 million	Number of employees	Mixed results
Doms, Dunne and Roberts (1995)	USA	1959-1988	6090	Number of employees	LPE rejected

Source: Own compilation (adapted from (Teruel-Carrizosa 2006; Nassar, Almsafir and Al-Mahrouq 2014; Masenyetse 2017a)

In addition, in critiquing the narrow view of the growth phenomenon assumed by Gibrat's Law (O'Farrell and Hitchens 1988: 1370), which claims a stochastic process to firm growth, previous studies argued that other factors may still be responsible for firm growth (Sutton 1997: 46; Bigsten and Gebreeyesus 2007: 816; Stam 2010: 132). Such claims if empirically ascertained would thus disconfirming the hypothesis that growth is fully a random process (Stam 2010: 132). A review of literature shows that initial studies (before the 1960s) accepted Gibrat's Law, while the latter ones (after the 1990s) reject the law (Teruel-Carrizosa 2006: 91; Voulgaris, Agiomirgianakis and Papadogonas 2015: 25). Key to note as well is that most studies used number of employees while some used assets, sales, and capital as measure of company size (Aslan 2008: 3; Dunne and Masenyetse 2015: 124). The manufacturing sector dominated many of the studies with a handful of other studies looking at the services sector (Teruel-Carrizosa 2006: 135; Nassar, Almsafir and Al-Mahrouq 2014: 271). Nassar, Almsafir and Al-Mahrouq (2014: 271) noted that there are limited studies on the stochastic theory in developing countries. It is thus essential to verify Gibrat's LPE and its extended version in PLM on SMMEs in KwaZulu Natal Province. The next section looks at the data and methodological approaches to test stochastic theory and its extended version by Jovanovic (1982).

### **3.3 Data and Analysis**

To assess the validity of Gibrat's LPE theory and its extension as suggested by Jovanovic's PLM, data from McFah Consultancy was used. The data covered 191 small enterprises in the manufacturing sector across ten districts and eThekweni metro in KZN Province for the three-year period between 2015 and 2017. A related study by Almsafir et al. (2015: 1603) used data over the same time length of a three-year period. In the previous chapter (as per Objective 1), it was established that SMMEs performance over the three-year period had significant relationships with various SMME internal characteristics, thus making it necessary to assess Gibrat's LPE which assumes that performance proxied by growth is a function of stochasticity (Le 2009: 3). Following previous related studies, annual sales were used as measure of firm size (Almsafir *et al.* 2015: 1605; Masenyetse 2017a: 26). R Statistical Software for computing was used to compute both descriptive statistics and econometric modelling.

The software allows for advanced data visualisations and statistical modelling (R Development Core Team 2019).

### 3.3.1 Descriptive Analysis

The following analysis on Table 5 shows that the mean distribution of the log of sales for KZN manufacturing SMMEs is increasing with time from 15.28 to 15.81 and 16.09 in 2015, 2016 and 2017 respectively. The standard deviation, skewness and kurtosis were also calculated and indicate that the SMME size is not normally distributed as assumed by Gibrat's LPE.

**Table 5: Sales Descriptive Statistics of KZN Manufacturing SMMEs**

	<b>2017</b> <b>Obs. = 573</b>	<b>2016</b> <b>Obs. = 573</b>	<b>2015</b> <b>Obs. = 573</b>
Mean	16.09	15.81	15.28
Std. dev.	1.4	1.92	1.30
Skew	-0.14	-3.00	-3.38
Kurtosis	2.85	25.66	17.91

### 3.3.2 Size Distribution Log Normality tests

The above descriptive statistics show that the KZN manufacturing SMME log size is not normally distributed as required for the Gibrat's Law to be satisfied. Following Bigsten and Gebreyesus (2007: 823) graphical analysis as per Figure 23 below, was used to informally assess the stochastic theory across all four SMME categories. Figure 23 indicates that SMMEs' log size does not follow a (log) normal distribution as suggested by the LPE theory.

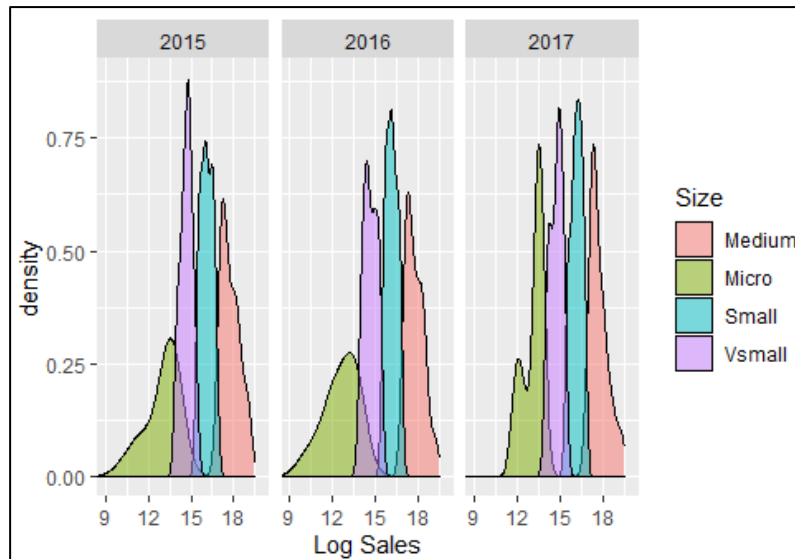


Figure 23: Firm Size Distribution by Category

### 3.3.3 Growth Distribution Normality Tests

Another way to verify Gibrat's Law is to use the approach by Dunne and Hughes (1994: 124) by looking at the mean growth rate distribution over the panel period which should be similar across all four small firm sizes if the law holds (Teruel-Carrizosa 2006: 101). As a rule of thumb, a Bell Curve shows that growth follows normal distribution, implying that any skewed shape would point towards rejection of the stochastic theory. The growth rate over the three-year period as per Figure 24 below, provides evidence against Gibrat's Law as growth rates across all categories over the data panel period are not similar and not bell-curved as the law postulates. These informal tests clearly indicate that SMME growth differs by firm size and is also skewed contrary to LPE.

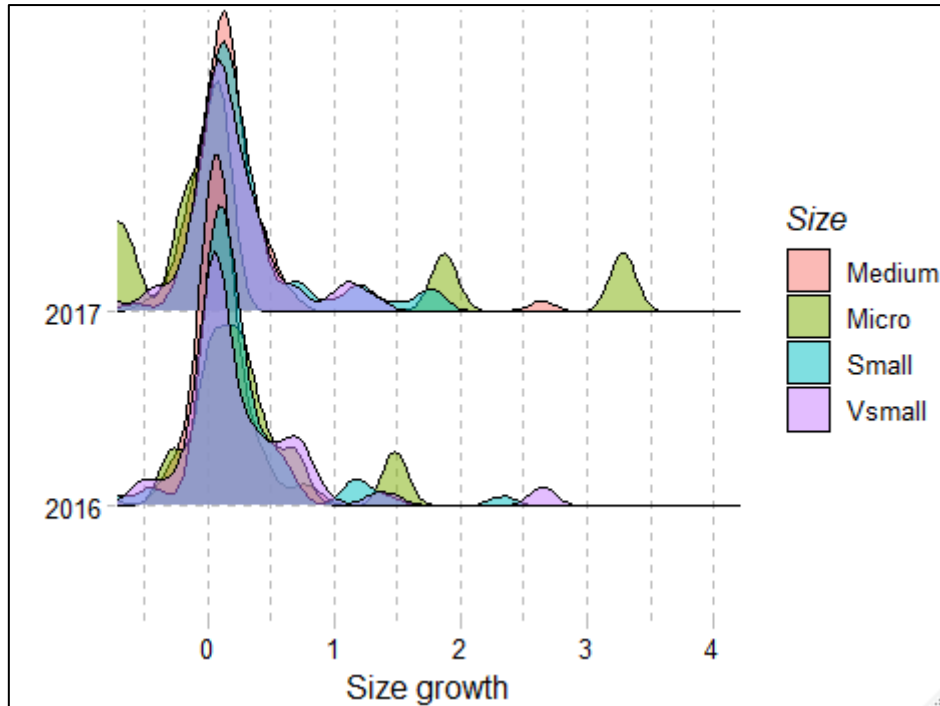


Figure 24: Firm Growth Distribution

The preceding analysis indicates that KZN SMMEs' log size and growth distributions do not follow a normal distribution which is inconsistent with Gibrat's hypothesis. However, as was indicated the above tests are informal and thus provides indirect evidence on the SMMEs size and growth performance. Investigating whether theory holds and, if it does not, ascertaining which firm size grows faster, requires direct tests (Bigsten and Gebreeyesus 2007), which are conducted as per the next section.

### 3.4 Econometric Modelling

Various authors have interpreted the implications of theory in a formal framework (Geroski 2005: 130; Teruel-Carrizosa 2006: 58). (O'Farrell and Hitchens 1988; Le 2009: 4) highlighted that the stochastic growth model assumes that growth rate for all firms is the same, as per (1), where  $S_{it}$  denotes firm size at time t and  $\varepsilon_{it}$  is random error term independently distributed of  $S_{it-1}$ .

$$\frac{S_{it}}{S_{it-1}} = \varepsilon_{it} \quad (1)$$

Building on this, the empirical investigations for Gibrat's Law is as per the following generalised equation in logarithmic specification:

$$\log S_{it} = \alpha_i + \beta \log S_{it-1} + \varepsilon_{it} \quad (2)$$

The influence of initial size on survival and growth is determined by  $\beta$ , and this provides the basis for testing the null hypothesis, that firm growth is a result of normally distributed stochastic shocks. Formally stated,  $\beta = 1$ , Gibrat's Law holds (implying that growth is independent of firm initial size),  $\beta < 1$ , smaller firms grow faster than large ones and the opposite is the case when  $\beta > 1$ .

Alternatively, the model in equation (2) can be reparameterised as a function of the firm's initial size and this is also referred to as the growth rate method (Teruel-Carrizosa 2006: 59; Masenyetse 2017a: 32) which is modelled by obtaining the firm growth rates during the periods " $t - 1$ " and " $t$ ", which is  $(\Delta \log(S_{it}))$ , as per equation (3).

$$\Delta \log S_{it} = \alpha_i + \beta_1 \log S_{it-1} + \varepsilon_{it} \quad \text{where } \beta_1 = \beta - 1 \quad (3)$$

In this case,  $\beta_1$  should be equal to 0 in order for Gibrat's Law to be satisfied. If the coefficient is less than zero, then it means smaller firms have higher growth rate than large ones, implying a convergence in the industry; on the other hand, if  $\beta_1$  is greater than zero then large firms will be growing faster than smaller firms and thus divergence in firm size. While there are various approaches to evaluating Gibrat's LPE, for this study equation (3) is used.

As highlighted in the literature review, various studies have investigated the impact of firm age or experience on growth (Esteve-Pérez and Mañez-Castillejo 2006: 172; Teruel-Carrizosa 2006: 131; Coad *et al.* 2018: 9). These studies are in line with Javnovic's (1982) PLM extended Gibrat's LPE which found that Gibrat's LPE is rejected for young and small-sized firms below the MES. To empirically evaluate PLM, the following model was used as per previous studies (McPherson 1996: 267; Teruel-Carrizosa 2006: 131; Malepe 2014: 15) which incorporates age into equation 3.



$$\Delta \log S_{it} = \alpha_i + \beta_1 \log S_{it-1} + \beta_2 \log A_{it} + \varepsilon_{it} \quad (4)$$

The first part of equation (4) ( $\beta_1 \log S_{it-1}$ ) directly analyses Gibrat's LPE as per equation (3) and the latter part ( $\beta_2 \log A_{it}$ ) analyses the firm's learning process in the market by introducing age into the picture. For the PLM to be satisfied both  $\beta_1$  and  $\beta_2$  should be negative highlighting inverse relationship between firm age and growth rate (Evans 1987: 577; Dunne and Hughes 1994: 137).

### 3.5 Empirical Results

Since we are dealing with panel data, the technique adopted for testing the stochastic theory is by Generalised Least Squares (GLS) regression analysis in line with a previous related study (Teruel-Carrizosa 2006: 133). This modelling technique ensures that the model outputs standard errors are heteroskedasticity consistent (Bigsten and Gebreeyesus 2007: 827; Perugachi-Diaz and Knapik 2017: 10). The GLS modelling approach has been found to be more effective in estimating unknown  $\beta$  coefficients for panel data (Perugachi-Diaz and Knapik 2017: 10). Unlike other models that have been used in previous studies to test both Gibrat's Law and its extended version by Jovanovic like Ordinary Least Squares (OLS) (Malepe 2014: 38; Masenyetse 2017), GLS effectively deals with correlation of errors and produces results from which one can make reliable statistical inferences from (Perugachi-Diaz and Knapik 2017: 23). The next sections present the GLS results for the SMMEs. Firstly, I assessed the narrow version of Gibrat's LPE and then tested the validity of its extended form by Jovanovic as per his PLM hypothesis on KZN manufacturing SMMEs.

#### 3.5.1 Gibrat's Law

The first part of the analysis assessed the validity of the stochastic theory on KZN SMMEs. This theory, as has been discussed, submits that firm growth rate follows a random walk and no systematic factors can be attributed to this process (Aslan 2008: 1; Stam 2010: 131). Geroski (1999: 4) contended that the random walk theory as hypothesised by Gibrat is plausible and can be used in researching growth distributions for firms of different sizes. Geroski further claimed that these stochastic

shocks are not predictable and leave a permanent mark. The theoretical model was tested using equation (3) on KZN manufacturing SMMEs, and the results rejected its validity (Table 6) but in the process provided key implications regarding the growth performance of both small- and large-sized enterprises.

**Table 6: Gibrat's LPE GLS Output**

	All	Medium	Small	Very Small	Micro
$\alpha_i$	-0.001 (0.039)	0.000 (0.099)	-0.012 (0.088)	0.001 (0.104)	0.012 (0.078)
$\beta_1$	-0.492*** (0.042)	-0.172*** (0.099)	-0.185** (0.089)	-0.166* (0.091)	-0.617*** (0.090)
	Obs. = 573 AIC= 985.5	Obs. = 159 AIC= 293.4	Obs. = 191 AIC= 348.3	Obs. = 172 AIC= 348.6	Obs. = 51 AIC= 100.7

The table shows the GLS estimates for testing Gibrat's LPE for the period 2015-2017. Models heteroskedasticity-robust standard errors in parentheses, \*\*\*  $p$ -value<0.01, \*\*  $p$ -value<0.05, \*  $p$ -value<0.1.

For all the categories of KZN manufacturing SMMEs, the beta coefficient is negative, thus indicating that  $\beta_1 \neq 0$  as postulated by Gibrat's Law. Combined analysis of all categories showed that small-sized enterprises grow at a faster rate than their larger counterparts as shown by  $\beta_1 = -0.492$  at 1% significance level. The analysis was further conducted by sub-categories. From Table 6 above, the results showed that smaller-sized enterprises tend to grow faster than large sized firms. For medium-sized enterprises the  $\beta_1 = -0.172$ , at 1% significance level, for small-sized category  $\beta_1 = -0.185$ , at 5% significance level, for very small-sized enterprises  $\beta_1 = -0.166$ , at 10% significance level and the micro-sized  $\beta_1 = -0.617$ , at a 1% level of significance. Compared to other models the micro-sized results had a low test error as reflected by the Akaike Information Criterion (AIC) (Casella, Fienberg and Olkin 2017: 12). Importantly, the implication of these findings is that large-sized firms have a lower growth tendency in the market, and, consequently, less likelihood of monopolistic trends in the manufacturing sector. The fundamental consequence of this trend is the convergence of firm size in the market, meaning that there is some kind of equilibrium where firm growth will converge.

As expected, based on literature review, the results of this study on Gibrat's Law tie up with most findings by previous studies in both developing and developed

economies. For instance, previous studies (Malepe 2014: 18; Masenyetse 2017: 36) show that the random walk theory does not hold in developing economies, particularly in South Africa. A review of empirical literature by Nassar, Almsafir and Al-Mahrouq (2014: 270) aligns with the findings of this study, as Gibrat's Law was rejected even in developed economies like the EU and USA. A study by Hall (1986: 29) on USA manufacturing firms, showed that small-sized firms grew faster than large-sized firms. The findings on Italian firms by Lotti, Santarelli and Vivarelli (2003: 231) also showed that the law seldom holds in spite of some Gibrat-like growth patterns when firms are past a certain stage in their lifecycle. However, this result is contrary to some studies testing the validity of stochastic theory in developing countries. Hermelo and Vassolo (2007: 16) study on Argentinian firms established that Gibrat's Law holds; they concluded that the growth rate measured by sales revenue is independent of the firm's initial size as posited by the stochastic theory. Further to these findings, the extended version of Gibrat by Jovanovic was assessed by including age in the analysis.

### **3.5.2 Jovanovic PLM**

In this section, the effect of age on the growth process of SMMEs in the province is assessed. Jovanovic (1982: 650) model asserts that costs are of a stochastic nature and differ among firms. The model claims that enterprises learn from their previous experiences and that firms cannot actively modify their levels of efficiency (Teruel-Carrizosa 2006: 135). Instead, according to the PLM firms learn about their efficiency over time post entry in the market, with growth being highest during early years of learning (Sutton 1997: 47; Bigsten and Gebreeyesus 2007: 816; Nunes, Viveiros and Serrasqueiro 2012: 445). To assess the presence of passive learning on SMMEs' growth process, age is included as per equation (4). The results in Table 7 below shows that *ceteris paribus*, when age effects are considered, there is no evidence for Jovanovic's passive learning model, as firm age is either positively related or not statistically significant but however, not inversely related with firm growth across all the models.

**Table 7: Jovanovic's PLM GLS Results**

	<b>All</b>	<b>Medium</b>	<b>Small</b>	<b>Very Small</b>	<b>Micro</b>
$\alpha_i$	-0.001 (0.039)	0.000 (0.099)	-0.012 (0.088)	0.001 (0.103)	0.012 (0.080)
$\beta_1$	-0.520*** (0.046)	-0.128* (0.107)	-0.175** (0.091)	-0.160* (0.090)	-0.616*** (0.095)
$\beta_2$	0.701** (0.045)	0.113 (0.107)	0.053** (0.091)	0.124*** (0.095)	0.000 (0.094)
	Obs. = 573 AIC= 989.4	Obs. = 159 AIC= 296.9	Obs. = 191 AIC= 352.9	Obs. = 172 AIC= 351.8	Obs. = 51 AIC= 105.6

The table shows the GLS estimates for testing Jovanovic's PLM for the period 2015-2017. Models heteroskedasticity-robust standard errors in parentheses, \*\*\*  $p$ -value<0.01, \*\*  $p$ -value<0.05, \*  $p$ -value<0.1.

The analysis as per Table 7 above shows that just like the preceding results (Table 6), contrary to Gibrat's LPE, generally small-sized firms in the manufacturing sector tend to grow at a faster rate than larger enterprises. In that light, holding age effects constant the PLM is satisfied. The combined analysis indicates a negative firm size beta coefficient for firm size ( $\beta_1 = -0.520$ ) at 1% significance level and a positive firm age beta coefficient ( $\beta_1 = 0.701$ ) which was significant at 5%. The medium-sized category size had a negative firm size beta coefficient ( $\beta_1 = 0.128$ ) at 10% significance level and the firm age coefficient was also positive ( $\beta_2 = 0.113$ ); however, it was not statistically significant. The small-sized category showed a negative firm size coefficient ( $\beta_1 = -0.175$ ) at the 5% significance level and a positive firm age coefficient ( $\beta_2 = 0.053$ ) at the 5% significance level. The very small-sized category analysis showed a negative firm size beta coefficient ( $\beta_1 = -0.160$ ) at 10% significance level and positive firm age beta coefficient ( $\beta_2 = 0.124$ ) at 1% significance level. For the micro-sized enterprises, which had best performing model as per the AIC, the pattern was similar, with a negative firm size beta coefficient ( $\beta_1 = -0.616$ ), at the 1% significance level. For this category, the age coefficient was not statistically significant.

These findings show that overall, while small-sized enterprises in the manufacturing sector tend to grow faster than larger-sized ones, it is the older firms despite their size that experience higher growth rates. These results are partially contrary to a study by McPherson (1995: 44) on five Southern African countries, which supported Jovanovic's passive learning theory establishing an inverse relationship between firm growth and the combination of size and age. Also, various studies (Evans 1987: 574; Dunne and Hughes 1994: 132; Özar, Oezertan and İrfanoğlu 2008: 349; Navaretti,

Castellani and Pieri 2012: 15) contrary to these findings, established a negative relationship between age and growth. Another study by Masenyetse (2017: 42) on JSE-listed firms in South Africa rejected Gibrat's LPE theory and, holding size constant, also rejected Jovanovic's passive learning theoretical models. The study showed that smaller-sized firms grew faster than larger-sized enterprises (Zhou and Gumbo 2021c: 154).

The possible explanation of these results could be that small firms, especially those in the manufacturing sector, are bound to grow faster to reach MES in order to survive (Lafuente and Rabetino 2008: 4; Kaselimi et al. 2011: 72; Nunes, Viveiros and Serrasqueiro 2012: 447). Some studies have argued that industries with higher MES will inevitably force small enterprises to grow faster in order to avoid failure and exit from the market (Masenyetse 2017a: 40), connoting that Gibrat's Law may well hold for firms above MES. Key to note is that these results align with findings by Malepe (2014: 23) on a study of manufacturing SMMEs in South Africa's Gauteng and Western Cape provinces. The study, using sales as a measure of size, showed that smaller-sized firms experienced faster growth rates compared to their large sized counterparts and age was found to be positively related with growth rate. On their study of Portuguese SMEs, Nunes, Viveiros and Serrasqueiro (2012: 460) could not fully corroborate the PLM arguments as age depicted a concave relationship with firm growth rates. The next step was to conduct some robust tests to check if the measure of size used could significantly change the results.

### **3.5.3 Robustness Tests**

Robust tests are important, especially when studying complex ideas like firm growth (Astley and Van de Ven 1983b: 246; Achtenhagen, Naldi and Melin 2010: 309; Farouk and Saleh 2011: 2). Conducting such tests as argued by Weisberg (2006: 731) plays an important role in ensuring that conclusions based on the specified model are reliable and not spurious. Kuorikoski, Lehtinen and Marchionni (2010: 542) argued that robust tests allow for some sort of model triangulation through independent means of determination. This is achieved through fitting similar models using distinct assumptions of the same phenomenon. Results consistency through robust tests would imply independence of a modelling output, which may carry epistemic weight by showing that the findings are not an invention of some idealising assumptions

(Kuorikoski, Lehtinen and Marchionni 2010: 543). Given the complexity of firm growth especially in a developing country like South Africa, it is important to ensure that findings are consistent and can be embraced with a degree of confidence in policy formulation (Weisberg 2006: 742). Stability of findings under independent and different forms of determination would help in ensuring that key stakeholders in the KZN SMME sector act on reliable results even under varying assumptions (Kuorikoski, Lehtinen and Marchionni 2010).

To assess the robustness of the results, different size measures (employees and total assets) were used. This is important as previous studies used these measures to assess the validity of Gibrat's Law and its extended version by Jovanovic. A study by Nassar, Almsafir and Al-Mahrouq (2014: 271) attested to the diversity of size measures assumed by researchers when testing the validity of Gibrat's Law. In his study on Spanish manufacturing and services sector firms, (Teruel-Carrizosa 2006: 101) used number of workers as measure of size and the LPE was rejected, and Jovanovic's PLM was weakly supported. Following Dunne and Hughes (1994: 124) study on UK firms, in which Gibrat's LPE was rejected, Aslan (2008: 3) used net assets as a measure of a firm's size and established mixed results on the validity of the stochastic theory on Turkish firms.

Masenyetse (2017a: 26) used net sales as a measure of firm size on his study of South African firms and the stochastic theory was rejected in its narrow and extended version. Malepe (2014: 23) used both firm turnover and number of employees as measures of size and Gibrat's Law was rejected in both cases while its extended version was only accepted when sales were used. To assess the robustness of the baseline models using sales as a measure of size, other measures are assessed under similar conditions (Kuorikoski, Lehtinen and Marchionni 2010: 547). The Table 8 below shows that measure of firm size had no material impact on the results as Gibrat's Law was consistently rejected.

**Table 8: Gibrat's Law GLS Results with different size measures**

	<b>Sales</b>	<b>Employees</b>	<b>Total Assets</b>
$\alpha_i$	-0.0010 (0.039)	0.0011 (0.046)	-0.0012 (0.036)
$\beta_1$	-0.492*** (0.042)	-0.314*** (0.047)	-0.629*** (0.037)
	Obs. = 573 AIC= 985.5	Obs. = 573 AIC= 1054.0	Obs. = 573 AIC= 889.4

The table shows the GLS estimates for testing Gibrat's LPE using different measures for the period 2015-2017. Models heteroskedasticity-robust standard errors in parentheses, \*\*\* p-value<0.01, \*\* p-value<0.05, \* p-value<0.1.

The above analysis shows that the type of measure assumed does not have any material effect on the baseline model. The two additional models indicate that both number of employees and total assets are strongly significant at 1% significance levels. The results show an inverse relationship between SMME size and growth, indicating that small-sized firms grow more quickly than large sized enterprises in KZN Province. Similar tests were carried out on the LPE's extended version by Jovanovic, and the results are presented in Table 9 below. The stability of the initial findings is noted, with firm size (regardless of the measure of size adopted) depicting a negative relationship with growth rate. The results do not fully provide evidence for the PLM when firm age is considered as it is positively related with growth and statistically significant when sales and employees proxy performance.

**Table 9: Jovanovic's PLM GLS Output with different size measures**

	<b>Sales</b>	<b>Employees</b>	<b>Total Assets</b>
$\alpha_i$	-0.001 (0.039)	-0.001 (0.045)	-0.012 (0.036)
$\beta_1$	-0.520*** (0.046)	-0.283*** (0.050)	-0.634** (0.040)
$\beta_2$	0.701** (0.045)	0.081*** (0.050)	0.017 (0.040)
	Obs. = 573 AIC= 989.4	Obs. = 573 AIC= 1057.6	Obs. = 573 AIC= 895.9

The table shows the GLS estimates for testing Jovanovic's PLM for the period 2015-2017. Models heteroskedasticity-robust standard errors in parentheses, \*\*\* p-value<0.01, \*\* p-value<0.05, \* p-value<0.1.

The above findings are important, in that as argued by Weisberg (2006: 731), they allow various stakeholders with an interest in KZN SMMEs to make trustworthy predictions and concomitant conclusions through these robust findings. The results conclusively show that older firms in KZN Province despite their size tend to experience higher growth rates than large sized firms (Zhou and Gumbo 2021c: 153). However, when sales and total assets are used as firm size measure, it is the smaller-sized firms despite their age which grow fastest. These results provide hope for the country as these enterprises are tagged as the best avenue to address the challenges of unemployment, inequality and poverty (National Planning Commission 2011: 119). The biggest challenge though, is how this fast growth rate can be sustained and how it can be leveraged to minimise the failure of small firms in the medium to the long term. This is in the back of a common and disturbing trend especially in KZN manufacturing sector, in which SMMEs continue to fail (Bureau for Economic Research 2016: 17; Small Enterprise Development Agency 2018: 15).

### **3.6 Conclusion**

This paper commenced with a focus on the importance of small business survival and growth theories. This allowed me to review the role of theories on the subject as reported in various sources of literature. The major focus was on the deterministic worldview to firm growth as explained by the lifecycle theory and the stochastic approach as explained by Gibrat's Law of Proportionate Effects. The main intention was to analyse the relationship between firm growth rate and the combination of size and age. Previous studies showed that to achieve this, compared to the lifecycle theory, Gibrat's Law, because of its tractability, allowed the examination of this complex phenomenon. As such Gibrat's Law as well as Jovanovic's model centre on evolutionary and learning effects, these were empirically tested on KZN manufacturing SMMEs for the period between 2015 and 2017. Following previous studies, sales turnover was used as a measure of firm size. The results found that SMMEs in the province do not follow a random walk as suggested by theoretical model (Geroski 1999: 4) and *ceteris paribus*, age had a significant positive impact on firm growth contrary to the stylised fact that both size and age are inversely related to firm growth rate (Jovanovic 1982: 650; Dunne and Hughes 1994: 137).



These results have important implications, as Gibrat's Law claims that firm growth process is random (Stam 2010: 131) and not a function of internal and external drivers. The claim that there is no dominant theory to explain firm growth is thus rejected (O'Farrell and Hitchens 1988: 1370). These findings provide a strong basis for the claims that firm growth performance is a function of different factors that may emanate from internal and external environments (O'Farrell and Hitchens 1988: 1366; Penrose 2009; Stam 2010: 131; Gupta, Guha and Krishnaswami 2013: 3; Miller 2015: 5; Calá, Manjón-Antolín and Arauzo-Carod 2017: 769). It would therefore be important to investigate various drivers that impact the growth performance of SMMEs in the manufacturing sector in KZN. This, as argued by He and Yang (2016: 72), would allow small enterprises in the province to identify various performance drivers presenting latent opportunities or posing varying degrees of danger to their operations and thus effectively drive sustainable growth. The next chapter, incentivised by the rejection of Gibrat's LPE, aims to identify key performance drivers which SMME owners should pay attention to in order to achieve sustainable growth.

## **CHAPTER FOUR: KEY PERFORMANCE DRIVERS OF MANUFACTURING SMMEs IN KZN PROVINCE<sup>4</sup>**

### **4.1 Introduction**

Over the years there has been growing interest on the performance drivers of small enterprises (Panda 2015; Lekhanya 2016b; Machado 2016; Essel, Adams and Amankwah 2019: 16; Zhou and Gumbo 2021b: 4). Various stakeholders are interested in key drivers of performance, owing to the role played by SMMEs in driving economic development (Mascarenhas *et al.* 2002: 317; Masenyetse 2017a: 53). Internal stakeholders strive for the survival of their firms, often with limited success due to limited understanding of factors impacting performance (Mascarenhas *et al.* 2002: 317). Establishing key drivers is more critical for manufacturing SMMEs because, despite their important role (Herman 2016: 976; Ngibe and Lekhanya 2019: 2), they continue to be faced with uncertain operational conditions that have resulted in increased failure rates (Vadakkepatt 2010: 7; Umjwali 2012: 19; Zhou, Dash and Kajiji 2021: 1). Evidence from Chapters 2 and 3 showed that SMMEs in KZN Province are impacted by various underlying factors, which are thus worth investigating. Inevitably, this chapter investigated key performance drivers of manufacturing SMMEs in KZN Province.

### **4.2 Theoretical and Empirical Literature Review**

Theories on firm performance abound and have been widely discussed in literature over the years (O'Farrell and Hitchens 1988: 1366; Geroski 1995: 129; Sutton 1997: 43; Le 2009: 3; Gupta, Guha and Krishnaswami 2013: 1; Coad *et al.* 2016: 218; Machado 2016). This is because researchers continue to explore models that best explain this complex phenomenon, something that is of interest to various stakeholders like governments, academics and practitioners themselves (Nemaenzhe 2010: 35). Firm performance theories are important in informing policy design to strategically address pertinent industrial issues like firm entry, survival and failure (Geroski 1999). They also provide an enhanced understanding of the various groups

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<sup>4</sup>A paper based on this chapter was published as a journal article (Special Issue): Zhou, H. and Gumbo, V. 2021. Key performance drivers of SMMEs in KwaZulu Natal, South Africa. *International Journal of Entrepreneurship*. 25 (3): 1-12

of firms like SMEs, which are of great interest to many governments because of their employment creation propensity (O'Farrell and Hitchens 1988: 1365; Ayandibu and Houghton 2017: 52). O'Farrell and Hitchens (1988: 1365), in their review of various sets of theories, argued that the majority of theoretical submissions failed to elaborate small enterprises' key performance drivers fully and clearly.

As various stakeholders have recognised the strategic role played by SMMEs in developing countries like South Africa, the paucity of studies regarding performance and evolution of these enterprises over time has become unarguably glaring (McPherson 1996: 224). Wiklund, Patzelt and Shepherd (2009: 351) noted that despite the increase in studies on small firm performance, there is limited reconciliation between highly fragmented theoretical paradigms. The study noted that there is limited correlation between varying theoretical perspectives, with some theories covering certain elements of business growth while others concentrate on other portions of variables that they deem important. This implies the need to reconcile some of the seemingly competing theoretical paradigms in assessing and ascertaining various factors influencing the performance of small firms (Astley and Van de Ven 1983b: 246; Madara and Katana 2016: 109).

This motivated me to embrace two broad theoretical perspectives focusing on various elements of the organisational aspects to provide a robust explanation on firm performance. Through this approach, this study attempts to link various pieces of firm performance together, thereby developing a comprehensive model that gives an enhanced understanding of manufacturing SMME performance in KZN Province (Wiklund, Patzelt and Shepherd 2009: 352).

### **4.3 Theory of the Growth of the Firm**

About six decades ago, Penrose (1959) coined the growth of the firm theory, stating that there is no cap to firm size and its growth rate, though the latter might experience transient limits or decrease (Panda 2015: 54). In her seminal work, Penrose argued that a firm is essentially a bundle of resources through which opportunities are effectively exploited in order to drive growth (Buckley and Casson 2007: 153; Hermelo and Vassolo 2007: 5). She pointed out the important role played by a firm, owing to its complexity traversing on both social and economic aspects in many directions. The

firm growth theory further draws attention to the vicissitudes a typical firm confronts which in turn impact its performance (Penrose 2009: 8). She argued that 'theory of the firm' was unsuitable, as its theoretical framework mainly considered price and production output forces. She bemoaned the rigidity of the theory's inability to vary types of products a firm can produce as it grows. Penrose reformulated the theoretical perspective's cost function in which she placed growth rate at centre stage and not scale of production as was commonly assumed (Buckley and Casson 2007: 152; Penrose 2009: 9-10).

Another central assumption of Penrose's theory is that firms are made up of an idiosyncratic configuration of resources, through which the company's performance is enhanced. These resources include skilled personnel, brand name, assets like machinery and efficient procedures (Coad 2007: 47). The Penrosian view further claims that besides being a collection of productive resources, a firm is also an administrative unit and, for it to grow, enterprising management is one of the fundamental requirements without which growth is impossible. She placed attention on both skilled and unskilled human resources which are different from durable resources and the firm is at risk of losing them compared to the latter. These internal resources are important in driving firm performance and the firm suffers loss if they leave at the peak of their performance, as among other things this will result in reduced productivity (Penrose 2009: 21). Penrose further argued that older and large-sized firms tend to have an extra competitive edge compared to small-sized and younger firms because of the formers' monopolistic power.

However, notwithstanding this, small-sized firms can still identify and seize profitable opportunities as large-sized and older firms cannot exhaust all opportunities in the market (Penrose 2009: 16). In their review of Penrose's theory, Buckley and Casson (2007: 153) articulated that 'costs of growth' is the critical point of the model, as these costs increase growth rate of the firm and not its size. This is because theory of the growth of the firm claims that investment decisions by firms are primarily guided by money-making opportunities, since firms generally pursue profits (Penrose 2009: 24). This submission is reducible into a basic formula for a growing firm's value, which is determined by the present value of the stream of its future profits. This is because managers serving the shareholders' interests will maximise profits while those serving

their own will maximise growth. These objectives are largely similar, because profit maximisation does not only lead in shareholder value being enhanced but also provides funding for firm growth (Buckley and Casson 2007: 154).

Theoretical model emphasises the importance of the entrepreneur's or top management's capability to drive firm growth (Coad 2007: 47; Penrose 2009: 14). Essentially theoretical perspective claims that internal resources which are unique to each business are key drivers of performance. In fact, Penrose argued that theory of growth is primarily theory of 'internal growth' without any outside factors like mergers and acquisition (Penrose 2009: 5). Theoretical perspectives have attracted attention from various researchers, testing the validity of unlimited firm size and growth assertion (Hermelo and Vassolo 2007: 5; Panda 2015: 54). Contrary to theory, consequent studies established the role of other factors besides entrepreneur and firm-specific factors on organisational performance. These are mainly geographical location and macroeconomic factors (Panda 2015: 55). While the Penrosian view somewhat recognised the role of external environmental factors on firm performance, theory hardly placed importance on these variables (Penrose 2009: 4; Ayandibu and Houghton 2017: 58).

The other key shortcoming of theory is its lack of attention to small enterprises, in which the owner is both a shareholder and manager. This strongly discounts theory's ability to comprehensively explain smaller firms whose structure and challenges are fundamentally different from those of large organisations (O'Farrell and Hitchens 1988: 1369). As shown in the previous chapter and in line with various studies, it was established that there is a negative relationship between firm growth and size. These findings indicate that larger firms grow at a slower rate than small firms, thus putting in doubt Penrosian's claim of unlimited growth as well (Van Biesebroeck 2005: 551; Hermelo and Vassolo 2007: 5; Masenyetse 2017a: 36). This requires harnessing of other theoretical perspectives to enhance the enquiry on small firm performance.

#### **4.4 Strategic Management Perspective**

The field of strategic management has evolved over the years, transitioning from a reductionist financial budgeting view to that of globalisation and continuous learning. The model's focus is now more on the acquisition and analysis of the resources to

exploit opportunities and parry potential threats to the organisation (Jofre 2011: 49). Strategic management is centred on the view that an organisation needs to develop a plan or strategy to drive performance amidst opposing pressures imposed by limited resources, competition and the ever-changing external environment (Omalaja and Eruola 2011: 60). The strategic management perspective appreciates the intersection of the owner specific attributes, internal and external environments on firm performance (Rhyne 1986: 423; Omalaja and Eruola 2011: 64). The theoretical model places emphasis on the role of the strategic dimension in driving performance and achieving sustainable growth (O'Farrell and Hitchens 1988: 1373). According to Rhyne (1986: 423), this theoretical perspective claims that the primary objective of the organisation is to develop an enterprise-wide plan in order to have some alignment between the firm's capabilities and the demands from the external environment. This was corroborated by other studies, asserting that every entity is affected by a set of complex internal and external variables and requires a strategic plan by which an organisation drives performance in order to survive and grow (Løwendahl and Revang 1998: 758; Jofre 2011: 26).

Through this theoretical framework, strategic thinking is promoted for both SMEs and large organisations to create a competitive edge through a culture of change and adaptability, connoting that through a strategy, an organisation develops objectives that can be adjusted in line with internal and external environment changes (Jofre 2011: 52; Pricop 2012: 106). Appreciation of a mixture of various drivers is important, because in the process, the influence of key economic factors on firms' performance are ascertained. The perspective aligns with findings by Hansen and Wernerfelt (1989: 406) that both internal and external environmental factors impact the performance of the organisation. Their study highlighted that internal and external factors produce approximately orthogonal models, showing that both factors have significant effect on the company's performance. This is corroborated by Gupta, Guha and Krishnaswami (2013: 11) submission that, while managers should pay attention to the internal environment, failure to constantly monitor and properly respond to the external environment can prove disastrous as external drivers have a huge impact on the direction of the organisation (Pricop 2012: 100).

These assertions align with previous studies, establishing that companies with strategic tools to optimise use of internal resources and keep track of external events in line with the strategic management theory, exhibited superior financial performance compared to those without (Rhyne 1986: 432; Pricop 2012: 104). This shows that it is fundamental for companies to identify various drivers of performance from the external and internal environments in order to systematically create competitive advantage (Jofre 2011: 39). This will be achieved through formulation of hypotheses based on previous findings and using empirical data to test them (Jofre 2011: 51). Based on previous studies, Table 10 shows various internal and external factors studies with impact on firm performance. However, the theory has its own critics, with Hiatt and Sine (2014: 3) charging that the model lacks a predictive element to help business owners conduct scenario analyses especially in areas marred by high levels of uncertainty. Pricop (2012: 102) criticised the strategic management model of for being too rigid and mechanistic owing to its overly formalised top-down design, with extended emphasis on the financial component over other key elements like innovation.

This structured planning system based on some pre-set template for managers to follow has been under scrutiny for quite some time now (Rhyne 1986: 423). The turbulences triggered by movements in both external and internal environments short-circuit the space horizon and time periods assumed in strategic planning, thus discounting the efficacy of the model in driving firm performance (Pricop 2012: 102). Despite some of these criticisms, some scholars are convinced that the strategic management model can simply improve its adaptability to both external shocks through dedicated environmental scanning. This means the organisation will not be caught off guard but can easily anticipate changes through acquisition, use and analysis of information from various sources (Jofre 2011: 37). To avoid some shortcomings in the traditional strategic management model, Hiatt and Sine (2014: 13) established that incremental planning which allows for continuous adaptation of the baseline strategy mitigates against the external environment.

Notwithstanding its theoretical and practical implications, concerningly, the strategic management theory applicability remains limited in the SMME sector, with Pricop (2012: 107) arguing that theory should be extended to SMMEs given their ubiquity

across various economies in both developed and developing countries (OECD 2009: 6; D'imperio 2015: 8). As such, it is necessary to embrace this theoretical model to identify various internal and external variables on SMMEs in KZN Province.

**Table 10: Summary of Previous Studies on Firm Performance**

Study	Country	Period	Sector	Explanatory Variables
<b>African Region</b>				
McPherson (1995)	Botswana, Swaziland, Zimbabwe and Malawi	Surveys(1996)	All Industries	Annual growth rate, size, age, location, gender, credit, industry
Söderbom, Teal and Harding (2006)	Ghana and Tanzania	1993-94/1998-99	Manufacturing	Productivity, firm size, age, factor intensity, ownership
Shiferaw (2009)	Ethiopia	1996-2002	All Industries	Productivity, firm size, age, factor intensity, ownership, location, Herfindahl index
Buyinza (2011)	Uganda, Kenya, Burundi, Rwanda and Tanzania	Survey (2006)	Manufacturing	Age, size, ownership, export status, value added per worker
Klapper and Richmond (2011)	Cote d'Ivoire	1976-1997	All Industries	GDP growth, location, sector, ownership, firm size, reforms
Okpara (2011)	Nigeria	Survey (2011)	All Industries	Financial support, poor management, corruption, training and experience, infrastructure, profit, and demand
Masenyetse (2017a)	South Africa	2000-2010	All industries	Size, age, leverage, profitability, origin, sector
(Lekhanya 2016b)	South Africa	Survey (2017)	Rural Enterprises	Market size, poor infrastructure, access to



				finance, government regulations
(Mahohoma 2018)	South Africa	Survey (2018)	All industries	Personality traits, leadership style,
<b>Other Regions</b>				
Hermelo and Vassolo (2007)	Argentina	1994-1996	All industries	Technology, diversification, adequate returns
Klos (2008)	Ukraine	1999-2006	All industries	liquidity, leverage, size, age and ownership, industry
Hiatt and Sine (2014)	Colombia	1997-2001	All industries	Political and civil violence, incremental (operational) planning, comprehensive(strategic) planning
Filho et al. (2017)	Brazil	Case study 2016	Retail	individual characteristics, sector, experience, abilities and social ties

**Source: Own compilation from literature review**

The above review shows that various studies have explored drivers behind firm performance in the African region and other regions as well. The findings attest to the growing interest in understanding key drivers influencing the performance not only of large corporates but SMEs as well. Embracing both the growth of the firm and strategic management theories, various internal and external factors impacting firm performance were explored. The internal variables were further separated into entrepreneur and firm-specific variables. The assessment of each variable necessitated development of hypotheses that were tested using the REWB modelling approach (Perugachi-Diaz and Knapik 2017: 14).

#### **4.4.1 Entrepreneur-Specific Attributes**

Various researchers have emphasised the role of entrepreneur-specific variables (McPherson 1995: 34; Shiferaw 2009: 579) in sustaining performance and growth of a business (O'Farrell and Hitchens 1988: 1373). This is because, owing to their size, an SMME's culture is largely connected with its owner's personality, such that the general operational model which, in turn, determines the survival and growth trajectory of the entity, is a manifestation of the entrepreneur's personal attributes, experiences,

skills and abilities (Kelliher and Reinl 2009: 523; Lucky 2011: 110). A study by Arasti (2011: 7491) shows that around 25% of SMEs in factor and efficiency-driven economies discontinued operations due to a litany of factors which include owner-specific drivers. It has been argued that for small enterprises to grow sustainably, owners/managers' actions should not only be positive (Lekhanya 2015: 43) but strategic enough to ensure that the firm's products or services match dynamic demands from the external environment (Nemaenzhe 2010: 122).

The submission reconciles well with the view that besides external and firm-specific factors, owner characteristics strongly correlates with firm performance (Rijkers, Söderbom and Loening 2010: 1280). It is also argued that entrepreneur-specific attributes can drive staff productivity, enhance internal communication and foster organisational agility. This means that if small business owners lack certain traits, then their enterprises are likely to fail (Kelliher and Reinl 2009: 526; Lekhanya 2016b: 50). This shows that individual entrepreneurial attributes have a significant effect on firm strategy and can either enhance the firm's survival chances or exacerbate the likelihood of its failure (McPherson 1995: 270; Lucky 2011: 111; Lekhanya 2016b: 43-44).

While various entrepreneur-specific characteristics have been enumerated, the role of gender and age on firm performance have attracted attention of many researchers in recent times (Chen, Cao and Wang 2010: 471; Essel, Adams and Amankwah 2019: 5; Zhou and Gumbo 2021d: 21). In fact, Tanveer et al. (2013: 449) argued that personal traits like age and gender remain key traits behind one's entrepreneurial behaviour and play a critical role compared to other variables in firms' success. The implication is that the performance of small and medium firms largely depends on the intrinsic attributes of the business owner (Levesque and Minniti 2006: 179; Gupta, Guha and Krishnaswami 2013: 9; Essel, Adams and Amankwah 2019: 6).

#### *4.4.1.1 Gender*

Some studies claim ambiguity when it comes to the role of gender on firm performance, indicating that the findings on this area remain inconclusive (Zhou and de Wit 2009: 7; Tanveer et al. 2013: 451). Some studies have indicated that gender influences business owners' behaviours in different ways hence different approaches

to decision making. A study by Arasti (2011: 7495) on Iranian SMEs indicated that female-owned enterprises' failure was mainly driven by lack of access to finance, something that was not a problem for men. On the other hand, male-owned enterprises grappled with partnerships issues more than female-owned enterprises. Contrary to this, a study by Shiferaw (2009: 581) on Ethiopian manufacturing SMEs, showed that female entrepreneurs are good at enhancing their firm's survival chances compared to male business owners. This shows that female-owned enterprises rarely take many risks in order to drive sales, unlike men who can easily do that, at times to the peril of their business operations. This aligns with Zhou and de Wit (2009: 7) assertions based on their findings in which they found a significant difference between male and female entrepreneurs.

It was noted that male entrepreneurs had higher growth ambitions than their female counterparts. In their research on the small-scale farmers in Ghana, Essel, Adams and Amankwah (2019: 16) found that male-owned enterprises performed better in separate cases when employment and sales were used as response variables. Such findings require female entrepreneurs to explore means to neutralise the adverse impact of their gender on the operations of their entities. It has also been established that female-owned enterprises' size proxied by sales revenue tend to be significantly smaller compared to those owned by men (Bardasi, Sabarwal and Terrell 2011: 24). The study also noted a trend of inefficiency among female-owned enterprises in Eastern Europe and Central, Latin America and sub-Saharan Africa. Another study by Amran (2011: 113) on 182 Malaysian family-owned businesses, found that male-owned enterprises performed better than female-run family enterprises. Therefore, based on the above evidence, the following hypothesis is stated:

- *Hypothesis 1: It is expected that male-owned firms perform better than female-owned SMMEs in KZN Province.*

#### *4.4.1.2 Entrepreneur age*

The role of the entrepreneur's age has for a long time attracted the interest of various researchers (Zhou and de Wit 2009: 7; Tanveer *et al.* 2013: 451; Filho *et al.* 2017: 12; Essel, Adams and Amankwah 2019: 16; Zhou and Gumbo 2021d: 21). It is unequivocally crucial that firm owners appreciate how their age impacts performance,

as this will be crucial for policy makers to prioritise certain age groups that may be more vulnerable. Previous research has shown that certain age groups are positively related with firm performance (Kaunda 2013: 40; Zhou and Gumbo 2021d: 21). The results are fairly mixed, with some noting positive, others negative and others no relationship between age and firm performance (Zhou and de Wit 2009: 7; Tanveer et al. 2013: 451; Hiatt and Sine 2014: 11). Levesque and Minniti (2006: 471) noted the growing entrepreneurial activity among the youth, attested by the median age of the Chief Executive Officers of the fastest growing firms in America averaging 31 years in 2000. A study on Ghanaian firms by Essel, Adams and Amankwah (2019: 12) echoed the same findings with around 35 years being the mean age of firm owners. These findings show the youths' growing interest in entrepreneurial activity and this trend would be expected in South Africa which is faced with a high unemployment rate especially among the youth (Herrington and Kew 2016: 5).

Using a study sample of 182 family-owned enterprises, (Amran 2011: 114) found that old entrepreneurs had an adverse effect on business performance. These findings explain that as entrepreneur's age increases the company's performance decreases, implying that younger entrepreneurs drive firm performance positively. Levesque and Minniti (2006: 181) argued that as individuals grow older, their risk appetite diminishes, and they would thus be less interested in engaging in risky and time-consuming activities than the younger age group. Using a sample of 103 small firms in Johannesburg, Kaunda (2013: 77) established that the youngest age group of entrepreneurs contributed the most to firm performance compared to the older age groups. De Kok, Ichou and Verheul (2010: 25) observed a significant non-linear inverted U-shaped relationship between the entrepreneur's age and performance. Their results indicated that younger entrepreneurs employed a higher number of workers than their older counterparts. The findings showed that, during the early years, entrepreneurs positively contribute to firm growth which then plateaus before diminishing with old age. In this light, the following hypothesis is stated:

- *Hypothesis 2: SMMEs owned by young entrepreneurs perform better than those owned by old entrepreneurs. An inverted U-shaped relationship is thus expected between entrepreneur age and firm performance.*

#### 4.4.2 Firm-Specific Variables

Both the strategic management perspective and Penrosian worldview appreciate the fundamental role of internal factors like firm size, age and productivity (Lucky 2011: 110; Yoshino 2011: 19; Panda 2015: 55) on firm growth and survival (Penrose 2009; Jofre 2011: 39; Gupta, Guha and Krishnaswami 2013: 6). Hermelo and Vassolo (2007: 4) noted that previous studies on firm growth concentrated mainly on external factors with less focus on organisational specific variables. Such an approach has been criticised for providing a truncated picture of what really drives firm performance. The resource-based view which also subscribes to the strategic management perspective (Jofre 2011: 31; Omalaja and Eruola 2011: 64) charges that the competitive advantage of a firm is a function of its internal attributes. By properly managing physical, financial and human resources, firms are able to enhance their performance in the market (Egbunike and Okerekeoti 2018: 143; Essel, Adams and Amankwah 2019: 8). A study by Hansen and Wernerfelt (1989: 406) concluded that organisational factors explain twice the firm's bottom-line than external drivers do. This means that small firms should consider internal attributes, which are also aligned with related studies. Adetunji and Owolabi (2016: 74) study on Nigerian firms found that firm-level factors accounted for higher variation in performance than external drivers.

In their study of Dutch SMEs, (Zhou and de Wit 2009: 16) established that compared to entrepreneurs' attributes and macroeconomic factors, firm-specific drivers had the greatest influence on performance. Unlike other drivers, organisational variables can be anticipated and to a greater extent are easily malleable to achieve an intended goal (Issah and Antwi 2017: 2), implying that, with a proper system augmented by astute leadership, the movement and potential impact of internal drivers can be easily monitored and aligned with organisational objectives (Egbunike and Okerekeoti 2018: 142). However, while indicating the pertinence of internal variables, Coad et al. (2016: 2018) charged that these factors' explanatory power on firm performance tends to decrease over time. Previous studies in the South African context also investigated and established a mixture of idiosyncratic factors which influence small firm performance (Olawale and Garwe 2010: 732; Dunne and Masenyetse 2015: 3). The results indicate the potency of these factors on firm performance compared to other

drivers. It is necessary to assess various internal variables and ascertain their impact on the performance of SMMEs in KZN Province.

#### *4.4.2.1 Labour productivity*

Labour productivity, which is normally measured as sales per employee (Roca-Puig, Beltrán-Martín and Cipres 2012: 11; Zhou and Gumbo 2021d: 16) has not received as much attention as other internal drivers in the recent past (Van Biesebroeck 2005: 553). Various studies have shown that labour productivity has a positive influence on firm performance (Beheshti and Beheshti 2010: 445). This is consistent with the PLM, which asserts that efficient firms experience sustainable growth, while less efficient ones perform poorly before contracting and exiting the market (Bigsten and Gebreeyesus 2007: 825). These findings align with Van Biesebroeck (2005: 554) claim, that productivity tends to drive performance and thus long-term survival. The importance of labour productivity cannot be overemphasised, with Shiferaw (2009: 581) asserting that productivity significantly mitigates the risk of firm closure, in the process confirming that there is a market selection process that eventually eliminates inefficient firms (Esteve-Pérez, Pieri and Rodriguez 2017: 173).

Improving productivity remains such an important goal for organisations, especially in this era where competition is cut-throat. To achieve this Gupta, Guha and Krishnaswami (2013: 12) highlighted the importance of ongoing improvement by firms, especially in their process flows, procedures and adopted technologies. Beheshti and Beheshti (2010: 447) argued that use of proper technological tools can further boost productivity by improving employee's ability to discharge their roles. Bellone et al. (2008: 767) underscored the crucial role productivity has on performance and thus ultimate firm survival charging that productivity negatively relates with the hazard rate of exit, clearly showing that firms that are not productive face a huge risk of failure compared to those whose use of labour is optimal (Esteve-Pérez, Pieri and Rodriguez 2017: 173). Against this backdrop, it is expected that labour productivity positively impacts performance and thus long-term survival of SMMEs in KZN Province and thus the following hypothesis is stated:

- *Hypothesis 3: Labour productivity has positive impact on the performance of SMMEs in KZN.*

#### *4.4.2.2 Permanent workers*

Employment security has been associated with a committed and motivated workforce which in turn positively drives organisational performance and thus long-term survival (Roca-Puig, Beltrán-Martín and Cipres 2012: 7; Zhou and Gumbo 2021d: 21). Human resources, especially a permanent or full-time workforce, is a critical driver for both small and big firms' performance (Zhou and de Wit 2009: 10; Roca-Puig, Beltrán-Martín and Cipres 2012: 7). Studies have shown that the lack of skilled staff is one of the fundamental obstacles for firms, thus having a negative bearing on performance (Buyinza 2011: 13; Coad et al. 2018: 10). The skills, knowledge and experience of staff are regarded as central in building SMEs (Zhou and de Wit 2009: 10). Firms that promote their human capital through effective selection and ongoing training of staff significantly improve their performance. There are various reasons for this: one of them is that firms that recruit and train their staff enhance their skills and employees are thus equipped to respond to competition and adjust to new and complex technologies (Roca-Puig, Beltrán-Martín and Cipres 2012: 6). This makes human resources, especially full-time workers, an important component of the organisation and provides a unique inimitable advantage owing to its social complexity as argued by both the Penrosian and strategic management perspectives worldviews (Knott 2009: 164; Penrose 2009: 21; Jofre 2011: 34; Omalaja and Eruola 2011: 64).

Thorsteinson (2003: 169), harnessing a meta-analysis approach, confirmed that permanent employees are more involved with work than part-time employees. The study aligns with Clinebell and Clinebell (2007: 164) study on 282 employees in the banking sector in USA, in which it was established that full-time workers are more involved in organisational activities, something which enhances their performance. These results are related to findings on German firms (Pauka 2015: 17) which indicated that due to their extensive involvement with their jobs, permanent workers have more experience and accumulate more human capital than other employment types. Inevitably, permanent workers positively drive the performance of firms more than other types of employment models (Pauka 2015: 17). Concerningly Roca-Puig, Beltrán-Martín and Cipres (2012: 5) noted the limited research on the impact of human capital on firm performance in other countries besides the United States. This then demands that attention be turned to other countries especially developing ones like

South Africa which aims to promote the growth of SMMEs in order to grow the economy (National Planning Commission 2011). Based on reviewed literature, one would expect that permanent employees have a positive impact in the performance of SMMEs in KZN Province, and the hypothesis is stated formally below:

- *Hypothesis 4: Use of permanent workers has a positive impact on the performance of SMMEs in KZN.*

#### *4.4.2.3 Temporary workers*

Temporary work also known as part-time work of various types has become a widespread practice over the years. For instance, Pauka (2015: 1) noted that about 25% of the workforce in the UK, Sweden and German are temporary workers. The trend is more pronounced in the Netherlands where close to 50% of the workers have a part-time job. Thorsteinson (2003: 151) highlighted the same trend in the USA where the number of temporary workers is increasing and now constitutes about one fifth of the total workforce in the country. Notwithstanding their widespread increase, temporary workers have been tagged as the “missing persons” of organisational research because of fragmented research focusing on them (Rotchford and Roberts 1982: 233; Clinebell and Clinebell 2007: 158). Economic and extant literature concedes that temporary employees are treated differently than full-time workers. While the debate goes on, as to how far this differential treatment goes, the consensus is that the differences indeed exist (Rotchford and Roberts 1982: 229; Thorsteinson 2003: 164; Clinebell and Clinebell 2007: 164; Pauka 2015: 3; Zhou and Gumbo 2021d: 21). Owing to different treatment, like limited involvement (Thorsteinson 2003: 170) and fewer fringe benefits (Rotchford and Roberts 1982: 229), research has shown that temporary workers relate negatively with organisational performance (Pauka 2015: 16)

Various empirical studies have shown that part-time employment has a negative impact on firm performance. A study of 5513 German firms by Pauka (2015: 15) found that temporary employees are negatively associated with firm’s financial performance. Another study on a sample of 1 403 small and large firms shows that human capital had a negative impact on performance for firms with higher levels of temporary employment (Roca-Puig, Beltrán-Martín and Cipres 2012: 15). A study on 1 468



private sector establishments in the USA, showed that there is an inverted U-shaped relationship between establishment performance and the ratios of part-time employees to full-time employees. These results suggested that low numbers of temporary workers may enhance financial performance, but higher proportions of temporary employment decrease firm performance (Chadwick and Flinchbaugh 2016: 1652). Chadwick and Flinchbaugh (2016: 1636) argued that there is limited research on the impact of temporary employment arrangements on establishment level performance. Clearly, a review of the literature shows that the majority of studies have so far been conducted in the developed countries and in order to contribute to literature in this area in South Africa, the following hypothesis will be tested:

- *Hypothesis 5: There is a concave relationship between part-time workers and SMME performance in KZN Province. Implying that use of low proportions of part-time employees has positive impact on the SMMEs' performance, but high levels of part-time employees negatively impact performance.*

#### 4.4.2.4 Total assets

Manufacturing companies largely depend on their asset structures to run their operations, with the main two sets of assets being non-current and current. Non-current assets which mainly includes plant, property and equipment are used to transform raw materials into finished items (Maggina and Tsaklanganos 2012: 113; Al-Ani 2013: 170) clearly showing that the sales performance of a typical manufacturing company hinges more on its asset base than other organisational level attributes (Gupta, Guha and Krishnaswami 2013: 3). Investment in assets, especially production equipment is not only crucial in driving sales performance but has a significant impact on employment growth as well (Voulgaris, Agiomirgianakis and Papadogonas 2015: 27). It is argued that the asset base determines performance and thus long-term survival of the firm either big or small (Maggina and Tsaklanganos 2012: 113; Zhou and Gumbo 2021d: 21). This is not only because firms use assets in the manufacturing process but can use the same, including current assets to access financial support from various institutions (Al-Ani 2013: 171).

To achieve efficient minimum scale (MES), small firms require adequate assets to drive operations and growth, or they might end up exiting the market (Persson 2004:

425; Zhou and de Wit 2009: 8; Maggina and Tsaklanganos 2012: 113). Using panel data of 28 Oman manufacturing firms in the Petro-chemical sector, Al-Ani (2013: 177) found that total assets had a positive impact on company performance. The results implied that additional investment in fixed assets would lead to an increase in shareholder value. The findings point out the fundamental role that total assets play, for firms in the manufacturing sector and thus their positive effect on sales performance. However, while older firms have been associated with high levels of total assets which they would have accumulated over time (Buyinza 2011: 13), some studies found that as firms age, their production equipment depreciates which in turn impacts performance negatively due to inefficiency. Using panel data on a sample of 10 930 firms, Loderer and Waelchli (2010: 21) established that older firms tend to have antiquated machinery which results in overheads increasing and thus deleteriously impacting performance. To determine this in terms KZN SMMEs, the following hypotheses were tested:

- *Hypothesis 6(a): Total assets have a positive effect on the performance of SMMEs in KZN Province.*
- *Hypothesis 6(b): As firms age total assets tend to have a deleterious effect on the performance of SMMEs in KZN Province.*

#### 4.4.2.5 Company age

Firm age seems to be a dominant area of research in recent times, with increased visibility in various academic journals across the globe (Persson 2004: 425; Shiferaw 2009: 573; Chen, Cao and Wang 2010: 471; Hiatt and Sine 2014: 11; Zhou and Gumbo 2021c: 148). Coad et al. (2018: 2) highlighted that the journal platform JSTOR identified more than 3 000 scholastic contributions containing the phrase 'firm age' for the period between 1980 and 2017. This shows the growing interest among researchers on the role of age on firm performance (Bellone et al. 2008: 754; Shiferaw 2009: 581; Radipere and Dhliwayo 2014: 10; Adetunji and Owolabi 2016: 70). The age of the firm has generally been regarded as an indicator of the learning process that takes place within the company as time passes (Jovanovic 1982: 652). Research has shown that older firms have an edge ahead of their younger counterparts owing to the former's affluent experience (Esteve-Pérez, Pieri and Rodriguez 2017: 172). Inexorably age plays a critical role in driving firm performance and their sustainable

growth, as firms would require time to learn their core competencies and be competitive in the market. In his review of literature Coad et al. (2018: 9) found that with age, firms are able to build up resources that in turn can drive performance.

The study further indicated that young firms are more susceptible to internal and external financial resources shortage. Consequently, younger firms register volatile sales revenue and thus are more prone to failure than older firms (Bellone et al. 2008: 754). Various studies have indicated a positive relationship between performance and firm age (Klos 2008: 20; Shiferaw 2009: 581; Buyinza 2011: 24; Hiatt and Sine 2014: 11). These findings align with the 'liability of adolescence' and 'liability of obsolescence' hypotheses, implying that firm performance improves with age (Strotmann 2007: 100; Buyinza 2011: 2). Tanveer et al. (2013: 451) noted that firm age has a positive relationship with success. These results demonstrate that old firms leverage on their experience to register superior performance compared to younger ones (Essel, Adams and Amankwah 2019: 9). In their study of 465 South African SMMEs, Radipere and Dhliwayo (2014: 10) found that age has a significant impact on firm performance for firms below 20 years and turns insignificant thereafter. In interpreting their results, they related their findings to the lifecycle worldview which claims that with age, firm performance tends to improve owing to the experience factor.

However, some studies in line with the 'liability of obsolescence' claim that older firms tend to perform poorly due to failure in keeping up with changes in the environment (Coad et al. 2018: 9). Owing to organisational rigidities, Loderer and Waelchli (2010: 4) found that older firms due to various issues like old assets, reduced research and development activities are less efficient and thus perform poorly compared to their industry peers. The findings clearly show the reality of corporate geriatrics as firms age (Majumdar 2004: 110). As has been pointed out, older firms suffer from inertia thus constraining ability and willingness to change (Fritsch, Noseleit and Schindele 2010: 19; Coad, Segarra and Teruel 2016: 388). In this regard, the following hypothesis will be tested:

- *Hypothesis 7: There is an inverted U-shaped relationship between performance and the age of SMMEs in KZN Province. We would expect that performance of SMMEs will initially suffer from the liability of newness before improvement due to*

*learning effects as they mature and then ultimately decreases due to the liability of obsolescence.*

#### 4.4.2.6 Registration type

Research has shown that due to the regulatory burdens which come with formal registrations, the majority of SMMEs in sub-Saharan Africa prefer informality or less restrictive forms of registrations like partnerships and sole trading (Adegbite *et al.* 2007: 11; Muriithi 2017a: 39; International Trade Centre 2018: 4). Less restrictive forms of registration have been found to be more of a hindrance to economic growth as such businesses do not make any contributions to the GDP through payment of various types of taxes paid by formal businesses, like limited liability registered entities (Muriithi 2017a: 39). According to the International Trade Centre (2018: 4), informality and certain types of registrations impedes investment. External challenges emanating from the government like corruption, red tape and punitive tax regimes disincentivise small enterprises to formally register as that adversely impacts their bottom-line (Muriithi 2017a: 43; International Trade Centre 2018: 14). This is corroborated by recent studies in South Africa's KZN province, showing that formal (particularly, limited liability) registration negatively impacts SMMEs performance (Zhou, Dash and Kajiji 2021:1; Zhou and Gumbo 2021d: 21).

The finding is in line with findings by the Banking Association of South Africa (2018: 35), charging that the majority of South African SMMEs spend a lot of time trying to comply with their registration requirements, like tax compliance and lose about R216 000 a year on regulatory compliance alone (Small Business Project 2014: 2). Adegbite *et al.* (2007: 11) found that many companies in the country preferred not to operate as limited liability companies due to the cost of incorporation and concomitant compliance requirements. The International Finance Corporation (2019: 23) noted the proclivity of SMMEs to take less strenuous forms of registration like sole proprietorship or partnership than limited liability. This is because with the former types of registrations, entities will not be required to register with CIPC or remit company income tax. Ayandibu and Houghton (2017: 58) bemoaned the negative impact of South African's tax compliance and related regulatory requirements on SMMEs. In their study, more than 63% of participants agreed that government regulatory requirements were the major hindrance to their operations.

Other studies corroborated this, avowing that regulatory compliance, especially for formal businesses remains a major hindrance for SMEs in South Africa (Small Business Project 2014: 2; International Finance Corporation 2019: 56). On the same point, Olawale and Garwe (2010: 737) asserted that the business registration requirements and consequent regulatory requirements have a negative effect on the performance of SMMEs in South Africa. It is, against this backdrop, that the following hypothesis is stated:

- *Hypothesis 8: Limited liability registration type has a negative impact on the performance of SMMEs in KZN Province due to onerous regulatory requirements which comes with this type of registration.*

#### *4.4.2.7 Digital marketing*

As argued by Parsons (2013: 27), in this day and age, it is nearly impossible to look into the marketing strategy without adequate considerations of the social or digital media platforms. This is because proper use of digital tools can positively impact organisational performance, especially that of SMEs by leveraging on these tools to reach wider audiences (Camilleri 2018: 2). Relevant and well-structured content targeted at selected audiences and deployed through digital media platforms can accrue a swathe of benefits for the company. (Olawale and Garwe 2010: 731) articulated that use of technological tools is crucial in the growth of SMMEs as such tools helps in maximising opportunities. Another study by Chimucheka, Dodd and Chinyamurindi (2018: 10) found that use of technology boosted the performance of SMMEs in South Africa's Eastern Cape province. Parsons (2013: 28) noted that, because of the impact of digital media platforms like Face Book, Twitter, Instagram, and others on business performance, many companies globally are scrambling to figure out how to harness such marketing tools.

Social media can be crucial in helping the company to reach a wider pool of potential clients at minimal cost and easily influence their purchasing decisions. According to Statista, a global research company, as of February 2020, Face Book, You Tube and Instagram had 2.45 billion, 2 billion and 1 billion users respectively across the world (Clement 2020). These staggering figures captures the growing popularity of these social media platforms which inexorably presents an opportunity for SMMEs to reach

not only local but potential clients in foreign markets. Jobs and Gilfoil (2014: 235) noted that while more complex than traditional media, digital marketing platforms are critical to the firm's long-term success. Camilleri (2018: 18-19) echoed the same sentiments, propounding that SMME owners in the EU were increasingly perceiving the positive contribution of digital media in engaging key stakeholders like customers, suppliers, and their counterparts in the marketplace.

Social media has been found more effective than other marketing mediums like websites which mainly provide standard information with limited real time engagement (Parsons 2013: 35). Consequently, these platforms are found not only as means to drive sales (Jobs and Gilfoil 2014: 36) but to develop long lasting relationships with key stakeholders through dialogical interaction (Parsons 2013: 35; Camilleri 2018: 6-7), something which translates to the sustainability of the company. Based on the preceding argumentation, the following is posited:

- *Hypothesis 9: Use of digital media platforms for marketing purposes, positively impacts the performance SMMEs in KZN Province.*

#### *4.4.2.8 Website use*

While digital marketing platforms seem to be quite dominant, use of websites is one of the main avenue firms used to promote their brand and products or services in the market (Camilleri 2018: 2). Website use is no longer associated with big or innovative firms but any firm which attempts to leverage the benefits emanating from internet penetration. To ensure online presence and credibility, the majority of companies have established and continuously update their websites (Meroño-Cerdan and Soto-Acosta 2005: 584). Previous studies noted that website content influences consumer purchasing patterns (Parsons 2013: 28; Camilleri 2018: 7). A study by Buyinza (2011: 24) showed that companies operating websites were more productive compared to their counterparts. Considering these results, the study recommended policy makers in the East African community to ensure affordability of the internet in order to allow business to use online tools like websites in driving firm performance. Camilleri (2018: 7) also observed that through websites, SMMEs can easily engage with their potential clients daily and thus drive their performance and long-term growth.

Meroño-Cerdan and Soto-Acosta (2005: 593) charged that in countries where e-business is ubiquitous, use of websites is common across both large and small firms. They further found that web technology is generally affordable and enhances the competitiveness of both small and large firms alike. Parsons (2013: 35) also established that websites are key in providing both current and potential clients with pertinent information, implying that those firms without websites may find it hard to share information with key stakeholders. It is important also to note that websites that merely supply information do not have an impact on performance compared to those which are dynamic and linked with the company's digital platforms (Meroño-Cerdan and Soto-Acosta 2005: 595; Parsons 2013: 28; Jobs and Gilfoil 2014: 235). Against this background, this study postulates that:

- *Hypothesis 10: Website use has a positive effect on the performance SMMEs in KZN Province.*

#### **4.4.3 External Factors**

In their elaboration of the strategic management perspective O'Farrell and Hitchens (1988: 1373) highlighted the need for small firms to understand the external environment to inform the development of an effective strategy to drive sustainable performance (Omalaja and Eruola 2011: 61; Moreno, Zarrias and Barbero 2014: 1516). Teruel-Carrizosa (2006: 41) study on Spanish manufacturing and service industry firms argued that little attention was given to the role external drivers play on business performance. Previous studies have shown that these variables are quite important to firms in this increasingly dynamic global village (Jofre 2011: 70). Understanding of the influence of external factors is important for SMMEs, as they continue facing environmental risks which amplify uncertainty (Moreno, Zarrias and Barbero 2014: 1516). Identification of relevant external environmental drivers by businesses remains key as they are uncontrollable and present a massive continuity risk to SMMEs (Jofre 2011: 37; Lekhanya 2015: 52; Ayandibu and Houghton 2017: 57).

Previous studies have strongly argued that most of the entrepreneurship and strategy studies are premised on a flawed assumption of a stable external environment (Pricop 2012: 106; Hiatt and Sine 2014: 3). Such an assumption disregards the inevitability of

high impact external environment stochastic shocks which normally result in small businesses experiencing a huge dip in revenue and, in most cases, closure of operations if they do not adapt fast enough to these unforeseen changes (Kelliher and Reinl 2009: 524; Hiatt and Sine 2014: 13). A study by Lekhanya (2016b: 48) on KwaZulu-Natal's rural SMMEs shows that business owners were wary of the external environment as it presented a huge threat to the survival prospects of their businesses. Zhou and de Wit (2009: 17) assessed the combined impact of the three categories of individual, organisational, and environmental factors on firm performance on Dutch entrepreneurs. While their results indicated the amplified role of organisational factors on firm performance, they admitted to the latent role of external variables in influencing firm performance.

Unfortunately, many SMMEs, owing to resource poverty, suffer from informational deficits which in turn hamper their ability to effectively identify and respond to external environmental risks (Kelliher and Reinl 2009: 526; Jofre 2011: 37; Pricop 2012). In their critique of Lussier (1995) small business survival model, Hyder and Lussier (2016: 96) highlighted the need for capturing extrinsic variables in order to enhance the model's predictive potency. The role of external factors, especially in strategic management cannot be overemphasised, with some studies establishing that sectoral factors have a large bearing on the performance and long-term growth of small enterprises (McPherson 1995: 34; Issah and Antwi 2017: 11). I thus reviewed some of the macroeconomic variables that have been found to affect firm performance.

#### *4.4.3.1 Unemployment*

The impact of unemployment on the performance of small enterprises has been a subject of debate over many years. Some view unemployment as a driver of entrepreneurial activity while others view the same as a hindrance to the dynamism in the SMME sector (Kitson 1995: 2). Issah and Antwi (2017: 10) found that unemployment rate had a positive effect on the performance of UK firms. In line with the theory of income choice, Halicioglu and Yolac (2015: 11) established that an uptick in unemployment leads to an increase in new business formation. They further argued that higher unemployment levels result in depreciation of human capital which inevitably presents a future threat to skills availability for SMMEs. On the other hand, Olawale and Garwe (2010: 732) noted that high levels of unemployment have an



adverse impact on the small enterprises' sales and market potential. This could be attributed to increased competition as unemployed individuals formerly employed by these small businesses establish their own operations offering poor quality products at a significantly lower price compared to the going market price (Kitson 1995: 3).

Inevitably increased firm creation leads to increased competition and loss of current customers. In his review of literature, Kitson noted that about 44% of unemployed founders establish their operations in the same locations where their former employers operate, meaning a reduction in the market share for the current firms. A study by Halicioglu and Yolac (2015: 17) found that unemployment stimulates new business start-ups for some or negatively impacts economic activity further for some countries in the EU. These results show that either way unemployment tends to impact small business performance negatively because of increased competition from newly established start-ups or a decrease in demand due to lost income by current and potential customers.

Findings by Huggins, Prokop and Thompson (2017: 376) on 1 452 Welsh SMEs indicated that higher levels of unemployment had a negative effect on enterprise survival. While included as a control variable, Hiatt and Sine (2014: 11) found a negative impact of regional unemployment on firm survival in Columbia, connoting that the higher the rate of unemployment the poorer the performance and thus lessened survival chances of small enterprises. Clearly the weight of evidence suggests a negative relationship between firm performance and the rate of unemployment, and the following hypothesis is thus postulated:

- *Hypothesis 11: The national unemployment rate has a negative impact on the performance of SMMEs in KZN Province.*

#### *4.4.3.2 Gross Domestic Product (GDP)*

The fundamental role of the country's economic activity as proxied by the GDP on the performance not only of small but also large enterprises cannot be over-elaborated. The GDP rate indicates the prevailing state of the country's economic cycle and thus the overall performance of the business sector (Muriithi 2017a: 39; Egbunike and Okerekeoti 2018: 147). Klapper and Richmond (2011: 40) found that a one percentage increase in the country's GDP growth reduces firm failure rate by 1.7%. The study

found that GDP growth strongly enhances the performance of firms in the manufacturing sector. A recent study by the Small Enterprise Development Agency (2019: 6) found that the performance of the SMME sector in South Africa is positively related with the country's GDP fluctuations, indicating that a positive and increasing GDP rate would enhance firm performance (Osoro and Ogeto 2014: 30). Motoki and Gutierrez (2015: 47) established a positive procyclical relationship between firm performance and the country's economic activity. In this case, the business cycle was derived from the Hodrick Prescott filter applied to the deseasonalised quarterly GDP series.

These findings reflect that the performance of companies especially those in the manufacturing sector hinges on the country's GDP performance. Klapper and Richmond (2011: 43) found that higher GDP growth rates have a significant positive bearing on performance and thus firm long-term survival. In their study of quoted Nigerian firms, Egbunike and Okerekeoti (2018: 158) found a positive effect of GDP growth rate on the performance proxied by return on assets (ROA), of manufacturing entities. The results align with findings by Motoki and Gutierrez (2015: 54), articulating a consistent contemporaneous procyclicality between manufacturing companies' ROA and return on equity and the country's business cycle. Their findings showed a persistent positive relationship, with results indicating a significant relationship of the lagged cycle (up to two lagged quarters) and firm performance.

A study by Gikombo and Mbugua (2018: 103) on 39 Kenyan commercial banks using five-year panel data, revealed the positive impact of GDP on banking institutions' performance. Some contradictory results were noted, with Issah and Antwi (2017: 11) establishing a negative relationship between the firm's performance and GDP. Hiatt and Sine (2014: 11) results established an insignificant relationship between firm performance and GDP per capita in Columbia. However, despite these findings, consulted literature is tilted in favour of a positive relationship between firm performance and GDP and the following hypothesis is stated:

*Hypothesis 12: There is a contemporaneous positive relationship between the country's GDP growth rate and the performance of SMMEs in KZN Province.*

#### *4.3.3.3 Purchasing Manager Index (PMI)*

In the last number of years, the PMI has emerged as one of the key manufacturing sector activity indicators. This index is made up of five different indices, which measures monthly changes in new orders, inventories, manufacturing industry output, employment and supplier deliveries (Harris 1991: 61). The index which was introduced in 1931 in the United States uses a survey instrument to get input from purchasing and supply activities (Koenig 2002: 3). In South Africa, the PMI was first introduced in September 2000 and is currently sponsored by Absa Bank and published by the BER (Bureau for Economic Research 2019: 1). The PMI is important, as it can provide critical indications on the direction of the country's manufacturing sector. According to the Institute for Supply Management (ISM), a reading of more than 50 on the PMI is indicative of an expanding manufacturing sector and a reading above 42.7 shows that the country's real GDP is expanding (Koenig 2002: 3). The relationship reflects a positive relationship between PMI and the performance of manufacturing firms.

Various studies have established that there is a strong positive linear relationship between the index and performance of the manufacturing firms. Implying that higher readings of the index is reflective of a booming manufacturing sector and the opposite holds for lower readings (Harris 1991: 62; Bureau for Economic Research 2019: 6). Koenig (2002: 2) acknowledged that PMI is seldom subject to large revisions which makes it an ideal component of a forecasting model. Harris (1991: 67) argued that while the index maybe somewhat flawed especially on the short-run movements in the economy, it remains useful. Harris claimed that combined with other variables the PMI provides important information in forecasting contemporaneous manufacturing activity. This was also articulated by Koenig (2002: 9), that when conjoined with other variables the PMI embodies useful information that can be harnessed for predictive purposes.

Clearly from the above literature review, the majority of studies focused on the impact of PMI on other macroeconomic variables like GDP and industrial production (Harris 1991: 62; Koenig 2002: 13; Bureau for Economic Research 2019: 6-7). In the South African context (Mudgal 2014: 58) assessed the effect of PMI in forecasting trends in the industrial sector and share performance of top 25 JSE in the manufacturing sector. However, no research could be found in a South African context, particularly in

KwaZulu-Natal, investigating the significance of PMI on manufacturing firms' revenue performance, specifically SMMEs. This study thus provides new knowledge in this area by investigating the following hypothesis:

*Hypothesis 13: The Absa Bank Purchasing Managers Index has a positive effect on the performance of SMMEs in KZN Province.*

#### *4.4.3.4 Location*

As noted in Chapter 2, several studies attest to the central role played by location on the performance of firms of different sizes and at different stages of their life cycle (Puga 2002: 7; Rijkers, Söderbom and Loening 2010: 1278; Zhou and Gumbo 2021d: 21). Firms located in more concentrated urban or metropolitan areas have been found to perform better compared to those in non-concentrated areas, especially rural regions (Puga 2002: 7; Rijkers, Söderbom and Loening 2010: 1278). The former, unlike the latter have access to thick markets, raw materials, highly skilled labour proficient in the use of advanced technologies (Puga 2002: 1; Phillipson et al. 2019: 231; Niyimbanira, Eggink and Nishimwe-Niyimbanira 2020: 52). As noted by previous studies, the type of support provided differs across regions due to various reasons. Poor infrastructure in rural areas mainly leads to SMMEs in these areas struggling to get information on various government schemes to support them, making it difficult for them to survive and grow (McPherson 1995: 34; Rijkers, Söderbom and Loening 2010: 1280). Arokium (2010) concluded that firms located close to each other tend to achieve higher levels of collective efficiency as they leverage positive external economies as well as inter-firm collaboration and inexorably mutual dependency.

As such, it is expected that owing to the general concentration of firms in urban areas, they are likely to benefit from various direct and indirect inter-firm engagements which are inexorably induced by their locational set-up. This shows that firm location has a strong moderating effect on performance. The analysis of the characteristics of SMMEs by location in Chapter 2 (as per objective 1) showed significantly different performance patterns of SMMEs based on their geographic location. This may be indicative of the locational effect at play as argued by (Lucky 2011: 112) that location is a critical factor with significant impact on the performance and long-term survival of a firm. Rijkers, Söderbom and Loening (2010: 1280) noted that despite potential

challenges which come with being located in urban areas, generally firms in such geographic regions tend to benefit from reduced transaction costs and knowledge spill-overs.

Studies in both developed and developing countries show that small firms based in urban areas generally tend to perform better than those located in rural regions (O'Farrell and Hitchens 1988: 1378; McPherson 1995: 34). McCann and Folta (2011: 107) noted that the level of innovation among small firms is affected by location, with those in developed regions likely to innovate compared to those in less developed areas. Consequently, various studies have noted the difference in firm performance owing to their geographical location (O'Farrell and Hitchens 1988: 1378; Rijkers, Söderbom and Loening 2010: 1291; Bomani and Derera 2018: 158; Phillipson *et al.* 2019: 234). In this light, the following hypothesis is stated:

- *Hypothesis 14: Firms located in urban areas (eThekweni Metro) perform better than those based in other ten district municipality areas which are predominantly rural in KZN Province.*

#### **4.4.4 Firm Performance**

It is important to define the main response variable, which is firm performance in the context of this research and elaborate how it is measured. Richard *et al.* (2009: 733) highlighted the importance of selecting the measure of performance that closely relates with the research question at hand. The study highlighted the importance of appreciating the multidimensionality of performance in research by maintaining a broad measurement approach. As such, in this research, two different but related variables are used as performance measures. To ensure robust results, some studies adopt two different measures to simultaneously investigate the effect of internal and external variables on small-scale enterprises' success (Essel, Adams and Amankwah 2019: 16). Essel *et al.* argued that, unlike previous related studies, their study was conclusive as it used more than one response variable to proxy performance.

Research attests to the variability of performance variables in entrepreneurship, making it difficult to have an agreed measure of success or failure of small and medium firms (Tanveer *et al.* 2013: 450; Adetunji and Owolabi 2016: 60). Santos and Brito (2012: 98) emphasised the importance of using effective measurements as dependent

variables in research. This is especially important when the variable of interest is complex like firm performance, which is generally used as a dependent variable when investigating issues pertaining to various organisational aspects. Previous studies noted the multifariousness of firm performance (Egbunike and Okerekeoti 2018: 148), charging that it encompasses three key areas of organisational outcomes: (i) financial performance (which includes, ROA, profits); (ii) product market performance (which includes sales revenue, market share); and (iii) shareholder return (which includes, economic value added, shareholder return) (Richard et al. 2009: 724). Gomera, Chinyamurindi and Mishi (2018: 3) noted that researchers can use either subjective or objective measures in evaluating firm performance.

These subjective and financial measures are also referred to as financial and non-financial indicators (Adetunji and Owolabi 2016: 60; Essel, Adams and Amankwah 2019: 3-4). Regardless of the definition and ultimate measure adopted, firm performance has acquired increasing interest as the main goal of industrial activity in recent times. To ensure that the study captured the complexity of organisational performance, two measures were used to proxy SMME performance in this study (Coad et al. 2016: 7). Annual sales revenue and sales growth rate were adopted as proxies of performance.

#### *4.4.4.1 Sales Revenue*

In line with previous related studies (Adegbite et al. 2007: 15; Buyinza 2011: 7; Hyder and Lussier 2016: 87; Phillipson et al. 2019: 231; Zhou and Gumbo 2021d: 15), one of the firm performance measures in this study is measured by SMME annual sales turnover (log transformed), indicated by Log Sales. In their thorough review of literature on firm performance measurement between 2005 and 2007 across five top academic management journals, Richard et al. (2009: 722) established that sales revenue was one of the key measures used by scholars as a measure of firm performance. Hermelo and Vassolo (2007: 11) asserted that sales provide a good measure of the general performance of the business. It has also been argued that entrepreneurs tend to place emphasis on sales as a performance indicator compared to any other metric, hence a strong basis to use it as an independent variable when investigating firm performance.

Sales is an important objective for any organisation, because it provides a good reflection of the firm's competitiveness as measured by market share, which can then help in the drafting of an effective strategic action plan (Rhyne 1986: 427; Olawale and Garwe 2010: 730). As such, SMMEs in the manufacturing sector would be interested in establishing the impact of various drivers, both internal and external, as reviewed in previous sections on the performance of their revenue. Increasing sales performance would result in sustainable growth which implies firm success (Essel, Adams and Amankwah 2019: 3). Key to note is that an assessment of annual sales revenue without assessing its progressive change over a certain period could only provide a truncated version on performance.

Many entrepreneurs are interested in factors that impact not only their ability to generate sales in a given period but the growth thereof over time, as that enhances their survivability (Machado 2016: 420). To address this, sales growth was also harnessed as a measure of performance to allow for comparison of drivers between the two different but integrated response variables (Essel, Adams and Amankwah 2019: 12).

#### *4.4.4.2 Sales growth*

Sales growth is another dominant measure of firm performance (Yasuda 2005: 4; Panda 2015: 54); however, unlike annual sales revenue, this performance measure indicates the firm's long-term survival prospects (Tanveer *et al.* 2013: 450; Essel, Adams and Amankwah 2019: 3). Gibrat's LPE is one of the popular theories on firm growth, claiming that growth is a function of stochastic shocks and not any particular internal or external variable (Lotti, Santarelli and Vivarelli 2003: 221; Geroski 2005: 130). However, this theory was rejected in Chapter 3, showing that firm performance as proxied by growth is not a random walk phenomenon, but a result of certain drivers. In critiquing Gibrat's proposition, Bigsten and Gebreeyesus (2007: 817) argued that firm growth-size relationship can be affected by other variables like entrepreneur attributes and firm-specific factors. Another relevant theory that gained the researcher's attention is Penrose's theory of the firm, that has been discussed above and claimed that there is no limit to firm growth and the size thereof (Panda 2015: 54). Theory has been largely questioned with some studies establishing a negative

relationship between size and growth, something that was further corroborated by the findings as per Chapter 3 as well (Dunne and Hughes 1994: 127).

Machado (2016: 419) argued that unlike annual sales which do not show performance over time, firm growth is an indicator of small firms' survival chances in the market. Increasing annual sales growth rate would simply imply year-on-year improved firm market share, with continued negative or stagnant growth showing limited survival prospects. This shows that firm growth in addition to a combination of other factors, is strongly dependent on the firm's annual sales. Firm growth has been used in many studies as a measure of performance (Coad 2007: 90; Panda 2015: 57). In their study on Argentina firms, Hermelo and Vassolo (2007: 11) used sales growth rate as a response variable when investigating firm performance drivers. As such, following previous studies, the researcher used growth rate as one of the dependent variables in this study and seek to establish how it is affected by the trio of entrepreneur attributes, firm internal factors, and external drivers. The next section conceptualises the expected relationship between firm performance and identified variables.

#### **4.5 Proposed Conceptual Framework**

Based on literature review, entrepreneur-specific factors have significant influence on firm performance (Arasti 2011: 7497; Coad et al. 2016: 231). In the same vein, as suggested by the growth of the firm theory (Penrose 2009; Gupta, Guha and Krishnaswami 2013: 6), we would expect that organisational specific factors strongly influence the performance of SMMEs. It is also argued that external factors though less impactful than entrepreneur and firm-specific factors have an impact on organisational performance (Hansen and Wernerfelt 1989; Levie and Lichtenstein 2010: 330; Hiatt and Sine 2014: 774). When investigating growth performance drivers, it is expected that sales alongside other drivers influence SMMEs' growth. This relationship is captured formally as per Figure 25 below:



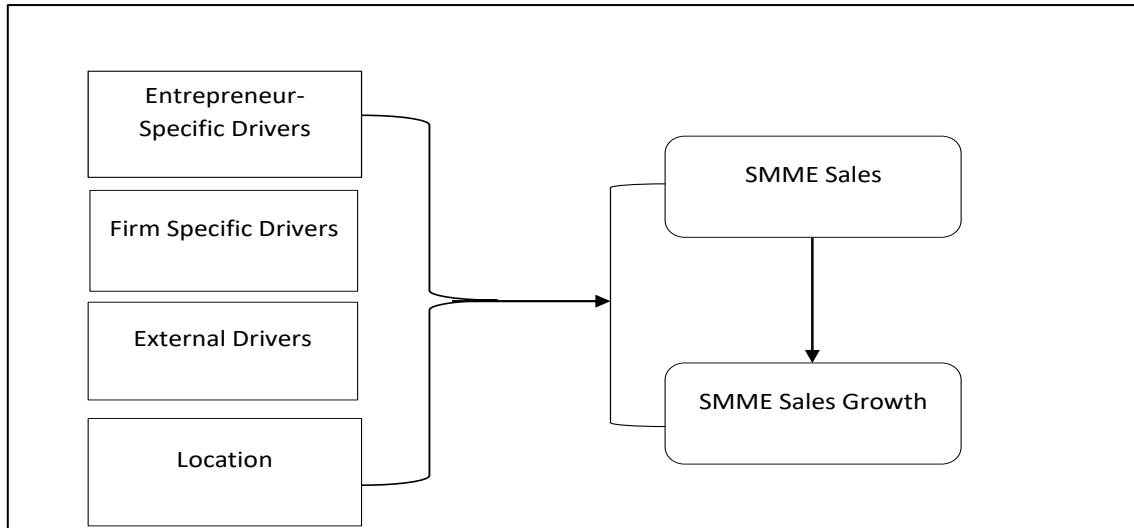


Figure 25: SMMEs performance conceptual framework

The above conceptual framework shows that both SMME annual sales and year-on-year growth is a function of a combination of factors which organisations should pay attention to, so as to drive performance. While the actual drivers from each source may be different and, in some instances, have varying effects on performance, it is expected that these sources present both opportunity and risks to SMMEs in the province. Identified drivers as argued by previous studies are to inform strategy development. These drivers are then continually monitored to improve firm performance on the back of changes in both the internal and external environments to establish a competitive edge in the market through a structured planning system (Rhyne 1986: 432; Jofre 2011: 52; Omalaja and Eruola 2011: 60; Hiatt and Sine 2014: 13).

#### 4.5.1 Data and Measures

The study used the same longitudinal data set of manufacturing SMMEs in KZN Province from McFah Consultancy for the period between 2015 and 2017. The same dataset was used in Chapter 2 to explore the characteristics of SMMEs and indicated various forms of relationships between sales and various internal variables. In Chapter 3, the researcher the same dataset to empirically investigate the validity of Gibrat's Law, which was rejected and thus results from both chapters provided an impetus to investigate key performance drivers for SMMEs in the province. The external economic data on Unemployment and GDP for the three years between 2015 and

2017 was obtained from Statistics South Africa (2019) while the PMI was accessed from the Bureau for Economic Research (2019). The panel data and external data provided adequate information to construct predictors that previous studies and theories deem important on performance of SMMEs. Independent variables under each category were defined and their specific measurements indicated.

### **Entrepreneur-Specific drivers**

- Entrepreneur Age (Age), this is the actual age of the business owner, measured as the difference between the owner's year of birth and the panel period (2015, 2016 and 2017).
- Entrepreneur Age Squared (Age2), is the squared age of the entrepreneur for each of the three years.
- Gender (Gen) is the gender of the entrepreneur which was represented by binary variable 1 = Male and 0 = Female.

### **Firm-Specific drivers**

- Permanent employees (Pemp), these are workers employed by the SMME on a full-time basis and are measured by the whole number as per the survey response.
- Temporary employees (Temp), these are workers employed by the SMME on a part-time basis.
- Total Assets (TA), these are the firms' assets, made up of the SMMEs' current assets and intangible, fixed and other assets, measured in rand value and log transformed for each year between 2015 and 2017.
- Productivity (Prod), this variable proxy the efficiency of an SMME and is measured by taking the log of firm sales divided by total number of workers.
- Company Age, (CoAge), this is the actual age of the business, measured as the difference between the year of the SMME's registration and the panel period (2015, 2016 and 2017).
- Company Age, (CoAge), is the squared version of the SMME age.
- Registration Type (Reg), this is the legal structure for each of the participants', defined by binary variable 1=Pty Ltd (limited liability company) and 0=Other.
- Digital Marketing (DigMkt), indicates whether the company uses social media platforms as a marketing conduit for its products, proxied by 1=Yes and 0=No.
- Website (Web), indicates whether the SMME has a website or not, defined by binary variables 1=Yes and 0=No

## **External drivers**

- PMI, this indicator measures the general performance of the manufacturing sector in an economy. Since the index is compiled monthly, the annual average indices for each of the three years under consideration were used.
- Growth Domestic Product (GDP) measures the country's economic performance.
- Unemployment (UMP) measures the country's annual unemployment rate.

### **4.5.2 Descriptive Statistics**

This section provides summary statistics on the main characteristics of SMMEs in KZN Province as per Table 11. The descriptive statistics are mainly for the continuous variables which were sales, labour productivity, entrepreneur age, permanent employees, temporary employees, TA, and firm age. Both descriptive statistics and econometric modelling was performed in R project for statistical computing, version 3.6.3 (R Development Core Team 2019).

**Table 11: Descriptive statistics**

	2015		2016		2017	
	Mean	SD	Mean	SD	Mean	SD
Sales	15.62	2.03	15.81	1.92	16.10	1.43
Prod	12.29	1.62	12.37	1.59	12.52	1.14
EntAge	43.91	7.89	44.90	7.83	45.89	7.81
Pemp	43.39	53.07	46.07	55.20	51.30	62.56
Temp	5.95	14.58	6.58	13.78	6.68	13.66
TA	15.11	2.01	15.19	2.34	15.47	1.56
CoAge	14.79	17.19	15.48	17.15	16.38	17.15

From Table 11, manufacturing SMMEs in KZN experienced an upward sales trend for the three years between 2015 and 2017. The variability of sales measured by the standard deviation also decreased over the three years. The same trend was also replicated for the labour productivity with significant increase being noted between 2016 and 2017. This shows improving levels of SMMEs productivity as sales revenue increase. The mean age of the entrepreneurs was 45.89 in 2017. This shows that the majority of SMMEs owners are old and past the youth age and this finding is in line with findings by Adegbite et al. (2007: 12) who observed that most owners were aged between 45 and 60 years on Nigerian firms. However, this is contrary to those by Essel, Adams and Amankwah (2019: 12) whose findings indicated a mean age of 35.64 on Ghanaian small-scale firm owners.

The trend for both full-time and temporary staff is similar, for both types of employment there was an upward growth during the three years to 2017. The variability across the two employment types over the three-year period is indicative of the broadness of the sector which covers firms that employ from 5 up to a maximum of 200 workers. In 2017 on average, manufacturing SMMEs employed 52 and 7 full-time and temporary workers, respectively. The SMMEs total assets experienced a marginal uptick over the three years from 2015. The average firm age over the period was 16.38 and marked with a great deal of variability, which is expected as the oldest firm was more than 100 years old and the youngest being just 1 year old. The next section explores the impact of these and other categorical as well as economic variables on SMME performance.

#### **4.5.3 Econometric Framework**

The methodological approach used in the analyses of firm performance drivers is discussed in this section. This study harnessed the REWB methodology that was developed following Mundlak (1978: 70) formulation. The modelling approach is sometimes referred to as the hybrid Fixed Effects (FE) and Random Effects (RE), which are the most used panel data modelling techniques (Dieleman and Templin 2014: 1; Gil-García and Puron-Cid 2014: 204; Adetunji and Owolabi 2016: 65). Of the two modelling approaches, FE is regarded as the default 'gold standard' of clustered data modelling in economics and related fields (Bell and Jones 2015: 133). The approach captures differences across cross-sectional units by assuming that differences between individual units can be accommodated from a different intercept.

The technique enables capturing each firm's individual characteristics effects over time (Gil-García and Puron-Cid 2014: 204; Zulfikar 2019: 5). Wooldridge (2012: 485) highlighted that the FE estimator is unbiased under a strict assumption of exogeneity on the independent variables. As charged by Bell and Jones (2015: 138), the reason for the growing popularity of the FE model lies in its ability to deal with the challenge of heterogeneity bias by explicitly modelling group-level effects. Through the FE approach, the variation between groups is differenced away and solely relies with the within-group variation and this results in the method at times being referred to as the 'within' estimator. As per equation (5), the FE estimator essentially assesses how changes in (the dependent variable)  $y$ , relates with changes in  $x$  (the explanatory variable) within each group (Dieleman and Templin 2014: 3):

$$(y_{jn} + \bar{y}_j) = \beta(x_{jn} - \bar{x}_j) + (\mu_j - \mu_j) + (\varepsilon_{jn} + \bar{\varepsilon}_j) \quad (5)$$

Where;

- the subscripts  $j \in (1, \dots, J)$  indicate the observed unit;
- $n \in (1 \dots N)$  is the time at which each observation is sampled;
- the marginal effect which is considered to be homogeneous is captured by  $\beta$ ;
- while  $\varepsilon$  is the error term which is i.i.d over firm and time;
- with mean being equal to zero;
- variance equal to  $\sigma^2$ ; and
- the single, aggregated unobserved group-level effect is measured by  $\mu$ .

In spite a myriad of advantages, one side-effect of the modelling approach is its inability to investigate the effect of time-invariant variables like gender, race amongst others on the response variable (Bell, Fairbrother and Jones 2019: 1058). This is because the FE transformation completely wipes away these variables, as the technique is designed to investigate causes of changes with a firm (entity) (Wooldridge 2012: 485; Bell and Jones 2015: 139). This weakness is fundamental as time-invariant variables may have influence on the time-variant variables and thus by using FE, hypotheses involving such factors cannot be investigated (Bell and Jones 2015: 139; Bell, Fairbrother and Jones 2019: 1058). To remedy this challenge, the so-called Fixed Effects Vector Decomposition was proposed, but this has been found to be problematic and has been criticised for its incorrect estimation of standard errors (Greene 2011: 135; Bell and Jones 2015: 141). To address this, Bell and Jones (2015: 139) charged that the RE technique is an option, as it allows the simultaneous investigation of both time-variant and time-invariant covariates.

In fact, Bell and Jones (2015: 143) asserted that the FE is more a constrained version of the RE, as the latter can encompass the former but not the other way round. Wooldridge (2012: 493) noted that the RE transformation, which assumes that explanatory variables, either categorical or continuous are uncorrelated with the unobserved effect, thus accommodates time-invariant variables, and in light of this, he argued the approach has an advantage over FE. The RE technique models panel data in cases where interference variables could be interconnected between time and

individuals. With this approach, which is also known as the GLS or Error Component Model approach, the problem of heteroscedasticity is eliminated (Zulfikar 2019: 7). The modelling approach employs Feasible General Least Squares which applies OLS to equation (6) and is an efficient way to addressing heteroscedasticity (Dieleman and Templin 2014: 3):

$$(y_{jn} + \theta \bar{y}_j) = \beta(x_{jn} - \theta \bar{x}_j) + (\varepsilon_{jn} + \theta \bar{\varepsilon}_j) \quad (6)$$

where  $\theta = 1 - \frac{\text{var}(\varepsilon_{jn})}{\sqrt{(\text{var}(\varepsilon_{jn}) + N \text{var}(\mu))}}$ .

However, just like the FE, the conventional RE is not all-encompassing owing to its failure to distinguish between ‘within’ and ‘between’ effects (Bell, Fairbrother and Jones 2019: 1069). This is because while RE is flexible and precise, it is also susceptible to being biased. On the other hand, the FE, despite being unbiased, is not flexible as noted earlier (Dieleman and Templin 2014: 4). Another key concern is that the basis for deciding whether the effects are fixed or random is not only inadequate and thus arbitrary but unnecessary (Mundlak 1978: 70). To overcome this problem and the narrow approach normally assumed by the FE and RE, the REWB also known as the ‘within-between’ is the obvious solution (Long 2020). The approach combines the benefits of FE and RE by allowing for distinct ‘between’ and ‘within’ effects. Mundlak (1978: 70) charged that this technique unifies RE and FE in a defined way and removes any arbitrariness required in deciding the nature of the effects. With this technique, heterogeneity is modelled at both observation and cluster levels (Bell, Fairbrother and Jones 2019: 1052). The REWB as per equation (7) because of its flexibility make the results not only nuanced and accurate but insightful by allowing the researcher to appreciate a given phenomenon, in light of both micro and macro associations (Bell, Fairbrother and Jones 2019: 1055). The within-between estimator applies RE to equation (7) below:

$$y_{jn} = \beta(x_{jn} - \bar{x}_j) + \gamma \bar{x}_j + \omega_{jn} \quad (7)$$

where  $\omega_{jn} = \mu_j + \varepsilon_{jn}$  and  $\bar{x}_j$ .

Falkner and Hiebl (2015: 22) noted that there is a need for research on tools that can enable identification and analysis of risks in the SMME sector. The REWB is best positioned to achieve this as it captures both the individual and group-level means for the included independent variables. We used equation (7) to investigate the impact of various drivers on the performance of SMMEs in KZN using R Statistical Software in the following section. We also used both FE and RE in their traditional form as per equations (5) and (6) respectively, to compare the results and assess the efficacy of REWB in line with previous studies (Dieleman and Templin 2014: 8; Gil-García and Puron-Cid 2014: 215; Bell and Jones 2015: 146)

## **4.6 Empirical Results**

Given the complexity of the response variable (Govuzela and Mafini 2019: 4), the empirical results are mainly divided into two parts. The first part investigated key drivers of SMMEs' sales performance, whilst the second part assessed the drivers of growth performance. While the main attention was on the REWB model, the FE and RE allowed us to compare the model output.

### **4.6.1 Firm Sales Performance**

The results on firm sales performance as per Table 12 shows that entrepreneur-specific factors have no effect on the sales performance of SMMEs in KZN. Based on the findings based on Model 1, our model of interest, hypothesis 1, which claimed a positive relationship between firm sales and male gender (Gen) was rejected and the result is contrary to previous studies which mainly found a significant positive relationship (Amran 2011: 113; Essel, Adams and Amankwah 2019: 16). Hypothesis 2 postulated a non-linear inverted U-shaped relationship between sales and entrepreneur age (EntAge and EntAge2) and could also not be supported. In fact, the relationship is opposite and based on Model 1, when the between effects are taken into consideration, a U-shaped relationship is established instead. This implies that young entrepreneurs tend to perform poorly compared to older SMME owners. This finding is contrary to related past findings on firm performance (De Kok, Ichou and Verheul 2010: 25; Essel, Adams and Amankwah 2019: 16).

Across all the models, firm productivity (Prod), as suggested by hypothesis 3, have a significant impact on sales performance and this aligns with the PLM (Bigsten and

Gebreeyesus 2007: 814; Zhou and Gumbo 2021e: 14) and thus placing emphasis on this driver to enhance performance. Permanent workforce (Pemp) has a positive impact on firm sales as per hypothesis 4. The finding confirm that this form of employment has a positive effect on SMMEs' sales performance. This could be indicative of the commitment which employees translate into performance owing to the nature of their employment contracts and concomitant benefits (Thorsteinson 2003: 170). The result also provided evidence for hypothesis 5 across all the three models, albeit weak in some instances. While the coefficient of the polynomial term is quantitatively small, the finding show that use of temporary employees should be limited as their excessive utilisation adversely impact sales.

The finding aligns with previous findings (Roca-Puig, Beltrán-Martín and Cipres 2012: 17; Pauka 2015: 3; Chadwick and Flinchbaugh 2016: 1643). Hypothesis 6 (a) is confirmed, as TA have a positive effect on SMMEs sales. This finding corroborates previous studies on the manufacturing sector, establishing the positive impact of firm performance (Al-Ani 2013: 177; Zhou and Gumbo 2021d: 21). There is also some evidence, however tenuous for hypothesis 6(b) which expected TA to impact adversely on performance as firms increase in age as was established by Loderer and Waelchli (2010: 21). The result does not fully support hypothesis 7, as can be noted that SMME age has a negative effect on performance which strengthens further as shown by negative coefficient of the quadratic factor (CoAge2). This shows that young firms tend to generate better sales compared to older firms and thus implies the reality of senescence on KZN SMMEs and is in line with other studies (Loderer and Waelchli 2010: 5; Agostini, Filippini and Nosella 2015: 169).

**Table 12: SMMEs sales drivers**

Explanatory Variable	Model 1		Model 2 FE	Model 3 RE
	Within	Between		
Intercept	-	-0.01 (0.02)	-	0.11*** (0.04)
EntAge	0.14 (0.64)	-0.25* (0.13)	0.03 (0.08)	-0.03 (0.04)
EntAge2	-0.19 (0.28)	0.25* (0.11)	-0.00 (0.00)	0.00 (0.00)
Gender	-	0.01 (0.02)	-	0.04 (0.09)
Prod	0.88*** (0.01)	0.71*** (0.03)	1.13*** (0.08)	1.10*** (0.08)
Pemp	0.30*** (0.00)	0.32*** (0.02)	0.01*** (0.00)	0.01*** (0.00)



Explanatory Variable	Model 1		Model 2	Model 3
	Within	Between	FE	RE
Temp	0.17*** (0.00)	0.16*** (0.04)	0.03*** (0.01)	0.03*** (0.01)
Temp2	-0.07*** (0.02)	-0.05 (0.04)	-0.00 (0.00)	-0.00* (0.00)
TA	0.02 (0.02)	0.15*** (0.03)	0.04 (0.06)	0.10* (0.05)
CoAge*TA	-0.03 (0.02)	0.02 (0.02)	-0.00 (0.00)	-0.00*** (0.00)
CoAge	-1.93*** (0.12)	0.15 (0.05)	-0.67** (0.26)	0.06*** (0.01)
CoAge2	-0.32 (0.27)	-0.13** (0.03)	-0.00** (0.00)	-0.00 (0.00)
Reg	-	-0.03 (0.02)	-	-0.15* (0.09)
DigMkt	-	-0.03** (0.02)	-	-0.20 (0.13)
Web	-	0.00 (0.02)	-	-0.05 (0.09)
PMI	0.00 (0.01)	0.07 (0.02)	0.02 (0.01)	-
UMP	-0.27*** (0.07)	-	-0.75** (0.26)	-0.42*** (0.16)
GDP	-	-	-	-
Loc	-	-0.03 (0.02)	-	-0.11 (0.08)
	Pseudo-R <sup>2</sup> (FE) = 0.90 Pseudo-R <sup>2</sup> (total) = 0.94		R <sup>2</sup> : 0.92 Adj. R <sup>2</sup> : 0.89	R <sup>2</sup> : 0.90 Adj. R <sup>2</sup> : 0.88

Notes: The response variable is *logSales*. \*\*\*: coefficient significant at 1% (\*\*): coefficient significant at 5%; (\*): coefficient significant at 10%. Robust standard errors for models in parenthesis.

While the negative sign for limited liability registration (Reg) is in line with expectations, this factor does not significantly impact sales performance of the SMMEs, hence the rejection of hypothesis 8. This finding is contrary to previous studies which noted the significant negative impact this form of registration has on SMMEs, due inter alia to onerous compliance requirements (Adegbite et al. 2007: 11; Small Business Project 2014; OECD 2017: 41). Unlike what was anticipated, use of digital media platforms has a significant negative impact on sales performance. The direction of the digital platforms' influence on sales is disconcerting and may be indicative of limited understanding by SMMEs of how these tools work to enhance performance (Camilleri 2018: 9; Chimucheka, Dodd and Chinyamurindi 2018: 10; Zhou and Gumbo 2021d: 23). Lack of support for hypothesis 10, which postulated a positive effect of website use on performance further confirms that SMMEs in KZN's manufacturing sector have limited appreciation of online tools to drive sales. These findings are contrary to findings by (Meroño-Cerdan and Soto-Acosta 2005: 595) which noted a positive effect of online tools like websites on firm performance.

Finally, an assessment of external variables shows that hypothesis 11 could not be supported as GDP was automatically dropped out of all models to enhance the quality of the output. Unemployment as per hypothesis 12 was the only external variable that was supported. The results across all the three models indicated an inverse relationship between sales performance and unemployment. This was expected, as noted by previous studies that unemployment has a negative effect on sales revenue and their survival prospects (Olawale and Garwe 2010: 732; Hiatt and Sine 2014: 11). The findings could not provide support for hypothesis 13, as location was not significant in either Model 1 or 3 (which considered time-invariant variables). The negative sign was, however, noted in both models, which is further contrary to the postulation that urban-based enterprises benefit more from their location than those in rural areas. While showing the significant role of internal variables in line with the Penrosian worldview (Coad 2007: 47; Penrose 2009: 16), these findings show the significance of one external variable lending support for the strategic management perspective as well. The strategic management theory claims that performance is a function of both internal and external drivers which aligns with the above findings, despite limited number of drivers from the latter category (Rhyne 1986: 423; Omalaja and Eruola 2011: 64). Overall, these findings are as per the recently published study based on this thesis (Zhou and Gumbo 2021e: 11).

#### **4.6.2 Firm Growth Performance**

In this study, the complexity of performance was considered owing to various measures adopted to proxy this response variable (Egbunike and Okerekeoti 2018: 148; Phillipson et al. 2019: 231). The analysis below shows that firm growth drivers differ from factors that impact sales performance. Just like the findings as per the preceding analysis, Entrepreneur's gender has no effect on the growth performance of SMMEs in KZN, and thus rejection of hypothesis 1. The within effects (Model 4) shows that entrepreneur age (EntAge) has a significant negative effect on growth. However, the squared factor (EntAge<sup>2</sup>) shows that the effect of this driver influence on growth diminishes over time. Contrary to expectations, labour productivity (Prod) and permanent (Pemp) have no effect on SMME growth, and this is contrary to previous related studies (Yasuda 2005: 3; Bellone et al. 2008: 767; Shiferaw 2009:

581). These findings do not provide support for hypotheses 3 and 4, which postulated a positive effect of these factors on firm performance.

Temporary employees (Temp) and its polynomial version (Temp2) were not significant which is contrary to expectations as per hypothesis 5, postulating concave relationship of the driver with performance. This finding does not align with various past studies on this area (Roca-Puig, Beltrán-Martín and Cipres 2012: 8; Chadwick and Flinchbaugh 2016). Key to note among internal variables, was the importance of sales in driving growth essentially across all models. The finding shows that current year sales are key in driving growth rate and thus there is a need for SMMEs to pay attention to this driver to enhance performance.

**Table 13: SMMEs growth drivers**

Explanatory Variable	Model 4		Model 5 FE	Model 6 RE
	Within	Between		
Intercept	-	2.73 (1.17)	-	-2.30 (1.55)
EntAge	-1.87*** (0.82)	0.12 (0.08)	-1.86 (1.56)	1.77 (1.06)
EntAge2	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.80 (0.71)
Gender	-	-0.08 (0.17)	-	-1.68 (0.09)
Sales	1.16*** (0.28)	0.16 (0.16)	1.56*** (0.37)	1.81** (0.26)
Prod	-0.33 (0.26)	-0.10 (0.17)	-0.33 (0.31)	2.21 (0.32)
Pemp	-0.01 (0.01)	0.00 (0.00)	-0.00 (0.01)	0.01 (0.01)
Temp	0.01 (0.03)	-0.01 (0.01)	0.01 (0.02)	0.00 (0.01)
Temp2	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
TA	-0.44*** (0.05)	-0.42*** (0.06)	-0.44 (0.38)	-0.78*** (0.14)
CoAge*TA	0.01 (0.01)	0.00 (0.00)	0.01 (0.01)	0.01** (0.00)
CoAge	1.82*** (0.77)	-0.06 (0.05)	1.80 (0.76)	-0.27** (0.06)
CoAge2	0.00 (0.00)	0.00 (0.00)	0.00*** (0.00)	0.00* (0.00)
Reg	-	0.28 (0.16)	-	0.06 (0.20)
DigMkt	-	0.61*** (0.20)	-	0.02 (0.27)
Web	-	0.20 (0.18)	-	0.31 (0.23)
Loc	-	-0.05 (0.17)	-	-0.23 (0.26)
PMI		-		-

Explanatory Variable	Model 4		Model 5 FE	Model 6 RE
	Within	Between		
UMP	-	-	-	-
GDP	-	-	-	-
	Pseudo-R <sup>2</sup> (FE) = 0.77 Pseudo-R <sup>2</sup> (total) = 0.82		R <sup>2</sup> : 0.82 Adj. R <sup>2</sup> : 0.63	R <sup>2</sup> : 0.80 Adj. R <sup>2</sup> : 0.78

Notes: The response variable is growth, measured as  $\log Sales_t - \log Sales_{t-1}$ . \*\*\*: coefficient significant at 1% (\*\*): coefficient significant at 5%; (\*): coefficient significant at 10%. Robust standard errors for models in parenthesis.

Models 4 and 6 shows that total assets have a negative effect on growth, which contradicts the expectation as per hypothesis 6(a). This differs from the results by Voulgaris, Agiomirgianakis and Papadogonas (2015: 27) as they found that assets have a positive effect on firm growth. The results also fail to provide evidence for hypothesis 6(b), indicating that as firms age, their asset structures do not necessarily negatively affect growth. Results as per Model 3 which considers within effects shows that there is a strong positive relationship between growth and firm age. The relationship however attenuates as SMMEs gets older as marked by the insignificant effect of CoAge2 on growth performance. The result does not fully provide support for hypothesis 7 as firm growth performance and age seem to have a positive relationship rather than an inverted U-shaped effect. The finding connotes that older manufacturing SMMEs in KZN are at an advantage compared to those with limited operational experience. Interestingly, this finding is contrary to the stylised fact which claims that firm age and growth performance have an inverse relationship (Evans 1987: 574; McPherson 1996: 271; Özar, Oezertan and İrfanoğlu 2008: 350).

Based on Model 4, limited liability registration has no impact on firm growth performance. Resultantly, these results reject hypothesis 8 as a negative relationship was expected. The result shows that limited liability registration does not significantly influence sales growth performance. Digital marketing has strong positive influence on the growth behaviour of SMMEs based on the findings and this provides evidence for hypothesis 9, which postulated this relationship. This finding shows that in order to achieve increasing year-on-year sales, SMMEs should effectively embrace digital platforms. In an era of digitisation, the positive relationship is expected as firms seek to harness digital tools to drive growth (Meroño-Cerdan and Soto-Acosta 2005: 595). Website has no effect on growth performance, and this fails to provide support for hypothesis 10, which anticipated a positive relationship between these variables. All macroeconomic variables were automatically dropped from the analysis to enhance

the models' performance. Firm location, contrary to expectation, as per hypothesis 13 has no significant effect on the growth performance of SMMEs. The results are aligned to the main drivers that were identified as per a study by Zhou and Gumbo (2021a: 7) utilising the same dataset. Overall, these findings indicate that SMMEs' growth performance is fundamentally a function of the firm's internal resources in line with Penrose's growth of the firm theory (Hansen and Wernerfelt 1989; Coad 2007: 47; Penrose 2009: 16).

#### **4.7 Conclusion**

Using a balanced panel dataset of manufacturing SMMEs in KZN, the chapter explored key drivers behind these small enterprises' performance for the period between 2015 and 2017. The REWB modelling technique which combines the strengths of fixed and random effects was embraced in this chapter. The approach to establishing performance drivers was two-pronged, with the first using sales as the response variable and the second using sales growth. The latter aimed to ascertain factors that influence KZN manufacturing SMMEs sustainable growth and hence long-term survival. The results show that entrepreneur's age relates negatively with performance as measured by both sales and growth: the former is established when between variation across firms is taken into consideration, while the latter is noted only when the variation within each individual firm is considered. This finding highlights that young entrepreneurs tend to suffer from various challenges like inexperience which then diminishes over time as they advance in age. Clearly, young entrepreneurs should be aware of the potential risk their age may pose to the performance of their entities which is more pronounced when growth is the response variable. It was also noted that the business owner's gender presents no advantage or risk for SMME performance (Zhou, Dash and Kajiji 2021).

It was noted that current year sales play a crucial role on firm growth, showing that by improving annual revenue the company's growth will be positively enhanced too. The importance of productivity by permanent staff and temporary staff was established, with particular reference to sales revenue as the independent variable. This finding shows that companies with strategies to enhance productivity and effectively harness its workforce will outperform those without a proper understanding of these key firm attributes. However, there is a caveat when it comes to the use of temporary workers,

as their increased use has a deleterious effect on sales performance. Interestingly, these drivers, in spite of having such a positive effect on sales, are of no consequence when it comes to growth. TA and firm age present a complex relationship with performance. When sales are used as a performance measure, TA were found to having a positive impact, while age has a negative effect on performance; however, these drivers swap directions when growth proxies performance. This implies that SMMEs should fully appreciate these factors within their context in order to balance the risk and opportunities they present.

The importance of digital tools was noted, indicating that SMMEs involved in social media marketing register superior growth performance. Regarding the three macroeconomic variables, unemployment presented a huge threat to sales revenue and SMMEs should be considerate of this driver when developing strategies to enhance performance. The results showed that internal variables are dominant in driving both firm sales and growth performance compared to external macroeconomic factors, which is in line with previous studies (Penrose 2009: 21; Egbunike and Okerekeoti 2018: 143; Essel, Adams and Amankwah 2019: 8). Overall, these findings show that SMMEs' performance in the province is a function of a combination of various drivers which these firms should be aware of when conducting sales and growth forecasting. With these drivers, organisations have the basis to develop strategic roadmaps and accompanying risk mitigation strategies to realise desired performance levels (Jofre 2011: 26). As such, since historical data was used in this chapter, the next step was to conduct a survey across the same group of 191 manufacturing SMMEs in the province to assess their level of awareness of the identified drivers impacting firm performance. Furthermore, it was interesting to investigate how these SMMEs manage the risk posed by the identified internal and external performance drivers to ensuring the sustainability of their enterprises.

## **CHAPTER FIVE:**

### **ASSESSMENT OF KEY RISK DRIVERS' AWARENESS AMONG SMMES IN KZN PROVINCE<sup>5</sup>**

#### **5.1 Introduction**

In Chapter 4, internal and external drivers were identified and the manner in which they affect SMMEs' performance was ascertained. The findings revealed the complexity of key drivers, with some having a positive while others negative impact on firm performance. The results highlighted that the established factors are the source of risk, as failure to attend to these factors in an effective and systematic way will result in poor performance and ultimate failure of SMMEs (Chiliya et al. 2015: 225). In an increasingly competitive environment, small enterprises need to be aware of factors which influence their businesses. The implication from these findings is mainly that, for an SMME to achieve a competitive advantage ahead of its peers, there is need for a solid understanding of key drivers impacting performance. As such, this chapter assessed the level of KZN SMME owners' awareness of the identified drivers and their management practices to minimise their negative and exploit positive impact on performance. To achieve this, a survey across the same cohort of 191 manufacturing SMMEs was conducted to ascertain if SMME owners were aware of the specified variables impacting their firm performance.

#### **5.2 Literature Review**

It has been noted that despite its importance to the performance of SMMEs, risk management has received little attention (Yusuf and Dansu 2013: 82; Chiliya et al. 2015: 225). Yusuf and Dansu (2013: 80) charged that SMMEs are largely susceptible to business risks and, without being aware of them and proper management practices (Li, Wan and Lai 2020: 66) to anticipate and proactively respond to them, then organisational value will be eroded as performance deteriorates. This shows the importance of SMMEs' awareness of key risk drivers and structured strategies to

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<sup>5</sup> A paper based on this chapter was presented at the following conferences:

- a) The African Finance Association Conference, 11-12 May 2021, Africa Growth Institute, Cape Town, South Africa.
- b) The 44th Annual Conference of the National Association of Business Economics and Technology (NABET), 21-22 October 2021, Days Inn Penn State, Pennsylvania, United States of America.
- c) Fostering Innovative Advances in Applied Management (FinAAM) Conference 2021 (Virtual), 02 December 2021, Durban University of Technology, South Africa.

enhance performance and thus longevity of their enterprises. Omalaja and Eruola (2011: 67) contended that a structured analysis of the firm's competitive advantage is key to driving performance and organisational value, connoting that development and ultimate deployment of a strategy without considering key risk factors is likely to leave SMMEs exposed to danger (Chiliya et al. 2015: 225). This in turn highlights the importance of enabling tools that can be harnessed by SMME owners to objectively identify key drivers and thus develop agile risk management strategies to future proof their businesses.

Pricop (2012: 106) charged that SMMEs operate in complex business environments riddled with complex risk drivers which can swing from one end to the other at a fast pace, thus making the principle of multiple scenarios indispensable. The uncertainty imposed by unpredictable movement requires organisations, especially SMMEs, to embed risk thinking in their strategy formulation in order to ensure sustainability (Iopev and Kwanum 2012: 151; Van der Walt 2017b: 113). In Chapter 4, the results showed that firm performance is a complex phenomenon and there is a need to appreciate the varying effects of key drivers which are the sources of both competitive advantage and threats to every organisation. By appreciating that an organisation is a system of interlinked drivers, SMMEs will be able to take a portfolio view to strategy development and consequently performance management (Kast and Rosenzweig 1992: 40; Lundqvist 2015: 443). This indicates that SMMEs should not only attempt to drive performance by looking at key drivers individually but assess how their combined effect and interdependence impacts performance (Mockler 1968: 53; Miles 2013: 12).

This approach aligns with the neoteric risk management concept, known as enterprise risk management (ERM), which demands that organisations assess how various components interrelate and impact performance (ISO 2009: 8; Lundqvist 2015: 442). This is in contrast with the traditional model of analysis, known as Traditional Risk Management (TRM), which is largely linear and breaks down key performance drivers into dichotomous components to study them individually (Miles 2013: 12; Lundqvist 2015: 442). The ERM approach is important as most organisational elements interrelate. Through applied analysis, SMMEs would be able to assess how internal or external risk drivers influence their performance, both individually and aggregated. In fact, drivers with a positive or negative effect on firm performance can be easily spotted



by looking at how they behave in a systematised model, thereby necessitating the identification of an optimal point, where performance is effectively risk adjusted (Mockler 1968: 53).

This highlights the importance of SMMEs appreciating the extent to which various variables influence performance in order to proactively develop means to mitigate their adverse impact or exploit their advantage if they positively relate with performance. Through ERM, SMMEs in KZN will be able to conduct scenario analyses through which they establish the variables with negative effect and should thus be prioritised to mitigate their impact on performance. Such a move would allow for the development of agile models to enable achievement of sustainable performance under varying and largely unpredictable conditions (Callahan and Soileau 2017: 123; Zungu, Sibanda and Rajaram 2018: 116). For example, findings in Chapter 4 showed that unemployment has a negative effect on SMMEs' sales performance, meaning that, should trends indicate that South Africa's unemployment rate will increase in the near future, an SMME with a risk management system can proactively explore means to mitigate the negative impact of this driver on performance. The SMME strategy will thus be quickly updated considering the possible impact of the forecasted movements by the macroeconomic variable in order to minimise its negative impact on performance targets.

On the other hand, with a dynamic predictive tool SMMEs can easily establish the optimal number of temporary workers required in order to increase productivity which in turn enhances performance. This is key as the findings in the previous chapter showed that this driver has a curvilinear relationship with performance, hence need to establish the optimal point on which sales are maximised. The preceding scenario demonstrates the value of well-structured predictive systems by SMMEs. Through such systematic activities, SMMEs will not only be able to monitor and effectively address key challenges which militate against them but also those drivers which present opportunities to bolster performance (Iopev and Kwanum 2012: 151; Adeyele and Omorokunwa 2016: 5). This is in line with previous studies (Alquier and Tignol 2006: 273; Zungu, Sibanda and Rajaram 2018: 116) which elucidated the importance of adopting risk management techniques. Through these techniques, SMMEs would be able to systematically integrate all company activities to drive performance.

However, research shows that there is scant research on the manner in which SMMEs understand and manage key performance drivers, not only in South Africa but globally (Crovini 2019: 16; Zhou, Dash and Kajiji 2021: 1). Falkner and Hiebl (2015: 22) noted that while this type of research is limited across the world, the gap is more pronounced in developing countries, which have a worrying higher proportion of struggling SMMEs than other parts of the world (Nemaenzhe 2010). A study by Chiliya et al. (2015: 232) showed that SMME owners and managers in South Africa have low awareness levels and rarely use risk management techniques in their operations. Based on literature reviewed, it was noted that there are limited previous studies on this subject in KZN Province and this study thus aimed to fill this gap. This study is important in assisting SMMEs appreciate their awareness levels regarding drivers which impact their sales and growth performances. Given the importance of risk management systems to drive firm performance, lack of awareness in this area by SMMEs could explain their continued failure (Worku 2013: 76; Bureau for Economic Research 2016: 10; Govuzela and Mafini 2019: 2).

Previous studies noted that SMMEs in South Africa continue to grapple with a myriad of internal and external risks, which militates against their survival because they lack awareness and intervention strategies to address them effectively (Chiliya *et al.* 2015: 232; Bureau for Economic Research 2016). This indicates the importance of appreciating the collective impact of internal and external forces on firm performance, in order to ensure that SMMEs proactively adapt to changes in their business environments (Lundqvist 2015: 442; Govuzela and Mafini 2019: 4). Simota, Tupa and Steiner (2017: 139) noted the importance of risk management on the sustainable growth of SMMEs in Europe. They charged that SMMEs should integrate risk management within their operational models in order to effectively manage their operations. However, that can only happen when SMMEs are fully aware of the key drivers influencing their operations and have enabling tools to objectively forecast future performance. Advanced machine learning techniques have been found critical in assisting SMMEs to identify and thus integrate important drivers in their risk and also strategic planning in order to drive sales and growth performance (Te 2018: 77; Zhou, Dash and Kajiji 2021:1; Zhou and Gumbo 2021d: 15).

To ensure businesses remain competitive and maintain sustainable growth, it has been argued that the adoption of risk management practices leveraging powerful analytics techniques is no longer optional but rather a fundamental requirement for business growth in the twenty-first century (Cancellier and Junior 2014: 2; Van der Walt 2017b: 13; Te 2018: 77). Inexorably, the emergence of various tools powered by machine learning algorithms (Goodfellow, Bengio and Courville 2016: 29; Casella, Fienberg and Olkin 2017: 6; Te 2018: 63) provide some promise for SMMEs, as they can embrace tools powered by such techniques to drive performance. Using such tools is critical in light of the complexity which pervades the business world in recent times, where both internal and external environments are dominated by uncertainty and thus need accurate predictive models to inform robust strategies (Van der Walt 2017b: 8; Van Liebergen 2017: 61; Bruwer, Hattingh and Perold 2020; Zhou, Dash and kajiji 2021:2).

In demonstrating the importance of ERM for the SMME sector, South Africa's King IV report included a supplement focusing on SMMEs (IODSA 2016: 103). By harnessing risk management tools which integrate key performance drivers, small firm owners can easily identify key areas which presents both opportunities and threats and ensure their risk appetite is realistic (Monelos, Sánchez and López 2011: 2; Adeyele and Omorokunwa 2016: 2; Li, Wan and Lai 2020: 70). Risk mitigation strategies will thus be well targeted to drivers with a negative effect on performance and thus minimise their impact on the company's sustainable performance. By the same token, in order to achieve higher performance levels, the SMME strategy will be centred on drivers which have an inherently positive impact on organisational performance (Yusuf and Dansu 2013: 82; Callahan and Soileau 2017: 124; Zhou and Gumbo 2021e: 14).

By appreciating the direction of each particular driver, SMME owners would thus be able to proactively engage relevant players and where necessary seek assistance and thus avert the danger of failure. In the previous chapter, using longitudinal data, the study investigated and established various internal and external risk factors with varying levels of impact on manufacturing SMMEs performance in the province. The results as per Chapter 4 showed that in order to effectively drive sales, SMMEs should focus more on human resources, digital marketing and unemployment. However, in order to drive year-on-year sales growth, the findings showed that SMMEs should pay

attention to sales, firm age, digital marketing platforms, firm age and total assets. As such this chapter investigated the extent to which SMME owners in the province understand drivers impacting the performance of their manufacturing establishments. In the next section, the methodology that was adopted is discussed.

### **5.3 Research Methodology**

This section covers the methodological approach that was adopted, which is made up of the research design, research sample, data collection procedure and statistical analysis.

#### **5.3.1 Research Design**

Research design is essentially a structured plan adopted by the researcher to investigate and provide an answer to a research problem (Creswell 2014: 250). Given (2008: 30) explained that research design involves both investigative plans and techniques to the analysis and dissemination of findings. According to Creswell and Creswell (2018: 45), a research design is a formal process through which data is gathered, analysed and communicated. The research design requires the careful selection of participants to ensure that the findings provide certainty on a given phenomenon (Given 2008: 30; Neuman 2014: 167). Creswell (2014: 250) noted that the main function of research design is to ensure that the results of the study are valid, accurate and objective through adoption of an appropriate research process. Quantitative, qualitative and mixed methods are the three main types of research designs, and the choice depends on the research question, the nature of the required data and concomitant limitations (Neuman 2014: 167). A quantitative design was adopted, given the nature of the primary objective in this study, which was to assess the extent to which SMMEs are aware of key risk or performance drivers and their management practices.

This approach which harnesses the post positivistic worldview (Creswell 2014: 36; Neuman 2014: 167) allowed me to assess whether the assumptions which provide the impetus for the adoption of risk management practices in SMMEs hold for manufacturing firms in KZN Province. More so, as has been highlighted, key drivers which impacts firm performance have already been identified. In this chapter, the main intention was to assess whether entrepreneurs in the province are aware of these risk

drivers and what intervention strategies they adopt to manage them. For this to be achieved, primary data was required, which was gathered through a survey instrument (Creswell and Creswell 2018: 46). Through quantitative design, statistical analysis was conducted to glean insights and derive conclusions that were confidently generalised across manufacturing SMMEs in KZN (Creswell 2014: 36; Creswell and Creswell 2018: 46).

### **5.3.2 Target Population and Sample Size**

The target population is the total collection of all elements from which the sample is drawn from (Neuman 2014: 252). The researcher's interest was to assess the level of awareness of key risk drivers by SMMEs whose data was used in Chapter 4. Thus, the same set of 191 companies from McFah Consultancy were targeted for this chapter as well.

### **5.3.3 Data Collection Procedures**

In this chapter, cross-sectional survey design approach was used and the research instrument was captured online using Survey Monkey. Creswell (2014: 206) noted the advantage of designing and deploying instruments through online survey facilities like Survey Monkey, which generates results for closed-ended questions in graphed format. Also, responses can be easily downloaded into various formats like excel, which can be easily fed into various statistical software packages. As such, the questionnaire instrument (Annexure C), was distributed via a Survey Monkey link through the McFah Consultancy. To ensure confidentiality, the researcher was supplied with data in excel format without any information on business names or contact details and the dataset was fed into R software for further analysis.

### **5.3.4 Reliability and Validity**

Reliability and validity of scores on research instruments enable meaningful data interpretations (Creswell 2014: 200). Reliability refers to the repeatability and consistency of the research instrument used (Creswell and Creswell 2018: 202). Internal consistency is the important form of reliability especially for multi-item instruments. Given (2008: 112) highlighted that reliability measures the accuracy of the meaning emanating from the study. To assess reliability, the same instrument is

applied at different points and ascertain if results differ or not (Mahohoma 2018: 56). However, because of the challenge of this approach, Cronbach's alpha is the preferred method to test reliability owing to its practicality (Creswell and Creswell 2018: 202). The Cronbach's alpha ranges between 1 and 0, with at least 0.7 being considered an optimal value (Creswell and Creswell 2018: 202; Govuzela and Mafini 2019: 6). As such the reliability test was conducted using R Statistical Software and the Cronbach alpha's coefficients of the internal variables was 0.73 which is acceptable based on previous related studies (Mahohoma 2018: 42). However, the construct for the external variables was 0.56, which is below the generally accepted cut point of 0.7.

Validity is another critical element in research, as it ensures that the research instrument does not have random and systemic errors (Creswell and Creswell 2018: 202). For this study, validity was performed to assess whether one can draw useful and meaningful deductions from scores on the research instrument (Creswell 2014: 206). The questionnaire was shared with experts in entrepreneurial and risk management fields who scrutinised the instrument and establish if it adequately covered the study's objective and their feedback was incorporated into the questionnaire. Furthermore, a pilot study (Neuman 2014: 217) was conducted on 15 randomly selected participants in the population who were later excluded from the final study. The results from the pilot study led to the rephrasing of three questions that were deemed ambiguous, and the pilot study showed that the average completion time was 10 minutes.

## **5.4 Data Analysis**

This section presents the results of the study as per the participants' responses gathered through the survey instrument. Since the results are mainly to assess awareness levels, descriptive statistics were used in various graphical formats with a view to glean salient patterns and relationships. The analysis was conducted using open-source software, the R project for statistical computing, version 3.6.3 (R Development Core Team 2019).

### **5.4.1 The Response Rate**

The survey link was distributed to 176 SMMEs excluding those that participated in the pilot study. While 132 participated in the survey, responses from 11 SMMEs had

significantly missing information and thus 121 fully completed the questionnaire, resulting in a 68% response rate. Altinay and Paraskevas (2008:99) cited in Lekhanya (2016b: 80) indicated that there is no generally accepted minimum response rate, indicating that anything from 10% is considered acceptable. The response rate in this study is acceptable in line with a previous study by Mahohoma (2018: 45), which was considered adequate to allow for the drawing of meaningful conclusions. The results are presented and discussed as per below.

#### 5.4.2 SMME Performance Measures

The study sought to appreciate the preferred performance measures adopted by SMMEs in the province. This was important in order to relate findings to empirical results from the previous chapter since both annual sales and sales growth were harnessed as performance measures. The results on Figure 26 revealed that the majority (35%) of the SMMEs use sales revenue as their main measure of performance. This is followed by profit, ahead of number of workers, growth, and assets, respectively.

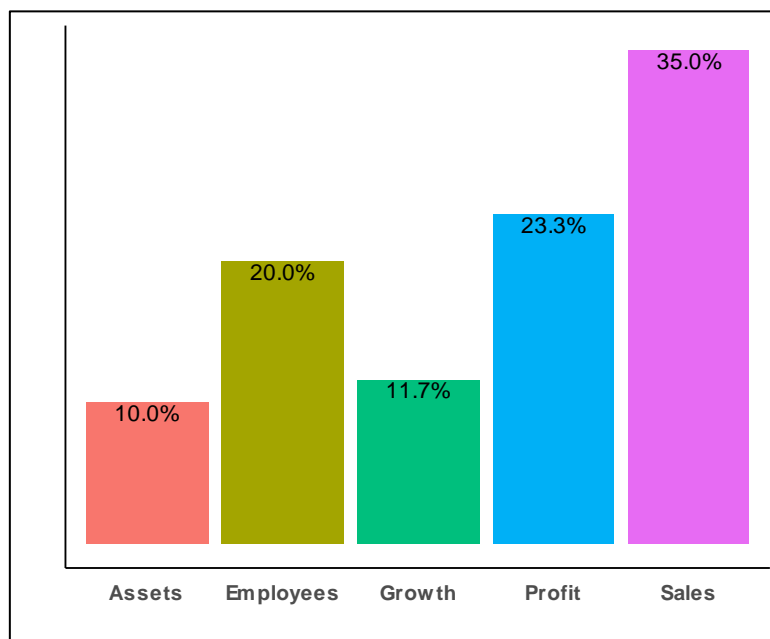


Figure 26: Performance measures

The above findings indicate that SMMEs are most concerned about turnover levels ahead of other variables. The results are contrary to findings by Mahohoma (2018: 66) which showed that SMMEs in the eThekweni metro prefer value of assets as the proxy

for performance. However, this finding aligns with various previous studies in which sales is preferred ahead of other metrics as the measure of performance (Adegbite et al. 2007: 15; Richard et al. 2009: 722; Hyder and Lussier 2016: 87; Phillipson et al. 2019: 231). The finding is important as it shows that tools or interventions meant to assist manufacturing SMMEs to drive performance should focus on sales revenue as the main variable of interest.

#### **5.4.3 Key Performance Driver's Awareness**

This section sought to ascertain the extent to which entrepreneurs in the manufacturing sector are aware of the significance and effect of identified internal and external drivers on their enterprises. As per the Likert scale, 1 indicates that the participant strongly disagrees and 5 strongly agrees on the impact of the driver on performance. This is important as the success of an SMME lies in understanding of internal and external drivers whose combined impact inevitably influences performance and survival positively or otherwise, as argued by Lekhanya (2016b: 46). Thus, in this section, the level of awareness of key risk drivers impacting performance of KZN-based manufacturing SMMEs was investigated.

##### *5.4.3.1 Understanding the impact of internal risk drivers*

The study used a 5-point Likert scale approach to solicit input from entrepreneurs and rate the extent at which internal factors impact their enterprises' performance. The analysis as per the Figure 27 below, shows some contrasting results in light of the empirical evidence in Chapter 4.



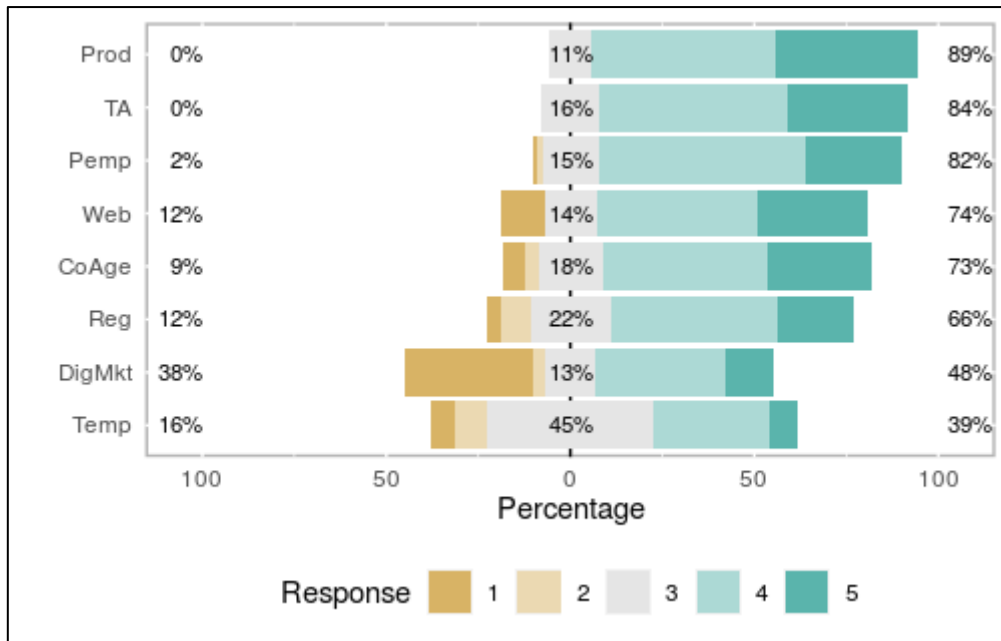


Figure 27: Perceived impact of internal risk drivers

The analysis above shows that participants agreed that ahead of other factors, labour productivity (Prod), total assets and permanent employees (Pemp) have at least a strong influence on the performance and survival of their firms, with 89%, 84% and 82% respectively, agreeing that. This is followed by website use (Web), company age (CoAge) which proxies experience and legal form (Reg) where between 66% and 74% of the respondents indicated that these drivers have a significant effect on performance. However, the entrepreneurs were not convinced that digital marketing (DigMkt) and temporary workers (Temp) have much effect on the performance of their enterprises. The results on the significance of productivity, TA permanent employees and company age aligns with the initial findings using panel data, when sales revenue proxied performance. However, the respondents' rating of temporary workers and firm legal form are contrary to the initial findings in Chapter 4. The difference is more pronounced when growth proxied performance as in the previous analysis, where the results showed that only sales, company age and TA were found to significantly influence growth performance contrary to findings as per the above results using 5-point Likert scale. In line with a recent study by Zhou, Dash and Kajiji (2021: 1), the findings reveal that SMME owners lack full understanding of the internal drivers which have an influence on their firm's performance.

### 5.4.3.2 Understanding the impact of external and location risk drivers

Figure 28 below reflects the entrepreneur's perceived impact of the external and locational factors on the performance of their enterprises. Compared to Chapter 4, the findings reflected on Figure 28 provide some striking differences on certain drivers.

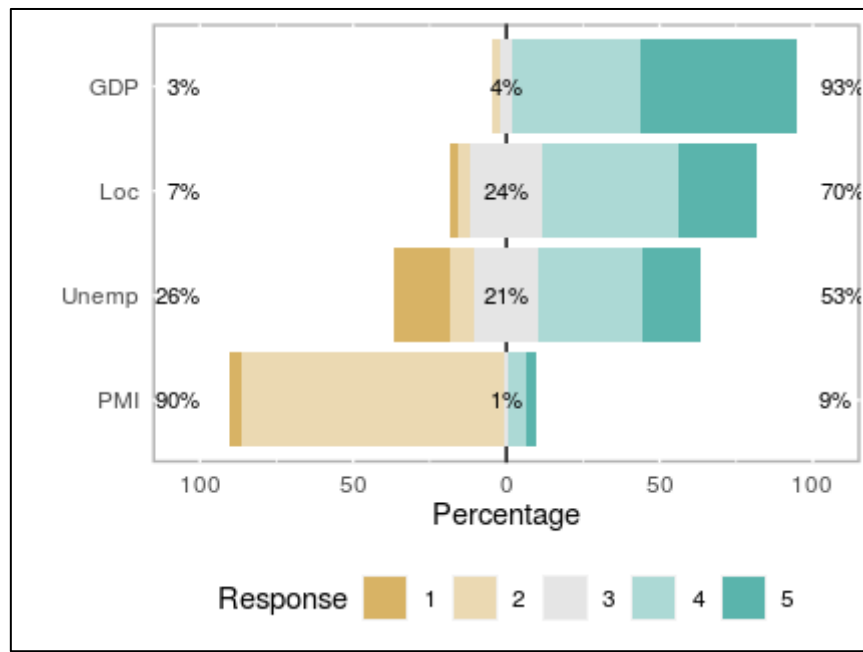


Figure 28: Perceived impact of external and Locational risk drivers

The analysis shows that the majority of the SMMEs owners are convinced that their enterprise's performance is significantly impacted by GDP growth rate, followed by location and unemployment. The respondents perceived PMI as a non-significant factor. Interestingly in Chapter 4, only employment was a significant driver of sales revenue and none of the external drivers had impact on growth performance using these enterprises' panel data. Just as was the case with internal variables, these findings show significantly limited understanding of SMME owners about the external drivers which affect their organisations' performance. However, this particular finding may not be generalised beyond this study as the Cronbach alpha (0.56) was below the generally accepted minimum threshold. In the next section, the study further explored if the entrepreneurs understood the nature of the impact (whether positive or negative) posed by these internal and external risk drivers.

### 5.4.3.3 Understanding the effect of internal risk drivers

Further to investigating the entrepreneurs' understanding the impact of internal risk drivers, SMME owners were asked to indicate how they thought various internal and external factors impact performance. The intention here was to assess whether entrepreneurs understand the effect (negative/positive/none) of the established drivers. The results as per Figure 29 below shows mixed understanding of expected internal factors' effect on the manufacturing SMMEs.

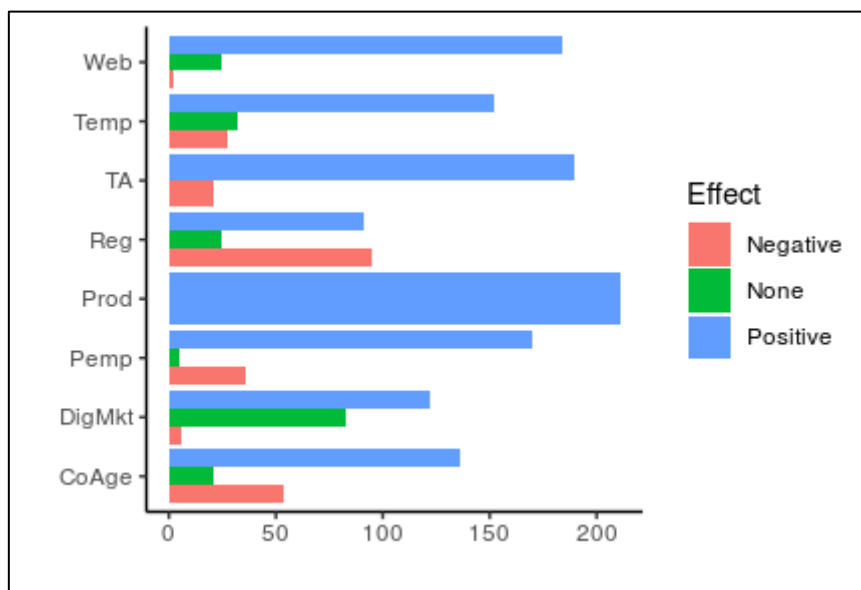


Figure 29: Perceived effect of internal risk drivers

From Figure 29, the respondents indicated that productivity has a positive effect on performance. This was followed by TA and website, which entrepreneurs generally agreed that they must have positive effect on their firms' performance. While the majority of the entrepreneurs indicated that permanent employees, temporary employees, company age and digital marketing have a positive effect on performance, some perceived these factors as having a negative effect. This was mainly noted on the combination of permanent workers and company age. On digital marketing, a fair number of respondents found this driver to be inconsequential on firm performance. Interestingly, the majority of the respondents highlighted that their registration type has a negative effect on performance. The perceived effects of productivity, permanent workers, temporary employees, TA and registration type align with the findings in Chapter 4. However, they differ when it comes to company age and digital marketing,

which entrepreneurs assumed to have a positive impact, where in the previous chapter these two drivers had a negative impact on sales performance. The initial findings on websites showed that it had no effect on performance contrary to entrepreneurs' expectations.

#### 5.4.3.4 Understanding the impact of external and location risk drivers

The analysis as per Figure 30, shows the SMME owners' perceived effect of external and locational risk drivers on their firms' performance.

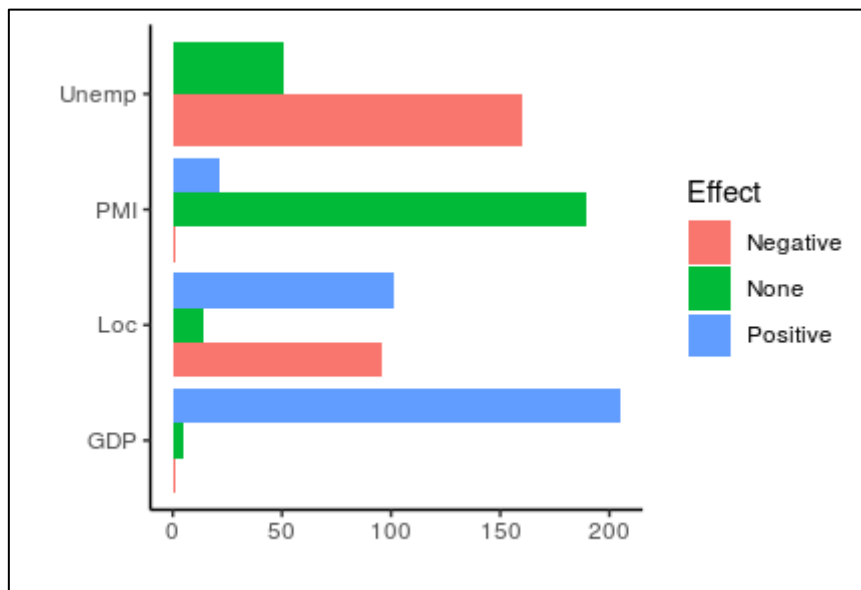


Figure 30: Perceived effect of internal risk drivers

The analysis shows that the majority of the SMMEs perceive unemployment as a negative performance driver. On the other hand, the majority of the respondents highlighted that GDP growth rate has a positive effect on the performance of their companies. When it comes to PMI, most business owners indicated that this driver has no effect on their performance. Finally, slightly more participants perceived their location as having a positive effect; however, almost the same number of respondents found their location had a deleterious effect on performance. The results, especially on employment, align with the findings in Chapter 4 with respect to sales performance; however, the other variables were insignificant in the regression analysis results and therefore the participants expectations could not be confirmed. The next section highlights the approaches applied by SMMEs in the province to manage the identified and other risks they confront in their environments.

#### 5.4.4 SMMEs Approach to Risk Management

In this section, the study assessed the approach that is adopted by manufacturing SMMEs to deal with risk emanating from established performance drivers. The current awareness levels of the ERM technique to managing risk were established. The survey instrument sought to establish the strategies and tools small firms use to manage internal and external risk drivers.

##### 5.4.4.1 SMMEs definition of risk

The research instrument asked the entrepreneurs' views and definitions of risk drivers and thus how they approached it in their companies. The findings based on Figure 31 indicated that SMME owners mainly define risk as something that is negative and thus by all means to be avoided. This view is mostly aligned with the traditional approach to managing risk.

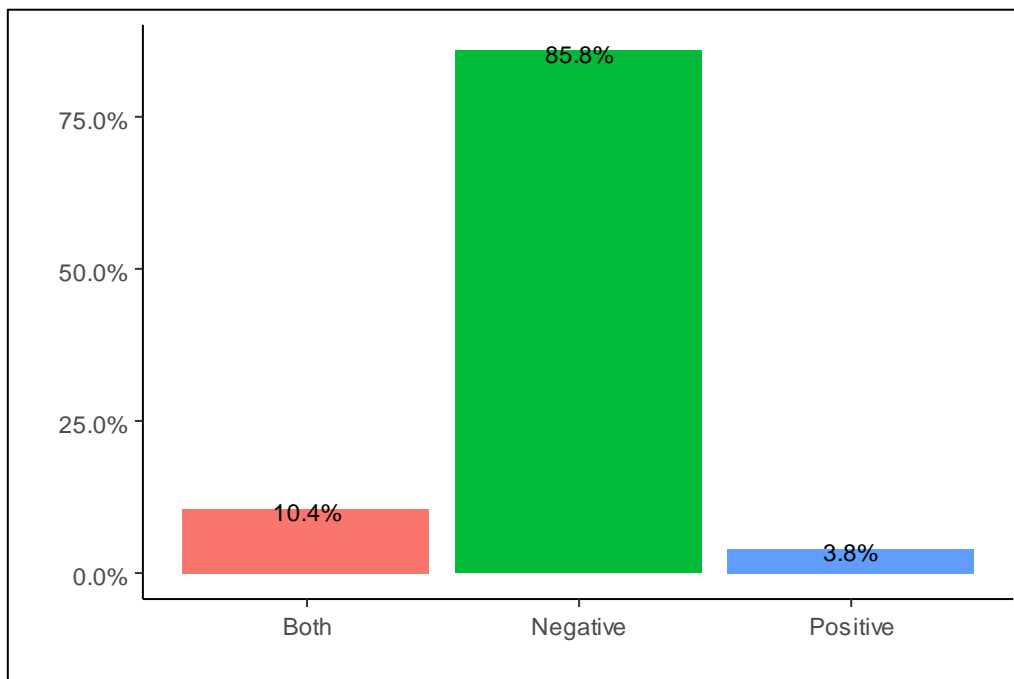


Figure 31: SMME definition of risk

The results indicate that SMMEs in the province are not aware of the ERM concept, which emphasises not only an all-encompassing view to risk management to achieve sustainable performance, but also seeking the positives which comes with performance drivers. According to Callahan and Soileau (2017: 124), effective risk management which results in increased value considers and balances both the

downside and upside of key performance drivers. The study showed that SMME owners were not aware that risk and opportunity are inseparable and hence should be properly balanced and not try to avoid one aspect in pursuit of the other.

#### 5.4.4.2 Current risk management methods

The study also sought to establish current risk interventions strategies adopted by SMMEs to manage internal and external drivers as per Figure 32. The analysis as per Figure 32 below shows various types of strategies used to manage risks by the SMMEs in the province. The respondents highlighted up to 11 intervention strategies that they harness to manage risk. Concerningly, more than 55% of the respondents do not have any formal strategy or techniques to deal with internal and external risks.

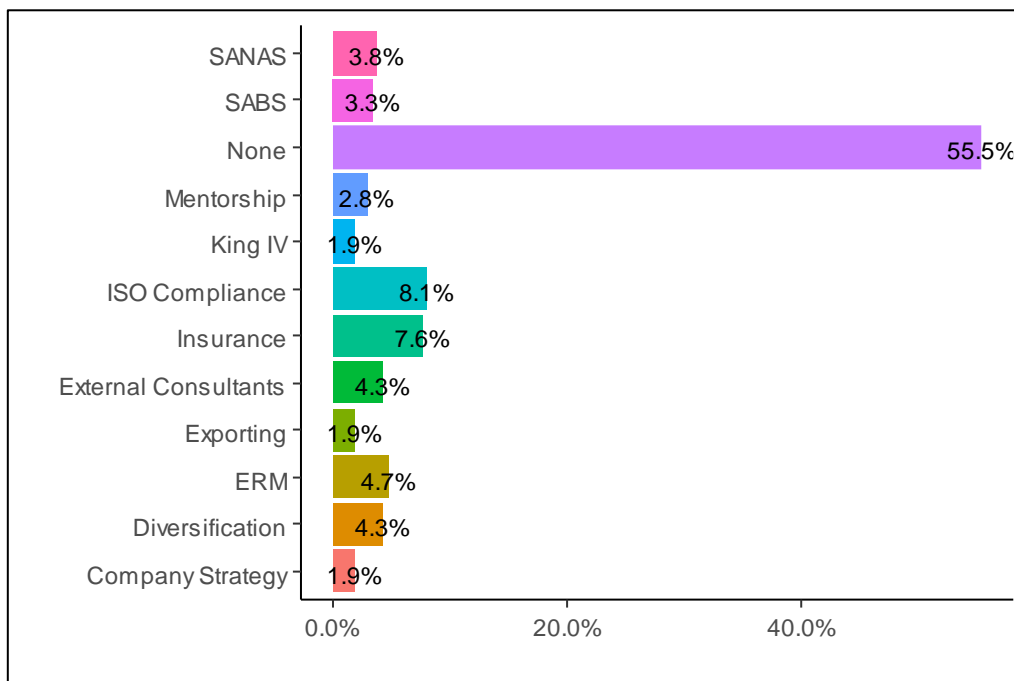


Figure 32: SMMEs risk intervention strategies

The assessment showed that SMMEs in the province with some form of intervention strategies in place largely rely on standardised methodologies that are not customised to their enterprises. This is indicative of the low level of awareness and risk management techniques by SMMEs. The finding is concerning, as research has shown that SMMEs without risk management tools are likely to register poor performance and ultimately discontinue operations (Chiliya et al. 2015: 225; Crovini 2019). This finding shows the need for affordable risk management techniques that

SMMEs can harness to effectively manage risk in an integrated way in order to register high performance levels and long-term survival.

#### 5.4.4.3 SMME use of predictive model

The study further sought to establish if the SMMEs used predictive models to consider potential integrated impact of various risk drivers on their future performance. Figure 33 below shows that almost 92% of the SMMEs in KZN do not have any models or tools that can be used for performance predictive analytics.

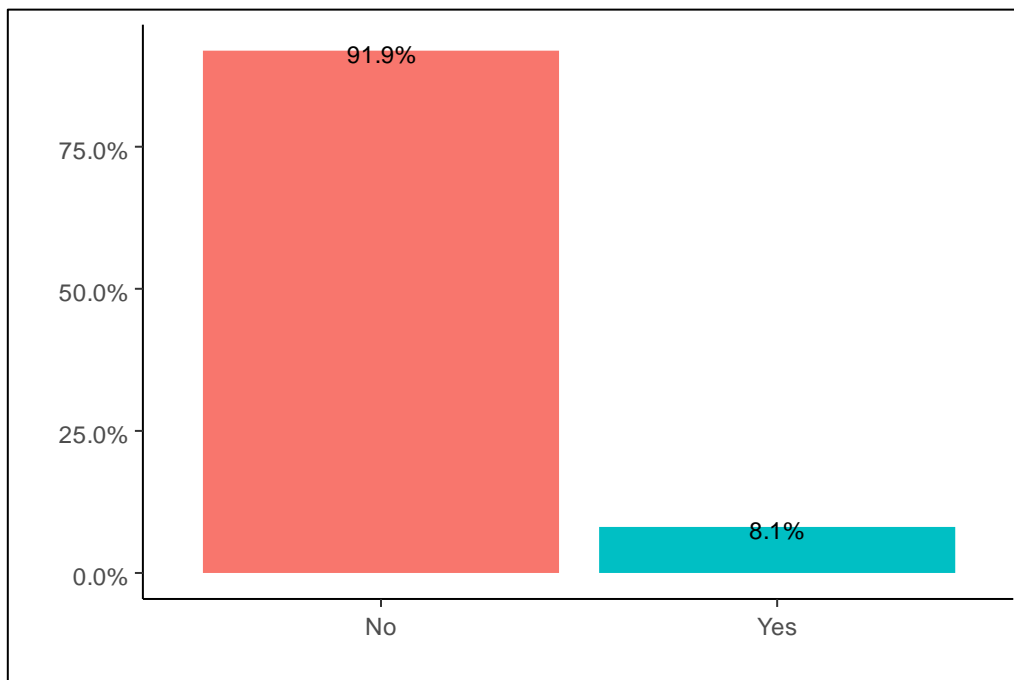


Figure 33: Use of performance predictive models

The findings inevitably show that SMMEs are currently not able to establish the impact and effect of each driver and thus inform strategic and risk management plans in order to enhance their sustainability. Considering the complexity of internal and external risk factors, as argued by Lundqvist (2015: 442), there is need for a model that allows for a portfolio view of the organisation's performance drivers. As a follow-up question, the study also assessed the business owners' view on the importance of having a performance predictive models for their companies. As can be noted on Figure 34, more than 75% of the SMME owners agreed that that such a tool was needed.

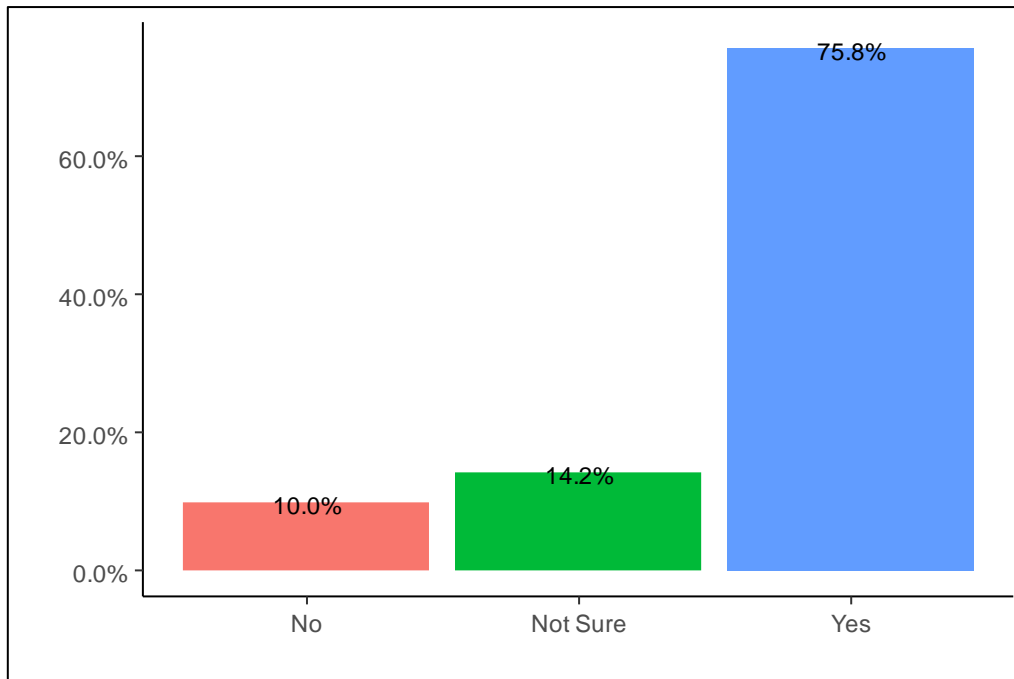


Figure 34: Need for performance predictive model

The results for this question show that the owners are aware of the potential benefits which come with the use of an integrated performance predictive tool. The predictive tool, as noted by Yusuf and Dansu (2013: 82), enables SMMEs to optimise performance by placing emphasis on their areas of strength while minimising the effects of drivers with a negative impact on performance. This is in line with a related study in South Africa, in which entrepreneurs proposed the need for enabling techniques to assist them to effectively manage risk and drive their growth (Chiliya et al. 2015: 232). The dynamic model will help SMME owners and managers to appreciate the impact and effect of each driver in an integrated model and how it impacts performance (Zhou and Gumbo 2021e: 15). A predictive application as argued by Cancellier and Junior (2014: 1) will enable SMMEs to be competitive in that it would allow them to assess the expected impact of internal and external factors on overall performance. Scenario analysis is also made possible through the use of predictive tools.

## 5.5 Conclusion

In this chapter, survey data was gathered from manufacturing SMMEs in the province to assess their awareness of key risk drivers that were identified in Chapter 4 and their intervention strategies. Using a 5-point Likert scale, it was apparent that while SMMEs



are aware of some of the risk drivers influencing their performance, their perceptions of the impact of some drivers like temporary workers, company age and website use were misplaced. When it comes to the effect of these drivers, the SMME owners misplaced the effect of digital marketing and company age, which, based on the panel data regression analysis in Chapter 4, were found to have a negative effect on performance, but they expected these to have a positive effect on performance. On external factors in terms of both impact and effect, there was generally no alignment except in the case of unemployment, which they expected to have a significant negative impact on performance.

Further analysis showed that the majority of the SMMEs in the province did not understand and use the ERM concept to manage key risk drivers but had a traditional approach which viewed risk as negative and something to be avoided. The results also showed that SMMEs did not have a predictive model that could be used to forecast and inform strategic and risk management plans aimed at driving their performance. The findings imply an individualistic approach to incorporating key performance drivers when planning and thus inability to view their entities as an integrated whole (Miles 2013: 12). Unsurprisingly, the SMME owners all agreed on the importance and need for a predictive performance forecasting tool that can enable them to make proactive and future-oriented decisions. This interest by the business owners is encouraging. To intercept that gap, in the next chapter, the machine learning techniques were harnessed to build an ideal performance forecasting model. The intention was to provide entrepreneurs in the province with a machine learning application to assist SMMEs in modeling their sales and growth performance. The tool can also be used by other stakeholders to proactively inform interventions for manufacturing SMMEs in the province.

## **CHAPTER SIX:**

### **PERFORMANCE PREDICTIVE MODELLING TOOL FOR SMMES IN KZN<sup>6</sup>**

#### **6.1 Introduction**

Firm sales and growth performance predictive modelling has occupied a critical position in business management in recent times (Tsoumakas 2019: 441; Zhou and Gumbo 2021a: 2, 2021e: 3). Findings from Chapter 5 indicated that SMME owners appreciate the fundamental role of predictive analytics in driving their performance, hence highlighting the need for a predictive toolkit they can use in their business operations. This is key as argued by Punam, Pamula and Jain (2018: 617), that using data from the past to conduct analytics enables firms to make informed futuristic decisions and enhance their long-term survival prospects (Zhou, Dash and Kajiji 2021: 2). Artificial intelligence techniques are key in assisting both business owners to predict performance with striking accuracy and thus devise effective strategies. The review of literature revealed a paucity of studies relating to its use by SMMEs not only in KZN, but South Africa at large, with few studies from developed countries (Haataja 2016; Te 2018; Kolkman and van Witteloostuijn 2019; Bauer 2020). Considering their avant-garde flavour to predictive analytics and limited use in South Africa, machine learning algorithms were utilised in this study to harness identified risk drivers and develop a performance predictive model (Zhou and Gumbo 2021e: 2).

#### **6.2 Machine Learning and Predictive Modelling**

Machine learning has been defined as the study of statistical and computational methods which allows for the automation of data gathering and analysis (Punam, Pamula and Jain 2018: 617). This aligns with Mohammed, Khan and Bashier (2016: 16) charging that machine learning is branch of artificial intelligence which aims to execute various functions intelligently through powerful algorithms, powered by statistical learning methods. The concept has been touted as one of the game changers with implications in nearly all economic sectors, driving disruptive innovation and exponential growth (Aziz and Dowling 2019: 2; Leo, Sharma and Maddulety 2019: 1; Ngufor *et al.* 2019: 56). The current research areas in machine learning are centred

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<sup>6</sup> A paper based on this chapter was presented at the Global Development Finance Conference, 18-19 November 2020, Africa Growth Institute, Cape Town, South Africa.

around finding means through which machines in a human-like style can gather data and then use computational intelligence to process data, make predictive analytics and recommend an ideal course of action (Mohammed, Khan and Bashier 2016: 11).

As argued by Goodfellow, Bengio and Courville (2016: 3), the emergence of machine learning has revolutionised many things, allowing computers to tackle complex problems with minimal human intervention. They highlighted that through simple machine learning algorithms a person can be advised, for example, on whether to have caesarean delivery or not. Through complex machine learning algorithms like deep learning, driverless cars have been deployed (Crane-Droesch 2017: 1). Their ability to learn from data samples and incorporate those relationships leading to staggeringly accurate out-of-sample predictions, indicates their potency in making predictions (Van Liebergen 2017: 61). Machine learning applications have been found to perform way better compared to traditional statistical techniques both in regression modelling and classification (Leo, Sharma and Maddulety 2019: 13). The advantage of machine learning tools is that they do not make any sort of presuppositions like assuming normality as do some classical statistical modelling approaches (Van Liebergen 2017: 61; Kolkman and van Witteloostuijn 2019: 4).

In machine learning, the approach is to assume a “distribution-free” setting, with few assumptions on the distribution of the data, which enables the learning algorithm to explore and identify models which best explain, give data set and make accurate predictions (Shalev-Shwartz and Ben-David 2014: 25; Leo, Sharma and Maddulety 2019: 6). This flexibility allows machine learning algorithms to learn and adapt and, in the process, uncover subtle insights in data, which facilitate not only reliable and accurate explanations but predictions as well (Leo, Sharma and Maddulety 2019: 6). Machine learning uses statistics to solve various regression, classification, and clustering problems (Van Liebergen 2017: 62; Cheriyan et al. 2018). Broadly speaking, these problems are solved through the combination of supervised and unsupervised learning (Van Liebergen 2017: 62).

Based on literature review, Figure 35 below depicts the main machine learning techniques, the required data, and the problems they solve. Under supervised learning, the algorithm is trained with labelled data set (input vector  $X$ ) to predict target variable (output vector  $Y$ ). The trained model is then applied on the test data set to

predict the target variable (Shalev-Shwartz and Ben-David 2014: 22; Mohammed, Khan and Bashier 2016: 20; Muthukrishnan and Rohini 2016: 18; Van Liebergen 2017: 61; Aziz and Dowling 2019: 5). Supervised learning, which is the primary focus of this chapter uses various algorithms such as linear regression, logistic regression, LASSO as well as modern approaches like artificial neural networks (ANN), Support Vector Machines (SVM) and Generalised Additive Models (Casella, Fienberg and Olkin 2017: 26). Some of the supervised learning approaches can solve regression problems by conducting predictive analytics for continuous variables like sales and classification problems like identifying whether a firm will grow or not in the following year (Van Liebergen 2017: 62).

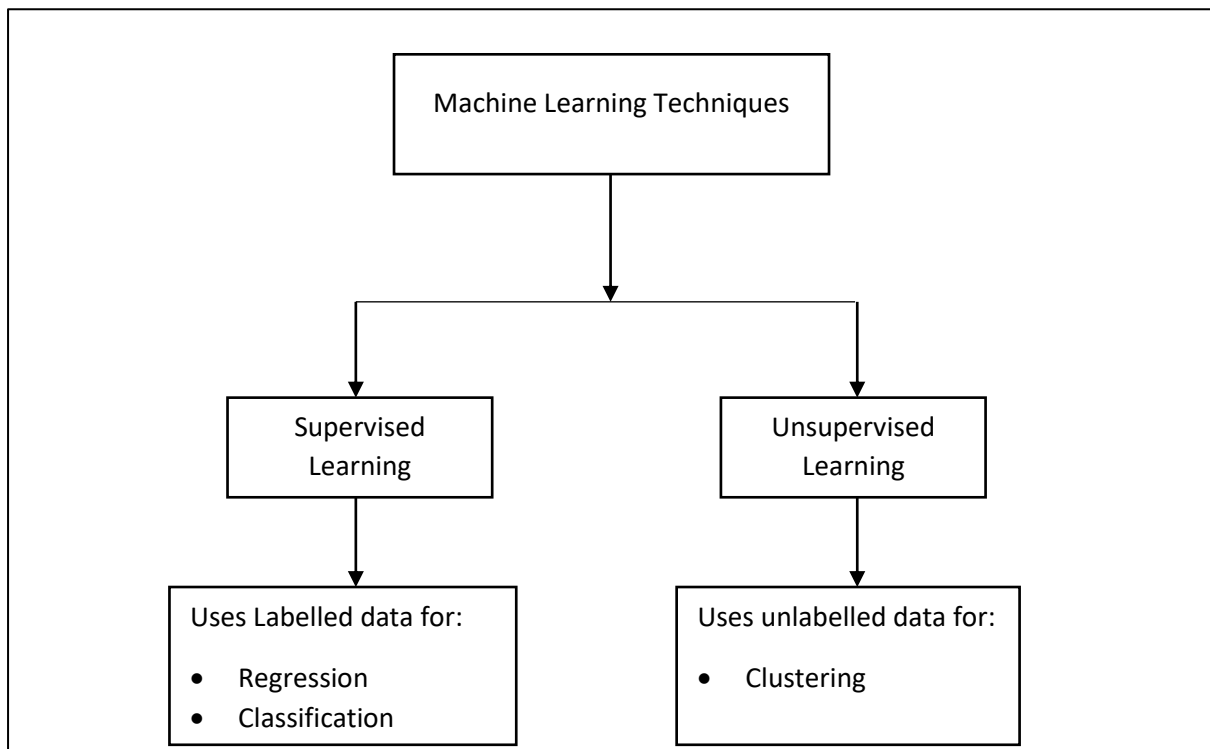


Figure 35: Machine Learning Techniques

On the other hand, with unsupervised learning techniques, data is not labelled and there is no supervising output like in the supervised learning approach (Muthukrishnan and Rohini 2016: 18; Casella, Fienberg and Olkin 2017: 1). There may be numerous reasons for having unlabelled data, which may include inherent data structure, or the labelling may be expensive (Mohammed, Khan and Bashier 2016: 21). As such, with unsupervised learning techniques, the main interest is to explore the data set in terms

of its structure and patterns (Casella, Fienberg and Olkin 2017: 1; Van Liebergen 2017: 61; Aziz and Dowling 2019: 5). The main interest in this chapter is to investigate and establish supervised machine learning techniques that can be used by KZN-based SMMEs to predict sales performance and ascertain whether the enterprise will experience positive growth or not in the next year. Therefore, two different but interrelated predictive models were developed for sales and growth predictive modelling.

KZN-based manufacturing SMMEs cannot afford to lag in embracing the use of machine learning to drive their operations and sustainable growth. Research has shown that organisations that adopt machine learning algorithms will benefit in many ways, which mainly include efficiency, risk management and enhanced competitive advantage (Kolkman and van Witteloostuijn 2019: 7; Leo, Sharma and Maddulety 2019: 6). This was corroborated by Krishna et al. (2017: 1) articulating that algorithms can be used to accelerate performance and achieve long-term goals. Dod and Sharma (2010: 243) highlighted that this concept has helped firms to harness their data to glean critical insights to inform strategic decision-making which in turn drives performance and long-term survival. Predictive analytics leveraging on the power of machine learning is fast becoming “a must have” as companies continue to seek means to effectively predict sales and intercept potential danger in advance. This will ensure that they achieve sustainable growth in a highly competitive and volatile business environment (Tsoumakas 2019: 441).

However, despite its seemingly endless advantages, machine learning has been criticised and characterised as “inevitably fragile”, because it is a theory-free analysis of mere correlations (Van Liebergen 2017: 63). Besides, machine algorithms which run in the background have been criticised for functioning as black boxes making it difficult to interpret their results at times (Krishna *et al.* 2017: 9; Leo, Sharma and Maddulety 2019: 6). Krishna et al. (2017: 9) charged that the opaqueness of various machine learning techniques like ANN and deep learning makes it impossible to understand their deductions from the training data and thus the correctness of their ultimate out-of-sample predictions. However, notwithstanding some of these challenges, the motivation for using machine learning techniques remains clear. Firstly, machine learning has performed fantastically well across many sectors in

which they have been harnessed, outperforming traditional predictive modelling techniques (Mohammed, Khan and Bashier 2016: 11; Chandrinou, Sakkas and Lagaros 2018: 35; Leo, Sharma and Maddulety 2019: 13).

Secondly, the ability of machine learning methods to analyse large amounts and varying types of data while allowing for high granularity and profound predictive analysis makes them ideal in a world in which data has become ubiquitous (Van Liebergen 2017: 60; Kolkman and van Witteloostuijn 2019: 7). Finally, machine learning is a nascent discipline (Krishna et al. 2017: 2) with space for improvement to address some of its limitations, although currently its benefits seem to outweigh the highlighted potential challenges. Importantly given its ability to reveal non-obvious patterns and facilitate reliable predictions, machine learning has the potential to transform the way SMMEs make operational and strategic decisions (Kolkman and van Witteloostuijn 2019: 7). It is interesting to assess and identify best performing machine learning algorithms that can be used for sales and growth predictive modelling by small business owners and other stakeholders in the KZN manufacturing sector, which is the central objective of this chapter.

### **6.3 Sales Performance Predictive Analytics<sup>7</sup>**

Sales are the lifeblood of every company and sales forecasting thus plays a fundamental role in driving business performance (Punam, Pamula and Jain 2018: 617). Sales predictive analytics have remained an area of interest by both practitioners and academics given its importance in developing effective strategies (Haataja 2016: 1; Punam, Pamula and Jain 2018: 617; Bauer 2020: 2). Sales forecasting is important for every organisation, as it is used as input for decision making across various departments like human resources, finance, operations and sales (Cheriyana et al. 2018; Bauer 2020: 2). Also, predictive sales output is key to effectively optimise the use of organisational resources and can be used to seek and acquire external funding support (Cheriyana et al. 2018). In addition, firms that make reliable and accurate sales predictions are best prepared to deal with any potential risks from both the internal and external environment which can affect their operations. Punam, Pamula and Jain

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<sup>7</sup> A paper based on this section was published as a journal article: Zhou, H. and Gumbo, V. 2021. Supervised Machine Learning for Predicting SMME Sales: An Evaluation of Three Algorithms. *The African Journal of Information and Communication (AJIC)*, 27(1): 1-21.

(2018: 617) argued that firms that treat sales predictions as a primary step are more likely to succeed than those that do not. This is because sales modelling allows companies to develop practical business strategies and optimise their resource use as well (Cheriyana et al. 2018; Zhou and Gumbo 2021e: 15).

To maximise profits through high sales levels, organisations, especially SMMEs would need to acquire pertinent data and extract important insights to make decisions that propel them ahead of their peers (Dod and Sharma 2010: 241). Strategy development by SMMEs without sales predictive tools, is almost an impossible task, as multiple scenarios cannot be properly assessed under different conditions or ensure that sales targets are realistic and can be achieved with planned resources (Cheriyana et al. 2018). In Chapter 2, it was demonstrated that for both urban and rural-based SMMEs, there is a concave trend in terms of sales revenue performance over time. The analysis indicated that, over time, SMMEs tend to experience a real senescence problem. This finding placed emphasis on the need for predictive tools that can “learn” from the company’s current data and make intelligent sales forecasts to avoid various challenges which emanate from firm age, like rigidity. In Chapter 4, various drivers with a significant effect on small enterprises’ sales performance were established. As such, KZN SMMEs would need tools to enable them to use these key drivers to ascertain future sales performance (Zhou and Gumbo 2021e: 2).

Through effective techniques, SMMEs would be able to model future sales performance and, where necessary, these firms can proactively and effectively rejig their business models and address issues behind poor performance. Importantly, in Chapter 5, SMMEs indicated the need for a predictive model to inform both effective strategy development process and risk management to ensure their performance objectives are achieved. However, SMMEs tend to lack skills and resources to perform complex sales predictive modelling, leaving them with no option but to make arbitrary predictions that are not data driven (Haataja 2016: 42; Tsoumakas 2019: 442). In fact, in Chapter 5, it was demonstrated that SMMEs largely misunderstand drivers impacting their performance aligning with a study by Zhou, Dash and Kajiji (2021) utilising the same dataset. Implying that their performance strategies might be largely ineffective and will not achieve intended objectives.

As such, through machine learning algorithms, SMMEs would be able to conduct accurate sales predictions and make data-driven decisions that will inevitably drive their sustainability (Tsoumakas 2019: 442; Zhou and Gumbo 2021e: 15). Like in many other fields, predictive modelling using powerful tools like machine learning provides small firms with the ability to identify the weight or importance of modelled variables on sales performance (Van Liebergen 2017: 61). This will be key in developing effective risk management strategies aimed at mitigating the impact from the potential areas of weakness, while maximising the firm's core competencies. In this section, linear regression, LASSO and ANN, which are some of the commonly used algorithms are explored for application in KZN manufacturing SMMEs panel data.

### 6.3.1 Pooled Ordinary Least Squares Regression

Many machine learning algorithms that are broadly used in practice today rely on linear predictors for two main reasons. Firstly, owing to their ability to learn efficiently and secondly, linear predictors are not only intuitive and easily interpretable but perform reasonably well in fitting data into different natural learning problems (Shalev-Shwartz and Ben-David 2014: 117; Casella, Fienberg and Olkin 2017: 6). This form of algorithm is the closest approach to that normally applied in traditional statistics when ascertaining causal relationships between variables (Aziz and Dowling 2019: 5). The machine learning technique aims to choose the slope and the intercept that minimise the sum of the squared errors. The algorithm essentially aims to minimise the distance between the predicted target variable and the actual target variable (Lantz 2019: 173).

Essentially the goal of the OLS as charged by (Casella, Fienberg and Olkin 2017: 72) is to minimise the sum of squared residuals (RSS), as per equation 6.1, where  $y_i$  is the actual value,  $\hat{y}$  is the predicted value and  $x_1, x_2, \dots, x_p$  are the predictor values,

$$\begin{aligned}
 RSS &= \sum_{i=1}^n (y_i - \hat{y}_i)^2 \\
 &= \sum_{i=1}^n (y_i - \hat{\beta}_0 - \hat{\beta}_1 x_{i1} - \hat{\beta}_2 x_{i2} - \dots - \hat{\beta}_p x_{ip})^2,
 \end{aligned} \tag{8}$$

when estimating the unknown regression coefficients  $\beta_0, \beta_1, \beta_2, \dots, \beta_p$  from the multivariate linear regression as per Equation 6.2,



$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p + \epsilon, \quad (9)$$

in order to estimate the coefficients  $\hat{\beta}_0, \hat{\beta}_1, \hat{\beta}_2, \dots, \hat{\beta}_p$  that will be then used to make the predictions using the following formula:

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \dots + \hat{\beta}_p x_p + \epsilon. \quad (10)$$

The OLS approach is one of the most used techniques in academia and is harnessed here as the yardstick for comparisons with other advanced and new methods. The approach is, however, criticised for its simplicity and inferring linearity between response and independent variables (Van Liebergen 2017: 61). This predictive technique is susceptible to overfitting due to its inability to deal with multicollinearity (Kolkman and van Witteloostuijn 2019: 8) compared to other approaches that are considered in the next sections.

### 6.3.2 LASSO regression

The LASSO method is a recent technique that achieves simultaneous parameter estimation and model selection in regression analysis (Muthukrishnan and Rohini 2016: 19). This supervised machine learning algorithm zero weights covariates with low explanatory power and allows one to work with an interpretable parsimonious model (Melkumova and Shatskikh 2017: 749; Aziz and Dowling 2019: 5; Leo, Sharma and Maddulety 2019: 10). The method has been found to perform better than OLS and another approach called ridge regression which, like LASSO, uses penalisation in performing multivariate predictions (Casella, Fienberg and Olkin 2017: 221). For a large regularisation parameter  $\lambda$ , LASSO results in a model in which some of the coefficient estimates are reduced to zero and only important ones are retained (Melkumova and Shatskikh 2017: 749). In the context of this study, this is key because LASSO will exclude unnecessary drivers and only retain variables that best predict sales and thus allow for practical planning even with limited resources to execute an appropriate sales strategy.

LASSO regression shares similarities with least squares, save that a slightly different quantity is minimised to estimate the coefficients (Casella, Fienberg and Olkin 2017: 215). Unlike OLS, LASSO coefficients  $\hat{\beta}_\lambda^L$ , are the values which minimise

$$\sum_{i=1}^n \left( y_i - \beta_0 - \sum_{j=1}^p \beta_j x_{ij} \right)^2 + \lambda \sum_{j=1}^p |\beta_j| = RSS + \lambda \sum_{j=1}^p |\beta_j|, \quad (11)$$

which can also be reparametrized as,

$$\left\{ \sum_{i=1}^n \left( y_i - \beta_0 - \sum_{j=1}^p \beta_j x_{ij} \right)^2 \right\} \text{ subject to } \sum_{j=1}^p |\beta_j| \leq s \quad (12)$$

Here  $\lambda \geq 0$  is a tuning parameter, that is separately determined; when  $\lambda = 0$ , the penalty has no effect and LASSO regression will produce similar estimates like least squares. However, as  $\lambda \rightarrow \infty$ , the penalty function, termed  $\ell_1$  in statistical terms, has the impact of forcing some of the LASSO coefficient estimates to zero, thus performing forward-looking variable selection (Muthukrishnan and Rohini 2016: 18; Casella, Fienberg and Olkin 2017: 219). It is noteworthy that there is some  $s$  such that equations (11) and (12) give the same coefficients for every  $\lambda$ . The selection of the optimal  $\lambda$  is critical and we will use cross-validation to achieve this. The proper  $\lambda$  would allow us to predict sales (the target variable) with highest accuracy (Melkumova and Shatskikh 2017: 749). As a newly developed computational algorithm, LASSO ( $\ell_1$ ) penalties have been found useful in fitting sparse models, especially given datasets with many predictors (Tibshirani 2011: 276).

### 6.3.3 Artificial Neural Networks (ANN)

The concept of ANN also known as neural networks was proposed in the late twentieth century (Gepp and Kumar 2012: 9; Shalev-Shwartz and Ben-David 2014: 268; Goodfellow, Bengio and Courville 2016: 19). ANN algorithms are inspired by the structure of the inner workings of the brain and the nervous system using the computer (Pao 2008: 721; Chandrinos, Sakkas and Lagaros 2018: 37). The technique attempts to mimic the brain as it consists of many interconnected neurons in a complex system through which the brain carries out complex computations (Shalev-Shwartz and Ben-David 2014: 36; Chandrinos, Sakkas and Lagaros 2018; Lantz 2019: 220). ANN aims to solve problems in the way the human brain would, through learning from past experiences to understand past data and use that as a basis for making future predictions (Chandrinos, Sakkas and Lagaros 2018: 36). Fast forward to the twenty-first century, ANN have increasingly become a popular approach for implementing

machine learning (Krishna et al. 2017: 8) owing to their ability to yield an effective learning paradigm which continues to produce excellent performance on various learning tasks (Shalev-Shwartz and Ben-David 2014: 268). ANN being a type of non-parametric artificial intelligence differentiates itself from traditional statistical modelling approaches in that it does not make *a priori* assumptions on the data distribution and between response and independent variables (Youn and Gu 2010: 122; Gepp and Kumar 2012: 10).

An ANN is essentially a network of connected nodes and for each node, inputs are summed before being linearly transformed (Merkel, Povinelli and Brown 2018: 5). Given that  $x_i$  is the  $i$ th input to the ANN node,  $w_i$  the  $i$ th input weight,  $n$  the number of inputs,  $b$  the bias term and  $o$  the node output, then

$$o = \sigma \left( \sum_{i=1}^n w_i x_i + b \right), \quad (13)$$

Where,

$$\sigma(x) = \frac{1}{1 + e^{-x}} \quad (14)$$

This type of artificial neural network node as per equation (14) is a sigmoid node, which is used for classification machine learning problems, and this will be applied when dealing with growth predictive analytics which is discussed in the next section. For regression problems for which the output should be continuous, which is the basis for the interest in sales predictive modelling in this section, the network final node is typically linear as per equation (15), where,

$$o = \sum_{i=1}^n w_i x_i + b \quad (15)$$

The model of a simple artificial neuron closely relates to the biological model as per the figure below. The diagram shows the functioning of the relationship between the input signals from the dendrites (covariates) and the output signal (response variable). Each dendrite's signal is weighted as per its importance, then the cell body sums up the input signals before being passed on according to the activation function  $f$ .

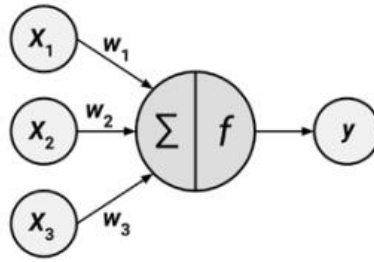


Figure 36: Artificial neural network representation

Source: (Lantz 2019: 220)

Due to the flexibility in addressing outliers, missing data, multicollinearity, and nonlinearities in increasing complex data structures, ANNs have been widely adopted for robust building predictive models (Gepp and Kumar 2012: 10; Merkel, Povinelli and Brown 2018: 4). Their advantage lies in their versatility in that they can be applied to almost any learning task be it numeric prediction, classification or even unsupervised learning tasks and perform extremely well compared to other algorithms (Youn and Gu 2010: 122; Lantz 2019: 207; Leo, Sharma and Maddulety 2019: 8). However, ANN is criticised for being a ‘black box’ approach, in that its internal computations are hidden from the user and thus limits full understanding of how it arrives at its final results (Youn and Gu 2010: 122; Gepp and Kumar 2012: 10). Despite these shortcomings, we aim to use this otherwise powerful method in line with previous studies and compare it with other popular learning algorithms, specifically least squares, LASSO (for numeric prediction) and logistic and support vector machine (for classification, as per the next section) (Youn and Gu 2010: 125; Crane-Droesch 2017: 13; Leo, Sharma and Maddulety 2019: 8). In addition, according to the researcher’s knowledge there are currently no studies that have used this approach in comparison with other algorithms in predicting SMME sales and growth in KZN.

#### 6.4 Growth Performance Predictive Analytics<sup>8</sup>

While sales predictions are critical in order to organise resources in the company, especially to inform short- and medium-term planning (Punam, Pamula and Jain 2018: 617; Tsoumakas 2019: 441), the ability to predict growth likelihood is of great interest

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<sup>8</sup> A paper based on this section was published as a journal article: Zhou, H. and Gumbo, V. 2021. Comparative analysis of a traditional and machine learning techniques in predicting SMMEs growth performance. *Academy of Entrepreneurship Journal*, 27(3): 1-12.

too. The latter provides a reflection of the company's acceptance in the marketplace and thus its future direction (Lussier 1995: 17; Šarlija et al. 2016: 1781; Megaravalli 2017: 125; Te 2018: 21). Besides this, individual SMMEs themselves and various other stakeholders like the policy makers are interested in growth forecasts, because it is growth-oriented firms that are considered to be key in stimulating economic growth (Šarlija et al. 2016: 1781; Megaravalli 2017: 126). Investors and financial institutions would also base their investments or financial support decisions on the growth prospects of the SMME (Lussier 1995: 17), which further amplifies the importance of accurate growth predictions (Megaravalli 2017: 132). Some of the benefits for accurate business growth predictions include proactive engagements to get assistance if the growth forecast shows a downward trend. Also, early identification of failing businesses, would allow corporates for instance to review alternatives and establish relationships with businesses showing positive growth prospects (Gepp and Kumar 2012: 2). Cheriyan et al. (2018) charged that, with accurate predictions, the firm would be able to improve market share growth through enhanced revenue generation by focusing on key drivers.

The findings in Chapter 3 showed that growth is not a random walk as postulated by the stochastic theory (Stam 2010: 131), and in Chapter 4, key growth drivers for KZN Province manufacturing SMMEs were established. The analysis in Chapter 5, showed lack of enabling tools by SMMEs to enhance growth performance and thus long-term survival. This provided the impetus for assessing emergent techniques that can be used for conducting growth predictive modelling. In this section, I thus aim to explore and identify the best machine learning algorithm that can be used by SMMEs and various stakeholders to perform growth predictive modelling. Following previous related studies (Šarlija et al. 2016: 1782; Megaravalli 2017: 129; Cheriyan et al. 2018; Te 2018: 38), the modelling is a classification process, with firms that experienced positive growth between 2015 and 2017 being categorised as 1 and 0 otherwise. In this section, together with ANN that has already been discussed, logistic regression and SVM supervised learning algorithms are harnessed.

#### **6.4.1 Logistic regression**

Logistic regression analysis is a long-standing and preferred classification technique mainly used for failure predictions (Lussier 1995: 15; Youn and Gu 2010: 122). The

approach has also been widely used in credit risk management (Megaravalli 2017: 126; Leo, Sharma and Maddulety 2019: 8). Following Megaravalli (2017: 126), the same idea has been adapted and applied to firm growth analysis. Logistic regression employs maximum likelihood to build an accurate classification predictive model (Lussier 1995: 11). The approach that has since been adapted for machine learning tasks (Te 2018: 64) has a number of advantages, mainly in that it takes a non-linear regression form, but regression type model diagnostics can be used to assess model fit, independent variables contributions and the influence of individual observations on the final model (Youn and Gu 2010: 122). Following (Casella, Fienberg and Olkin 2017: 132), logistic regression is given by the equation (16)

$$\log \left[ \frac{p(X)}{1 - p(X)} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p \quad (16)$$

where  $p(X)$  denotes outcome (growth) probability,  $\beta_0$  is the intercept,  $\beta_1, \beta_2, \dots, \beta_p$  represent model coefficients,  $X_1, X_2, \dots, X_p$  are growth performance drivers.

In a logit form, the odds of growth will be defined as  $p(X)/(1 - p(X))$  and by solving for  $p(X)$  as per equation (17), the probability of growth is

$$p(X) = \frac{e^y}{1 + e^y} \quad (17)$$

where  $y = \log[p(X)/(1 - p(X))] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p$

When the trained logistic regression algorithm is applied to the test data, it gives the resulting regressand which lies between 0 and 1, representing the SMME's growth probability. Generally, the cut-off point is 0.5, to determine if the company will grow or not in the next period (Youn and Gu 2010: 123; Megaravalli 2017: 127). Implying that an SMME with a  $p(X)$  value equal to or more than 0.5 is classified into the growth category; otherwise, it is a non-growth entity. However, just like other models, logistic regression has its own drawbacks. As a probability model, it requires a specific functional association between the regressand and the regressors. Also, these probability models may compute inaccurate predictions if proportions of the growth and non-growth in the sample differ from those in the actual population (Youn and Gu 2010: 122).

### 6.4.2 Support Vector Machine

SVM was introduced in the 1990s and over time has become one of the widely used machine learning algorithms in solving classification problems (Pal and Mather 2005: 1007; Casella, Fienberg and Olkin 2017: 337; Aziz and Dowling 2019: 6; Kolkman and van Witteloostuijn 2019: 9; Leo, Sharma and Maddulety 2019: 13). The technique is also referred to as a sparse kernel decision machine which build its models by avoiding computing posterior probabilities (Awad and Khanna 2015: 40). This algorithm classifies data points by applying a maximum margin hyperplane that optimally and efficiently separates different classes (Van Liebergen 2017: 62; Lantz 2019: 243). The main goal of the SVM is mapping the input space to a higher dimension and in that transformed feature space then produces a flat boundary known as the hyperplane that effectively separates data into fairly homogeneous classes (Clark 2013: 33; Shalev-Shwartz and Ben-David 2014: 202; Lantz 2019: 241). Essentially, this algorithm combines aspects of various statistical approaches to create groups based on input attributes to classify and make accurate predictions (Pal and Mather 2005: 1007; Aziz and Dowling 2019: 7). The SVM has different forms: the hard margin, soft margin, and kernel (Awad and Khanna 2015: 43; Lantz 2019: 242-247).

As demonstrated by Lantz (2019: 244), the hard margin, which assumes linearly separable points, is a classifier that aims to find a hyperplane in  $n$ -dimensional space, using the following equation

$$\vec{w} \cdot \vec{x} + b = 0 \quad (18)$$

where  $\vec{w}$  is a vector of  $n$  weights and  $b$  is the bias. The main goal of equation (18) is to identify a set of weights which as per the following inequalities, specify two hyperplanes:

$$\vec{w} \cdot \vec{x} + b \geq 1 \quad (19)$$

$$\vec{w} \cdot \vec{x} + b \leq -1 \quad (20)$$

It is key that the hyperplanes above are specified in such a way that all points belonging to one class fall above the first hyperplane and all points belonging to the other class fall below the second hyperplane. The distance between these two planes

is defined by vector geometry as  $\frac{2}{\|\vec{w}\|}$ , with  $\|\vec{w}\|$  indicating distance from the origin to  $\vec{w}$ , which is referred to as the Euclidean norm. Since the Euclidean norm is the denominator, then to maximise the distance, the former should be minimised and where  $y$  indicates the transformed class values to either 1 or -1, the task is formulated as,

$$\min \frac{1}{2} \|\vec{w}\|^2 \quad (21)$$

$$s. t. y_i(\vec{w} \cdot \vec{x} - b) \geq 1, \forall \vec{x}_i$$

Unlike the former, soft margin is useful when data is not completely linearly separable and here the slack variables  $\xi_i$  are introduced to the above objective function to allow for errors in misclassification. Instead of finding the hard margin, in this case, the algorithm attempts to minimise the total cost  $C$  such that now the optimisation problem is revised as per the function below:

$$\min \frac{1}{2} \|\vec{w}\|^2 + C \sum_{i=1}^n \xi_i \quad (22)$$

$$s. t. y_i(\vec{w} \cdot \vec{x} - b) \geq 1 - \xi_i, \forall \vec{x}_i, \xi_i \geq 0$$

Finally, kernel SVM is used when a problem in input space is not linearly separable and soft margins cannot find a robust separating hyperplane to minimise misclassified data points and allow for generalisations. The method is attractive as the overhead on going to kernel space is minimal compared with learning a non-linear surface. The kernel SVM is demonstrated by Awad and Khanna (2015: 49) as per equation (23):

$$K(x, u) = \sum_r \varphi_r(x) \varphi_r(u) \quad (24)$$

where  $\varphi(x)$  belongs to the Hilbert Space as also explained by (Shalev-Shwartz and Ben-David 2014: 215), and the main kernel functions includes linear, polynomial, sigmoid, gaussian radial basis and randomised blocks analysis of variance (Awad and Khanna 2015: 49).

The preceding discussion shows that SVM is versatile and can be adapted for almost any learning task to model a wide range of relationships either simple or highly



complex (Casella, Fienberg and Olkin 2017: 351; Lantz 2019: 241). Compared to some traditional techniques like logistic regression and discriminant analysis, SVM has been found to outperform them in solving classification problems (Leo, Sharma and Maddulety 2019: 8). Some studies have indicated that SVM performs better than some emerging machine learning algorithms like ANN, as it does not suffer from the classical multilocal minima which ANN is prone to (Pal and Mather 2005: 1009; Awad and Khanna 2015: 40). SVM, unlike ANN, determines model complexity automatically through selection of the support vectors number (Awad and Khanna 2015: 40). However, the approach has also some limitations which mainly includes that it is computationally expensive to find best model, slow in training datasets with many features and results in hard-to-interpret 'black box' results (Kolkman and van Witteloostuijn 2019: 9; Lantz 2019: 248).

## **6.5 Empirical Application**

This section details the steps that are taken in the empirical application of the five supervised machine learning algorithms on the KZN manufacturing SMMEs panel data for the period between 2015 and 2017, from McFah Consulting. These steps as per Figure 37 below culminate in the development of the performance predictive model that can be harnessed by SMMEs and pertinent stakeholders in the province. The final predictive models are underpinned by machine learning techniques, which is crucial for both practitioners and other stakeholders owing to the impact of 4IR on the sector. Each step as per the figure below are further unpacked in detail under subsequent sub-sections.

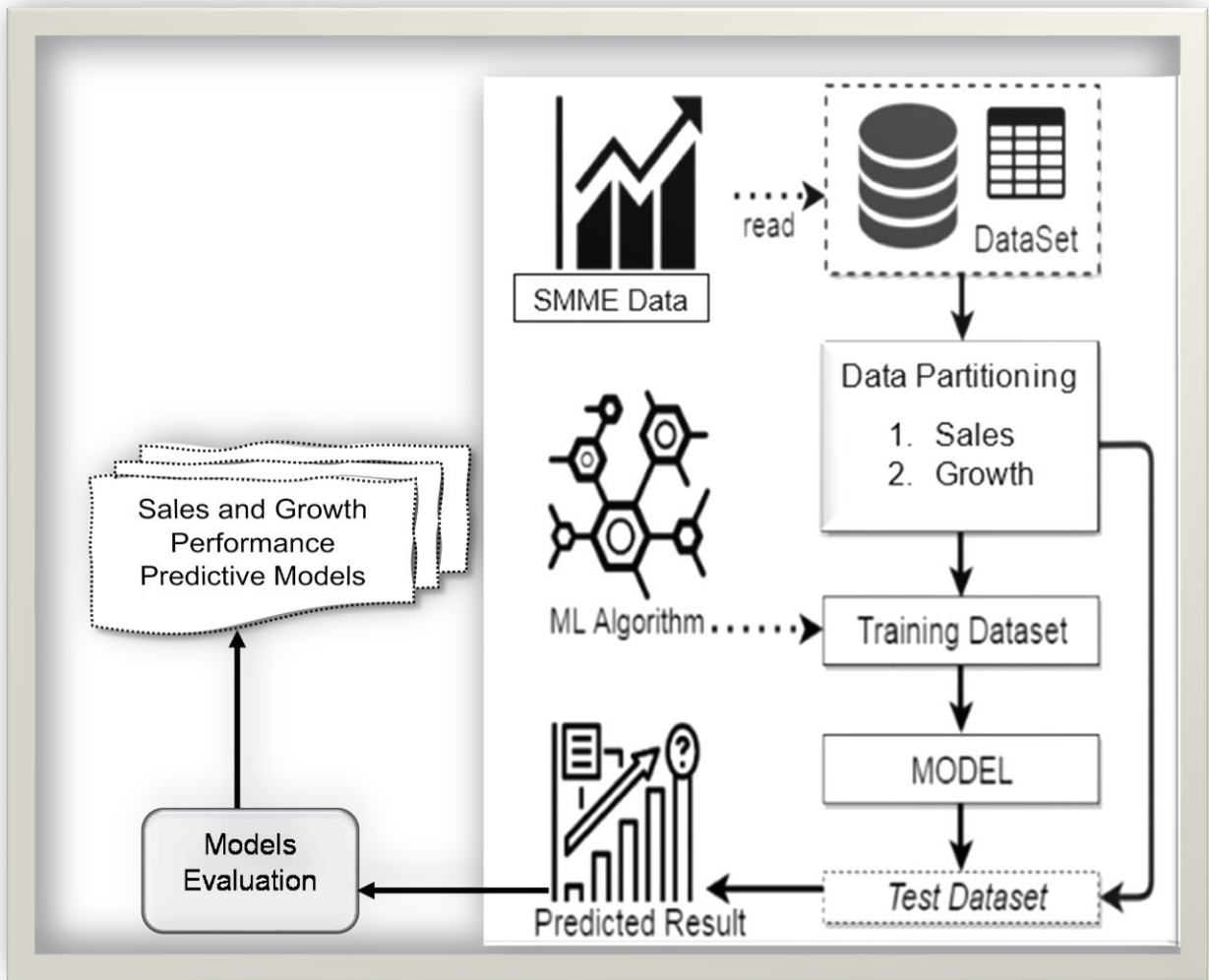


Figure 37: Overview of SMME performance predictive model development steps

### 6.5.1 SMME Dataset

The longitudinal dataset that was used in Chapters, 2, 3 and 4 was used for the development of both sales and growth predictive models given its depth compared to the follow-up cross-sectional survey data in Chapter 5. The dataset was reviewed and analysed through R Programming for Statistical Computing version 4.0.2. Data exploration was done in Chapter 2 and in Chapter 4, hypothesis tests were performed through which significant 11 variables were selected from 18 variables for sales performance. These variables were Pemp, Temp, Temp2, Prod, TA, CoAge and Unemp at 1% level of significance, DigMkt and CoAge2 at 5% level of significance, as well as EntAge and EntAge2 at 10% level of significance (Zhou and Gumbo 2021e: 11). For growth performance 5 from 19 variables were identified post hypotheses tests.

The main drivers were EntAge, Sales, TA, CoAge and DigMkt at 1% level of significance (Zhou and Gumbo 2021a: 7). This step was important as it allowed me to establish key drivers with significant impact on each of the target variables and discarding those with less effect and thus minimising the challenge of data redundancy (Cheriyān *et al.* 2018; Punam, Pamula and Jain 2018: 618). Importantly the hypothesis testing step enabled the building of both sales and growth predictive performance models using only significant variables which enhances their accuracy and reliability when applied to real world problems (Venishetty 2019: 20).

### **6.5.2 Data Partitioning**

The next step was the data partitioning, which is one of the critical elements in machine learning. To ensure enhanced model performance, the common practice is to divide data into two parts, which is also known as training and test data (Bauer 2020: 4). Training data is used for model training and the testing also known as out of sample data is used for model validation (Mohammed, Khan and Bashier 2016: 14; Te 2018: 63). The step ensures that algorithms fitting well on training data are examined to check if they are not overfitting the data by applying them on the testing (unseen) labelled data (Mohammed, Khan and Bashier 2016: 14). For this study, following a related study (Delen, Kuzey and Uyar 2013: 3973), for both sales and growth predictive models, a 70:30 split ratio for the training and testing data was used. The predictions from three algorithms for sales and three for growth were then evaluated as per the next step.

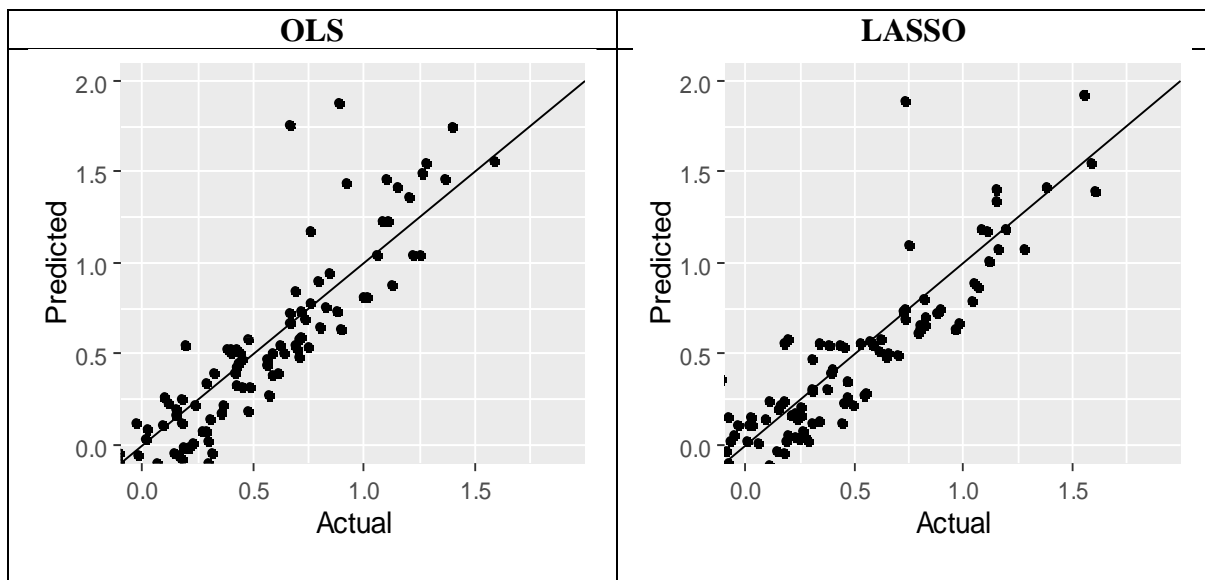
### **6.5.3 Model Evaluation**

This is also another important part of the machine learning building process, as the performance of all the algorithms is assessed to select the one which provides a better predictive result on the hold-out-sample (Cheriyān *et al.* 2018). For the sales models, the researcher some of the commonly adopted evaluation metrics, namely, Mean Squared Error (MSE), Mean Absolute Error (MAE), Median Absolute Error (MDAE), Root Mean Squared Error (RMSE), and Mean Absolute Scaled Error (MASE). For all of them, the lower the metric the better the performance of the algorithm in fitting the test data (Hyndman and Koehler 2006: 682; Muthukrishnan and Rohini 2016: 19; Casella, Fienberg and Olkin 2017: 29; Punam, Pamula and Jain 2018: 617; Kolkman

and van Witteloostuijn 2019: 15; Tsoumakas 2019: 445). For the growth predictive modelling, this study relied on the confusion matrix, which is mainly used for binary classification model assessment, from which the following key performance measures were derived: accuracy, sensitivity and specificity (Delen, Kuzey and Uyar 2013: 2013; Te 2018: 73).

### 6.5.3.1 Sales performance modelling

This section shows the empirical application of the trio of least squares, LASSO and ANN machine learning algorithms<sup>9</sup>. The assessment for sales predictive modelling was done in two parts. The first was graphical visualisation, comparing the algorithm's predictions and actual test data sales figures. Figure 38 shows the comparison on the performance of the three machine learning algorithms. In line with Zhou and Gumbo (2021b:13), the figure shows that least squares and LASSO algorithms' predictive performances are closely related and neither fit the data well compared to ANN, which performs extremely well. The visualisations indicate that ANN provides the most accurate sales predictions for the KZN manufacturing SMME sector. Further to the graphical comparisons, various metrics were also used to assess performance and select the best performing model.



<sup>9</sup> The `plm`, `glm` and `nnet` functions in R were used to fit the pooled OLS, LASSO and ANN models, respectively.

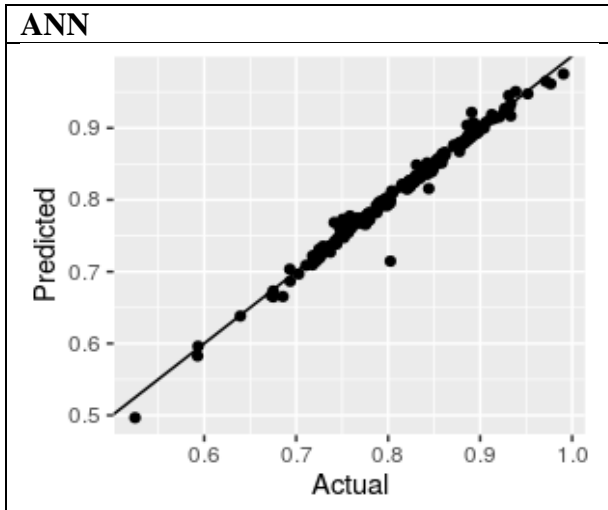


Figure 38: Sales predictive models' performance visualisations

Table 14 below, essentially confirms the findings on Figure 38, as the ANN clearly outperforms other machine learning algorithms. The worst performing as would have been expected was OLS, with LASSO compared to the former showing some improvement on all the assessment metrics as per the following table. Based on the assessment below and preceding graphical analysis, ANN was thus selected as the best performing predictive model.

**Table 14: Sales predictive models performance assessment**

	<b>MSE</b>	<b>RMSE</b>	<b>MAE</b>	<b>MASE</b>	<b>MDAE</b>
<b>OLS</b>	1.085967	1.042097	0.4517873	0.6902265	0.2088684
<b>LASSO</b>	0.08130493	0.2851402	0.1868477	0.2065746	0.1474003
<b>ANN</b>	0.000259	0.01611	0.0120	0.1389323	0.0072478

### 6.5.3.2 Sales performance predictive models

Given the superior predictive potency of the ANN, Figure 39 below, shows the proposed sales prediction model. The proposed sales predictive model as per Figure 39 shows the identified eleven predictor variables, the adopted machine learning algorithm, which is the feedforward neural network, with one hidden layer and three neurons.

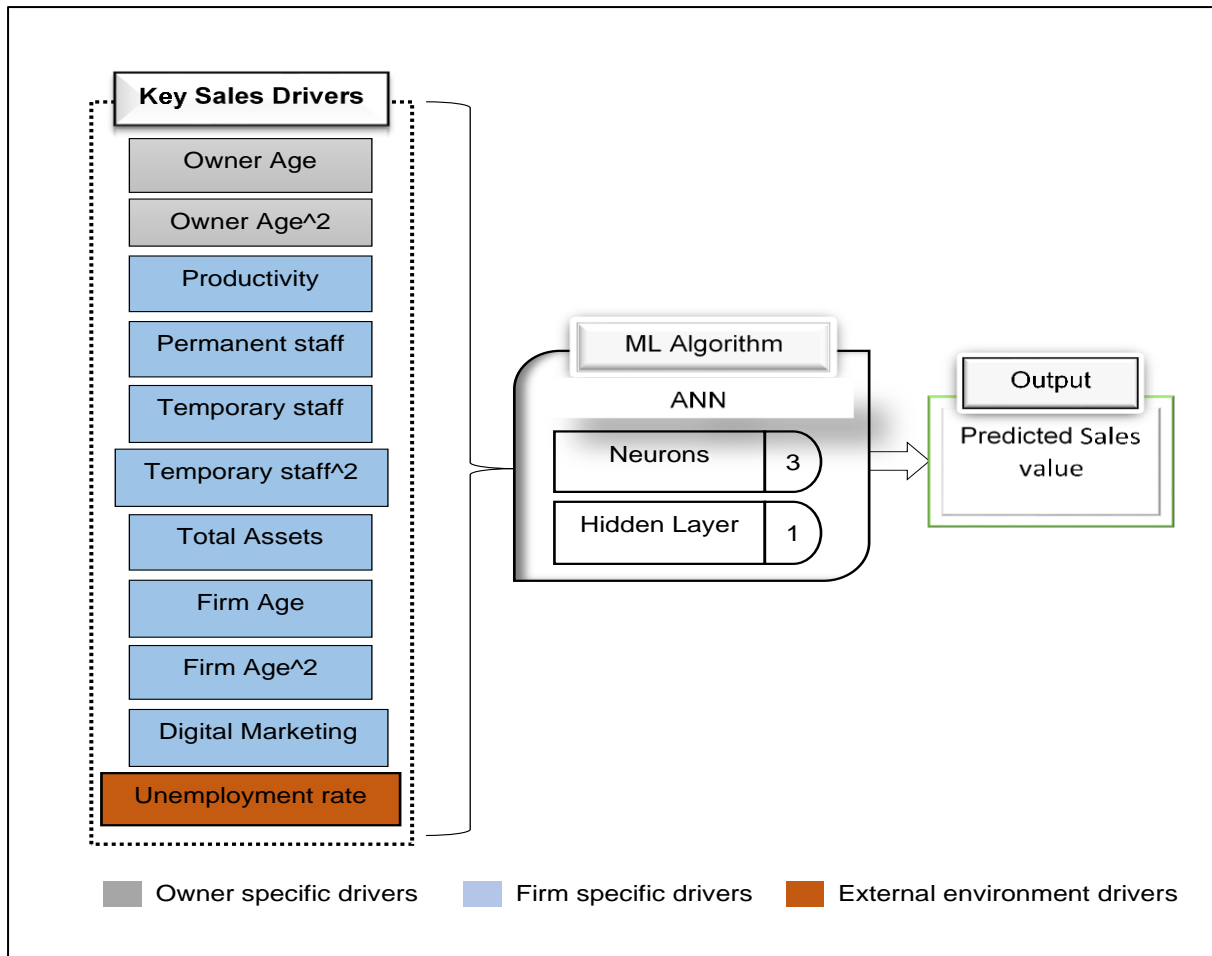


Figure 39: Sales performance predictive model

Using this new predictive model which incorporates both linear and non-linear drivers, manufacturing SMMEs in the province can easily forecast sales performance and thus inform effective strategies to achieving set targets with minimal variations (COSO 2016: 24). The predictive model is also of great benefit to SMMEs in KZN as they operate in ever-changing business environments and thus need to conduct scenario analyses and ensure that they properly adapt to internal or external movements (Jofre 2011: 34). The predictive model powered by machine learning algorithms will enable SMMEs to focus on key strengths and opportunities while proactively managing weaknesses and threats through formalised risk management strategies so as to achieve superior performance targets (Crovini 2019: 18; Leo, Sharma and Maddulety 2019: 1; Zhou and Gumbo 2021e: 15).

An assessment of the variable importance for each of the predictors from the ANN algorithm was also conducted using the `olden`<sup>10</sup> function in R as per Figure 40 below. Some studies have noted the importance of diagnostic information like relative importance of predictor variables, especially when using complex techniques like ANN, which are black boxes as they provide limited insight on variables relationship with the regressand (Braun and Oswald 2011: 331; Beck 2018: 2). Establishing the importance of each variable is thus key in enabling manufacturing SMMEs in KZN to focus on top-ranking factors so as to achieve their sales performance targets through optimal deployment of resources. Through this, SMMEs, especially given their usually limited resources are able to plan and implement practical strategies centred on highly ranked positive contributors while implementing mitigation steps to minimise the adverse impact of top-ranked negative contributors to sales performance. The following Figure 40 shows the ranking of various variables and thus how they contribute to SMME sales performance.

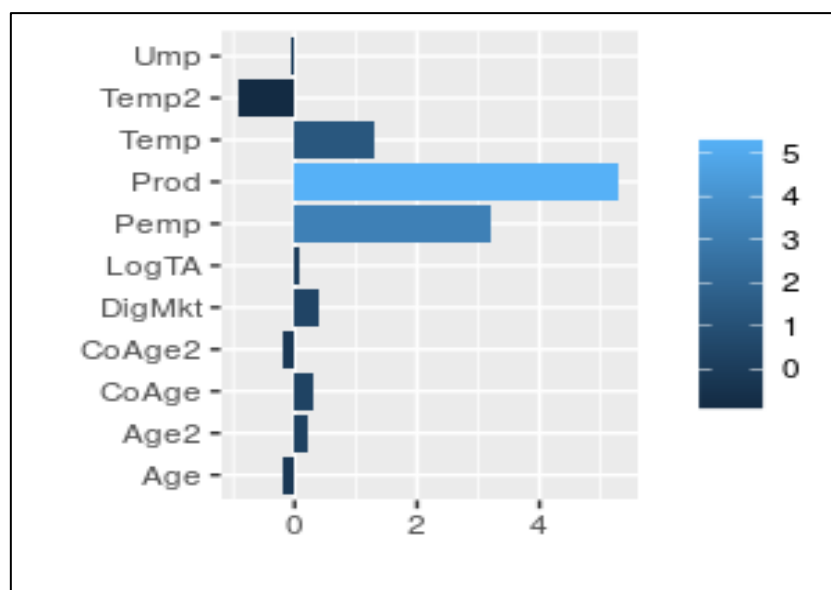


Figure 40: Key sales performance drivers' relative importance

From the above visualisation, SMMEs should largely pay attention to permanent employees followed by the combination of temporary workers and productivity in order to positively drive sales performance. The predictor importance assessment revealed

<sup>10</sup> Olden is the flexible variable importance approach which uses the connection weights algorithm. This method is more preferred ahead of the Garson function because unlike the latter, the olden function shows the relative contributions of each predictor in both magnitude and sign as well (Beck, M. W. 2018. NeuralNetTools: Visualization and analysis tools for neural networks. *Journal of statistical software*, 85 (11): 1.)

that excessive use of temporary staff has significant adverse impact on sales, something SMMEs should aim to avoid in order to maximise on their sales performance. The sales predictive model is mainly an internal tool, which is key in assisting individual SMMEs make effective short- and long-term plans. However, the performance of SMMEs is of interest to various organisations who would like to evaluate the long-term direction of these enterprises. Thus, the next section focuses on the aspect of firm growth.

### 6.5.3.3 Growth performance modelling

In this section the comparative assessment of growth performance predictive modelling machine learning machine learning algorithms<sup>11</sup>, which are logistic regression, ANN and SVM, was conducted. Following Delen, Kuzey and Uyar (2013), Table 15 shows the output from the three models using the training and test datasets. The results as established in a recent paper (Zhou and Gumbo 2021a: 7) showed that overall, all the three techniques managed to make more correct than incorrect predictions during training and also when applied on the test dataset.

**Table 15: Growth modelling confusion matrices**

Table 16 Confusion matrix using train and test datasets									
Output based on train data set						Output based on test dataset			
Algorithm		Non-Growth (0)	Growth (1)			Non-Growth (0)	Growth (1)		
Logistic	Non-growth (0)	3	1	Correct	207	0	1	Correct	86
	Growth (1)	60	204	Wrong	61	27	86	Wrong	28
SVM	Non-growth (0)	0	0	Correct	204	0	0	Correct	87
	Growth (1)	64	204	Wrong	64	27	87	Wrong	27
ANN	Non-growth (0)	18	5	Correct	215	3	6	Correct	88
	Growth (1)	48	197	Wrong	53	20	85	Wrong	26

<sup>11</sup> The in-built glm function was used to fit the logistic regression model, caret function for ANN and e1071 function for the SVM.



However, while the above table provides some informal insight into the performance of the three predictive models, there is need to use formal measures to evaluate and compare their accuracy in predicting whether an SMME will grow or not in the next period. Consequently, the performance of each algorithm was evaluated as per Table 16 below using the quartet of accuracy, misclassification, sensitivity, and specificity (Delen, Kuzey and Uyar 2013; Megaravalli 2017; Te 2018). Accuracy is used to measures the model’s correct classification of growth and non-growth firms into their categories. On the other hand, misclassification measures the percentage of growth and non-growth SMMEs classified into wrong categories, and in mathematical terms this metric is defined as 1-Accuracy. Specificity measured the ratio of correctly classified non-growth SMMEs divided by the sum of non-growth SMMEs. Finally, sensitivity, which is also known as recall, measures the proportion of correctly predicted growth firms divided by the total of SMMEs correctly classified as growth and misclassified as non-growth.

**Table 17: Growth predictive models’ assessment**

	Evaluation based on test dataset		
	Logistic	SVM	ANN
Accuracy	0.754	0.763	0.759
Misclassification	0.246	0.237	0.241
Specificity (True Negative Rate)	0.000	0.000	0.130
Sensitivity (True Positive Rate)	0.989	1.000	0.934

The preceding assessment of the three techniques shows that SVM has superior accuracy and true positive (sensitivity) rates and has the least misclassification errors, while ANN performs better on specificity compared to the former. From Table 16 above, SVM can accurately classify an SMME that is likely to grow into the correct class “1” but performs poorly in classifying a no-growth firm into the correct class “0. On the other hand, ANN performs relatively well compared to both SVM and logistic in classifying a no-growth firm into its proper category. Overall, logistic regression is the worst performing technique compared to SVM and ANN algorithms. The findings align with previous studies (Aziz and Dowling 2019; Leo, Sharma and Maddulety 2019) which highlighted the superiority of SVM in classification problems compared to other techniques like ANN and logistic regression. Based on these findings, a growth

predictive model, incorporating SVM was developed which can be used by both SMMEs and key stakeholders to conduct growth predictions.

#### 6.5.3.4 Growth performance predictive model

Figure 41 below, depicts the manufacturing SMMEs growth performance predictive model. The model shows the identified five covariates and the machine learning algorithm, which is the SVM with linear kernel and the cost of 0.09 and, as already highlighted, the resultant growth prediction will be “1” for a company that will grow in the next year and “0” otherwise. This newly developed predictive model besides practitioners themselves can be largely beneficial to various stakeholders across the SMME ecosystem in KZN and beyond. By establishing the growth prospects of an enterprise, both internal and external stakeholders can make informed proactive decisions (Megaravalli 2017: 126; Zhou and Gumbo 2021a: 10). For instance, suppliers can review vendor agreements, with firms that may stagnate or experience negative growth in the future, while SMME owners can proactively adapt their strategies based on predicted growth performance. Importantly government entities like SEDA, TIKZN, SEFA and LED agencies, among others, can harness this model to predict SMME growth trajectory and devise data driven interventions.

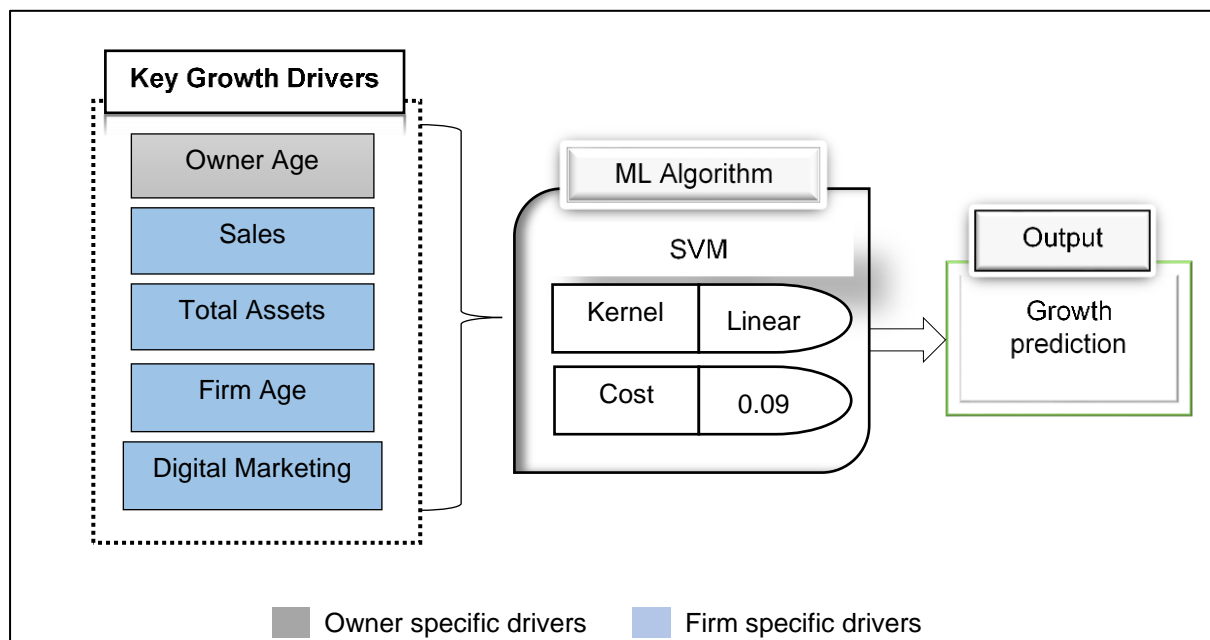


Figure 41: Growth performance predictive model

An assessment of the contributions of each variable to growth performance was performed as per Figure 42 below. As already highlighted, establishing the relative importance of pertinent stakeholders can help interested parties to prioritise areas of interventions to enhance SMME growth in the province (Braun and Oswald 2011: 331). The variable importance assessment showed that company age and sales are highly and positively ranked drivers; however, the importance of company age tends to decrease over time. On the other hand, total assets and entrepreneur’s age have a negative effect on the growth performance of SMMEs in KZN Province.

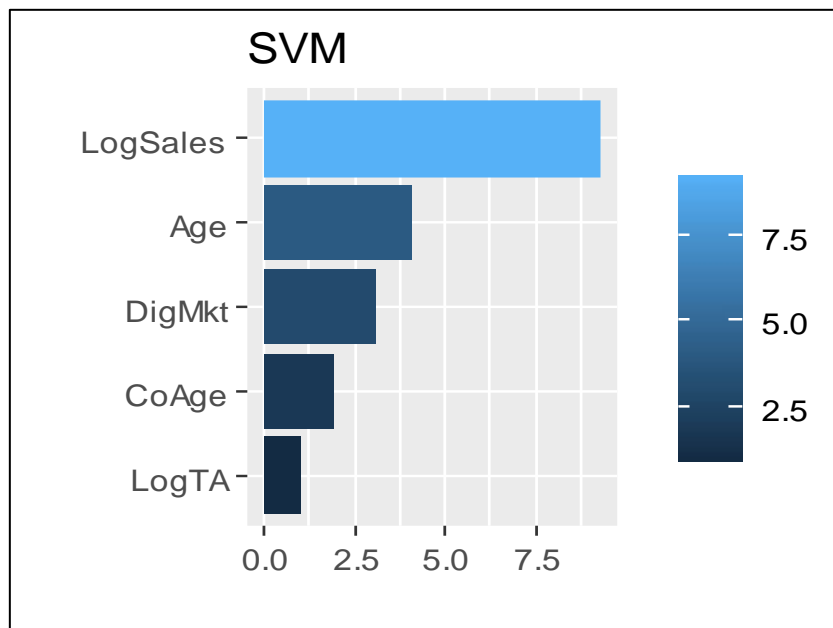


Figure 42: Key growth performance drivers' importance

With this summary as per Figure 42, various players can devise action steps in order to effectively minimise the impact of drivers with negative while leveraging those with positive effect on SMME performance. Given the limited resources of SMMEs and even various other support organisations, variable importance enables them to focus on the most important factors to enhance their sustainable growth.

## 6.6 Conclusion

The chapter used the panel data and based on various findings from the previous chapters, assessed five machine learning models to identify the best approach to use in predicting sales and growth performance of manufacturing SMMEs in KZN. The chapter focused on two main areas. The first focused on sales predictive modelling, in

which the trio of OLS, LASSO regression and ANN machine learning algorithms were reviewed and applied. Using graphical visualisations and commonly used performance assessment metrics, the predictive models' predictive performance was evaluated. The assessment showed that ANN was superior to the other two machine learning approaches, followed by LASSO regression. This finding aligns with previous studies, which found that neural networks yield a powerful learning paradigm and continue to show cutting-edge performance on various learning tasks (You 1995: 122; Shalev-Shwartz and Ben-David 2014: 268; Leo, Sharma and Maddulety 2019: 8; Zhou and Gumbo 2021e). Subsequently the sales performance predictive model based on ANN was developed and the relative contribution of each variable was computed.

The next focus area reviewed various growth predictive modelling techniques, which attempted to predict growth and no-growth SMMEs. Together with ANN, logistic regression and SVM were applied on the SMME data informed by findings from Chapters 3 and 4. Using the confusion matrix, each machine learning algorithm's accuracy, misclassification, specificity, and sensitivity were computed. From the assessments, SVM performed better in terms of overall accuracy and other measures except for specificity. As already indicated, this shows the predictive potency of SVM in performing accurate classifications (Pal and Mather 2005: 1009; Enkono and Suresh 2020; Zhou and Gumbo 2021a: 10). Consequently, the growth performance predictive model for use by various stakeholders was developed. Based on the SVM, output variable importance was computed as well.

Both models provide a solid basis for the development of structured strategies and risk management plans by SMMEs (Zhou and Gumbo 2021e: 15) as well as informed support by various support organisations (Zhou and Gumbo 2021a: 10), something that has been lacking in the province. Finally, the predictive models provided a starting point for the development of an artificial intelligence application for SMMEs that have since been accepted for patenting and ultimately commercialisation through DUT's Technology Transfer Innovation unit. The manufacturing SMMEs will be able to harness the application to inform the development of their strategic and operational plans. Instead of being vulnerable to key risk drivers, SMMEs will be able to effectively manage them to achieve sustainable performance and long-term growth.

## **CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS**

### **7.1 Introduction**

For developing economies like South Africa to drive sustainable economic growth, it is crucial that SMMEs are embraced, especially those in labour-absorbing industries. This makes it fundamental that the nature of factors influencing the performance of these enterprises is well understood to inform effective policy formulation. However, most empirical studies on this area have been conducted in developed countries and, due to data limitations, there are very few studies in emerging economies. Understanding of risk drivers, let alone developing predictive models for SMMEs, requires rich data which should ideally be in longitudinal form. Unfortunately, it is seldom available in most developing countries. As such, the thesis used a unique three-year panel data set of 191 manufacturing SMMEs in KwaZulu-Natal, the second largest province in the country by GDP contribution. The main intention was to establish the characteristics, growth distribution and key performance drivers and assess the level of awareness of established drivers among SMMEs. Machine learning algorithms that can be harnessed for sales and growth predictive modelling were also identified and integrated into respective predictive models. Finally, in this chapter, recommendations on practical risk mitigants that could improve SMMEs' sustainable growth in KZN are provided.

### **7.2 Summary of Findings**

Appreciating the role played by SMMEs not only in KZN but in South Africa and beyond, the main goal of this thesis was to identify and model key risk drivers influencing the performance of SMMEs in the manufacturing sector in KZN. The following were the secondary objectives of this study:

- ✓ To explore the main characteristics of manufacturing SMMEs in KZN Province
- ✓ To establish various factors that influence the performance of SMMEs in the manufacturing sector in KZN Province
- ✓ To investigate SMMEs' awareness of identified key risk drivers impacting their performance and adopted intervention strategies

- ✓ To develop performance predictive model using machine learning techniques for SMMEs in KZN Province
- ✓ To outline viable recommendations to improve SMMEs' sustainable performance in KZN Province

The thesis contributes to an enhanced understanding of the role of SMMEs in the manufacturing sector in KZN. In the first chapter, the contributions of SMMEs across the world, in Africa, South African and finally in the province of KZN were highlighted. It was clearly adduced those small enterprises constitute the majority of the firms in the private sector globally and make significant contributions to the socio-economic development in both developed and emerging economies. Despite their contributions, through employment creation, innovation and export activity, manufacturing SMMEs in the country continue to face headwinds, having decreased in number by more than 24% between 2008 and 2015. Compared to other provinces, KZN had the highest mortality rate of small manufacturing firms, with more than 10% of these enterprises in the province having ceased operations between 2017 and 2019. This disturbing trend informed the interest of this thesis in establishing the key performance drivers that influence the performance of manufacturing enterprises.

There was an appreciation of a plethora of previous investigations somewhat related to this enquiry, which, however, differed not only in the data structure used, but also the overall characterisation of the research enquiry. The approach was not only to identify performance drivers as has been largely done before, but in this thesis, they were characterised as risk drivers. This aimed to bring the attention of pertinent stakeholders to the fact that certain drivers either internal or external might be a source of strength or opportunity while others can be of weaknesses or threats, respectively. This meant that the research was not only aimed at establishing whether certain factors impact performance, but rather went beyond that and sought to establish their importance in driving performance. Such an approach would allow SMMEs to systematically leverage on drivers with higher importance ranking and positive effect to drive performance and track those with a negative effect to ensure that their impact is minimised. Such an approach aligns with the nascent ERM concept, which marks a departure from the deterministic view of firm performance and appreciates the

complex relationship between performance, risk drivers and organisational sustainability.

In Chapter 2, it was established that, at global and national levels, there are varying definitions of SMMEs, with no commonly agreed definition. The South African SMME sector was found to be very diverse, including survivalist, micro, small and medium-sized enterprises. The study established that while manufacturing SMMEs constituted only 9% of the total SMMEs in the country, they nevertheless exhibit a stellar performance, being the fourth and third highest source of employment and turnover in the country, respectively. However, many SMMEs in the manufacturing sector continue to struggle despite various forms of interventions running into hundreds of billions of Rands by both the national and provincial governments. In this chapter, it was highlighted that the manufacturing sector and the SMMEs operating therein play a fundamental role in addressing unemployment in KZN. Using three-year panel data from McFah Consultancy, the key attributes of SMMEs in the manufacturing sector were established. The analysis revealed that some SMME characteristics, namely workers, total assets, firm age, and productivity exhibited a strong relationship with performance (Zhou and Gumbo 2021d). These findings implied that performance over time is a function of certain factors, which, of course, will be contrary to one of the stylised facts on firm growth dynamics which claims a random walk firm growth phenomenon.

Consequently, in Chapter 3, the main interest was to establish if the performance of SMMEs in the province was a function of stochastic shocks as claimed by Gibrat's LPE. The validity of theory or lack thereof equally carry some crucial implications for both the practitioner and pertinent stakeholders. Confirmation of Gibrat's Law would have implied that manufacturing SMMEs' growth performance in the province is not influenced by any set of systematic drivers meaning that there is no need for any strategy by SMMEs or policies by the government to drive growth. However, in line with the wider body of literature, the findings showed a departure from the Law, highlighting that small-sized firms grow faster than their larger counterparts. This meant that the manufacturing sector in KZN is relatively healthy, as faster growth among smaller-sized firms is indicative of moving away from concentration or monopolistic behaviour (Zhou and Gumbo 2021c: 150).

The extended version of Gibrat's Law by Jovanovic was also empirically tested. The validity of this theoretical model would imply a passive learning process by manufacturing SMMEs, with efficient ones surviving and those that are not, upon realisation, exiting the market. The findings were contrary to the majority of previous findings which established a negative relationship between firm size and growth performance. Holding size constant, the results showed an overall positive effect of age on growth, contrary to the PLM model which claims an inverse relationship. This showed that older firms are at an advantage owing to their age compared to smaller-sized firms which struggled to establish networks in the market, owing to their newness (Zhou and Gumbo 2021c: 152).

In Chapter 4, having found no evidence for Gibrat's Law, two theoretical models were harnessed to investigate and establish the key drivers impacting the performance of manufacturing SMMEs in KZN. Despite the ubiquity of firm performance theories, the duo of the theory of the growth of the firm postulated by Penrose as well as the strategic management theory provided the researcher with an enabling basis to investigate key risk drivers (Zhou and Gumbo 2021b). These theoretical models whose claims are complementary, effectively directed this enquiry. The Penrosian view allowed appreciation of the role of internal drivers on SMME performance. On the other hand, the strategic management theory came in as an extension of the former. Without necessarily disputing the claims of the Penrosian worldview, strategic management theory appreciates the role of internal and external factors as well as firm location on performance. Thus, using the same panel data from McFah Consultancy, a total of 19 hypotheses were derived for empirical investigation. These hypotheses were grouped into four main groups, entrepreneur-specific factors (three hypotheses), firm-specific drivers (12 hypotheses), external drivers (three hypotheses) and location (one hypothesis). Based on these hypotheses, the conceptual framework was derived, showing the expected relationship between firm performance and these key drivers.

Given the complexity of the drivers and the response variable – performance, the innovative and powerful panel data modelling technique, the REWB, was employed. This technique unlike others allowed the study to simultaneously establish both the within and between effects of each performance driver on performance. Performance



was measured by two different but related variables: annual sales and their year-on-year growth over three years. The first part of the analysis showed that entrepreneur age had a U-shaped relationship with performance (initially having a negative effect which then turns positive over time), productivity (positive), permanent workers (positive). Temporary workers had an inverted U-shaped relationship with performance (initially having a positive effect which then turns negative with an increase in the number of temporary workers), total assets (positive), company age (negative), digital marketing (negative), and unemployment (negative). However, when growth proxied performance, some key drivers which had a significant effect on sales were dropped and others initially not significant were added, and the main drivers were entrepreneur age (negative), sales (positive), total assets (negative), firm age (positive) and digital marketing (positive). Armed with this empirical evidence, there was a need to assess the level of awareness among SMME owners on the effect of the identified key drivers which were the source of both risk and opportunity for SMMEs.

In Chapter 5, a survey among participants whose data was used in previous chapters was conducted. The main thrust was to establish if the SMME owners were aware of the impact of identified drivers on their companies' performance. The survey findings which were descriptive, highlighted that the majority of SMMEs used sales as the main measure of performance. The results on the awareness of key risk drivers were concerning, with owners misplacing the impact of internal drivers, website use, digital marketing, company age and temporary workers on performance (Zhou, Dash and Kajiji 2021). Further to that, it was also noted that SMMEs expect their location to have a positive impact on performance, contrary to empirical findings. While owners showed that they understood the impact of certain risk drivers on their operations, their misunderstanding of some variables presents a significant challenge as their strategies would be based on wrong assumptions regarding those drivers. Furthermore, it was established that SMMEs largely rely on generalised intervention strategies to manage the risk emanating from identified drivers, which are not customised to their specific operations. However, it was promising to note that owners agreed on the need for a predictive model they can embrace to inform futuristic decision-making.

Having noted the overwhelming convergence by SMME owners on the need for a performance predictive model, in Chapter 6, six machine learning algorithms were harnessed and their ability to accurately model performance evaluated. For sales predictive modelling, the trio of Least Squares, LASSO and ANN were used. Using five different model evaluation metrics, ANN performed better than the other two (Zhou and Gumbo 2021e: 14). For growth predictive modelling, SVM, ANN and logistic regression machine learning techniques were used. Based on metrics computed from each model's confusion matrix, overall SVM performed better than ANN and logistic regression, respectively (Zhou and Gumbo 2021a: 10). Variable importance utilising features that were used to build the two machine learning algorithms was performed and showed that productivity and permanent workers are critical in driving SMME sales performance. On the other hand, turnover was highly ranked as an important variable in driving SMME growth performance. Finally, two sales and growth performance predictive models were constructed incorporating the best performing machine learning algorithms. The model formed the foundation for the development of a dedicated SMME sector machine learning application.

### **7.3 Recommendations**

The findings above are key for the development of ideal and viable risk mitigants that could improve SMMEs' sustainable performance in KZN. The following are key areas SMMEs should systematically attend to, to sustainably drive performance:

Labour productivity is a critical element to driving the sales performance of small enterprises in the manufacturing sector and should be given adequate attention to enhance competitive advantage. As has been highlighted in literature and corroborated by empirical investigation, including a recent paper (Zhou and Gumbo 2021d: 21), labour productivity is key in driving firms' ability to generate higher levels of sales turnover. Manufacturing SMMEs in the province should closely monitor their productivity levels and define minimum thresholds which must not be breached as that will pose a performance risk for the organisation. The KZN provincial government and other entities involved in SMME development, like SEDA, TIKZN, EDTEA and incubators should take a leading role in devising training courses for both owners and workers that can in turn enhance their productivity.

Permanent workers have been found to be crucial for SMMEs, as they positively influence sales performance. To leverage on this type of employment, firms should continuously recruit skilled personnel and from time-to-time design relevant training workshops to align their skills with the changing milieu. Besides adequate training, in line with extant literature, SMMEs should provide their permanent employees with competitive salaries and innovative benefits. These will entrench their interest in the organisation which minimises challenges of absenteeism and high staff turnover. Essentially, talent management should be the top-ranking priority of the SMMEs to mitigate the risk of losing experienced and skilled employees, as this will negatively impact on sales performance and ultimately survivability.

Just like permanent employees, temporary workers play an important role in driving manufacturing SMMEs' sales performance. While not part of the organisation for long-term purposes, SMMEs in the province should design innovative packages which stimulates this type of workforce's interest so that they buy into the company's vision. Such an approach would ensure that temporary workers do not feel 'neglected' by the company but rather find themselves as an important part in the mission of the company so as to increase their motivation. However, with this type of workforce, SMMEs in the province should know the maximum number they can employ. This is because excess use of temporary workers has a negative effect on sales performance. It is recommended that SMMEs should use the proposed predictive tools to model their performance and in the process ascertain the maximum number of temporary workers they can employ without adversely impacting sales performance. External consultants and relevant government support agencies like SEDA and Productivity South Africa (PSA) can also play an important role in helping SMMEs to conduct in-depth analytics and establish the turning point for this type of workforce.

Total assets give SMMEs a competitive edge, as per this study finding, implying that small firms should ensure availability of adequate assets in order to drive performance. Based on this finding, manufacturing SMMEs should be careful about the type of assets they acquire. In terms of production assets, SMMEs should acquire modern equipment which is more efficient and minimises production costs. A deliberate assessment of the production equipment used by peers in the industry, especially those with higher sales levels or market share is recommended. Importantly, when it

comes to current assets, especially debtors, SMMEs should deal with reliable customers with minimal default likelihood as this will ensure that the company's working capital is healthy at all times and thus minimise performance risk. However, SMMEs should be careful of the type of assets they purchase so that they will not adversely impact growth as they get old and thus impact the cost of production over time. It is thus recommended that SMMEs engage relevant organisations like PSA, PUM and SES mentorship programmes to get input from technical experts on the type of equipment to acquire.

The strengthening negative effect of firm age on sales performance, requires SMMEs in the sector to continuously reinvent themselves in order to remain competitive. To address this, SMMEs in the province should keep abreast of the innovative trends in their particular manufacturing sub-sectors. The provincial government, research institutions, consultants, among other pertinent stakeholders should develop customised interventions which inculcates agility among old firms. The importance of both physical and virtual incubators to enhance survivability of SMMEs through deployment of customised interventions was also highlighted based on a study (Zhou and Gumbo 2021d: 24). However, while incubators are normally aimed at young SMMEs, it is important that such targeted interventions are developed to assist older SMMEs in the province, which are clearly prone to the liability of obsolescence. On the other hand, SMMEs should take comfort in that age is important in driving growth and they should thus harness their experience accumulated over years to make judicious decisions which enhance their sustainability. The complexity of age and firm performance relationship shows the need for advanced tools to inform effective decision-making depending on the firm's preferred proxy for performance.

Another interesting finding in this study was the negative effect of digital marketing on SMME turnover. This points towards poor understanding and thus management of digital platforms by small enterprises in the province. The challenge was more pronounced for urban based firms as per findings by Zhou and Gumbo (2021d: 21). Concerningly, the findings from the survey showed a disturbing level of incongruence between entrepreneur's assumptions on the effect of digital platforms (positive), which is diametrically opposed to the actual effect (negative) based on econometric modelling. Inevitably, to deal with this risk driver, it is recommended that SMMEs

recruit qualified personnel or alternatively hire social media consultants to effectively manage and reap the potential benefits of digital marketing. Relevant organisations like SEDA, TIKZN, LED function within the district and local municipalities and various other support organisations should develop interventions like self-learning toolkits to assist SMMEs leverage various digital marketing platforms so as to drive sustainable performance.

The significant role of entrepreneur's age on sales performance requires young business owners to find mentors who can help them to drive their companies' sales performance. Older entrepreneurs would also need to continue investing in new skills to minimise the negative effect of age on the growth of their enterprises. Entrepreneurs should identify and apply for various coaching and mentorship programmes like the PUM, SES and SEDA coaching and mentorship programmes. Through these programmes, owners will get bespoke support to enhance the operations of their businesses and mitigate lack of experience, which is common among young entrepreneurs in specialised industries like the manufacturing sector.

SMMEs should appreciate that they are not immune to environmental movements from which some drivers significantly influence their performance. The negative effect of the unemployment rate on the sales performance of SMMEs shows the need for a robust risk management toolkit to continually track this and other external variables. This approach would ensure that the SMMEs proactively devise mitigation strategies and, where necessary, collectively lobby the government to devise policies which minimise the impact of certain external risk drivers on their performance. Key stakeholders in the SMME ecosystem, like chambers of commerce in the province should also play a leading role in advocating for policies that promote employment growth to ensure the sustainable performance of SMMEs.

Finally, the complexity of certain drivers whose impact differs between sales and growth shows the need for harnessing techniques that can help SMMEs identify such subtle differences. Development and implementation of customised risk management plans relying on machine learning algorithms is not optional but a requirement for SMMEs if they are to grow sustainably (Zhou and Gumbo 2021a: 10; Zhou and Gumbo 2021e: 15). This is crucial as it was established that SMMEs in the province lack understanding of the key drivers impacting on their performance (Zhou, Dash and Kajiji

2021). It is recommended that small manufacturing firms use the developed sales and growth performance predictive models to forecast performance and guide configuration and prioritisation of resources. It is also further recommended the developed predictive models be automated and deployed on a web-based platform as an artificial intelligence application for easy use by both SMMEs and other stakeholders in the province. The researcher is already involved in further developing the predictive models into an application, incorporating other additional features based on this study. The prototype of the artificial intelligence application has since been accepted for patenting and commercialisation through the DUT Technology Transfer and Innovation Directorate. It's expected that the application will be availed to SMMEs, not only in KZN but across the country and other developing countries aiming to drive economic growth via a resilient small business sector.

#### **7.4 Study Limitations and Suggestions for Future Research**

This study primarily focused on the manufacturing SMMEs in KwaZulu Natal, which according to the Small Enterprise Development Agency (2019), constitute 14.1% of the total manufacturing SMMEs in the country. Future research may extend this study across the country to get an overall picture on the impact of key drivers on performance of manufacturing SMMEs. Moreover, the study can also be extended to cover other sectors in KwaZulu Natal and South Africa at large. The thesis used three-year panel data, which is relatively short compared to other studies in developed countries. To address this shortcoming, future studies should employ data covering longer periods and assess if there are significant changes on findings compared to these results. In addition, future datasets should include additional variables that can aid development and testing of additional hypotheses. Net sales which reflect the small businesses efficiency can also be embraced as dependant variable in future studies. Key to note also is that the study did not cover other factors of interest like access to funding, and it's thus recommended that future studies utilise datasets covering this and other drivers. Finally, the study used just five of many powerful machine learning techniques. Future research work should consider harnessing other approaches and compare their predictive analytics performance to those harnessed in this study.

## REFERENCES

- Achtenhagen, L., Naldi, L. and Melin, L. 2010. "Business growth"—Do practitioners and scholars really talk about the same thing? *Entrepreneurship Theory and Practice*, 34 (2): 289-316.
- Adegbite, S., Ilori, M., Ireferin, I., Abereijo, I. and Aderemi, H. 2007. Evaluation of the impact of entrepreneurial characteristics on the performance of small scale manufacturing industries in Nigeria. *Journal of Asia Entrepreneurship and Sustainability*, 3 (1): 1.
- Adetunji, O. M. and Owolabi, A. A. 2016. Firm performance and its drivers: how important are the industry and firm-level factors? *International Journal of Economics and Finance*, 8 (11): 60-77.
- Adeyele, J. S. and Omorokunwa, O. G. 2016. Risk Appetites and Empirical Survival Pattern of Small and Medium Enterprises in Nigeria. *The Journal of Entrepreneurial Finance*, 18 (2): 1-22.
- Agarwal, R. and Gort, M. 2002. Firm and product life cycles and firm survival. *American Economic Review*, 92 (2): 184-190.
- Agostini, L., Filippini, R. and Nosella, A. 2015. Brand-building efforts and their association with SME sales performance. *Journal of Small Business Management*, 53: 161-173.
- Al-Ani, M. K. 2013. Effects of assets structure on the financial performance: Evidence from sultanate of Oman. In: *Proceedings of 11th EBES Conference proceedings in Ekaterinburg, Russia*, 147-165. Available: <http://ebesweb.org/pdf/11th%20EBES%20Conference%20Proceedings.pdf#page=155> (Accessed 24 March 2020).
- Albuquerque, A. F., Filho, E. E., Nagano, M. S. and Junior, L. A. P. 2016. A change in the importance of mortality factors throughout the life cycle stages of small businesses. *Journal of Global Entrepreneurship Research*, 6 (1)
- Allahar, H., Brathwaite, C., Roberts, D. and 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.
- Almsafir, M. K., Nassar, I. A., Al-Mahrouq, M. H. and Hayajneh, J. A. 2015. The validity of gibrat's law: Evidence from the service sector in Jordan. *Procedia Economics Finance*, 23: 1602-1606.
- Alquier, B. A. and Tignol, L. M. 2006. Risk management in small-and medium-sized enterprises. *Production Planning Control*, 17 (3): 273-282.
- 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.

Arasti, Z. 2011. An empirical study on the causes of business failure in Iranian context. *African Journal of Business Management*, 5 (17): 7488-7498.

Arokium, K. A. 2010. Small, micro and medium enterprise support intervention: an exploratory analysis of clustering effects in Clairwood and Cato Manor, Durban. Masters Development Studies, University of KwaZulu-Natal. Available: <http://ukzn-dspace.ukzn.ac.za/handle/10413/6435> (Accessed 01 February 2020).

Aslan, A. 2008. Testing Gibrat's law: Empirical evidence from panel unit root tests of Turkish firms. *Munich Personal RePEc Archive*,

Astley, W. G. and Van de Ven, A. H. 1983a. Central perspectives and debates in organization theory. *Administrative science quarterly*. 245-273.

Astley, W. G. and Van de Ven, H. A. 1983b. Central Perspectives and Debates in Organization Theory. *Administrative Science Quarterly*, 28 (2): 245-273.

Audretsch, D. B. and Dohse, D. 2007. Location: A neglected determinant of firm growth. *Review of World Economics*, 143 (1): 79-107.

Awad, M. and Khanna, R. 2015. Support vector machines for classification. In: *Efficient Learning Machines*. Springer, 39-66. Available: [https://link.springer.com/chapter/10.1007/978-1-4302-5990-9\\_3](https://link.springer.com/chapter/10.1007/978-1-4302-5990-9_3) (Accessed 22 August 2020).

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

Aziz, S. and Dowling, M. 2019. Machine learning and AI for risk management. In: *Disrupting Finance*. Palgrave Pivot, Cham, 33-50. Available: <http://library.oapen.org/bitstream/handle/20.500.12657/23126/1007030.pdf?sequence=1#page=54> (Accessed 09 August 2020).

B20 Cross-Thematic Group. 2017. *Think Big for Small: Small and Medium Enterprises as Pillar for Future-oriented, Sustainable Growth*. Germany: Available: [https://www.b20germany.org/fileadmin/user\\_upload/documents/B20/B20\\_CTG\\_SME\\_S\\_Final\\_Policy\\_Paper\\_2017-04-11.pdf](https://www.b20germany.org/fileadmin/user_upload/documents/B20/B20_CTG_SME_S_Final_Policy_Paper_2017-04-11.pdf) (Accessed 19 December 2019).

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

Banking Association of South Africa. 2019. *Small Business Definition*. Available: <https://www.banking.org.za/what-we-do/sme/sme-definition> (Accessed 07 March 2019).

Bardasi, E., Sabarwal, S. and Terrell, K. 2011. How do female entrepreneurs perform? Evidence from three developing regions. *Small Business Economics*, 37 (4): 417.

Bauer, M. 2020. Pre-Print: Machine Learning Framework for Small and Medium-Sized Enterprises. SSRN 3532389,



- Beck, M. W. 2018. NeuralNetTools: Visualization and analysis tools for neural networks. *Journal of statistical software*, 85 (11): 1.
- Beheshti, H. M. and Beheshti, C. M. 2010. Improving productivity and firm performance with enterprise resource planning. *Enterprise Information Systems*, 4 (4): 445-472.
- Bell, A., Fairbrother, M. and Jones, K. 2019. Fixed and random effects models: making an informed choice. *Quality & Quantity*, 53 (2): 1051-1074.
- Bell, A. and Jones, K. 2015. Explaining fixed effects: Random effects modeling of time-series cross-sectional and panel data. *Political Science Research and Methods*, 3 (1): 133-153.
- Bello, D. C. and Kostova, T. 2012. *From the Editors: Conducting high impact international business research: The role of theory*. Springer.
- Bellone, F., Musso, P., Nesta, L. and Quere, M. 2008. Market selection along the firm life cycle. *Industrial and Corporate Change*, 17 (4): 753-777.
- Bentzen, J., Madsen, E. S. and Smith, V. 2012. Do firms' growth rates depend on firm size? *Small Business Economics*, 39 (4): 937-947.
- Bhorat, H., Asmal, Z., Lilenstein, K. and Van der Zee, K. 2018. SMMES in South Africa: Understanding the Constraints on Growth and Performance.
- Bigsten, A. and Gebreeyesus, M. 2007. The small, the young, and the productive: Determinants of manufacturing firm growth in Ethiopia. *Economic Development and Cultural Change*, 55 (4): 813-840.
- Bomani, M. and Derera, E. 2018. Towards developing a strategic framework for stimulating rural entrepreneurship in Kwazulu-Natal, South Africa: A case study of three municipalities. *International Journal of Economics and Finance Studies*, 10 (1): 150-166.
- Brand, R., Schutte, C. and du Preez, N. 2013. Small Business Development: Improving Sustainability through Networked-Enterprises. *University of Stellenbosch Department of Industrial Engineering Working Paper*. [Online] Available at: [http://www.indutech.co.za/attachments/147\\_Small% 20Business% 20Development.pdf](http://www.indutech.co.za/attachments/147_Small%20Business%20Development.pdf). (Accessed 13/03/2014).
- Braun, M. T. and Oswald, F. L. 2011. Exploratory regression analysis: A tool for selecting models and determining predictor importance. *Behavior research methods*, 43 (2): 331-339.
- Bruwer, J.-P., Hattingh, C. and Perold, I. 2020. Probable measures to aid South African Small Medium and Micro Enterprises' sustainability, post-COVID-19: A literature review. *Post-COVID-19: A Literature Review* (June 12, 2020).
- Buckley, P. J. and Casson, M. 2007. Edith Penrose's Theory of the Growth of the Firm and the Strategic Management of Multinational Enterprises. *MIR: Management International Review*, 47 (2): 151-173.

Bureau for Economic Research. 2016. *The small, medium and micro enterprise sector of South Africa*. Cape Town: Small Enterprise Development Agency. Available: <http://www.seda.org.za/publications/publications/the%20small,%20medium%20and%20micro%20enterprise%20sector%20of%20south%20africa%20commissioned%20by%20seda.pdf> (Accessed 9 January 2019).

Bureau for Economic Research. 2019. *South African Absa Bank manufacturing Purchasing Managers' Index™: A monthly index of business conditions in the manufacturing sector*. South Africa: BER. Available: <https://www.ber.ac.za/BER%20Documents/ABSA-PMI/?doctypeid=1066> (Accessed 11 February 2020).

Buyinza, F. 2011. *Performance and Survival of Ugandan Manufacturing firms in the context of the East African Community*. Economic Policy Research Centre (EPRC). Available: <https://ideas.repec.org/p/ags/eprcrs/150477.html> (Accessed 25 May 2019).

Calá, C. D., Manjón-Antolín, M. and Arauzo-Carod, J.-M. 2017. Regional Determinants of Exit Across Firms' Size: Evidence from Argentina. *Tijdschrift voor economische en sociale geografie*, 108 (6): 768-785.

Calcagno, V. and de Mazancourt, C. 2010. glmulti: an R package for easy automated model selection with (generalized) linear models. *Journal of statistical software*, 34 (12): 1-29.

Callahan, C. and Soileau, J. 2017. Does enterprise risk management enhance operating performance? *Advances in accounting*, 37: 122-139.

Camilleri, M. A. 2018. The SMEs' technology acceptance of digital media for stakeholder engagement. *Journal of Small Business and Enterprise Development*,

Cancellier, E. and Junior, E. 2014. Environmental scanning, strategic behaviour, organizational characteristics, and performance in small firms. *Journal of Information Systems and Technology Management*, 11 (3): 18.

Cao, Y., Chen, X., Wu, D. D. and Mo, M. 2011. Early warning of enterprise decline in a life cycle using neural networks and rough set theory. *Expert Systems With Applications*, 38 (6): 6424-6429.

Carpiano, R. M. and Daley, D. M. 2006. A guide and glossary on postpositivist theory building for population health. *Journal of Epidemiology Community Health*, 60 (7): 564-570.

Casella, G., Fienberg, S. and Olkin, I. eds. 2017. *An introduction to statistical learning with applications in R*. Springer Texts in Statistics.

Chadwick, C. and Flinchbaugh, C. 2016. The effects of part-time workers on establishment financial performance. *Journal of Management*, 42 (6): 1635-1662.

Chandrinis, S. K., Sakkas, G. and Lagaros, N. D. 2018. AIRMS: A risk management tool using machine learning. *Expert Systems with Applications*, 105: 34-48.

Chen, X., Cao, Y. and Wang, F. 2010. A life cycle analysis of Hunan's enterprises and their determinants. *China Economic Review*, 21 (3): 470-481.

Cheriyana, S., Ibrahim, S., Mohanan, S. and Treesa, S. 2018. Intelligent Sales Prediction Using Machine Learning Techniques. In: Proceedings of 2018 International Conference on Computing, Electronics & Communications Engineering (iCCECE). IEEE, 53-58. Available: <https://ieeexplore.ieee.org/abstract/document/8659115/> (Accessed 20 August 2020).

Chiliya, W., Rungani, E. C., Chiliya, N. and Chikandiwa, C. T. 2015. The impact of risk on the financial performance of small medium enterprises in the construction industry in Eastern Cape, South Africa. *Risk Governance and Control: Financial Markets and Institutions*, 5 (3): 224-234.

Chimucheka, T., Dodd, N. and Chinyamurindi, W. T. 2018. The Effect of the Use of Technology on the Performance of Immigrant-Owned Smmes in the Eastern Cape Province, South Africa. *International Journal of Entrepreneurship*, 22 (3): 1-12.

Churchill, N. C. and Lewis, V. L. 2000. The five stages of small business growth. *Small business: critical perspectives on business management*, 291

Clark, M. 2013. An Introduction to machine learning with Applications in R. *Center for Social Research, University of Notre Dame*, [ogled 5.1. 2014], dostopno na <http://www3.nd.edu/~mclark19/learn/ML.pdf>,

Clement, J. 2020. *Global social networks ranked by number of users 2020* Available: <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/> (Accessed 10 March 2020).

Clinebell, S. K. and Clinebell, J. M. 2007. Differences Between Part-Time and Full-Time Employees in the Financial Services Industry. *Journal of Leadership & Organizational Studies*, 14 (2): 157-167.

Coad, A. 2007. Empirical investigations into the characteristics and determinants of the growth of firms. PhD, Université Panthéon-Sorbonne. Available: <https://tel.archives-ouvertes.fr/tel-00163394/> (Accessed 25 October 2019).

Coad, A., Frankish, J. S., Roberts, R. G. and Storey, D. J. 2016. Predicting new venture survival and growth: Does the fog lift? *Small Business Economics*, 47 (1): 217-241.

Coad, A., Holm, J. R., Krafft, J. and Quattraro, F. 2018. Firm age and performance. *Journal of Evolutionary Economics*, 28 (1): 1-11.

Coad, A., Segarra, A. and Teruel, M. 2016. Innovation and firm growth: Does firm age play a role? *Research Policy*, 45 (2): 387-400.

Colquitt, J. A. and Zapata-Phelan, C. P. 2007. Trends in theory building and theory testing: A five-decade study of the Academy of Management Journal. *Academy of Management Journal*, 50 (6): 1281-1303.

- COSO. 2016. *Enterprise Risk Management: Aligning Risk with Strategy and Performance* United States: Committee of Sponsoring Organizations of the Treadway Commission.
- Crane-Droesch, A. 2017. Semiparametric panel data models using neural networks. *arXiv preprint arXiv:1702.06512*,
- Creswell, J. W. 2014. *Research design: International student edition*. Los Angeles, CA: Sage.
- Creswell, J. W. and Creswell, J. D. 2018. *Research design: Qualitative, quantitative, and mixed methods approaches*. 4th ed ed. Sage publications.
- Crovini, C. 2019. *Risk management in small and medium enterprises*. Routledge.
- D'imperio, R. 2015. *Growing the global economy through SMEs*. Available: [http://www.edinburgh-group.org/media/2776/edinburgh\\_group\\_research\\_-\\_growing\\_the\\_global\\_economy\\_through\\_smes.pdf](http://www.edinburgh-group.org/media/2776/edinburgh_group_research_-_growing_the_global_economy_through_smes.pdf) (Accessed 10 January 2020).
- Davies, R. B. 1994. From cross-sectional to longitudinal analysis. *Analyzing social & political change: A casebook of methods*: 20-40.
- de Araújo Lima, P. F., Crema, M. and Verbano, C. 2020. Risk management in SMEs: A systematic literature review and future directions. *European Management Journal*, 38 (1): 78-94.
- De Kok, J., Ichou, A. and Verheul, I. 2010. New firm performance: Does the age of founders affect employment creation. *Zoetermeer: EIM Research Reports*, 12: 42-63.
- Deepa, M. and Annamalai, G. 2018. Internal Factors For New Venture Growth In Malaysian Manufacturing SMEs: An Empirical Study. *Taylor's Business Review*, 7 (1): 21.
- Delen, D., Kuzey, C. and Uyar, A. 2013. Measuring firm performance using financial ratios: A decision tree approach. *Expert systems with applications*, 40 (10): 3970-3983.
- Dieleman, J. L. and Templin, T. 2014. Random-effects, fixed-effects and the within-between specification for clustered data in observational health studies: a simulation study. *PloS one*, 9 (10)
- Dludlu, J. 2021. Policy madness: SA's industrialisation policies have slowed economic growth. Daily Maverick Available: <https://www.dailymaverick.co.za/opinionista/2021-04-22-policy-madness-sas-industrialisation-policies-have-slowed-economic-growth/> (Accessed October 2021).
- Dod, H. S. and Sharma, R. 2010. Competing with Business Analytics: Research in progress. *Information Systems Foundations*: 239.
- Dodge, H. R. and Robbins, J. E. 1992. An empirical investigation of the organizational life cycle model for small business development and survival. *Journal of Small Business Management*, 30 (1): 27.

DSBD. 2014. *Speech by Minister of Small Business Development in the Opening Session of the National Small Business Policy Colloquium*. Sandton: Department of Small Business Development. Available: <https://www.gov.za/speeches/minister-lindiwe-zulu-opening-session-national-small-business-policy-colloquium-21-oct-2014> (Accessed 07 March 2019).

DSBD. 2019. Revised Schedule 1 of the National Definition of Small Enterprise in South Africa. Pretoria: South Africa. Available: [www.gov.za/sites/default/files/gcis\\_document/201903/2423041gon399.pdf&clen=803785&chunk=true](http://www.gov.za/sites/default/files/gcis_document/201903/2423041gon399.pdf&clen=803785&chunk=true) (Accessed 22 November 2020).

DSBD. 2020. *The Black Business Supplier Development Programme*. Available: [http://www.dsbd.gov.za/?page\\_id=1218](http://www.dsbd.gov.za/?page_id=1218) (Accessed 02 May 2020).

DTI. 2015. *The DTI black industrialists policy*. Pretoria: DTI. Available: [https://www.thedti.gov.za/financial\\_assistance/docs/BI\\_Policy2015.pdf](https://www.thedti.gov.za/financial_assistance/docs/BI_Policy2015.pdf) (Accessed 10 January 2019).

DTI. 2017. *Industrial Policy Action Plan 2017/18 - 2019/20*. Pretoria: Department of Trade and Industry. Available: [https://www.thedti.gov.za/parliament/2017/IPAP\\_13June2017.pdf](https://www.thedti.gov.za/parliament/2017/IPAP_13June2017.pdf) (Accessed 11 March 2019).

DTI. 2019. *Financial Assistance (Incentives)*. Available: [http://www.thedti.gov.za/financial\\_assistance/financial\\_assistance.jsp](http://www.thedti.gov.za/financial_assistance/financial_assistance.jsp) (Accessed 22 March 2019).

Dunne, J. P. and Masenyetse, R. 2015. *The Determinants of Firm Survival in South Africa*. Cape Town: University of Cape Town. Available: [http://2015.essa.org.za/fullpaper/essa\\_2900.pdf](http://2015.essa.org.za/fullpaper/essa_2900.pdf) (Accessed 10 January 2019).

Dunne, P. and Hughes, A. 1994. Age, size, growth and survival: UK companies in the 1980s. *The Journal of Industrial Economics*, 42 (2): 115-140.

EDGE. 2013. *Focus on SMMEs in eThekweni*. Durban: Available: [http://architecture.durban.gov.za/Resource\\_Centre/edge/Documents/SMME%27s.pdf](http://architecture.durban.gov.za/Resource_Centre/edge/Documents/SMME%27s.pdf) (Accessed 10 January 2019).

Egbunike, C. F. and Okerekeoti, C. U. 2018. Macroeconomic factors, firm characteristics and financial performance. *Asian Journal of Accounting Research*,

Enkono, F. S. and Suresh, N. 2020. Application of Machine Learning Classification to Detect Fraudulent E-wallet Deposit Notification SMSes. *The African Journal of Information and Communication*, 25: 1-12.

Essel, B. K. C., Adams, F. and 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.

Esteve-Pérez, S. and Mañez-Castillejo, J. A. 2006. The Resource-Based Theory of the Firm and Firm Survival. *Small Business Economics*, 30 (3): 231-249.

- Esteve-Pérez, S., Pieri, F. and Rodriguez, D. 2017. Age and productivity as determinants of firm survival over the industry life cycle. *Industry and Innovation*, 25 (2): 167-198.
- Evans, D. S. 1987. The relationship between firm growth, size, and age: Estimates for 100 manufacturing industries. *The journal of industrial economics*: 567-581.
- Falkner, E. M. and Hiebl, M. R. 2015. Risk management in SMEs: a systematic review of available evidence. *The Journal of Risk Finance*,
- Farouk, A. and Saleh, M. 2011. An explanatory framework for the growth of small and medium enterprises. In: Proceedings of *International Conference of System Dynamics Society*.
- 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.
- Fatoki, O. and Asah, F. 2011. The impact of firm and entrepreneurial characteristics on access to debt finance by SMEs in King Williams' town, South Africa. *International Journal of Business and management*, 6 (8): 170.
- Felipe, J. 1998. The role of the manufacturing sector in Southeast Asian development: a test of Kaldor's first law. *Journal of Post Keynesian Economics*, 20 (3): 463-485.
- Filho, E. E., Albuquerque, A. F., Nagano, M. S., Junior, L. A. P. and de Oliveira, J. 2017. Identifying SME mortality factors in the life cycle stages: an empirical approach of relevant factors for small business owner-managers in Brazil. *Journal of Global Entrepreneurship Research*, 7 (1): 1-15.
- Fritsch, M., Noseleit, F. and Schindele, Y. 2010. *Success or Failure? A Multi-Dimensional Analysis of Business-, Industry-and Region-Specific Determinants of Survival*: Friedrich-Schiller-Universität Jena (mimeo).
- Gepp, A. and Kumar, K. 2012. Business failure prediction using statistical techniques: A review. *Bond Business School Publications*, Paper 675: 1-25.
- Geroski, P. A. 1995. What do we know about entry? *International Journal of Industrial Organization*, 13 (4): 421-440.
- Geroski, P. A. 1999. *DP2092 The Growth of Firms in Theory and in Practice* London: Centre for Economic Policy Research. Available: [http://www.cepr.org/active/publications/discussion\\_papers/dp.php?dpno=2092](http://www.cepr.org/active/publications/discussion_papers/dp.php?dpno=2092) (Accessed 22 July 2018).
- Geroski, P. A. 2005. Understanding the Implications of Empirical Work on Corporate Growth Rates. *Managerial and Decision Economics*, 26 (2): 129-138.
- GEN 22 On Sloane. 2020. COVID-19 impact on South Africa's SMMEs. Available: <https://www.22onsloane.co/wp-content/uploads/2020/11/COVID-19-Impact-on-South-Africa-SMMEs-April-2020-22-ON-SLOANE.pdf> (Accessed 03 March 2021).

- Gikombo, E. M. and Mbugua, D. 2018. Effect of select macro economic variables on performance of listed commercial banks in Kenya. *International Academic Journal of Economics and Finance*, 3 (1): 80-109.
- Gil-García, J. R. and Puron-Cid, G. 2014. Using panel data techniques for social science research: an illustrative case and some guidelines. *CIENCIA ergo-sum, Revista Científica Multidisciplinaria de Prospectiva*, 21 (3): 203-216.
- Given, L. M. 2008. *The Sage encyclopedia of qualitative research methods*. Sage publications.
- Gomera, S., Chinyamurindi, W. T. and Mishi, S. 2018. Relationship between strategic planning and financial performance: The case of small, micro-and medium-scale businesses in the Buffalo City Metropolitan. *South African Journal of Economic and Management Sciences*, 21 (1): 1-9.
- Goodfellow, I., Bengio, Y. and Courville, A. 2016. *Deep learning*. Michigan: MIT press.
- Govuzela, S. and Mafini, C. 2019. Organisational agility, business best practices and the performance of small to medium enterprises in South Africa. *South African Journal of Business Management*, 50 (1): 1-13.
- Graham, M. 2018. The keys to scaling up South Africa's businesses. (Journal, Electronic): 16-17
- Greene, W. 2011. Fixed effects vector decomposition: A magical solution to the problem of time-invariant variables in fixed effects models? *Political Analysis*, 19 (2): 135-146.
- Gumede, V. 2000. Growth and exporting of small and medium enterprises in South Africa, some thoughts on policy and scope for further research. *Trade and Industrial Policy Strategies, South Africa*,
- Gupta, P. D., Guha, S. and Krishnaswami, S. S. 2013. Firm growth and its determinants. *Journal of Innovation and Entrepreneurship*, 2 (1): 15.
- Haataja, T. 2016. Sales Forecasting in Small and Medium-Sized Enterprises. Master of Business Administration, Helsinki Metropolia University of Applied Sciences. Available: <https://www.theseus.fi/handle/10024/106191> (Accessed 16 August 2020).
- Halicioglu, F. and Yolac, S. 2015. Testing the impact of unemployment on self-employment: Evidence from OECD countries. *Procedia-Social and Behavioral Sciences*, 195: 10-17.
- Hall, B. H. 1986. *The relationship between firm size and firm growth in the US manufacturing sector*. National Bureau of Economic Research Cambridge, Mass., USA.
- Hanks, S. H. 1990. The organization life cycle: Integrating content and process. *Journal of Small Business Strategy*, 1 (1): 1-12.

- Hansen, G. S. and Wernerfelt, B. 1989. Determinants of firm performance: The relative importance of economic and organizational factors. *Strategic management journal*, 10 (5): 399-411.
- Harris, E. S. 1991. *Tracking the Economy with the Purchasing Managers Index*. Federal Reserve Bank.
- Harrison, X. A., Donaldson, L., Correa-Cano, M. E., Evans, J., Fisher, D. N., Goodwin, C. E., Robinson, B. S., Hodgson, D. J. and Inger, R. 2018. A brief introduction to mixed effects modelling and multi-model inference in ecology. *PeerJ*, 6: e4794.
- Hart, P. E. 2000. Theories of Firms' Growth and the Generation of Jobs. *Review of Industrial Organization*, 17 (3): 229-248.
- He, C. and Yang, R. 2016. Determinants of Firm Failure: Empirical Evidence from China. *Growth and Change*, 47 (1): 72-92.
- Herman, E. 2016. The importance of the manufacturing sector in the Romanian economy. *Procedia Technology*, 22: 976-983.
- Hermelo, D. F. and Vassolo, R. 2007. The determinants of firm's growth: an empirical examination. *Revista Abante*, 10 (1): 3-20.
- Herrington, M. and 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.
- Herrington, M. and Kew, P. 2016. *Global Entrepreneurship Monitor-South African Report 2015/16: Is South Africa heading for an economic meltdown*. Cape Town: Development Unit for New Enterprise, UCT.
- Hiatt, S. R. and Sine, W. 2014. Clear and present danger: Planning and new venture survival amid political and civil violence. *Strategic Management Journal*, 35 (5): 773-785.
- Howell, A. 2015. 'Indigenous' innovation with heterogeneous risk and new firm survival in a transitioning Chinese economy. *Research Policy*, 44 (10): 1866-1876.
- Huggins, R., Prokop, D. and Thompson, P. 2017. Entrepreneurship and the determinants of firm survival within regions: human capital, growth motivation and locational conditions. *Entrepreneurship & Regional Development*, 29 (3-4): 357-389.
- Hunter, M. G. 2011. Understanding the common causes of small business failures: A qualitative study. *Journal of Applied Management Entrepreneurship*, 16 (1): 86-103.
- Hyder, S. and 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.
- Hyndman, R. J. and Koehler, A. B. 2006. Another look at measures of forecast accuracy. *International journal of forecasting*, 22 (4): 679-688.



IDC. 2019. *Industrial Development Corporation: About Us*. Available: <https://www.idc.co.za/about-us/> (Accessed 22 March 2019).

IMBADU. 2016. *Accelerating SMME growth in South Africa*. Pretoria: SEDA. Available: <http://www.seda.org.za/Publications/Publications/Imbadu%20Newsletter%20Q2%20and%20Q3%202016.pdf> (Accessed 13 January 2019).

Industrial Development Corporation. 2016. *Recent developments in the global and South African economies*. Pretoria: Department of Research and Information,. Available: [https://www.idc.co.za/wp-content/uploads/2018/11/IDC\\_RI\\_publication-EconomicOverview\\_June-2016.pdf](https://www.idc.co.za/wp-content/uploads/2018/11/IDC_RI_publication-EconomicOverview_June-2016.pdf) (Accessed 21 December 2017).

International Finance Corporation. 2019. *The unseen sector: A report on the MSME opportunity in South Africa*. Washington: World Bank. Available: <https://www.ifc.org/wps/wcm/connect/2dddbf2b-bd44-4965-a7bf-b71475602649/2019-01-MSME-Opportunity-South-Africa.pdf?MOD=AJPERES&CVID=mxxxHod> (Accessed 27 January 2020).

International Trade Centre. 2018. *Promoting SME Competitiveness in Africa: Data for de-risking investment*. Geneva: ITC. Available: [http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Africa\\_SME%20web.pdf](http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Africa_SME%20web.pdf) (Accessed 31 January 2020).

IODSA. 2016. *King Report on Corporate Governance in SA* Institute of Directors in Southern Africa. Available: [https://c.ymcdn.com/sites/iodsa.site-ym.com/resource/collection/684B68A7-B768-465C-8214-E3A007F15A5A/IoDSA\\_King\\_IV\\_Report\\_-\\_WebVersion.pdf](https://c.ymcdn.com/sites/iodsa.site-ym.com/resource/collection/684B68A7-B768-465C-8214-E3A007F15A5A/IoDSA_King_IV_Report_-_WebVersion.pdf) (Accessed 31 March 2019).

Iopev, L. and Kwanum, I. M. 2012. An assessment of risk management of Small and Medium Scale Enterprises in Nigeria. *Research Journal of Finance and Accounting*, 3 (5): 1-9.

ISO. 2009. *ISO 31000: Risk management — Principles and guidelines* Switzerland: International Organization for Standardization.

Issah, M. and Antwi, S. 2017. Role of macroeconomic variables on firms' performance: Evidence from the UK. *Cogent Economics & Finance*, 5 (1)

Jamali, M. A., Voghouei, H. and Md Nor, N. G. 2014. Information technology and survival of firms: A review of economic literature. *NETNOMICS: Economic Research and Electronic Networking*, 15 (2): 107-119.

Jobs, C. G. and Gilfoil, D. M. 2014. A social media advertising adoption model for reallocation of traditional advertising budgets. *Academy of Marketing Studies Journal*, 18 (1): 235.

Jofre, S. 2011. *Strategic Management: The theory and practice of strategy in (business) organizations*. DTU Management,

- Jovanovic, B. 1982. Selection and the Evolution of Industry. *Econometrica: Journal of the Econometric Society*: 649-670.
- Kalechofsky, H. 2016. A simple framework for building predictive models. *A Little Data Science Business Guide*: 1-18.
- Kaselimi, E. N., Notteboom, T. E., Pallis, A. A. and Farrell, S. 2011. Minimum Efficient Scale (MES) and preferred scale of container terminals. *Research in Transportation Economics*, 32 (1): 71-80.
- Kast, F. E. and Rosenzweig, J. E. 1992. System concepts: Pervasiveness and potential. *MIR: Management International Review*: 40-49.
- Kaunda, C. M. 2013. Entrepreneurial orientation, age of owner and small business performance in Johannesburg. Master of Management, University of the Witwatersrand. Available: <http://wiredspace.wits.ac.za/handle/10539/12992> (Accessed 03 April 2020).
- Kelliher, F. and Reinl, L. 2009. A resource-based view of micro-firm management practice. *Journal of Small Business Enterprise Development*, 16 (3): 521-532.
- Kerr, A., Wittenberg, M. and Arrow, J. 2014. Job Creation and Destruction in South Africa. *South African Journal of Economics*, 82 (1): 1-18.
- Kitson, M. 1995. *Seedcorn Or Chaff?: Unemployment and Small Firm Performance*. ESRC Centre for Business Research, University of Cambridge.
- Klapper, L. and Richmond, C. 2011. *Patterns of business creation, survival and growth: Evidence from Africa*. The World Bank.
- Klos, V. 2008. Firm's Performance analysis using survival method. Economics, National University.
- Knott, P. 2009. Integrating resource-based theory in a practice-relevant form. *Journal of Strategy and Management*, 2 (2): 163-174.
- Koenig, E. F. 2002. Using the purchasing managers' index to assess the economy's strength and the likely direction of monetary policy. *Federal Reserve Bank of Dallas Economic and Financial Policy Review*, 1 (6): 1-14.
- Kolkman, D. and van Witteloostuijn, A. 2019. Data Science in Strategy: Machine learning and text analysis in the study of firm growth.
- Kongolo, M. 2010. Job creation versus job shedding and the role of SMEs in economic development. *African journal of business management*, 4 (11): 2288-2295.
- Krishna, D., Albinson, N., Chu, Y. and Burdis, J. 2017. *Managing algorithmic risks: Safeguarding the use of complex algorithms and machine learning*. Deloitte Risk and Financial Advisory. 2017. Available: <https://www2.deloitte.com/us/en/pages/risk/articles/algorithmic-machine-learning-risk-management.html> (Accessed 20 July 2020).

Kuorikoski, J., Lehtinen, A. and Marchionni, C. 2010. Economic modelling as robustness analysis. *The British Journal for the Philosophy of Science*, 61 (3): 541-567.

KwaZulu Natal PPC. Provincial Planning Commission. 2012. *Condensed Version of the Kwazulu-Natal Provincial Growth and Development Strategy and Plan: 2012 To 2030*. Pietermaritzburg

KwaZulu Natal PPC. 2017. *2035 Provincial Growth and Development Plan*. Pietermaritzburg: KwaZulu Natal Premier's Office. Available: <http://www.kznonline.gov.za/images/Downloads/Publications/ppc.pdf> (Accessed

KwaZulu Natal PPC. Provincial Planning Commission. 2019. *Provincial Growth and Development Strategy*. Pietermaritzburg: Office of the Premier,. Available: <http://www.kznppc.gov.za/images/downloads/PGDP%202019%20v4%20Final.pdf> (Accessed 02 February 2020).

Lafuente, E. and Rabetino, R. 2008. The Pursuit of the Efficient Scale Size: Implications for Firm Growth.

Laljit, C. R. 2006. The business strategy development among SMME's in the KwaZulu-Natal clothing manufacturing sector. Available: <https://openscholar.dut.ac.za/handle/10321/84> (Accessed 10 January 2018).

Lantz, B. 2019. *Machine learning with R: expert techniques for predictive modeling*. Packt Publishing Ltd.

Lawrence, F. and Rogerson, C. M. 2019. Local economic development agencies and peripheral small town development: Evidence from Somerset East, South Africa. *Urbani izziv*, 30: 144-157.

Le, V. 2009. Small Firm Growth Theory and Models: A Review. In: *Proceedings of 22nd SEANZ Annual Conference*. Massey University, Wellington, 1-17.

Lekhanya, L. M. 2015. Public outlook on small and medium enterprises as a strategic tool for economic growth and job creation in South Africa. *Journal of Governance and Regulation*, 4 (4): 412-418.

Lekhanya, L. M. 2016a. Business characteristics of small and medium enterprises in rural areas: a case study on southern region of KwaZulu-Natal province of South Africa. *Problems and perspectives in management*, (14, Iss. 3): 108-114.

Lekhanya, L. M. 2016b. Determinants of survival and growth of small and medium enterprises in rural KwaZulu–Natal. Doctor of Philosophy in the Faculty of Economic and Management Sciences, University of the Western Cape. Available: <http://etd.uwc.ac.za/handle/11394/5569> (Accessed 19 January 2019).

Leković, B. and Marić, S. 2015. Measures of small business success/performance: Importance, reliability and usability. *Industrija*, 43 (2): 7-26.

Leo, M., Sharma, S. and Maddulety, K. 2019. Machine Learning in Banking Risk Management: A Literature Review. *Risks (Basel)*, 7 (1): 29.

- Lester, D. L., Parnell, J. A. and Carraher, S. 2003. Organizational life cycle: A five-stage empirical scale. *The international journal of organizational analysis*, 11 (4): 339-354.
- Levesque, M. and Minniti, M. 2006. The effect of aging on entrepreneurial behavior. *Journal of business venturing*, 21 (2): 177-194.
- Levie, J. and Lichtenstein, B. B. 2010. A terminal assessment of stages theory: Introducing a dynamic states approach to entrepreneurship. *Entrepreneurship theory practice*, 34 (2): 317-350.
- Levinthal, D. A. 1991. Random walks and organizational mortality. *Administrative Science Quarterly*: 397-420.
- Li, J., Wan, X. and Lai, B. 2020. Research on risk early warning system of transitional operation of Africa related enterprises. *African Journal of Business Management*, 14 (2): 8.
- Loderer, C. F. and Waelchli, U. 2010. Firm age and performance. *SSRN 1342248*,
- Löfsten, H. 2016. Business and innovation resources. *Management Decision*, 54 (1): 88-106.
- Long, J. 2020. *Introduction to the panelr package*. Available: <https://cran.r-project.org/web/packages/panelr/vignettes/wbm.html> (Accessed 06 June 2020).
- Lotti, F., Santarelli, E. and Vivarelli, M. 2003. Does Gibrat's Law hold among young, small firms? *Journal of evolutionary economics*, 13 (3): 213-235.
- Løwendahl, B. and Revang, Ø. 1998. Challenges to Existing Strategy Theory in a Postindustrial Society. *Strategic Management Journal*, 19 (8): 755-773.
- Lucky, E. O.-I. 2011. The conceptual framework of the effect of location on performance of small firms. *Asian Social Science*, 7 (12): 110.
- Lundqvist, S. A. 2015. Why firms implement risk governance – Stepping beyond traditional risk management to enterprise risk management. *Journal of Accounting and Public Policy*, 34 (5): 441-466.
- Lussier, R. N. 1995. A nonfinancial business success versus failure prediction mo. *Journal of Small Business Management*, 33 (1): 8.
- 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.
- Machado, H. P. V. 2016. Crescimento de pequenas empresas: revisão de literatura e perspectivas de estudos. *Gestão & Produção*, 23 (2): 419-432.
- Madara, D. and Katana, S. S. N. H. 2016. Theories and models relevant to cheating-behavior. *Research on Humanities Social Sciences*, 6 (17): 108-139.

Maggina, A. and Tsaklanganos, A. 2012. Asset growth and firm performance evidence from Greece. *The International Journal of Business and Finance Research*, 6 (2): 113-124.

Mahohoma, T. 2018. The impact of entrepreneurial competencies on the performance of SMEs in the eThekweni Municipal Region, KwaZulu-Natal, South Africa. Available: <http://openscholar.dut.ac.za/handle/10321/3145> (Accessed 20 June 2019).

Majumdar, S. K. 2004. The hidden hand and the license raj to an evaluation of the relationship between age and the growth of firms in India. *Journal of Business Venturing*, 19 (1): 107-125.

Malepe, N. 2014. How's business? Manufacturing small, medium and micro enterprises (SMMEs') contributions to the formal sector employment in Gauteng and the Western Cape between 2007 AND 2013. Stellenbosch: Stellenbosch University. Available: <http://scholar.sun.ac.za/handle/10019.1/95730> (Accessed 12 July 2019).

Mano, Y., Iddrisu, A., Yoshino, Y. and Sonobe, T. 2012. How can micro and small enterprises in sub-Saharan Africa become more productive? The impacts of experimental basic managerial training. *World Development*, 40 (3): 458-468.

Mascarenhas, B., Kumaraswamy, A., Day, D. and Baveja, A. 2002. Five strategies for rapid firm growth and how to implement them. *Managerial and Decision Economics*, 23 (4-5): 317-330.

Masenyetse, R. F. 2017a. Firm Growth, Survival and Productivity in South Africa. PhD, University of Cape Town. Available: <https://open.uct.ac.za/handle/11427/27099> (Accessed 22 April 2020).

Masenyetse, R. F. 2017b. Firm growth, survival and productivity in South Africa. University of Cape Town. Available: <https://open.uct.ac.za/handle/11427/27099> (Accessed 20 May 2019).

McCann, B. and Folta, T. 2011. Performance differentials within geographic clusters. *Journal of Business Venturing*, 26 (1): 104-123.

McCann, P. 1998. The Location of the Firm in Theory. In: *The Economics of Industrial Location*. Springer, 17-47. Available: [https://link.springer.com/chapter/10.1007/978-3-662-03702-7\\_3](https://link.springer.com/chapter/10.1007/978-3-662-03702-7_3) (Accessed 12 October 2017).

McNiff, J. and Whitehead, J. 2011. *All you need to know about action research*. Sage Publications.

McPherson, M. A. 1995. The hazards of small firms in southern africa. *The Journal of Development Studies*, 32 (1): 31-54.

McPherson, M. A. 1996. Growth of micro and small enterprises in southern Africa. *Journal of development economics*, 48 (2): 253-277.

Megaravalli, A. 2017. Estimating growth of SMES using a logit model: Evidence from manufacturing companies in Italy. *Management Science Letters*, 7 (3): 125-134.

- Melkumova, L. and Shatskikh, S. Y. 2017. Comparing Ridge and LASSO estimators for data analysis. *Procedia engineering*, 201: 746-755.
- Merkel, G. D., Povinelli, R. J. and Brown, R. H. 2018. Short-term load forecasting of natural gas with deep neural network regression. *Energies*, 11 (8): 2008.
- Meroño-Cerdan, A. L. and Soto-Acosta, P. 2005. Examining e-business impact on firm performance through website analysis. *International journal of electronic business*, 3 (6): 583-598.
- Miles, K. J. 2013. Exploring Factors Required for Small Business Success in the 21st Century. ProQuest Dissertations Publishing.
- Miller, D. and Friesen, P. H. 1984. A Longitudinal Study of the Corporate Life Cycle. *Management Science*, 30 (10): 1161-1183.
- Miller, L. N. 2015. Firm growth: An exploration of the processes of growth of new and small firms. St. Ambrose University.
- Mockler, R. J. 1968. The systems approach to business organization and decision making. *California Management Review*, 11 (2): 53-58.
- Mohammed, M., Khan, M. B. and Bashier, E. B. M. 2016. *Machine learning: algorithms and applications*. Crc Press.
- Monelos, P. d. L., Sánchez, C. P. and López, M. R. 2011. A model to forecast financial failure, in non financial galician SMES.
- Moorthy, M. K., Tan, A., Choo, C., Wei, C. S., Ping, J. T. Y. and Leong, T. K. 2012. A study on factors affecting the performance of SMEs in Malaysia. *International journal of academic research in business social sciences*, 2 (4): 224.
- Moreno, M. A., Zarrias, A. J. and Barbero, L. J. 2014. The relationship between growth and volatility in small firms. *Management Decision*, 52 (8): 1516-1532.
- Motoki, F. Y. S. and Gutierrez, C. E. C. 2015. Firm Performance and Business Cycles: Implications for Managerial Accountability. *Applied Finance and Accounting*, 1 (1): 47-59.
- Mudgal, N. 2014. An empirical analysis of the relationship between the Purchasing Managers' Index (PMI) and share prices in the manufacturing sector of South Africa. Available: <https://pdfs.semanticscholar.org/ad49/816c88445d9623ae976836d6cd62746ceba2.pdf> (Accessed 21 December 2020).
- Mukorera, S. Z. 2014. The rise of micro and small-scale entrepreneurial activity in a melting down economy: a case of Zimbabwe. Doctor of Philosophy, Economics, University of KwaZulu-Natal. Available: <https://pdfs.semanticscholar.org/fb6f/d0c365a5f209aa45032ed41246d4de82fd32.pdf> (Accessed 29 January 2020).

- Mundlak, Y. 1978. On the pooling of time series and cross section data. *Econometrica: journal of the Econometric Society*: 69-85.
- Muriithi, S. 2017a. African small and medium enterprises (SMEs) contributions, challenges and solutions. *European Journal of Research and Reflection in Management Sciences* 5(1): 36-48.
- Muriithi, S. 2017b. African small and medium enterprises (SMEs) contributions, challenges and solutions. *European Journal of Research and Reflection in Management Sciences*, 5 (1): 13.
- Muthukrishnan, R. and Rohini, R. 2016. LASSO: A feature selection technique in predictive modeling for machine learning. In: *Proceedings of 2016 IEEE international conference on advances in computer applications (ICACA)*. IEEE, 18-20. Available: <https://ieeexplore.ieee.org/abstract/document/7887916/> (Accessed 15 June 2020).
- Nassar, I. A., Almsafir, M. K. and Al-Mahrouq, M. H. 2014. The Validity of Gibrat's Law in Developed and Developing Countries (2008–2013): Comparison based Assessment. *Procedia-Social Behavioral Sciences*, 129: 266-273.
- National-Treasury. 2017. *Implementation Guide: Preferential Procurement Regulations, 2017 Pertaining to the Preferential Procurement Policy Framework Act, Act No 5 Of 2000*. Pretoria: National Treasury.
- National Planning Commission. 2011. *National Development Plan 2030*. Pretoria: Available: [http://www.dac.gov.za/sites/default/files/NDP%202030%20-%20Our%20future%20-%20make%20it%20work\\_0.pdf](http://www.dac.gov.za/sites/default/files/NDP%202030%20-%20Our%20future%20-%20make%20it%20work_0.pdf) (Accessed 19 January 2019).
- Navaretti, G., Castellani, D. and Pieri, F. 2012. *The role of age in shaping firms' size dynamics: "learning" effects or willingness to grow*. EFIGE Working Paper 60, 1-29. Available: [http://bruegel.org/wp-content/uploads/2015/09/efige\\_wp60\\_3108121.pdf](http://bruegel.org/wp-content/uploads/2015/09/efige_wp60_3108121.pdf) (Accessed 23 July 2019).
- Ncube, T. R. 2016. The intrinsic motivational factors of small and medium business growth: a study on the furniture manufacturing sector in the Ethekezi Metropolitan area. Durban University of Technology. Available: <https://openscholar.dut.ac.za/handle/10321/1533> (Accessed 25 April 2020).
- NEF. 2020. *National Empowerment Fund: Growing Black Economic Participation*. Available: <https://www.nefcorp.co.za/products-services/> (Accessed 26 April 2020).
- Nemaenzhe, P. P. 2010. Retrospective analysis of failure causes in South African small businesses. University of Pretoria.
- Neuman, W. L. 2014. *Social Research Methods: Qualitative and Quantitative Approaches: Pearson New International Edition*. Pearson Education Limited.
- Ngibe, M. and Lekhanya, L. M. 2019. Innovative leadership in South African manufacturing Small Medium Enterprises within KwaZulu-Natal. *Journal of Contemporary Management*, 16 (2): 300-330.

- Ngufor, C., Van Houten, H., Caffo, B. S., Shah, N. D. and McCoy, R. G. 2019. Mixed Effect Machine Learning: a framework for predicting longitudinal change in hemoglobin A1c. *Journal of biomedical informatics*, 89: 56-67.
- Niyimbanira, F., Eggink, M. E. and Nishimwe-Niyimbanira, R. 2020. The identification of the key sub-industries among coastal metropolitan cities of South Africa: An application of the location quotient technique. *International Journal of Economics and Finance Studies*, 12 (1): 50-70.
- Nunes, P. M., Viveiros, A. and Serrasqueiro, Z. 2012. Are the determinants of young SME profitability different? Empirical evidence using dynamic estimators. *Journal of Business Economics and Management*, 13 (3): 443-470.
- O'Farrell, P. N. and Hitchens, D. M. 1988. Alternative theories of small-firm growth: a critical review. *Environment and Planning* 20 (10): 1365-1383.
- OECD. 2009. *The impact of the global crisis on SME and entrepreneurship financing and policy responses*. Paris: OECD.
- OECD. 2017. *OECD Economic Surveys: South Africa*. South Africa: Available: [www.oecd.org/eco/surveys/economic-survey-southafrica.htm](http://www.oecd.org/eco/surveys/economic-survey-southafrica.htm) (Accessed 19 January 2019).
- Okpara, J. O. 2011. Factors constraining the growth and survival of SMEs in Nigeria: Implications for poverty alleviation. *Management Research Review*, 34 (2): 156-171.
- Okpara, J. O. and Kabongo, J. D. 2009. An empirical evaluation of barriers hindering the growth of small and medium sized enterprises (SMEs) in a developing economy. *African Journal of Business and Economic Research*, 4 (1): 7-21.
- Olawale, F. and Garwe, D. 2010. Obstacles to the growth of new SMEs in South Africa: A principal component analysis approach. *African Journal of Business Management*, 4 (5): 729-738.
- Omalaja, M. A. and Eruola, O. 2011. Strategic management theory: Concepts, analysis and critiques in relation to corporate competitive advantage from the resource-based philosophy. *Economic analysis*, 44 (1-2): 59-77.
- Osoro, C. and Ogeto, W. 2014. Macroeconomic fluctuations effects on the financial performance of listed manufacturing firms in Kenya. *The international journal of social sciences*, 20 (1): 26-40.
- Özar, Ş., Oezertan, G. and İrfanoğlu, Z. B. 2008. Micro and small enterprise growth in Turkey: Under the shadow of financial crisis. *The Developing Economies*, 46 (4): 331-362.
- Pal, M. and Mather, P. 2005. Support vector machines for classification in remote sensing. *International journal of remote sensing*, 26 (5): 1007-1011.
- Panda, D. 2015. Growth determinants in small firms: drawing evidence from the Indian agro-industry. *International Journal of Commerce Management*, 25 (1): 52-66.



- Pao, H.-T. 2008. A comparison of neural network and multiple regression analysis in modeling capital structure. *Expert Systems with Applications*, 35 (3): 720-727.
- Parsons, A. 2013. Using social media to reach consumers: A content analysis of official Facebook pages. *Academy of marketing studies Journal*, 17 (2): 27.
- Pauka, K. 2015. *How does Part-time Work Affect Firm Performance and Innovation Activity?* WWZ Working Paper. Available: <https://www.econstor.eu/handle/10419/123473> (Accessed 22 March 2020).
- Peltoniemi, M. 2013. How do the determinants of firm survival change in the course of the industry life cycle? A fuzzy-set analysis. *Technology Analysis & Strategic Management*, 26 (2): 223-239.
- Penrose, E. 2009. *The Theory of the Growth of the Firm*. 4th;4; ed. GB: Oxford University Press.
- Persson, H. 2004. The survival and growth of new establishments in Sweden, 1987-1995. *Small Business Economics*, 23 (5): 423-440.
- Perugachi-Diaz, Y. and Knapik, B. 2017. Correlation in Linear Regression.
- Phillipson, J., Tiwasing, P., Gorton, M., Maioli, S., Newbery, R. and Turner, R. 2019. Shining a spotlight on small rural businesses: How does their performance compare with urban? *Journal of rural studies*, 68: 230-239.
- Pistol, L., Epure, M. and Bucea-Manea-Țoniș, R. 2016. WEB-Marketing Strategy for SMEs. *Procedia of Economics and Business Administration*, 1: 128-137.
- Pricop, O. C. 2012. Critical aspects in the strategic management theory. *Procedia-Social and Behavioral Sciences*, 58: 98-107.
- Provincial-Treasury. 2017. *Socio-Economic Review and Outlook 2017/2018*. Pietermaritzburg: KZN Provincial Treasury.
- Provincial Treasury. Government, K.-N. P. 2017. *Socio-Economic Review and Outlook 2017/2018*. Pietermaritzburg: Available: [http://www.kzntreasury.gov.za/ResourceCenter/Documents%20%20Fiscal%20Resource%20Management/SERO\\_Final\\_28%20Feb%202017.pdf](http://www.kzntreasury.gov.za/ResourceCenter/Documents%20%20Fiscal%20Resource%20Management/SERO_Final_28%20Feb%202017.pdf) (Accessed 17 January 2019).
- Puga, D. 2002. European regional policies in light of recent location theories. *Journal of economic geography*, 2 (4): 373-406.
- Punam, K., Pamula, R. and Jain, P. K. 2018. A two-level statistical model for big mart sales prediction. In: *Proceedings of 2018 International Conference on Computing, Power and Communication Technologies (GUCon)*. IEEE, 617-620. Available: <https://ieeexplore.ieee.org/abstract/document/8675060/> (Accessed 12 July 2020).
- R Development Core Team. 2019. R: A language and environment for statistical computing. R Foundation for Statistical Computing (computer software). Available: <https://www.R-project.org/>. (Accessed 17 August 2019).

Radipere, S. and Dhlwayo, S. 2014. The role of age and business size on small business performance in the South African small enterprise sector. *Problems and Perspectives in Management*, (12, Iss. 4): 7-12.

Real Economy Bulletin. 2016. *Provincial Review 2016: KwaZulu-Natal*. Pretoria: Trade and Industrial Policy Strategies

Real Economy Bulletin. 2017. *Special Edition: The State of Small Business in South Africa*. Pretoria: Trade and Industrial Policy Strategies. Available: <http://www.tips.org.za/manufacturing-data/the-real-economy-bulletin/the-state-of-small-business-in-south-africa/item/3366-the-real-economy-bulletin-the-state-of-small-business-in-south-africa-2017> (Accessed 15 January 2019).

Renski, H. 2011. External economies of localization, urbanization and industrial diversity and new firm survival. *Papers in Regional Science*, 90 (3): 473-502.

Resende, M., Cardoso, V. and Façanha, L. O. 2015. Determinants of survival of newly created SMEs in the Brazilian manufacturing industry: an econometric study. *Empirical Economics*, 50 (4): 1255-1274.

Rhyne, L. C. 1986. The Relationship of Strategic Planning to Financial Performance. *Strategic Management Journal*, 7 (5): 423-436.

Richard, P. J., Devinney, T. M., Yip, G. S. and Johnson, G. 2009. Measuring organizational performance: Towards methodological best practice. *Journal of management*, 35 (3): 718-804.

Rijkers, B., Söderbom, M. and Loening, J. L. 2010. A rural–urban comparison of manufacturing enterprise performance in Ethiopia. *World Development*, 38 (9): 1278-1296.

Roca-Puig, V., Beltrán-Martín, I. and Cipres, M. S. 2012. Combined effect of human capital, temporary employment and organizational size on firm performance. *Personnel Review*,

Roopchand, R. 2020. SMEs in Mauritius: economic growth, employment and entrepreneurial culture. *International Journal of Entrepreneurship and Small Business*, 39 (4): 585-596.

Rotchford, N. L. and Roberts, K. H. 1982. Part-Time Workers as Missing Persons in Organizational Research. *The Academy of Management Review*, 7 (2): 228-234.

Santos, J. B. and Brito, L. A. L. 2012. Toward a subjective measurement model for firm performance. *BAR-Brazilian Administration Review*, 9 (SPE): 95-117.

SARB. 2015. *The role of small business in the economy*. Pretoria: South African Reserve Bank.

Šarlija, N., Pfeifer, S., Jeger, M. and Bilandžić, A. 2016. Measuring enterprise growth: pitfalls and implications. *International journal of social, behavioural, educational, economic, business and industry engineering*, 10 (6): 1792.

SBI. 2018. *The number of formal micro, small & medium businesses in South Africa*. South Africa: Small Business Project. Available: <https://www.smallbusinessinstitute.co.za/wp-content/uploads/2018/10/SBIbaselineAlert1final.pdf> (Accessed 11 March 2019).

Sekban, J. 2019. Applying machine learning algorithms in sales prediction. Masters in Computer Engineering, Kadirhas University. Available: <http://academicrepository.khas.edu.tr/handle/20.500.12469/2782> (Accessed 10 December 2020).

Shalev-Shwartz, S. and Ben-David, S. 2014. *Understanding machine learning: From theory to algorithms*. Cambridge university press.

Shangase, N., N. 2016. A comparative analysis of the critical success factors affecting local and foreign owned Small-Medium Enterprises in the Ndwedwe area of Kwazulu-Natal. Masters of Business Administration, Durban University of Technology.

Shiferaw, A. 2009. Survival of private sector manufacturing establishments in Africa: The role of productivity and ownership. *World Development*, 37 (3): 572-584.

Shirokova, G. 2009. Organisational life-cycle: The characteristics of developmental stages in Russian companies created from scratch. *Journal for East European Management Studies*, 14 (1): 65-85.

Simota, J., Tupa, J. and Steiner, F. 2017. Risk Management to Enhance Performance in the Construction SME Sector; Theory and Case Study. In: *Risk Management Treatise for Engineering Practitioners*. IntechOpen. Available: [https://books.google.co.za/books?hl=en&lr=&id=hl-UDwAAQBAJ&oi=fnd&pg=PA139&dq=Risk+Management+to+Enhance+Performance+in+the+Construction+SME+Sector%3B+Theory+and+Case+Study+By+Jan+Simota,+Jiri+Tupa&ots=o6777U2WWs&sig=aqoyRGppEDNf4EipRzsZQY4\\_0MM](https://books.google.co.za/books?hl=en&lr=&id=hl-UDwAAQBAJ&oi=fnd&pg=PA139&dq=Risk+Management+to+Enhance+Performance+in+the+Construction+SME+Sector%3B+Theory+and+Case+Study+By+Jan+Simota,+Jiri+Tupa&ots=o6777U2WWs&sig=aqoyRGppEDNf4EipRzsZQY4_0MM) (Accessed 03 May 2019).

Sitharam, S. and Hoque, M. 2016. Factors affecting the performance of small and medium enterprises in KwaZulu-Natal, South Africa. *Problems perspectives in Management*, 14 (2): 277-288.

Small Business Project. 2014. Examining the challenges facing small businesses in South Africa. SBP. Johannesburg. Available: [http://www.sbp.org.za/uploads/media/SBP\\_Alert\\_-\\_Examining\\_the\\_challenges\\_facing\\_small\\_businesses\\_in\\_SA\\_01.pdf](http://www.sbp.org.za/uploads/media/SBP_Alert_-_Examining_the_challenges_facing_small_businesses_in_SA_01.pdf) (Accessed 26 February 2019).

Small Enterprise Development Agency. 2012. *Analysis of the Needs, State and Performance of Small and Medium Businesses in the Agriculture, Manufacturing, ICT and Tourism Sectors in South Africa*. Pretoria: SEDA.

Small Enterprise Development Agency. 2018. *SMME Quartely Update: 3rd Quarter 2017*. Pretoria: Available: <http://www.seda.org.za/Publications/Publications/SMME%20Quarterly%202017-Q3.pdf> (Accessed 05 January 2019).

Small Enterprise Development Agency. Department of Small Business Development. 2019. *SMME Quarterly Update 1st Quarter*. Pretoria: SEDA.

Small Enterprise Development Agency. Development, S. B. 2021. *SMME Quaterly Update: 3rd Quater 2020*. Pretoria: SEDA.

Söderbom, M., Teal, F. and Harding, A. 2006. The Determinants of Survival among African Manufacturing Firms. *Economic Development and Cultural Change*, 54 (3): 533-555.

Soni, P., Cowden, R. and Karodia, A. M. 2015. Investigating the characteristics and challenges of SMMEs in the Ethekewini Metropolitan Municipality. *Nigerian Chapter of Arabian Journal of Business and Management Review*, 62 (2469): 1-79.

South-Africa. Presidency. 2014. *Act No. 46 of 2013: Broad-Based Black Economic Empowerment Amendment Act, 2013*. 37271. Cape Town: Available: [https://www.gov.za/sites/default/files/gcis\\_document/201409/37271act46of2013.pdf](https://www.gov.za/sites/default/files/gcis_document/201409/37271act46of2013.pdf) (Accessed 23 March 2019).

South Africa. 2018. *Presidential Job Summit 2018: Mandate Paper For Government On Small And Micro-Enterprise Support*. Pretoria:

Stam, E. 2010. Growth beyond Gibrat: firm growth processes and strategies. *Small Business Economics*, 35 (2): 129-135.

Stam, E., Gibcus, P., Telussa, J. and Garnsey, E. W. 2008. Employment growth of new firms. *Centre for Technology Management (CTM) Working Paper*, (2008/02)

Statistics South Africa. 2017. *Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2015*. Pretoria: Statistics South Africa. Available: <https://www.statssa.gov.za/publications/Report-03-10-06/Report-03-10-062015.pdf> (Accessed 10 August 2019).

Statistics South Africa. 2018. *Quarterly Labour Force Survey: Quarter 2*. Pretoria: Statistics South Africa. Available: <http://www.statssa.gov.za/publications/P0211/P02112ndQuarter2018.pdf> (Accessed 31 October 2018).

Statistics South Africa. 2019. *Discouragement decreases and unemployment increases in the second quarter of 2019*. Pretoria: Available: <http://www.statssa.gov.za/?s=unemployment+rate&sitem=content> (Accessed 19 August 2019).

Statistics South Africa. 2021. *STATISTICAL RELEASE: Quarterly Labour Force Survey* Pretoria: Available: [www.statssa.gov.za/publications/P0211/P02111stQuarter2021.pdf](http://www.statssa.gov.za/publications/P0211/P02111stQuarter2021.pdf)&clen=5578056&chunk=true (Accessed November 2021).

Strotmann, H. 2007. Entrepreneurial Survival. *Small Business Economics*, 28 (1): 87-104.

- Sunday, C. E. 2015. The role of theory in research. *South Africa: University of the Western Cape*,
- Sutton, J. 1997. Gibrat's legacy. *Journal of economic literature*, 35 (1): 40-59.
- Tanveer, M. A., Akbar, A., Gill, H. and Ahmed, I. 2013. Role of personal level determinants in entrepreneurial firm's success. *Journal of Basic and Applied Scientific Research*, 3 (1): 449-458.
- Te, Y.-F. 2018. Predicting the Financial Growth of Small and Medium-Sized Enterprises using Web Mining. ETH Zurich. Available: <https://www.research-collection.ethz.ch/handle/20.500.11850/309271> (Accessed 19 December 2019).
- Teruel-Carrizosa, M. 2006. Firm growth, persistence and multiplicity of equilibria: an analysis of Spanish manufacturing and service industries. Universitat Rovira i Virgili.
- Thorsteinson, T. J. 2003. Job attitudes of part-time vs. full-time workers: A meta-analytic review. *Journal of Occupational and Organizational Psychology*, 76 (2): 151-177.
- Tibshirani, R. 2011. Regression shrinkage and selection via the lasso: a retrospective. *Journal of the Royal Statistical Society. Series B, Statistical methodology*, 73 (3): 273-282.
- TIKZN. 2013. *Doing Business in KwaZulu-Natal*. Durban: Trade and Investment KwaZulu-Natal. Available: [http://www.tikzn.co.za/resources/docs/marketing\\_promotional\\_material/Doing\\_Business\\_in\\_KwaZulu-Natal.pdf](http://www.tikzn.co.za/resources/docs/marketing_promotional_material/Doing_Business_in_KwaZulu-Natal.pdf) (Accessed 15 March 2019).
- TIKZN. 2016. *An overview of international trade statistics: South Africa, KZN and RoW*. Durban: Trade and Investment KwaZulu Natal.
- TIKZN. TIKZN. 2018. *KZN Disinvestment Study and Business Health Index*. Durban: Trade and Investment KwaZulu Natal.
- Tsoumakas, G. 2019. A survey of machine learning techniques for food sales prediction. *Artificial Intelligence Review*, 52 (1): 441-447.
- Umjwali. 2012. *Research on the Performance of the Manufacturing Sector*. SEDA. Available: <http://www.seda.org.za/publications/publications/research%20on%20the%20performance%20of%20the%20manufacturing%20sector.docx> (Accessed 25 January 2019).
- Vadakkepatt, G. G. 2010. Essays on firm growth and survival as a "Fortune" 500 firm. ProQuest Dissertations Publishing.
- Van Biesebeek, J. 2005. Firm size matters: Growth and productivity growth in African manufacturing. *Economic Development and Cultural Change*, 53 (3): 545-583.
- Van der Walt, V. 2017a. An integrated strategy and risk management approach for public universities in South Africa. Doctor of Philosophy (PhD), Stellenbosch

University. Available: <http://scholar.sun.ac.za/handle/10019.1/102855> (Accessed 08 May 2020).

Van der Walt, V. 2017b. An integrated strategy and risk management approach for public universities in South Africa. PhD: Business Management and Administration, Stellenbosch University. Available: <http://scholar.sun.ac.za/handle/10019.1/102855> (Accessed 30 March 2019).

Van Liebergen, B. 2017. Machine learning: A revolution in risk management and compliance? *Journal of Financial Transformation*, 45: 60-67.

Van Biesebroeck, J. 2005. Firm Size Matters: Growth and Productivity Growth in African Manufacturing. *Economic Development and Cultural Change*, 53 (3): 545-583.

Venishetty, S. V. 2019. Machine Learning Approach for Forecasting the Sales of Truck Components. Master of Science in Computer Science, Blekinge Institute of Technology. Available: <https://www.diva-portal.org/smash/record.jsf?pid=diva2:1366957> (Accessed 28 January 2021).

Voulgaris, F., Agiomirgianakis, G. and Papadogonas, T. 2015. Job creation and job destruction in economic crisis at firm level: the case of Greek manufacturing sectors. *International Economics and Economic Policy*, 12 (1): 21-39.

Weisberg, M. 2006. Robustness analysis. *Philosophy of Science*, 73 (5): 730-742.

Wiklund, J., Patzelt, H. and Shepherd, D. A. 2009. Building an integrative model of small business growth. *Small Business Economics*, 32 (4): 351-374.

Williamson, D. F., Parker, R. A. and Kendrick, J. S. 1989. The box plot: a simple visual method to interpret data. *Annals of internal medicine*, 110 (11): 916-921.

Wooldridge, J. M. 2012. *Introductory econometrics: A modern approach: Cengage Learning*. 5th ed. Mason: Nelson Education Ltd.

Worku, Z. 2013. Analysis of factors that affect the long-term survival of small businesses in Pretoria, South Africa. *Journal of Data analysis information processing*, 1 (04): 67.

World Bank Group. 2020. *The World Bank In South Africa: The World Bank's strategy in South Africa reflects the country's development priorities and its unique leadership position at sub-regional and continental levels*. Available: <https://www.worldbank.org/en/country/southafrica/overview> (Accessed 02 May 2020).

Yasuda, T. 2005. Firm Growth, Size, Age and Behavior in Japanese Manufacturing. *Small Business Economics*, 24 (1): 1-15.

Yoshino, Y. 2011. *Industrial clusters and micro and small enterprises in Africa: From survival to growth*. World Bank.

You, J.-I. 1995. Small firms in economic theory. *Cambridge Journal of Economics*, 19 (3): 441-462.

- Youn, H. and Gu, Z. 2010. Predicting Korean lodging firm failures: An artificial neural network model along with a logistic regression model. *International Journal of Hospitality Management*, 29 (1): 120-127.
- Yusuf, T. O. and Dansu, F. S. 2013. SMEs, business risks and sustainability in Nigeria. *European Journal of Business and Social Sciences*, 2 (9): 76-94.
- Zhou, H. and de Wit, G. 2009. Determinants and dimensions of firm growth. *SCALES EIM Research Reports (H200903)*,
- Zhou, H., Dash, G. and Kajiji, N. 2021. Artificial Intelligence Function Mapping to Calibrate the Determinants of SMME Performance. Paper presented at the *Virtual African Finance Association Conference*. 11-12 May Africa Growth Institute, Available: [http://www.africagrowth.com/AFJ\\_conference\\_abstracts.pdf](http://www.africagrowth.com/AFJ_conference_abstracts.pdf)
- Zhou, H. and Gumbo, V. 2021a. Comparative analysis of a traditional and machine learning techniques in predicting SMMEs growth performance. *Academy of Entrepreneurship Journal*, 27 (3): 1-12.
- Zhou, H. and Gumbo, V. 2021b. Key performance drivers of small enterprises in the manufacturing sector in KwaZulu Natal province, South Africa. *International Journal of Entrepreneurship*, 25 (3): 12.
- Zhou, H. and Gumbo, V. 2021c. The Role of Size and Age on Firm Growth: Evidence from Manufacturing SMMEs in KwaZulu-Natal Province, South Africa. *African Journal of Inter/Multidisciplinary Studies*, 3 (1): 144-160.
- Zhou, H. and Gumbo, V. 2021d. Rural-urban comparison of manufacturing SMMEs performance in KwaZulu Natal province, South Africa. *African Journal of Development Studies*, 11 (1): 7-31.
- Zhou, H. and Gumbo, V. 2021e. Supervised Machine Learning for Predicting SMME Sales: An Evaluation of Three Algorithms. *The African Journal of Information and Communication (AJIC)*, 27: 1-21.
- Zulfikar, R. 2019. *Estimation model and selection method of panel data regression: an overview of common effect, fixed effect, and random effect model*. Available: <https://osf.io/download/5b24301a8b4bed0011b5b80f/> (Accessed 06 June 2020).
- Zungu, S., Sibanda, M. and Rajaram, R. 2018. The effect of the enterprise risk management quality on firm risks: A case of the South African mining sector. *African Journal of Business and Economic Research*, 13 (1): 115-133.

## ANNEXURE A: INSTITUTIONAL ETHICAL CLEARANCE



### MANAGEMENT SCIENCES: FACULTY RESEARCH ETHICS COMMITTEE (FREC)

29 November 2017  
Student No: 21752005

FREC No: 154/17 FREC

Dear Mr H Zhou

PHD: MANAGEMENT SCIENCES: BUSINESS ADMINISTRATION

**TITLE: Impact of internal and external risk drivers on the performance and long term survival of SMMEs in the manufacturing sector in KwaZulu Natal Province**

Please be advised that the FREC Committee has reviewed your proposal and the following decision was made: **Approved – Ethics Level 2**

Date of FRC Approval: 29 November 2017

Approval has been granted for a period of two years from the above FRC date, after which you are required to apply for safety monitoring and annual recertification. Please use the form located at the Faculty. This form must be submitted to the FREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the FREC according to the FREC SOP's. Please note that ANY amendments in the approved proposal require the approval of the FREC as outlined in the FREC SOP's.

---

Prof JP Govender  
Chairperson: Faculty Research Ethics Committee



## ANNEXURE B: CONSENT LETTER FROM DATA PROVIDERS



Business & Tax Accountant

**Fawiza Farouk**  
Tel: 067 127 5441

**Date:** 05 November 2019

**Our Reference:** mcfah0520

**TO WHOM IT MAY CONCERN**

Dear Sir/Madam

**RE: ETHICAL CLEARANCE TO DO RESEARCH**

This letter serves to confirm that Helper Zhou has been given permission to get assistance from Mcfah Consultancy to do his PhD research with reference to the topic: *"Impact of internal and external risk drivers on the performance and long-term survival of SMMEs in the manufacturing sector in KwaZulu Natal Province"*

Should there be any further queries regarding this matter, kindly contact the writer at your earliest.

Yours Faithfully

**Ms F Farouk**  
Member of SAIT & SAIBA (SA)

334 Randles Road, Overport, 4067 • Suite 13, Private Bag X05, Overport 4091  
Email: mcfah@vodamail.co.za • Cell: 083 978 4765 • Cell: 067 127 5441

## ANNEXURE C: LETTER TO SURVEY PARTICIPANTS - INFORMED CONSENT AND RESEARCH QUESTIONNAIRE



Faculty of Management Sciences

Department of Entrepreneurial Studies and Management

Date: 10 November 2018

Dear Participant

### **REQUEST FOR PERMISSION TO CONDUCT RESEARCH**

My name is Helper Zhou (21752005) and I am a student studying towards a Doctoral Degree (Business Administration) at Durban University of Technology. The research I am conducting involves the participation of SMMEs in different sectors, titled: "Influence of key risk drivers on the performance of SMMEs in the manufacturing sector in KwaZulu Natal Province".

I do hereby seek your consent to participate as a respondent during my research.

Attached is a copy of the research questionnaire.

Should you be interested in the final research a soft copy of the full research will be provided.

Thank you for your time.

Yours Sincerely,

Helper Zhou (21752005)

Cell: 073176 5014

Email: [21752005@dut4life.ac.za](mailto:21752005@dut4life.ac.za)

Durban University of Technology

Supervisor: Dr V Gumbo

Email: [gumbov@ub.ac.bw](mailto:gumbov@ub.ac.bw)

### RESEARCH QUESTIONNAIRE

PLEASE INDICATE YOUR RESPONSES BY PLACING A TICK (✓) IN THE APPROPRIATE BOX EXCEPT IF STATED OTHERWISE

1. How do you measure your firm performance?

Sales	
Employees	
Profit	
Assets	
Growth	
Other (Specify).....	

2. Please rate and indicate the following internal factors' impact (1-5) and effect on the performance of your organisation?

	5 (Very Strong impact)	4 (Strong impact)	3 (Average impact)	2 (Minor effect)	1 (Very limited effect)
Productivity					
Permanent Employees					
Temporary Employees					

Total Assets					
Company Age (Experience)					
Registration Type					
Digital Marketing					
Website					

3. Please indicate the effect of the following internal drivers on your organisational performance.

	Positive	Negative	None
Productivity			
Permanent Employees			
Temporary Employees			
Total Assets			
Company Age (Experience)			
Registration Type			
Digital Marketing			
Website			

4. Please rate and indicate the following external factors' impact (1-5) and effect (negative/positive) on the performance of your organisation, respectively.

	5 (Very Strong impact)	4 (Strong impact)	3 (Average impact)	2 (Minor effect)	1 (Very limited effect)	Direction (Positive/negative/None)

Purchasing Managers Index (PMI)						
Unemployment						
GDP Growth rate						
Location						

5. Please indicate the effect of the following internal drivers on your organisational performance.

	Positive	Negative	None
Purchasing Managers Index (PMI)			
Unemployment			
GDP Growth rate			
Location			

6. Are you aware of enterprise-wide risk management concept ?

Yes	
No	
Not Sure	

7. What is your view/definition and approach of the term "risk driver"?

Positive	
Negative	

Both	
------	--

8. Please list the intervention strategies you use to manage the impact of the identified internal and external factors with an impact on your organisation?

- a. ....
- b. ....
- c. ....
- d. ....
- e. ....
- f. ....

9. Do you use a predictive analytics technique to identify key drivers and inform your company strategy and risk management plans?

Yes	
No	

10. If NO to the above question, do you think it is necessary for your organisation to use predictive tools when developing/updating company strategy and risk management plans?

Yes	
No	
Not Sure	

11. General comments?

## ANNEXURE D: TURNITIN REPORT



### Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

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## ANNEXURE E: EDITOR'S CERTIFICATE



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1 March 2021

#### Declaration of professional edit

Influence of key risk drivers on the performance of SMMEs in the manufacturing sector in KwaZulu-Natal

by  
Helper Zhou

I declare that I have edited and proofread this thesis. My involvement was restricted to language usage and spelling, completeness and consistency and referencing style. I did no structural re-writing of the content.

I am qualified to have done such editing, being in possession of a Bachelor's degree with a major in English, having taught English to matriculation, and having a Certificate in Copy Editing from the University of Cape Town. I have edited more than 200 Masters and Doctoral theses, as well as articles, books and reports.

As the copy editor, I am not responsible for detecting, or removing, passages in the document that closely resemble other texts and could thus be viewed as plagiarism. I am not accountable for any changes made to this document by the author or any other party subsequent to the date of this declaration.

Sincerely,

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University of Cape Town: Certificate in Copy Editing  
University of Cape Town: Certificate in Corporate Coaching



Jacqui Baumgardt  
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