BRCR2024 CONFERENCE

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON BUSINESS RESILIENCE, CONTINUITY AND REGENERATION

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

BRU BUSINESS RESCUE UNIT

INSPIRING GREATNESS

BRCR2024 CONFERENCE

Proceedings of the International Conference on Business Resilience, Continuity and Regeneration

CONFERENCE THEME:
Resilience and Regeneration of Businesses and Financial Markets in the Fourth Industrial Revolution

CONFERENCE DATES: 13 – 15 March 2024
VENUE: Durban, South Africa

PUBLISHER:
Business Rescue Unit, School of Accounting,
Economics and Finance,
University of KwaZulu-Natal

ISSN: 2959-9563 (Online)

Business Rescue Unit,
School of Accounting, Economics and Finance,
University of KwaZulu-Natal,
University Road,
Private Bag X54001,
Westville, Durban,
4000,
South Africa

For more information please contact the Business Rescue Unit at BRCR-Conference@ukzn.ac.za

ISSN: 2959-9563 (Online)

Preface

We are very happy to the introduce the Proceedings of the 2nd International Conference on Business Resilience, Continuity and Regeneration BRCR2024 Conference. The conference was running under the theme: Resilience and Regeneration of Businesses and Financial Markets in the Fourth Industrial Revolution.

The COVID 19 pandemic has significantly disrupted and revolutionised how businesses and financial systems operate worldwide. It led to health and economic crises that forced businesses and financial institutions to adopt new ways of doing business. Interestingly, the pandemic also augmented the fourth industrial revolution (4IR) adoption process by businesses. Businesses anticipated that adopting the 4IR can deliver good results, such as decline in labour costs and increase in productivity, and can lead to better resilience, especially against oscillates of economic cycles. Nevertheless, businesses and financial markets are not invulnerable to volatility, uncertainty, complexity and ambiguity brought about by the disruptive ability of the 4IR. Henceforth, businesses and financial markets resilience and regeneration in the 4IR has become a research topic of interest to many researchers.

The main aim of the conference was to create an effective platform for connecting, collaborating, and exchanging various research results and problem-solving *modi operandi* among academicians, postgraduate students, practitioner-researchers, policy-makers, and entrepreneurs from all four corners of the world.

We had more than 90 presentations from delegates from various countries around the globe. All submissions were blind peer-reviewed by a pool of scientific committee members and reviewers from different countries. The presented research articles consider a myriad of topics in management sciences.

The success of the BRCR2024 Conference was due to the commitment and collective efforts of everyone who was involved. Our special vote of thanks goes all the delegates, guests, and speakers. We also want to express our gratitude to the reviewers, scientific committee members and Business Rescue Unit members who made this Conference a big success.

Sincerely,

Professor Mabutho Sibanda, Professor Paul-Francois Muzindutsi
Conference Chairpersons of the BRCR2024 Conference
University of KwaZulu-Natal
South Africa

Conference Organising Committee

Conference Chairpersons

Professor Mabutho Sibanda, University of KwaZulu-Natal, South Africa
Professor Paul-Francois Muzindutsi, University of KwaZulu-Natal, South Africa

Conference coordinator

Dr Frank Ranganai Matenda, University of KwaZulu-Natal, South Africa

Business Rescue Unit organising members

Professor Rajendra Rajaram
Professor Bomi Cyril Nomlala
Professor Joseph Olorunfemi Akande
Dr Bhasela Yalezo
Dr Frank Ranganai Matenda
Ms Kajal Ramnanun
Ms Zamanguni Hariatah Gumede

Disclaimer: The organising committee is not liable for any errors or omissions in this document

Conference Scientific Committee

Professor Jobo Dubihlela,
University of KwaZulu-Natal, South Africa

Professor Cecile Gerwel,
University of KwaZulu-Natal, South Africa

Professor Evelyn Derera,
University of KwaZulu-Natal, South Africa

Professor Josue Mbonigaba,
University of KwaZulu-Natal, South Africa

Professor Liafisu Sina Yekini,
University of Derby, UK

Professor Gbadebo Odularu,
Bay Atlantic University, USA

Professor Patricia Lindelwa Makoni,
University of South Africa, South Africa

Professor Sunde Tafirenyika,
Namibia University of Science and Technology, Namibia

Professor Kalu O. Emenike,
University of Eswatini, Eswatini

Professor Mulatu Fekadu Zerihun,
Tshwane University of Technology, South Africa

Professor Olubukunola Ranti Uwuigbe,
Covenant University, Nigeria

Professor Zandri Dickason Koekemoer,
North-West University, South Africa

Professor Suné Ferreira-Schenk,
North-West University, South Africa

Professor Yusuf Opeyemi Akinwale,
Imam Abdulrahman Bin Faisal University, Saudi Arabia

Professor Mabutho Sibanda,
University of KwaZulu-Natal, South Africa

Professor Paul-Francois Muzindutsi,
University of KwaZulu-Natal, South Africa

Professor Rajendra Rajaram (CA)(SA),
University of KwaZulu-Natal, South Africa

Professor Joseph Olorunfemi Akande,
Walter Sisulu University, South Africa

Professor Surendran Subrayan Pillay,
University of KwaZulu-Natal, South Africa

Professor Phocenah Nyatanga,
University of KwaZulu-Natal, South Africa

Professor Kerry-Ann McCullough,
University of KwaZulu-Natal, South Africa

Professor Teresa Kaulihowa,
Namibia University of Science and Technology, Namibia

Professor Godfrey Marozva,
University of South Africa, South Africa

Professor Bomi Nomlala,
University of KwaZulu-Natal, South Africa

Professor Barnes Sookdeo,
University of South Africa, South Africa

Professor Patrick Ndayizigamiye,
University of Johannesburg, South Africa

Professor Kin Sibanda,
Walter Sisulu University, South Africa

Professor Nhamo Mashavira,
Great Zimbabwe University, Zimbabwe

Dr Esinath Ndiweni,
Heriot Watt University, UK

Professor Ashika Maharaj,
University of KwaZulu-Natal, South Africa

Dr Jeremiah Machingambi,
University of the Western Cape, South Africa

Dr Mashford Zenda,
University of the Free State, South Africa

Dr Tendayi Mutimukuru Maravanyika,
Great Zimbabwe University, Zimbabwe

Dr Meshel Muzuva,
Management College of Southern Africa, South Africa

Dr Cuthbert Muza,
Walter Sisulu University, South Africa

Dr Dorah Dubihlela,
Walter Sisulu University, South Africa

Dr Sedzani Musundwa,
University of South Africa, South Africa

Dr Durrel Ramrathan,
MultiChoice, South Africa

Dr Mugove Mashingaidze,
BA ISAGO University, Botswana

Dr Reward Utete,
University of Zululand, South Africa

Conference Scientific Committee

Professor Adefemi A. Obalade,
University of the Western Cape, South Africa

Dr Magret Olarewaju,
Coventry University, UK

Dr Eriyoti Chikodza,
Great Zimbabwe University, Zimbabwe

Dr Mjabuliseni Ngidi,
University of KwaZulu-Natal, South Africa

Dr Nkosinamandla Shezi,
University of South Africa, South Africa

Dr Gulali Indiya Donald,
Maseno University, Kenya

Professor Mishelle Doorasamy,
University of KwaZulu-Natal, South Africa

Dr Victor Gumbo,
Modworld Consulting, Botswana

Dr Agyei Samuel Kwaku,
University of Cape Coast, Ghana

Dr Oluwasoye P. Mafimisebi,
De Montfort University, UK

Dr Stephen C. Mpembele,
Copperbelt University, Zambia

Dr Precious Mncayi,
North-West University, South Africa

Dr Bhupendra Kumar,
Debre Tabor University, Ethiopia

Professor Rufaro Garidzirai,
Walter Sisulu University, South Africa

Professor Ferdinand Niyimbanira,
University of Mpumalanga, South Africa

Dr Thomas Habanabakize,
Tshwane University of Technology, South Africa

Dr Bhasela Yalezo,
University of KwaZulu-Natal, South Africa

Dr Frank Ranganai Matenda,
University of KwaZulu-Natal, South Africa

Professor Upasana Gitanjali Singh,
University of KwaZulu-Natal, South Africa

Dr Lorraine Muguto,
University of KwaZulu-Natal, South Africa

Dr Njabulo Nkomazana,
Midlands State University, Zimbabwe

Dr Jean Damascene Mvunabandi,
Durban University of Technology, South Africa

Dr Helper Zhou,
Sigma International/Durban University of Technology, South Africa

Dr Hillary Muguto,
University of KwaZulu-Natal, South Africa

Dr Elmon Mudefi,
Walter Sisulu University, South Africa

Dr Justin Chirima,
Great Zimbabwe University, Zimbabwe

Dr Lilian Nwosu,
North-West University, South Africa

Dr Caleb Adelowo,
North-West university, South Africa

Dr Hlupeko Dube,
Great Zimbabwe University, Zimbabwe

Dr Haruna Maama,
Durban University of Technology, South Africa

Dr Masibulele Phesa (CA)(SA),
University of KwaZulu-Natal, South Africa

Ms Kajal Ramnanun,
University of KwaZulu-Natal, South Africa

Ms Zamanguni Hariatah Gumede (CA)(SA),
University of KwaZulu-Natal, South Africa

Ms Salma Vanker (CA)(SA),
University of KwaZulu-Natal, South Africa

Ms Fikile Dube,
University of the Western Cape, South Africa

Adv Annastacia Mthembu,
University of South Africa, South Africa

Ms Edith Mbiriri,
University of South Africa, South Africa

DHET Conference Compliance Letter

(for South Africa Authors)

To whom it may concern:

The International Conference on Business Resilience, Continuity and Regeneration (BRCR2024 Conference) was hosted by the Business Rescue Unit, School of Accounting, Economics and Finance, University of KwaZulu-Natal, Durban, from 13 - 15 March 2024. This Conference Proceedings aims to disseminate original research and new developments in the areas of management sciences under the theme Resilience and Regeneration of Businesses and Financial Markets in the Fourth Industrial Revolution. Complete articles were subjected to a double-blind peer-reviewing process before acceptance for presentation at the conference and subsequent publication in the Conference Proceedings. Each article was reviewed by at least two subject specialists selected for their expert knowledge in the areas. The related Conference Proceedings' International Standard Serial Number (ISSN) is 2959-9563 (Online). More than 70% of contributions published in this Conference Proceedings emanate from multiple institutions. The conference has an organising committee (see Pg. 2), and a scientific committee that plays the role of the editorial board (see Pg. 3 - 4), with a considerable majority of members beyond a single institution and single country. Consequently, the scientific committee reflects expertise in the management sciences field.

Sincerely,

Professor Mabutho Sibanda
BRCR2024 Conference Chair
Dean and Head of School - School of Accounting, Economics and Finance
University of KwaZulu-Natal, South Africa
Email: Sibandam@ukzn.ac.za

Table of contents

Investor Sentiment, Stock Market Returns and Volatility: Evidence from the Johannesburg Stock Exchange

Pavan Hiramoney
University of KwaZulu-Natal
215063232@stu.ukzn.ac.za

Lorraine Muguto
University of KwaZulu-Natal
Mugutol@ukzn.ac.za

Hilary Tinotenda Muguto
University of KwaZulu-Natal
Mugutoh@ukzn.ac.za

Abstract

Traditional asset pricing theory asserts that investors are rational and, therefore, asset prices are solely influenced by fundamental factors. However, the effect of behavioural biases on asset returns has been documented in recent financial literature, leading to the questioning of the traditional financial theories. Accordingly, this study investigated whether investor sentiment has an impact on the returns and volatility of headline indices on the Johannesburg Stock Exchange market over a ten-year period. A composite broad market sentiment index was used to measure sentiment and the generalised autoregressive conditional heteroscedasticity models were used as the method of analysis. Findings show that there is a significant relationship between market returns, volatility and investor sentiment on the South African market. These findings point to the inadequacy of traditional asset pricing models as they do not take into account investor sentiment or any other behavioural component in pricing assets in spite of the evidence that they are significant risk factors. The results have implications for price discovery, risk management and policymaking – all aspects the success of which depends on the proper measurement and forecasting of volatility.

Keywords:
Investor sentiment; Volatility; Returns; General Autoregressive Conditional Heteroscedasticity

Introduction

Background

Traditional finance theories such as the Efficient Market Hypothesis (EMH) are based on the assertion that investors always make rational investment decisions (Malkiel and Fama, 1970). Oseni and Olanrewaju (2017) further state that there is a widely accepted model for asset pricing, known as the Capital Asset Pricing Model (CAPM), which was developed by Treynor (1961), Sharpe (1964), Lintner (1965) and Mossin (1966). The model is used to determine the required rate of return of a risky asset, with the notion that the price movements are caused by fundamental information flowing into the market and the efficient and rational reaction of investors to that information (Oseni and Olanrewaju, 2017). Much of the assertions in traditional finance theories stem from the Markowitz mean-variance portfolio theory (Markowitz, 1952). Therein, Markowitz (1952) asserted that market participants are willing to construct portfolios that maximise returns depending on the amount of risk captured and that volatility in stock prices is driven only by variations in fundamental factors (Shefrin and Statman, 2000).

Over the years, the concept of efficiency has been challenged as a result of human behaviour (Suryawanshi and Jumle, 2016). According to Yang and Copeland (2014), behavioural literature has proved that investor sentiment does influence trading decisions, leading to mispriced stocks. Further empirical evidence brought forward by Sewell (2012) and Malkiel and Saha (2005), alludes to the fact that there are limitations to a fully efficient market. The focus has thus moved to this new and seemingly robust paradigm of finance – behavioural finance. Therein, it is stated that investors are prone to cognitive biases and are not fully rational. Therefore, asset prices and market volatility may be influenced by the investors' sentiments and not only by fundamental factors (Hu, Wang and Chi, 2013). Baker and Wurgler (2007) state that investor sentiment represents the investor's subjective expectations of future asset prices. Since it is widely accepted that human behaviour is indeed a systematic risk factor that influences volatility and asset prices (Hirshleifer, 2001; Lee, Jiang and Indro, 2002; De Bondt and Thaler, 1985), asset pricing models should include it as a variable.

Subrahmanyam (2007) and Statman, Fisher and Anginer (2008) state that to fully understand stock price movements, it is imperative to include the behaviour of market participants. Furthermore, De Bondt and Thaler (1985) and Kourtidis (2011) argue that to truly understand and elucidate market abnormalities such as price bubbles, it is necessary to comprehend human psychology. This will ensure that participants supersede traditional asset pricing models which claim that risk is affected solely by fundamental factors (Yang and Copeland, 2014). Dow and Gorton (2006) declare that investors who make trading decisions that are led by human behaviour instead of fundamental factors are known as noise traders. These investors often act on impulse and irrationality but play an important role in the impact that investor sentiment has on asset pricing and the volatility of the market (Dow and Gorton, 2006).

Problem Statement

Asset pricing models should aim to include market sentiment as a variable that impacts the volatility and the returns of financial assets as this will reflect their true fundamental value. However, as pointed out by Gottesman, Jacoby and Wang (2012), traditional asset pricing models inaptly assume that asset prices are solely affected by fundamental factors. This assumption creates a problem of deviating asset prices from fundamental values (Gottesman et al., 2012), which, in turn, creates problems for investors, portfolio managers and policymakers due to the resulting poor price discovery process (Yang and Copeland, 2014). If efficient pricing is ever to be achieved, behavioural components of asset pricing will have to be taken into account. This study employed an investor sentiment index constructed by Rupande, Muguto and Muzindutsi (2019) and GARCH models to show that market-wide investor sentiment is systematic and should be considered when pricing financial assets.

Research Question and Objectives

The study addressed the following question: Does investor sentiment influence stock market returns and volatility on the Johannesburg Stock Exchange (JSE)?

The objectives of the study were to:

- Determine the impact of investor sentiment on volatility and returns of the headline indices on the South African market.
- Determine whether sentiment affect the volatility

and returns of the headline indices differently on the South African market.
- Determine whether sentiment-augmented models are superior to non-augmented models.

Importance of Study

The research conducted in this paper aims to investigate whether investor sentiment influences returns and volatility on the JSE. Much of the studies in this regard have focussed their attention on financial markets in developed countries such as the United States, Germany and the United Kingdom (Kumari and Mahakud, 2015) and much less so in the developing and emerging markets such as South Africa. Assessing this relationship in South Africa will add to the limited research conducted in the context of emerging markets. Two related studies by Kumari and Mahakud (2015) and Rupande et al. (2019) have also been done in the emerging markets – India and South Africa, respectively. However, this study differs from the mentioned studies as its focus is narrowed down to headline indices on the JSE to achieve its objectives – the Small Market Capitalisation (SmallCap), Middle Market Capitalisation (MidCap) and JSE Top 40 indices as opposed to the broad market indices they employed.

Observing if there is indeed a relationship between these variables will assist policymakers in realising the importance of incorporating investor sentiments when measuring risk and making decisions that affect the markets (Sayim and Rahman, 2015). Doing so may contribute to reducing stock market volatility and uncertainty (Rupande et al., 2019). As this study hypothesizes that investor sentiment does influence volatility, the incorporation of market sentiment to asset pricing may result in better portfolio management and measurement of risk by market participants. An integral function of financial markets regarding asset pricing is price discovery which determines how information is incorporated into prices (Brogaard, Hendershott and Riordan, 2014). It reduces the noise component of prices and acquires different types of information to trade on, making prices more efficient overall (Lin, Chou and Wang, 2018). Therefore, failing to incorporate sentiment in traditional asset pricing models would lead to poor price discovery, causing investors to be misinformed and market to be volatile due to poor information processing.

Literature Review

Evidence from Developed Markets

Brown and Cliff (2005) evaluated the predictive power of various investor sentiment proxies employed in previous studies. They used vector autoregression (VAR) models to examine the relationship between a sentiment index and stock markets returns. Results suggest that the forecasting power of a sentiment index for future stock returns is weak, but the fluctuations of investor sentiment are correlated with contemporaneous market returns.

Investigating the relationship that exists between investor sentiment and the volatility of stocks, Michelfelder and Pandya (2005) analysed the volatility of stock returns and predictability for emerging Asian economies and differentiated them with the developed markets of the Unite d States and Japan. The EGARCH model using the Skewed Generalised Error Distribution (SGED) addressed the volatility clustering in stock returns. Two important conclusions made by this model regarding noise traders are: the sentiment of noise traders is random and thus cannot be anticipated by rational investors, and the irrationality of noise traders leads to systematic risk. This risk is the result of a variation in fundamental prices and extra volatility. The findings of the paper were that in emerging markets the volatility shocks last for longer periods when compared with developed countries. This occurs due to the fact that mature markets have information systems that do not allow volatility shocks to persist and ultimately result in a collective volatility shock for the whole market. Kumar and Lee (2006) conducted a study in the United States spanning from 1991-1996. The purpose of the study was to test the noise trader model as the model asserts that individual investor sentiment has an influence on stock returns. This was implemented through the investigation of the impact of over one million retail transactions on stock returns. Results suggested that the noise trader theory holds. Thus, transactions activities in the retail space had an incremental explanatory power for small stocks, value stocks and stocks with lower prices, resulting in the conclusion that investor sentiment is significant in stock prices.

Finter, Niessen-Ruenzi and Ruenzi (2012) examined the effect of investor sentiment on the German stock

market. The principal component analysis was used to construct a sentiment indicator that condenses information of several well-known sentiment proxies. Contrary to the above study conducted in the US, where investor sentiment has strong predictive power on future stock market returns and prices, it was found that the opposite is true for the German stock market. This is mainly due to the German market being dominated by institutional investors who are less likely to make decisions based on sentiment fluctuations. Baker, Wurgler and Yuan (2012) conducted a study on Canada, France, Germany, Japan, the United Kingdom and the United States markets to examine the contribution of the global component of sentiment on the stock prices of highly integrated markets. The research found that sentiment fluctuations reflected in returns and volatility influence arbitrage opportunities, portfolio management and capital budgeting. Shu and Chang (2015) examined periods of aviation disasters, terrorist attacks, huge sporting events, and others, to examine how sentiment emerging from these events influences prices in the financial markets. Results from this study proved that prices in financial markets are elevated with higher sentiments, whilst there is a decrease in prices with lower sentiments (Shu and Chang, 2015). Empirical evidence also shows that when there are good events and investors are optimistic, sentiment has a stronger influences prices (Shu and Chang, 2015).

Da, Larrain, Sialm and Tessada (2015) conducted a study in Chile to see whether noise trading results in increased volatility. They observed both equity and bond markets and focused on the volatility caused by a large number of individual investors, as it seemed their investment decisions contributed to a large amount of volatility. Prices in both markets seemed to shift from intrinsic values as a result of a large number of individual investors making similar trades around the same time. The volatility on the Santiago's Stock Market Equity Index and the Dow Jones LATixx Chile Government Bond Index was observed before the firm entered the markets in 2011 up until a few years after they did. It was found that investors often switched from funds when they observed large changes such as the 2008 financial crisis. Thereafter, in 2009, the markets started stabilising with investors moving back to funds with the risk they preferred before the crisis. After 2011, the markets saw high volatility after each recommendation by the firm. As mentioned, these recommendations were not rational. This study proves that noise trading does affect volatility as suggested by Shiller (1981) and Black (1986).

Evidence from Emerging Markets

The impact of sentiment on financial markets has been a subject of many studies over time. A study by Chi, Zhuang and Song (2012) compared the returns of stocks with high and low sentiment to observe the relationship between investor sentiment and stock returns. It was found that over the long run, stocks with high sentiment had a higher return than stocks with low sentiment. These results were not as expected as usually, the converse is true with sentiment pushing stock prices above the intrinsic value (Agarwal, Liu and Rhee, 2008). This discrepancy resulted as the study was conducted in an emerging capital market. The findings of Białkowski, Etebari and Wisniewski (2012), which revealed that during the holy month of Ramadan, stock markets illustrate abnormal returns but low volatility. This is not substantiated by fundamental factors, thus proving that during this month investors are merely optimistic, and this optimism leads to higher volume of investment. Chi et al. (2012) also looked at investor sentiment and its relationship with stock returns and volatility in an emerging capital market – the Chinese stock market. The focus was on the inflows and outflows of different types of mutual funds and trying to relate these to different stocks in order to measure individual sentiment. A measure by Frazzini and Lamont (2008) was used to assess the sentiment indicator on individual stocks held by mutual funds. Considering a positive relationship between the flows measured and return volatility, the conclusion was that investor sentiment does affect volatility.

Kumari and Mahakud (2015) looked at whether Indian stock market returns, an emerging market, are affected by investor sentiment. To see this, Kumari and Mahakud (2015) developed a broad-based irrational aggregate investor sentiment index and used GARCH models to examine the impact of changes in investor sentiment on the market volatility and returns. From the findings, volatility is affected negatively and positively by past investor sentiments and by past returns. Kumari and Mahakud (2015) mention that results also show that investor sentiment is priced as a systematic risk factor in the Indian market and that it plays a huge role in predicting the market's future returns and volatility. Unlike developed markets

characterised by a large number of retail investors who influence market returns, institutional investor sentiment affects stock returns and volatility more in India (Kumari and Mahakud, 2015).

A study by Sayim and Rahman (2015) investigated if stock returns, volatility and individual investor sentiment are related in Turkey. Evidence is from the Istanbul Stock exchange which is a developing market. For investor sentiment, the monthly Consumer Confidence index was used as a proxy. To measure its impact on stock returns and volatility, Sayim and Rahman (2015) used impulse response functions from the vector autoregression (VAR) model. The study found that the Istanbul's Stock exchange returns were increased by any positive investor sentiment and that unanticipated increases in rational investor sentiments in the market resulted in significant negative impact of the stock market's volatility. This suggests that stock returns, volatility and individual investor sentiment are indeed related. Sayim and Rahman (2015) conclude that these findings suggest that investors in Turkey have positive expectations about their economy as a whole.

Evidence from South Africa

Dalika and Seetharam (2014) analysed the relationship between stock returns and investor sentiment in the South African market. The study investigated two questions of central importance concerning investor sentiment: does investor sentiment have an influence on the South African market and is the effect of sentiment greater on securities that are difficult to value and arbitrage. A linear combination of volatility premium, the total volume of IPOs, average initial first-day returns of IPOs and market turnover was used to construct a composite sentiment index. The primary empirical finding is that sentiment has a broad cross-sectional and rich effect on securities in the South African market. When investor sentiment is relatively high, young stocks, highly volatile stocks, small firm stocks and extreme growth experience low future returns relative to other securities (Dalika and Seetharam, 2014).

Balcilar, Gupta and Kyei (2018) conducted a study in South Africa, an emerging market, with the aim of predicting returns and volatility using investor sentiment indices. This was done by replicating an investor sentiment index constructed by Baker and Wurgler (2006) and combining it with the non-parametric causality-in-quantiles test proposed by Balcilar et al (2018). Findings indicate that the two indices employed in this study are able to predict returns and volatility. Balcilar et al., (2018) associate such findings with the noise trader theory, as this limits the ability of fully arbitraging mispricing in the stock markets.

Rupande et al. (2019) examined the effect of volatility and investor sentiment on the JSE All Share Index (ALSI) by utilising GARCH-M specifications augmented by a sentiment factor under the three error distribution assumptions by analysing daily data over the period 2002-2018. The results found that the effect of past returns and past shocks on the JSE ALSI to the conditional mean will disappear after one period. Significant evidence of a positive relationship between risk and return on the JSE was also found, showing that volatility is a priced factor on the JSE. Evidence of leverage effects and volatility persistence were also present in the results found. Investor sentiment was found to be a significant factor in describing the conditional variance and returns on the JSE. The GJR-GARCH-M with an investor sentiment factor was found to be the most ideal for volatility modelling, this attests to the significance of investor sentiment on the JSE (Rupande et al., 2019).

Data

Returns Calculation

This study employed daily closing prices, dividend yields and volume turnover on the SmallCap, MidCap and JSE Top 40 indices from the Iress database over the period of January 2007 – December 2017 (Iress, 2019). This period was chosen due to the fact that it includes the financial crisis and several political changes both globally and in South Africa. The study used daily data rather than weekly or monthly data for two reasons: firstly, it would be easier to identify and trace the origins of trends, spikes and drops in share prices and the overall market; and secondly, a higher frequency of data would lead to the models used to generate more accurate results, as financial forecasting is often inaccurate if less frequent data estimates are utilised (Reilly, 2013; Rupande et al., 2019). Accordingly, the daily returns on the indices were computed as:

$$R_t = \frac{(D_t + (P_t - P_t - 1)}{P_t - 1} \qquad (1)$$

Where: R_t is the total daily return; D_t is the closing

price for dividends on day t; P_t is the closing price on day t and P_{t-1} is the closing price on the previous day. The dividend payment was estimated by multiplying the specific market's (JSE Top 40, MidCap or SmallCap) dividend yield on day t by P_t. The returns were transformed to logs because the log-normal distribution of returns, especially over a longer term than daily is satisfactory, because the skew of log-normal distribution is positive, whereas actual market returns, for example, JSE Top 40 is negatively skewed (Medina, 2010). In the initial tests to be conducted, student's t is one of the choices of distribution along with the normal distribution and Generalised Error Distribution (GED). Therefore, the decision to transform the data to logs was taken (O'Neil, 2011). If logs were computed, it gives the assumption that the expected value of any such stock in one day is infinity (O'Neil, 2011).

Investor Sentiment

Due to the nonexistence of an uncontroversial measure of investor sentiment, a sentiment measure constructed by Rupande et al. (2019) was employed. The measure was based on daily data on the exchange rate between the South African Rand and the United States (US) dollar (Exch), the prime rate (Prime), the 90-day Treasury bill rate (Treasury), the repo rate (Repo), the trading volume of the JSE All Share Index (ALSI) (Volume), the volume-weighted average price changes of the JSE ALSI and the SAVI index (Savi). Rupande et al. (2019) based the selection of these proxies on the availability of data and motivation from the available literature. Thereafter, Principal Component Analysis (PCA) was utilised to derive a sentiment index from the fitted proxies. The composite sentiment index was formulated using this technique because it permitted for the reduction of the data's dimensionality. This aids the ability to interpret the data without information loss in the determination of whether investor sentiment influences stock volatility and returns on the South African market (Jolliffe and Cadima, 2016).

Orthogonal transformation is used by the PCA technique to transform an array of correlated series into a set of linearly uncorrelated ones (Jolliffe and Cadima, 2016). The Varimax rotation was used to rotate the PCA matrix in order to maximise the variance of the loadings. Baker and Wurgler (2006) stated that some sentiment proxies take longer to display sentiment, to account for this an index with first principal components of the current values and one-period lagged values was established. This led to the evaluation of the correlation between the first stage index and the current and lagged values of each of the proxies. A composite index (InvSent) was then specified as the first principal component of the correlation matrix of the factors – each corresponding proxy's current or lagged values, whichever had a greater correlation with the first-stage index as (Rupande et al., 2019):

$$InvSent_t = \theta_1 Exch_{t-1/t} + \theta_2 Prime_{t-1/t} + \theta_3 Treasury_{t-1/t} + \theta_3 Repo_{t-1/t} + \theta_3 Volume_{t-1/t} + \theta_3 Vwap_{t-1/t} + \theta_3 Savi_{t-1/t} \quad (2)$$

Where: θ_i displays the factor loadings on the first principal components of the proxies, which are lagged and contemporaneous. According to Kumari and Mahakud (2015), the relationship between sentiment and price volatility is contemporaneous at the level of individual securities. A study by Lee, Jiang and Indro (2002) studied the impact of sentiment on returns and volatility using the GARCH model and found that excess returns are contemporaneously positively correlated with shifts in sentiment. The terms in the mean and variance equations are lagged and contemporaneous due to the present value of stock returns depending on its own past lagged values in order to condition the volatility on the past values. The inclusion of lagged implies that investor sentiment has a considerable effect on the mean-variance equations when using GARCH models (Kumari and Mahakud, 2015).

Stationarity and Unit Root Tests

Stationarity and Unit Root Tests were conducted first as stationarity can strongly influence the behaviour and properties of a series, and lead to spurious regressions. If the variables in the model are not stationary, standard assumptions for asymptotic analysis will not be valid and hypothesis testing of the regression parameters cannot be conducted (Brooks, 2014). Estimation involved applying the Augmented Dickey-Fuller (ADF) to test for the presence of unit roots, and the Kwiatkowski Phillips Schmidt Shin (KPSS) to test for stationarity. ADF is the higher order test of the Dickey-Fuller test which can be used with serial correlation (Cheung and Lai, 1995). However, the model should be used with caution because like most unit root tests it has a relatively high type one error rate. The null hypothesis for this test is that there is are unit root against the alternative that the

variable is stationary. The ADF test equation is:

$$\Delta y_t = \psi y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta y_{t-1} + u_t \quad (3)$$

On the other hand, the KPSS test hypothesises that a variable is stationary against the alternative that it is not (Syczewska, 2010; Shin and Schmidt, 1992). The KPSS statistic is based on a linear regression and consists of three variables: a random walk (r_t), a deterministic trend (β_t) and a stationary error (ε_1), with the regression equation:

$$x_t = r_t + \beta_t + \varepsilon_1 \quad (4)$$

KPSS-type tests are intended to complement unit root tests such as the Dickey-Fuller tests through testing both the unit root hypothesis and the stationarity hypothesis. Should the results obtained from each test clash in terms of the order of integration, the KPSS test will be favoured compared to the ADF test. This is because KPSS tests for a null hypothesis of stationarity while ADF tests for non-stationarity. A null hypothesis cannot be proven – it can only be affirmed or rejected. Therefore, rejecting the null hypothesis implies that the alternative is more correct than the null (Shin and Schmidt, 1992).

Method of Analysis

GARCH (1,1)

Generalised Autoregressive Conditional Heteroscedasticity (GARCH) models were employed to examine the effects of investor sentiment on market returns and volatility. To estimate GARCH models, it is necessary to test for serial correlation in the data and this was carried out using the Ljung Box test (Brooks, 2014; Kumari and Mahakud, 2015). Since the correlation of the residuals with one another was found, the Ljung-Box and Autoregressive Conditional Heteroscedasticity – Lagrange Multiplier (ARCH-LM) (Engle and Ng, 1993) tests were conducted to test for autocorrelation. These tests were conducted both before and after the estimation of GARCH models. The lag order of (1,1) was employed as most empirical work in South Africa has shown that it captures the ARCH effects and the autocorrelation in the variance (Mangani, 2008; Mandimika and Chinzara, 2012; Yavas and Dedi, 2016). In cases where these first-order models failed to capture the inherent ARCH effects and autocorrelation, higher order models were used. The mean equation for GARCH (1,1), both with and without sentiment were estimated respectively as:

$$y_t = \mu + \alpha y_{t-1} + v\varepsilon_{t-1} + \delta h_{t-1} + \theta \Delta InvSent_t + \varepsilon_i \quad (5)$$

$$y_t = \mu + \alpha y_{t-1} + v\varepsilon_{t-1} + \delta h_{t-1} + \varepsilon_i \quad (6)$$

Where: y_t represents the index returns; δ denotes the risk premium; α captures the effect of past returns; v captures the effect of past shocks; $\Delta InvSent_t$ represents the changes in investor sentiment in the mean and conditional variance equation. The conditional variance (h_t) for GARCH (1,1), both with and without sentiment, respectively, were estimated as:

$$h_t = \omega + \alpha\varepsilon^2_{t-j} + \beta h_{t-i} + \varphi \Delta InvSent_t \quad (7)$$

$$h_t = \omega + \alpha\varepsilon^2_{t-j} + \beta h_{t-i} \quad (8)$$

A limitation of the GARCH (1,1) model of Bollerslev (1986) is that the estimated model may violate the non-negativity conditions. Therefore, artificial constraints must be placed on the model coefficients in order to avoid this. The GARCH model can account for volatility clustering and leptokurtosis as well as leverage effects (Brooks, 2014). According to Black (1976), leverage effects is the notion of positive and negative shocks of the same magnitude having different results on stock market volatility.

GJR-GARCH (1,1)

The GJR-GARCH model by Zakoian (1994) and Glosten, Jagannathan and Runkle (1993) captures the asymmetry in terms of negative and positive shocks and adds a multiplicative dummy variable to check whether there is a statistical difference when shocks are negative versus when they are positive (Kumari and Mahakud, 2015).

The mean equation estimated for Glosten, Jagannathan and Runkle (GJR) – GARCH (1,1) is the same as that of GARCH (1,1), represented by equations 5 and 6, for both with and without sentiment respectively.

The conditional variance (h_t) for GJR-GARCH (1,1) both with and without sentiment respectively, were estimated as:

$$h_t = \omega + \alpha\varepsilon^2_{t-1} + \beta h_{t-j} + \gamma\varepsilon^2_{t-1} d_{t-1} + \varphi \Delta InvSent_t \quad (9)$$

$$h_t = \omega + \alpha\varepsilon^2_{t-1} + \beta h_{t-j} + \gamma\varepsilon^2_{t-1} d_{t-1} \quad (10)$$

The leverage effect in Equation 9 is denoted by a positive γ. However, since the non-negativity constraints may still be violated under the GJR-GARCH model, the condition for non-negativity where ω>0, α>0, β≥0, and α+γ≥0 has to be satisfied. The model is still admissible, even if γ<0, provided that α+γ≥0.

E-GARCH (1,1)

Consequently, the GARCH model has been modified a number of times. One of the extensions is the Exponential GARCH (E-GARCH) model proposed by Nelson (1991). The E-GARCH model also allows for asymmetric effects between positive and negative asset returns (Kumari and Mahakud, 2015).

The mean equation estimated for E-GARCH (1,1) is the same as that of GARCH (1,1), represented by equations 5 and 6, for both with and without sentiment respectively.

The conditional variance (h_t) for E-GARCH (1,1) both with and without sentiment respectively, are estimated as:

$$log\,(h_t) = \omega + \alpha\left[\left|\frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}} - E\left(\frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}}\right)\right]\right| + \gamma k\,\frac{\varepsilon_{t-k}}{\sqrt{h_{t-k}}} + \beta h_{-t-i} + \varphi \Delta InvSent_t \quad (11)$$

$$log\,(h_t) = \omega + \alpha\left[\left|\frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}} - E\left(\frac{\varepsilon_{t-j}}{\sqrt{h_{t-j}}}\right)\right]\right| + \gamma k\,\frac{\varepsilon_{t-k}}{\sqrt{h_{t-k}}} + \beta h_{t-i} \quad (12)$$

With the E-GARCH in Equation 11, there is no need to artificially impose the non-negativity constraints as it models conditional variance in logs. The log of conditional variance makes the leverage effect exponential instead of quadratic, and therefore, the estimates of the conditional variance are guaranteed to be non-negative. However, the following conditions still need to be met where $\omega > 0$, $\alpha_j + \beta_i < 1$. The leverage effect under the E-GARCH is shown when $\gamma < 0$.

Equations 8, 10 and 12 were estimated and using the GED. Seeing as financial time series data does not follow a normal distribution and the t-distribution is most efficient when dealing with a relatively small sample size, the descriptive statistics were analysed and a conclusion was drawn that the GED would be the most suitable option (Cappuccio, Lubian and Raggi, 2004; Zuoxiang, Bin and Nadarajah, 2009). The GED is efficient when the errors around the mean of a distribution are not normally distributed and are of special interest to the subject under study – as is in this case (Statisticshowto, 2019). The best model was selected based on Schwarz's Bayesian Criterion (SBIC) since SBIC is most efficient in a large sample, while Akaike Information Criterion (AIC) is not. In a small sample, AIC is efficient but SBIC is not (Brooks, 2014). The results from the estimated models are reported in the section below.

Results and Interpretation

Analysis of Stationarity Tests

Table 1 below depicts the results of the stationarity tests – ADF and KPSS tests – employed to determine the order of integration of the variables employed in this study. Evidence from both tests show that the investor sentiment index (InvSent) is I(1), that is,

Table 1: Unit Root Tests (ADF)

Null Hypothesis: The variable has a unit root				
At Level				
	INVSENT	SMLCAP	MIDCAP	TOP40
Constant	-1,7156	-25,6843***	-47,2006***	-52,9492***
Constant and Trend	-2,6495	-25,6818***	-47,1928***	-52,9395***
At First Difference				
Constant	-37,9379***	-21,7877***	-23,1168***	-24,4829***
Constant and Trend	-37,9393***	-21,7862***	-23,1153***	-24,4786***

****, ** and * denotes significance at the 1%, 5% and 10% levels of significance, respectively.*

Table 2: Stationarity Tests (KPSS)

Null Hypothesis: The variable is stationary				
At Level				
	INVSENT	SMLCAP	MIDCAP	TOP40
Constant	2,8151***	0,1148	0,0689	0,0416
Constant and Trend	0,2279***	0,1172	0,0623	0,0403
At First Difference				
Constant	0,1003	0,2697	0,0711	0,3858
Constant and Trend	0,0543	0,2636	0,0674	0,3523

****, ** and * denotes significance at the 1%, 5% and 10% levels of significance, respectively.*

it has unit roots. However, the returns series on all the indices (Top40, MidCap and SmallCap) are I(0). This means that only the sentiment index had to be differenced once before estimating the GARCH models to avoid spurious estimations.

Analysis of Descriptive Statistics

Table 3 below reports the descriptive statistics of the three-return series. From the table, there is no evidence of an outlier in the data as the minimum and the maximum values from all three market returns are more or less equal to each other. The mean returns are nearly equal for the SmallCap and MidCap but are slightly higher for Top 40 data. Similarly, the standard deviations for all market returns are relatively low but slightly higher for Top 40 returns. All the returns series slightly negatively skewed and leptokurtic, which is reflective of abnormal distribution. The null hypothesis is that data is normally distributed is rejected in the Jacque-Bera, consistent with the skewness and leptokurtic values. This suggests that a linear structural model such as Ordinary Least Squares cannot be used on Small Cap, Mid Cap and Top 40 indices as it does not explain the mentioned features of the data (Brooks, 2014). This explains why a non-linear data generating process (GARCH) is thus preferred in this study. This departure from normality of return distribution has implications for GARCH models through the introduction of the leverage effect to stochastic bubbles (Black, 1976 and Christie, 1982) and the volatility feedback effect (Campbell and Hentschel, 1992).

Table 3: Descriptive Statistics

	SMLCAP	MIDCAP	TOP40
Minimum	0,987408	0,988958	0,979210
Maximum	1,016747	1,014135	1,023786
Mean	1,000097	1,000110	1,000124
Kurtosis	11,13747	4,830198	4,940825
Standard Deviation	0,001598	0,002390	0,004713
Skewness	-0,393485	-0,279961	-0,159131
Jarque-Bera	7652,928***	419,4291***	442,8967***
ARCH LM Statistic	193,4757***	83,55178***	71,22517***

****, ** and * denotes significance at the 1%, 5% and 10% levels of significance, respectively.*

Analysis of Autoregressive Conditional Heteroscedasticity (ARCH) Effects

Volatility clustering explains the likelihood of large changes in asset prices to follow large changes, and small changes to follow small changes. Therefore, the current level of volatility is positively correlated with its level during the immediately preceding periods (Brooks, 2014). Figure 1 below plots daily returns for the indices over the sample period. For the SmallCap index, there appears to have been a prolonged period of relative stability during the 2007 to 2015 period, evidenced by only relatively small positive and negative returns until that point. During mid-2015 to 2016, the volatility was significantly higher, when many large positive and large negative returns were observed during a short space of time. When a market suffers a volatile shock, more volatility should be expected. This can be seen by the persistence of volatility shocks for both the MidCap and JSE Top 40, during the sample period. Comparing all three indices, it can be seen that the MidCap and JSE Top 40 indices exhibit higher volatility clustering than the SmallCap index. While the GARCH model captures volatility clustering and leptokurtosis, the E-GARCH and GJR-GARCH models capture volatility clustering, leptokurtosis and volatility persistence (Masinga, 2015).

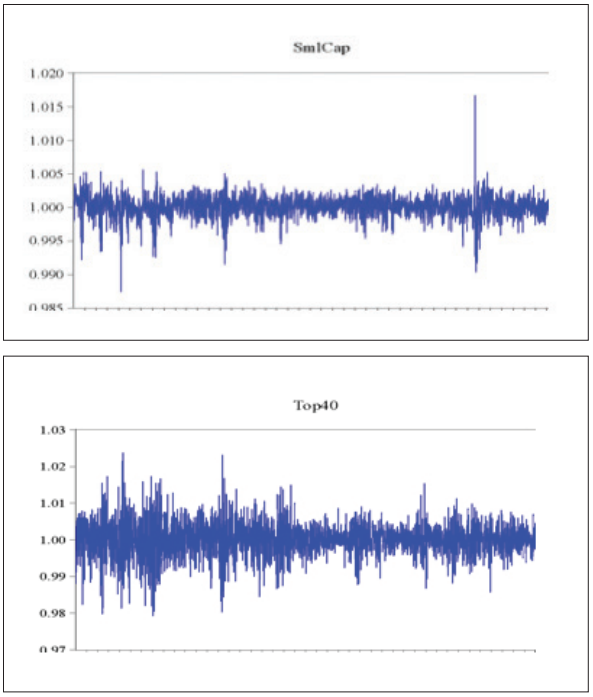
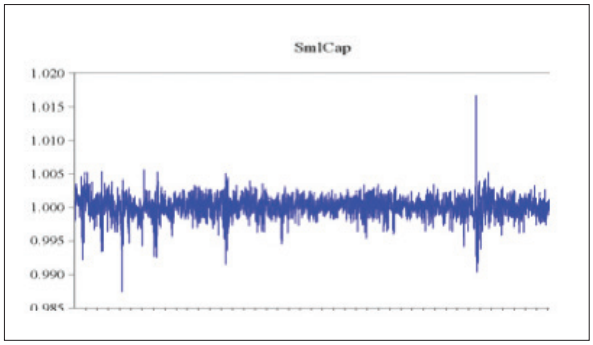


Figure 1: Daily returns for January 2007 – December 2017



Model Selection Criteria

Following the confirmation of the presence of ARCH effects above, the three models – GARCH (1,1), TGARCH (1,1) and EGARCH (1,1) – were estimated. These models were estimated under three distribution assumptions – Normal, Student's t and GED. The SBIC from the outputs are reported in Table 3 (without sentiment augmentation) and Table 4 (with sentiment augmentation). The market indices were compared using SBIC information criterion due it being asymptotically efficient (Kumari, 2015). In both tables, the SBIC is minimised by the EGARCH (1,1) estimated using the GED distribution. Overall, however, the information criteria is optimally minimised for all the distributions and markets, where there is sentiment. This suggests that sentiment does have an impact on asset returns and volatility (Brooks, 2014).

Table 4: Distribution without Sentiment

Variable	Distribution	GARCH	TGARCH	EGARCH
SMLCAP	Normal	2,846718	2,8496	2,846718
	Student's t	2,849601	2,852522	2,852532
	GED	1,423678	1,426559	1,423672
MIDCAP	Normal	2,846748	2,849629	2,846748
	Student's t	2,849631	2,852534	2,852562
	GED	1,423673	1,426555	1,423561
TOP40	Normal	2,846792	2,849673	2,846792
	Student's t	2,849674	2,852587	2,852606
	GED	1,442901	1,445783	1,442883

Table 5: Distribution with Sentiment

Variable	Distribution	GARCH	TGARCH	EGARCH
SMLCAP	Normal	2,630963	2,631362	1,636519
	Student's t	2,697084	2,71077	1,639814
	GED	2,514517	2,518262	1,115728
MIDCAP	Normal	2,62949	2,630828	1,643159
	Student's t	2,697735	2,711908	1,639385
	GED	1,392384	1,395142	1,106451
TOP40	Normal	2,630963	2,631362	1,636519
	Student's t	2,697084	2,71077	1,639814
	GED	2,514517	2,518262	1,115728

Analysis of Model Parameters for Models with Sentiment

Table 6 below lists the parameter values for the EGARCH model both with and without sentiment. When comparing the coefficients of all three indices both with and without the effects of sentiment, the results obtained suggest that the ARMA (1,1) coefficients are statistically significant at all conventional levels of significance for all indices, with sentiment. This is as expected in accordance with literary evidence provided by Michelfelder and Pandya (2005); Frazzini and Lamont (2008); (Kumari and Mahakud, 2015); Sayim and Rahman (2015); and Rupande et al. (2019). The studies all agree that investor sentiment does need to be included in asset pricing models in order to provide results that are fundamentally accurate. Accounting for irrational investors, noise traders and behavioural finance prevents problems associated with price discovery, portfolio management and risk management. Therefore, correlation does exist between market index returns and its past values, which indicates that stock trading prices, historical returns and unexpected shocks eventually revert to their long-term mean (Brooks, 2014).

Now comparing the three indices with sentiment, it can be seen that the coefficient of risk aversion (δ) is positive and significant for the MidCap. This indicates that higher risk leads to higher returns, thus δ can be interpreted as a risk premium. The risk premium

Table 6: Results from the Various E-GARCH Specifications

	TOP40		SMLCAP		MIDCAP	
Mean	-InvSent	+InvSent	-InvSent	+InvSent	-InvSent	+InvSent
AR(1)	0,431078	1,000000***	0,310963	1,000001***	0,228800	0,889773***
MA(1)	0,248792	-0,998976***	0,346370	-0,975171***	0,591654	0,849470***
δ	-	-0,000310***	-	-9,66E-05*	-	0,030806***
Variance						
ω	-0,021798	-3,224697 ***	-0,000956	-2,569091***	-0,002459	-2,324069***
α	-0,441175	0,140533***	-0,572311	0,319392***	-0,593743	-0,324750***
β	-0,523693	-0,052542**	-0,572104	-0,039140**	-0,593558	-0,604385***
y	0,391605	0,708576***	0,203324	0,821783***	0,216717	0,427234***
φ	-	-0,052868***	-	0,000968	-	-0,038396***
α + β	-0,964868	0,087991	-1,144415	0,280252	-1,187301	0,929135

****, ** and * denotes significance at the 1%, 5% and 10% levels of significance, respectively.*

is negative and significant at the 1% and 10% levels of significance for the JSE Top 40 and SmallCap respectively, indicating that there is feedback from the conditional variance to the conditional mean (Brooks, 2014).

The parameters for all indices with sentiment are statistically significant in the conditional variance equation. This shows that current volatility can be depicted by past shocks (α), volatility in the previous period (β) and changes in investor sentiment (φ), with previous period volatility accounting for the majority of the volatility. The results for all indices without sentiment show that $\alpha+\beta < 1$ which indicates the stationary condition is satisfied and persistence in volatility does exist. A shock in current volatility will affect the expected volatility in future periods (Brooks, 2014). There is a negative effect on conditional volatility and returns for changes in investor sentiment in the JSE Top 40 and MidCap markets. This indicates that when sentiment is high there is an increase in mispricing in the market, this results in a fall in the prices and returns. This is in accordance with the findings by Dalika and Seetharam (2016) on the South African market.

-InvSent denotes 'without investor sentiment' and +InvSent denotes 'with investor sentiment.'

Residual Diagnostics

Following the estimation of the EGARCH models, model diagnostics were conducted with the null hypothesis of no serial correlation in the residuals versus an alternative that there is serial correlation. All the residual diagnostic tests - Q Statistics, Squared Residuals and Serial Correlation Tests – indicated that there was no more serial correlation in the residuals following the estimation of the EGARCH model.

Conclusion

This study aimed to determine whether investor sentiment affects market returns and volatility on the SmallCap, MidCap and the JSE Top 40 indices; whether any impact noted was different for the South African market in particular; and whether sentiment-augmented models are superior to non-augmented models. GARCH models were employed over the period 2007 – 2017. A sentiment measure constructed by Rupande et al. (2019) was introduced in both the mean and variance equations of the models.

From the results, GARCH models performed better when investor sentiment was included, which suggested a significant relationship between market returns and investor sentiment. Investor sentiment,

therefore, did affect returns and volatility. Results showed that the SmallCap index with investor sentiment gave the best results from all GARCH models employed and can be supported with evidence from a study by Baker and Wurgler (2006). Their study tested and verified that stocks of smaller companies belonging to the SmallCap index are more likely to be disproportionately affected by sentiment, because they have valuations that are highly subjective and difficult to arbitrage (Baker and Wurgler, 2006).

The findings of this study were as expected due to South Africa being an emerging market. Michelfelder and Pandya (2005) suggested that volatility shocks last longer in emerging markets than in developed countries and information systems in mature markets do not allow volatility shocks to persist. A possible reason for this as explained by Charitou, Vafeas and Zachariades (2005) is that a large proportion of investors in emerging markets are often irrational. Therefore, emerging market investors lack the ability to understand and correctly interpret market announcements, indicators and movements – making them more likely to be driven by sentiment rather than fundamentals (Charitou, Vafeas and Zachariades, 2005). In favour of behavioural finance, market returns and volatility in the SmallCap, MidCap and the JSE Top 40 were influenced by investor sentiment.

Since the JSE markets were affected by investor sentiment, it is important that investors also incorporate such sentiment to measure risk when constructing their portfolios and making investments. More diversified portfolios will then be preferred in order to reduce the risk associated with behavioural finance and maximise returns on investments. From this study, policymakers may realise that market volatility is not only affected by the fundamentals, but also by investor sentiment. Including sentiment in asset pricing models may contribute to reducing market volatility and uncertainty as it will ensure that participants supersede traditional asset pricing models, and true fundamental values are reflected (Yang and Copeland, 2014). Accounting for investor sentiment in analysis increases the accuracy with which volatility is measured and forecasted, which in turn will result in better portfolio management, price discovery and measurement of risk.

An earlier study by Rupande et al. (2019) has also been conducted on the South African market. However, while the work of Rupande et a. (2019) was based on the broad JSE ALSI, this study delves deeper and analyses the SmallCap, MidCap and JSE Top 40 indices as opposed to the broad market indices previously employed. Focusing only on the three headline indices can however, still be seen as a limitation to this study. Future studies should consider analysing individual stocks and/or a portfolio of similar stocks. This is because returns and volatility of an individual company's shares may each be affected differently by investor sentiment and therefore, this may not be well captured when focusing on different markets. An additional factor to consider for future studies is one of structural breaks. A structural break is a sudden shift in a macroeconomic time series (Hailegiorgis, 2018). Seeing as this study involved time series analysis, it is based on the assumption of stationarity and constancy of parameters over time. Therefore, a structural break could affect any or all of the model parameters and each case would in turn have its own respective impact (Hansen, 2001).

References

Agarwal, S., Liu, C. and Rhee, S. G. (2008). Investor Demand for IPOs and Aftermarket Performance: Evidence from the Hong Kong Stock Market. Journal of International Financial Markets, Institutions and Money, 18(2), 176-190.

Allaro, Hailegiorgis. (2018). A Time Series Analysis of Structural Break Time in Ethiopian GDP, Export and Import. Journal of Global Economics, 6(3), 2-4.

Baker, M. and Wurgler, J. (2006). Investor Sentiment and the Cross-Section of Stock Returns. Journal of Finance, 61(4), 1645-1680.

Baker, M. and Wurgler, J. (2007). Investor Sentiment in the Stock Market. Journal of Economic Perspectives, 21(2), 129-152.

Baker, M., Wurgler, J. and Yuan, Y. (2012). Global, Local, and Contagious Investor Sentiment. Journal of Financial Economics, 104(2), 272-287.

Balcilar, M., Gupta, R. and Kyei, C. (2018). Predicting Stock Returns and Volatility with Investor Sentiment Indices: A Reconsideration Using a Nonparametric Causality in Quantiles Test. Bulletin of Economic Research, 70(1), 74-87.

Białkowski, J., Etebari, A. and Wisniewski, T. P. (2012). Fast Profits: Investor Sentiment and Stock Returns during Ramadan. Journal of Banking and Finance, 36(3), 835-845.

Black, F. (1976). Studies of Stock Price Volatility Changes. Conference Paper: Proceedings of

the Business and Economic Statistics, American Statistical Association, 13(1), 177-181.
Black, F. (1986). Noise. Journal of Finance, 41(3), 528-543.
Bollerslev, T. (1986). Generalized Autoregressive Conditional Heteroscedasticity. Econometrics, 31(1), 307-327.
Brogaard, J., Hendershott, T. and Riordan, R. (2014). High-Frequency Trading and Price Discovery. Review of Financial Studies, 27(8), 2267-2306.
Brooks, C. (2014). Introductory Econometrics for Finance, 3rd ed., Cambridge, United Kingdom: Cambridge University Press.
Brown, G. W. and Cliff, M. T. (2005). Investor Sentiment and Asset Valuation. Journal of Business, 78(2), 405-440.
Campbell, J.Y. and Hentschel, L., 1992. No news is good news: An asymmetric model of changing volatility in stock returns. Journal of financial Economics, 31(3), 281-318.
Cappuccio, N., Lubian, D. and Raggi, D. (2004). MCMC Bayesian Estimation of a Skew-GED Stochastic Volatility Model. Studies in Nonlinear Dynamics and Econometrics, 8(2), 3-6.
Charitou, A., Vafeas, N. and Zachariades, C. (2005). Irrational Investor Response to Stock Splits in an Emerging Market. The International Journal of Accounting, 40(2), 133-149.
Cheung, Y. W. and Lai, K. S. (1995). Lag Order and Critical Values of the Augmented Dickey-Fuller Test. Journal of Business and Economic Statistics, 13(3), 277-280.
Chi, L., Zhuang, X. and Song, D. (2012). Investor Sentiment in the Chinese Stock Market: An Empirical Analysis. Applied Economics Letters, 19(4), 345-348.
Christie, A.A., 1982. The stochastic behaviour of common stock variances: Value, leverage and interest rate effects. Journal of financial Economics, 10(4), 407-432.
Da, Z., Larrain, B., Sialm, C. and Tessada, J. (2015). Price Pressure from Coordinated Noise Trading: Evidence from Pension Fund Reallocations. Working Paper, Pontificia Universidad Catolica de Chile, 1-48.
Dalika, N.K. and Seetharam, Y. (2014). Sentiment and Returns: Analysis of Investor Sentiment in the South African Market. Investment, Management and Financial Innovations, 12(1), 2-10.
De Bondt, W. F. and Thaler, R. (1985). Does the Stock Market Overreact? Journal of Finance, 40(3), 793-805.
Dow, J. and Gorton, G. (2006). Noise Traders. Working Paper, National Bureau of Economic Research, 1-12.
Engle, R., (2001). GARCH 101: The Use of ARCH/GARCH Models in Applied Econometrics. Journal of Economic Perspectives, 15(4), 157-168.
Engle, R. F. and Ng, V. K. (1993). Measuring and Testing the Impact of News on Volatility. Journal of Finance, 48(5), 1749-1778.
Finter, P., Niessen-Ruenzi, A. and Ruenzi, S., 2012. The impact of investor sentiment on the German stock market. Zeitschrift für Betriebswirtschaft, 82(2), 133-163.
Frazzini, A. and Lamont, O. A. (2008). Dumb Money: Mutual Fund Flows and the Cross-Section of Stock Returns. Journal of Financial Economics, 88(1), 299-322.
Glosten, L. R., Jagannathan, R. and Runkle, D. (1993). On the Relation between the Expected Value and the Volatility of the Nominal Excess Return on Stocks. Journal of Finance, 48(1), 1779-1801.
Gottesman, A.A., Jacoby, G. and Wang, Y., (2012). Investor Sentiment and Asset Pricing. Working Paper, Brock University Faculty of Business, 1-13.
Hansen, B. E. (2001). The New Econometrics of Structural Change: Dating Breaks in US Labour Productivity. Journal of Economic Perspectives, 15(4), 117-128.
Hirshleifer, D. (2001). Investor Psychology and Asset Pricing. Journal of Finance, 56(4), 1533-1597.
Hu, C., Wang, Y. and Chi, Y. (2013). Investor Sentiment and the Predictability of Asset Returns: Evidence from China. Journal of Chemical and Pharmaceutical Research, 6(6), 577-585.
Iress. (2019). Iress Research Domain [Online], Available: http://research.mcgregorbfa.com.ukzn.idm.oclc.org/Default.aspx. [Accessed: 20 June 2019].
Jolliffe, I.T. and Cadima, J., 2016. Principal component analysis: A review and recent developments. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 374(2065), 51-96.
Kling, G., (2008). Chinese Institutional Investors' Sentiment. Journal of International Financial Markets, Institutions and Money, 18(4), 378-387.
Kourtidis, D.E. (2011). Investors' Trading Activity, a Behavioural Perspective: Professionals versus Individuals. International Journal of Behavioural Accounting and Finance, 2(3), 346-366.
Kumar, A. and Lee, C.M. (2006). Retail Investor Sentiment and Return Comovements. Journal of Finance, 61(5), 2451-2486.

Kumari, J. and Mahakud, J. (2015). Does Investor Sentiment Predict Asset Volatility? Evidence from Emerging Stock Market India. Journal of Behavioural and Experimental Finance, 8(1), 25-39.

Lee, W. Y., Jiang, C. X. and Indro, D. C. (2002). Stock Market Volatility, Excess Returns, and the Role of Investor Sentiment. Journal of Banking and Finance, 26(12), 2277-2299.

Lin, C. B., Chou, R. K. and Wang, G. H. (2018). Investor sentiment and price discovery: Evidence from the pricing dynamics between the futures and spot markets. Journal of Banking and Finance, 90(1), 17–31.

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. Review of Economics and Statistics, 47(1), 13-37.

Malkiel, B. G. and Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. Journal of Finance, 25(2), 383-417.

Malkiel, B. G. and Saha, A. (2005). Hedge Funds: Risk and Return. Financial Analysts Journal, 1(1), 80-88.

Mandimika, N. Z. and Chinzara, Z. (2012). Risk–Return Trade-Off and Behaviour of Volatility on the South African Stock Market: Evidence from Both Aggregate and Disaggregate Data. South African Journal of Economics, 80(3), 345-366.

Mangani, R. (2008). Modelling Return Volatility on the JSE Securities Exchange of South Africa. African Finance Journal, 10(1), 55-71.

Markowitz, H. (1952). Portfolio Selection. Journal of Finance, 7(1), 77-91.

Masinga, Z.C. (2015). Modelling and Forecasting Stock Return Volatility in the JSE Securities Exchange. University of Witwatersrand, Johannesburg, South Africa: Dissertation, 18-25.

Medina, J. (2010). A Tale of Two Returns, [Online], Available: https://www.portfolioprobe.com/2010/10/04a-table-of-two-returns/. [Accessed: 30 August 2019].

Michelfelder, R. and Pandya, S. (2005). Volatility of Stock Returns: Emerging and Mature Markets. Managerial Finance, 32(2), 66-86.

Mossin, J. (1966). Equilibrium in a Capital Asset Market. Econometrica, 34(4), 768-783.

Nelson, D. B. (1991). Conditional Heteroscedasticity in Asset Returns: A New Approach. Econometrica, 59(1), 347-370.

O'Neil, C. (2011). Why Log Returns? [Online], Available from: https://mathbabe.org/2011/08/30/why-log-returns/. [Accessed: 30 August 2019].

Oseni, E. and Olanrewaju, R. O. (2017). A Capital Asset Pricing Model's (CAPM's) Beta Estimation in the Presence of Normality and Non-normality Assumptions. International Journal of Finance and Banking Research, 3(3), 44-52.

Palm, F. C., (1996). Seven GARCH Models of Volatility. Handbook of Statistics, 14(1), 209-240.

Reilly, T. (2013) Advantages and Disadvantages of using Monthly, Weekly and Daily Data, [Online] Available: https://autobox.com/cms/index.php/blog/entry/advantages-and-disadvantages-of-using-monthly-weekly-and-daily-data [Accessed: 10 June 2019].

Rupande, L., Muguto, H. T. and Muzindutsi, P. F. (2019). Investor Sentiment and Stock Return Volatility: Evidence from the Johannesburg Stock Exchange. Cogent Economics and Finance, 7(1), 1-13.

Sayim, M. and Rahman, H. (2015). The Relationship between Individual Investor Sentiment, Stock Return and Volatility: Evidence from the Turkish Market. International Journal of Emerging Markets, 10(3), 504-520.

Sewell, M. (2012). The Efficient Market Hypothesis: Empirical Evidence. International Journal of Statistics and Probability, 1(2), 164-172.

Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. Journal of Finance 19(1), 425-442.

Shefrin, H. and Statman, M. (2000). Behavioural Portfolio Theory. Journal of Financial and Quantitative Analysis, 35(2), 127-151.

Shiller, R. J. (1981). Alternative Tests of Rational Expectations Models: The Case of the Term Structure. Journal of Econometrics, 16(1), 71-87.

Shin, Y. and Schmidt, P. (1992). The KPSS Stationarity Test as a Unit Root Test. Economics Letters, 38(4), 387-392.

Shu, H. C. and Chang, J. H. (2015). Investor Sentiment and Financial Market Volatility. Journal of Behavioural Finance, 16(3), 206-219.

Statisticshowto.com. (2019). What is an Error Generalized Distribution? [Online], Available: https://www.statisticshowto.datasciencecentral.com/generalized-error-distribution-generalized-normal/ [Accessed: 24 July 2019].

Statman, M., Fisher, K. L. and Anginer, D. (2008). Affect in a Behavioral Asset-Pricing Model. Financial Analysts Journal, 64(2), 20-29.

Subrahmanyam, A. (2007). Liquidity, Return and Order-Flow Linkages between REITs and the Stock Market. Real Estate Economics, 35(3), 383-408.

Suryawanshi, P. and Jumle, A. (2016). Comparison of

Behavioural Finance and Traditional Finance: For Investment Decisions. International Journal of Commerce Business Management, 5(3), 81-100.

Syczewska, E. M. (2010). Empirical Power of the Kwiatkowski-Phillips-Schmidt-Shin Test. Working Papers, 45(1), 14-22.

Treynor, J.L. (1961). Market Value, Time, and Risk. Journal of Investment Management, 1(2), 60-72.

Yang, Y. and Copeland, L. (2014). The Effects of Sentiment on Market Return and Volatility and the Cross-Sectional Risk Premium of Sentiment-Affected Volatility. Working Paper, Cardiff Economics, 12-26.

Yavas, B. F. and Dedi, L. (2016). An Investigation of Return and Volatility Linkages among Equity Markets: A Study of Selected European and Emerging Countries. Research in International Business and Finance, 37(1), 583-596.

Yu, J. Yuan, Y., (2011). Investor Sentiment and the Mean-Variance Relation. Journal of Financial Economics, 100(2), 367-381.

Zakoian, J. M., (1994). Threshold Heteroscedastic Models. Journal of Economics, 18(1), 931-955.

Zuoxiang, P., Bin, T. and Nadarajah, S. (2009). Tail Behaviour of the General Error Distribution. Communications in Statistics – Theory and Methods, 38(11), 1884-1892.

Critical success factors for hotel and restaurant SMEs growth in Eswatini

Dr Wilson B Dlamini*
Graduate School of Business and Leadership,
University of KwaZulu-Natal, Westville
Campus Durban, South Africa,
Email: dlaminiB5@ukzn.ac.za or bafanadw@yahoo.com
ORCID ID: 0000-0002-9372-3608

Prof. Jobo Dubihlela
Graduate School of Business and Leadership,
University of KwaZulu-Natal, Westville, Durban, South Africa,
Email: dubihlelaj@ukzn.ac.za
ORCID ID:0000-0001-2345-6789

*Corresponding Author

Abstract

Travellers and tourists from developed countries assume that hotel and restaurant standards in developing countries are very low. However, more travellers are visiting these in particularly Africa. The aim of the study was to examine the critical success factors (CSFs) influencing hotel and restaurant SMEs in Eswatini.A sequential mixed-methods approach was used. First, a self-administered questionnaire was distributed to 320 employees working in the hotel and restaurant SMEs sector. Then, follow-up interviews were conducted with managers from 35 establishments. The results revealed that customer service (74%), internal business processes (70%), financial (69%), and learning and growth (62%) are the four most important CSFs for hotel and restaurant SMEs growth in Eswatini. The Chi-Square test results also revealed a significant association between these CSFs and hotel SME growth. The findings of this study have several practical implications for hotel SMEs in Eswatini and other developing countries. It is important for hotel and restaurants SMEs owners and managers to focus on improving their customer service, internal business processes, and financial performance. The findings provide valuable insights for hotel and restaurants SMEs on how to achieve sustained growth.

Keywords:
Hotel and Restaurant SMEs Growth, Customer CSF, Financial CSF, Internal Business process CSF, Learning and Growth CSF

Introduction

Previous studies from the World Bank on Harnessing Tourism for Growth and Improved Livelihoods in Sub Sahara Africa suggested that several guest houses were at only 10% ranking standards compared with developed countries (Christie; et al., 2013). According to WTTC (2022) report, Travel & Tourism (including its direct, indirect, and induced impacts) was one of the world's largest sectors, accounting for 1 in 4 of all new jobs created in the world, 10.3% of all jobs (333 million) and 10.3% of global GDP (USD 9.6 trillion). WTTC (2022) reveal that in 2019, international visitor spending amounted to USD 1.8 trillion (6.8% of total exports). Travel & Tourism enables socio-economic development, job creation, and poverty reduction, which in turn drives prosperity and significant positive social impact, providing unique opportunities for women, minorities, and young people.

However, World Bank on Harnessing Tourism for Growth and Improved Livelihoods in Sub Sahara Africa suggested that several guest houses were at only 10% ranking standards compared with developed countries (Christie; et al., 2013). According to the Eswatini Tourism Authority (ETA) annual report (2018), the sector received 65% of its tourists from South Africa. Some of these tourists were repeat and loyal customers. National events and ceremonies, such as the Easter Holidays, the Bush Fire annual event festival, the Reed Dance, and the Incwala festival, are the main attractions for tourists visiting Eswatini. The sector also experienced a high number of repeat customers from Europe, the United States, and Asia.

Wang and Hung (2015) state that China guest houses' critical success factors were room facilities, cleanliness, location, service, home atmosphere, and value for money. Chiun Lo et al. (2016) also reveal that the critical success factors for hospitality in China was top management support which yielded high financial performance in China. The relationship between differentiation strategy and financial performance (profit and market share), and the facilitation of the relationship market performance such as improved service quality and customer satisfaction are critical success factors that lead to higher financial performance (Sitawati, 2015). The cause and effect relationship between financial and non-financial critical success factors contributes to hotel and restaurant SME's growth. The study on critical success factors for SMEs' organisational performance in Malaysia revealed that SMEs growth is positively related with financial and nonfinancial performance (Chiun Lo et al., 2016).

Chiun Lo et al. (2016) found a positive association between customer success factors and organizational performance. However, customer-oriented strategies can be expensive for small and medium enterprises (SMEs). Additionally, increasing customer demand can make it difficult for SMEs to maintain such demand to enhance performance (Xuan, 2019). However, if firms emphasize reactiveness, innovativeness, competitive aggressiveness, riskiness, and autonomy as critical evaluation strategies in response to market changes, then a more entrepreneurial mind-set would be linked with the non-financial and financial performance of the organization (Gupta and Barua, 2016).Most organizations have realized that the contributing critical success factor for them is employees who are likely to voice their opinions and approach their superiors directly without intimidation (Chiun Lo et al., 2016).

Literature review

The literature reviews critical success (CSF) factors for small and medium hotels and restaurant in Eswatini. The sturdy reviewed the critical success factors using the four Balanced Scorecard perspectives. These are finances, customers, internal business processes, and learning and growth which contribute to hotel and restaurant SMEs performance growth.

Balance Scorecard and Critical Success Factors

The Balanced Scorecard (BSC) is a widely used tool for performance management and measurement of organizations of all sizes (Kaplan and Norton, 1996). It is a four-perspective framework that helps organizations to evaluate their performance and manage their activities:-

Financial: What kind of financial performance should we provide to shareholders to succeed financially? Customer: How should customers see us in order to achieve our vision?

Internal business processes: What business processes must we excel at to satisfy our stakeholders and

customers? Learning and growth: How will we sustain our ability to change and improve in order to achieve our vision?

The BSC has been linked to Critical Success Factors (CSFs) (Quintano, 2016). Kaplan and Norton (1996) revealed that organizations of all sizes have widely used the BSC to set objectives, key performance indicators, and targets. The basis for the model is to develop questions based on the four perspectives (Uddin and Bose, 2013).

Critical Success factors

Marais et al. (2017), defined critical success factors (CSFs) as the forces that drive organizational competitiveness and enable organizations to achieve their objectives and goals. CSFs are influenced by the traits or qualities that contribute to an organization's success or economic growth. They are directly aligned with an organization's strategic management, which defines the organization's big picture.

The study "Critical Success Factors of a Business Tourism Destination: Supply Side Analysis" found that the CSFs for business tourism in South Africa are finances, human resources, product, and customer-related aspects (Marais et al., 2017). These identified themes are linked to the four Balanced Scorecard (BSC) perspectives. Understanding these factors that can lead to the success of hotels and restaurant SMEs can improve the industry, boost the success of individual tourism ventures within the destination, and contribute to the development of Eswatini business tourism destination.

Critical success factors (CSFs) are the small number of areas that result in successful competitive advantage (Ifeanyi et al., 2020). CSFs can have a positive or negative impact on performance.Customer focus is one of the most important CSFs in business. It is the process of identifying, establishing, maintaining, enhancing, and, when necessary, terminating relationships with customers and other stakeholders Customer focus is essential because it is a strong contributor to business profitability, competitive advantage, and overall success. Ifeanyi et al. (2020), found that customer focus is positively related to SME performance and is a basic strategic approach that ensures SME growth and sustainability

Critical Success Factors for Financial Growth

Chiun Lo et al. (2016) argue that intangible and tangible assets derived from the internal and external environment in the short and long term are critical factors for enhancing financial growth. Using these assets, a business should offer something unique to command a premium price for its products or services (Sitawati, 2015). For example, a hotel with a strong brand image and exclusive properties or room facilities may be able to charge higher rates. Neirotti et al. (2016), found that Trip Advisor, a popular online travellers' tool, has a significant impact on financial growth in the hotel and restaurant SME's sector. They argue that Trip Advisor has shifted hotel competition from unit profit margin to higher room occupancy rates. Companies that use online travel platforms such as Trip Advisor and Booking.com have a competitive advantage over their rivals because customers can view their products and services before making their bookings.

Wang and Hung (2015) further emphasized that room facilities are critical success factors that lead to an increase in room sales. Their study found that customers consider room and bathroom amenities, comfortable beds, and bedding to be critical factors when choosing a hotel. Guests also commented that the beds and bedding in guesthouses were often more comfortable than those found in five-star hotels. Wang and Hung also note that hot and good water pressure, decent bathroom accessories, and first-class toiletries are critical success factors for small and medium hotels and guesthouses

According to Kori Faith Wangui et al. (2018), many customers have recommended improvements to guesthouses, including fixing leaking rooms, improving soundproofing, adding windows, and installing doors in bathrooms. Wang and Hung (2015) found that customers generally commented positively on value for money, with most guests claiming that prices were affordable. Furthermore, their study found that only 7% of guests commented negatively about the guesthouses. This may be because most customers review room rates online before making booking decisions.

Sitawati (2015) observes that previous studies have also suggested that competitive strategy makes no difference to organizational performance. Jennings

et al. (2003) argued that there is no performance difference when measured by sales growth rate, return on investment, and return on sales. However, a limitation of their study is that it used samples from different industries, rather than focusing on a single sector such as banking, hotel, insurance, brokerage, or transportation.

Critical Success factors for Customer growth

Customer service's critical success factors include location, innovation, and competition. In the guest houses, one of the customer critical success factors was the location. Location in a quiet place is a critical success factor because it helps customers to sleep and relax on the premises.

The online booking website was the leading customer rating for the accommodation establishments in Shah Alam, Malaysia (Ahmad et al., 2019). Guests usually evaluate and leave comments at the reception or front desk in the hotel. Ahmad et al. (2019), stated that the base for the rating was factors like cleanliness, value for the money which the customer paid for the accommodation, treatment from the staff, and the location of the establishment. The collection of data and analysis that occurred in Agoda.com and Booking.com, revealed that customers rated either satisfaction or dissatisfaction on the service they received from the hotel they stayed in.

Kaplan and Norton (1996) state that companies need to be innovative to make themselves different from their competitors. Innovation is essential to hotels and the tourism industry because their products and services are often imitated by competitors since their products are unprotected by patents or copyrights (Sitawati (2015). Most hotels, guest houses, and other accommodation facilities now have modern technology such as the internet, a website, and others where customers make their bookings easily online, enhancing customer satisfaction which influences them to return to the same hotel in the future (Sitawati, 2015). This is no longer an exclusive attribute of the Marriot group. Effective internal communication contributes to performance brands for small and medium enterprises in Kenya, Nairobi (Kori Faith Wangui et al., 2018). Further, they argued that where internal communication was active in the organisation brand, staff empowerment with sufficient skills, staffing process, payments, and acknowledgment system, brand performance would advance.

Sitawati (2015) hypothesised that the more a hotel employs a competitive strategy in product differentiation, the higher it's financial performance and indicates a positive and significant relationship between competitive strategy and customer-related performance. The hotel industry's intense competition encourages hotel management to seek a competitive strategy that could differentiate them from competitors. However, the manager could offer the same price with additional attributes like applying architecture or interior design to properties or creating cultural packages for customers lodging in their hotels, as part of the strategy to outplay the competition. Sitawati (2015) found that competitive strategy was positively associated significantly with hotel customer-related performance. The demand for hotel accommodation services is a function of tourist demand; therefore, hotels and SMEs should know that hotel services are the function of travel (Ćorluka et al., 2017).

The study of "Understanding Satisfied and Dissatisfied Hotel Customers" claimed that hotel frontline workers were critical in customer satisfaction since they trigger customers to write positive online reviews. Therefore customer satisfaction is crucial for small and medium hotels and tourism performance growth. When a customer receives a lower quality of service than what had been advertised, they would definitely raise their dissatisfaction and lodge a complaint that could be a stumbling block for customer growth (Al-Azzam, 2016).

Internal business processes critical success factors

This subsection discusses the internal business processes' critical success factors influencing Hotel SME's growth. Quality of services, cost, and time to deliver services were previously found to be critical success factors for the hotel and tourism SME sector (Wang and Hung, 2015). The findings of the study revealed that most customers raised concern about cleanliness, where they politely stated that the place looked dirty in rooms. Some customers complained about mosquitoes, dust in the room, bedding smell in rooms, and cleanness in toilet seats. Furthermore, Wang and Hung (2015) reported that some customers raised dirty towels, and others complained about the messy and dirty courtyards.

Sitawati (2015) found that competitive strategy was positively associated with the hotels' "internal business process-related performance". He claims that hotels are required to have a competitive value such as unique resources (assets) and exceptional skills different from those of competitors. Therefore, hotels and tourism should provide quality service with the highest skills that attract customers. This could be a factor for the application of differentiation strategy if the hotel can meet customer needs and preferences in an accurate and timely manner (Sitawati, 2015). Furthermore, he argues that hotels that use the differentiation strategy could apply a comprehensive information system to be more efficient. For instance, he states that a differentiator hotel could employ a comprehensive customer database system used to get the latest and more accurate information related to customers to provide superior service. When the hotels deliver accurate customer service, they will save time and expenses resulting from service error and handling customer complaints. This implied that customers are satisfied due to an improvement in internal business processes in relationship to effective and efficient service delivery.

Ahmad et al. (2019) state that technology, in hotels and tourism, is one way to listen and respond to customers' complaints. The industry depends on technology for reservations, payments, room smartcards taking orders from eating places, and many more places. Elliot and Joppe (2016) motivate that the central reservation system (CRS) not only provides Destination Management Organizations (DMO) with new sources of revenue but also the ongoing accommodation and attraction booking process, which creates rich databases when mined, could provide DMOs with relevant and timely performance measures. The DMOs are a critical operational system for reaching out to potential customers.

Learning and growth critical success factors

Sitawati (2015) further found that there was a positive relationship between the competitive strategy and company learning and growth performance in Thailand's manufacturing sector. Sitawati (2015) reports that the company investigated used three items for measuring its learning and growth performance, namely, employee efficiency, employee satisfaction, and a computerised information system. Previous studies found that firms that apply the differentiation strategy tend to use a high capital human resources management system more extensively than a cost leadership company, and the GRM system focuses on selection, training, performance appraisal, compensation, and work design. Sitawati (2015) asserted that the differentiator companies need highly skilled, competent, and motivated staff to support the hotel in providing quality service and have innovative products. Based on the findings of the previous studies, he argued that the hotel needs to invest comprehensively in the selection, training, performance appraisal, and compensation. Therefore, as a result of staff recruitment or training, a hotel should expect highly skilled, professionally competent, confident and motivated staff who perform their tasks appropriately. Consequently, they will receive rewards for achieving predetermined targets. These tend to lead to higher employees' satisfaction (Sitawati, 2015).

Therefore, the differentiation strategy influences the employee's satisfaction. Hotels that face intensive competition require increasing employees' capacity through strategic leadership and ongoing training, acknowledging and understanding the daily tasks, and responding immediately to the fast-changing situation (Sitawati 2015). Another differentiation strategy that needs skilled employees is the use of an advanced, sophisticated technology reservation system. This present study also examined the critical success factors and processes of recruiting and attracting great competitive staff who adapt quickly to new technologies and systems incorporated by the sector to perform their tasks efficiently. The usage of model technology improved the quality of the guest profile for five-star hotels in Nairobi and increased the training hours of employees (Gesage et al., 2015).

Research Methodology

This section covers research design, and quantitative and qualitative research methods.

Research design

The research study was on the primary data collection for both quantitative and qualitative research. The collection of the primary data is mainly for the researcher's aim of his research (Johnson and Onwuegbuzie, 2004). The study used an explanatory sequential mixed-methods research design. The

explanatory sequential mixed method is one method in which the researcher first conducts a quantitative research phase, analyses the data, and then builds on the results to explain them in more detail with qualitative interview questions (Creswell and Cresswell, 2018b). The reason behind the usage of the explanatory sequential mixed method research design is that it gives the researcher an opportunity for complementarity, corroboration, development, initiation, and expansion (Halcomb; and Hickman, 2015).. Complimentary use enables one method to elaborate, illustrate, enhance or clarify the results from the others. The quantitative data analysis provides results and qualitative analysis gives the processes. Complimentary use enables this research to explain unexpected results from one method.

Quantitative method

Sample

Both surveys were conducted on the sample of 35 out 115 hotel SMEs located within the Manzini-Mbabane corridor and 10 km away from the main road (MR) 3 freeway. A stratified random sampling method was used to select the samples. This sample size was 30% of the target population establishments of 115. The sample size is well represented and minimises the sampling error when sampling of the population is 10% of the sampling population (Creswell and Cresswell, 2018b). Walsh; et al. (2015) state that a representative sample requirement is significant where the selected sample should be a reflection of the accurate population so that it is a microcosm of the population. In this case, some hotel SMEs are stand-alone establishments while others are within facilities such as conference centres, Game and entertainment facilities.

Research instrument and structure

The primary data collection instrument used in the quantitative phase was a questionnaire, while the qualitative method used an interview. For the survey, the questionnaire was emailed, faxed, or hand-delivered to respondents in 35 establishments as sample size. The research instruments and variables were structured around the four balanced scorecard critical success factors. The questionnaire was structured with closed–ended questions. The first section sought to give general information such as Gender, Age group, hotel SMEs establishment, level of position, number of years, qualification, and location of the establishment. The second section had closed-ended questions based on five Point Likert scale from 1-5 (1 = strongly disagrees, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 strongly Agree) to examine critical success factors growth in hotel SMEs in Eswatini.

Data analysis

The Statistical Package for Social Sciences (SPSS) was used to analyse the quantitative data from the questionnaire survey. In a mixed sequential method, qualitative and quantitative data are analysed separately. The quantitative results may inform the development of qualitative questions to further explain the quantitative findings(Creswell and Cresswell, 2018b). Of the 500 questionnaires distributed to the 35 hotel SMEs who agreed to participate, 350 were returned. The sampling was well-represented, so there was no bias from the respondents. Some participants did not answer all of the research questions, but 330 participants responded to all of them. Missing data was removed, as it was not necessary for the research data and was only related to participant profiling.

Boone; and Boone (2012) suggest that data analysis procedures for Likert-type and Likert scale data require the analyst (the researcher in this case) to understand the measurement scale represented by each number. The authors suggest using ordinal measurement scale for descriptive statistics analysis. Items for ordinal measurement scale include mode or median for central tendency and frequencies for variability. Additional analysis techniques appropriate for ordinal scale items include the nonparametric chi-square measure of association (O'Gorman and MacIntosh, 2015).

Likert scale data are analyzed based on the interval scale (Boone; and Boone, 2012). Likert scale items are formed by computing a combined score (sum or mean) from four or more Likert-type items. Therefore, the composite score for Likert scales is analyzed using the interval measurement scale. Mishra et al. (2018),state that the descriptive statistics suggested for interval scale items are the mean for central tendency and standard deviations for variability. Additionally, statistical data analysis techniques applicable to interval scale items include Pearson's r, t-test, ANOVA, and regression procedures (Creswell and Cresswell, 2018b).

Frequency table, Pearson Chi-Square test, and P-value

The descriptive statistical analysis used in this study was the frequency table to analyse respondents' reactions in the questionnaire survey on financial and nonfinancial critical success factors influencing growth in hotel SMEs in Eswatini. The frequency was categorically analysed based on the research objectives and questions for the quantitative method. A Chi-square was used to analyse data in this research study. A Chi-square is a significant non-parametric test that is used in social science to test the association between variables (Chavan; and Kulkarni, 2017). Chi-Square test functions as a test for independence; that is, it tests the significance of the association of variables when the measured data is at a nominal or ordinal scale. The Pearson Chi-Square Test examines if there was a significant association between financial and non-financial critical success factors that influence the growth of hotel SMEs in Eswatini.

Qualitative research method

Phase two of the research method was a qualitative interview. The follow-up qualitative research method discussed in this section covers: the summary of qualitative results, the target population and sample size of the interview schedule, the data collection instrument, data collection procedures, and data. The qualitative research interview is an interpretative research method. In this case, follow-up interviews were conducted with owners and CEOs of hotel SMEs for those establishments that had participated in the first phase of the study. The follow-up interview was to find out why the respondents responded in that manner.

Non-probability sampling

The qualitative data collection and analysis used a non-probability sampling method. O'Gorman and MacIntosh (2015) define a non-probability sample as a sample selected without using a random selection method, meaning that some units in the population are more likely to be selected than others. In this study, the non-probability sample participants were senior management or owners of hotels in the small-medium enterprise sector because this was a follow-up research question. Follow-up interviews help researchers to understand why respondents answered the questionnaire survey in the way they did. Since this was a follow-up interview, the researchers focused on senior management and owners of hotels in the small-medium enterprise sector, and the cost of sampling error was low.

This study used purposive sampling. Bryman and Bell (2018) state that purposive sampling is a non-probability sampling method that does not require a random sample of participants. The main objective of purposive sampling is to strategically sample participants who are relevant to the research questions (O'Gorman and MacIntosh, 2015). Purposive sampling does not require researchers to generalize the results to the population; instead, they sample participants with specific goals in mind. For example, in this study, the goal of the follow-up interview was to use the qualitative data to help explain the initial quantitative results in more (Creswell and Cresswell, 2018b).

Sample size

The target populations were 35 General Managers or Directors of hotel SMEs establishments in Eswatini. The data drawn through the qualitative interviews were from 5 small hotels, 1 Bed & breakfast, 5 Lodges, two guest houses, one game park and accommodations, and one tourism and conference facilities within the Manzini-Mbabane corridor of Eswatini. The estimated number of participants for the interviews was 15, including a Director, General Managers, a Finance Manager, and Operations and Human Resource Managers of hotel SMEs establishments. According to (Creswell and Cresswell, 2018b),10% of the target population represents the target population which is about 35 establishments that had participated in the quantitative research study. However, in this study, only 14 participants were interviewed, representing 40% of the target population.

Research instrument

The second phase of the research instrument was the qualitative data collection instrument. The basis for the development of interview questions was the previous quantitative results. Based on the findings of the questionnaire survey results, the qualitative research questions were to investigate further why respondents agreed, were neutral, or disagreed. A face-to-face and telephone interview was conducted to collect data. To get facilitate a response, semi-structured and open-ended questions were developed that guided the discussions. During the interview, notes were taken and conversations recorded.

Data Analysis and presentation procedures for follow up interview

The qualitative data was then organised and analysed according to themes and categories. Creswell and Cresswell (2018a) argue that this process involves transcribing interviews, scanning materials, sorting, and arranging data into different types. The second step was to quickly read all the data to get the overall picture and general response of the participants (Johnson and Onwuegbuzie, 2004). Thirdly, the data coding occurred. The next step was to use the codes to generate descriptions and themes. The final step was representing the description and themes.

Findings and Discussions

Quantitative results

This study used the non-parametric statistical techniques because the questionnaire has a neutral variable that affects the normal variability distribution. Therefore statistical analysis such as mean and standard deviation was not used. Statistical Package for the Social Sciences (SPSS) was used to analyse the data through Pearson Chi-square tests. Further, a descriptive analysis also used frequency distribution based on the three main variables, which are Disagree (1), Neutral (2) and Agree (3).

Pearson Chi-Square test

The relationship between financial and nonfinancial critical success factors and Hotel and Restaurant SME's growth was tested. Pearson Chi-square value, which is represented by the Chi-Square test, revealed the significance of association between the financial and nonfinancial critical success factors and hotel SMEs growth at ordinal level scale and results as shown in Table 1.

Overall critical success factors, as measured by the Pearson Chi-square, is 667.646 with a P-value of .000, which indicates a significant association between critical success factors and hotel and restaurant SMEs growth. The association between the nonfinancial critical success factors and the hotel SMEs growth with regards to critical financial factors (Chi-square = 677.235, p=.000), customer critical factors (Chi-square = 605.093, p=.000), internal business process (Chi-square = 612.324, p=.000) and learning and growth (Chi-square = 1072.278, p=.000) result showed a strong association.

Critical success factors for financial growth

A total of 316 participants responded that financial critical success factors contribute to small and medium Hotel and Restaurant SME's growth in Eswatini. Figure 1 shows that financial critical success factors contribute to hotel SMEs' growth in Eswatini (n=219, 69.2%), neutral respondents (n=70, 22.1%) and disagree respondents (n=27, 8.5%).

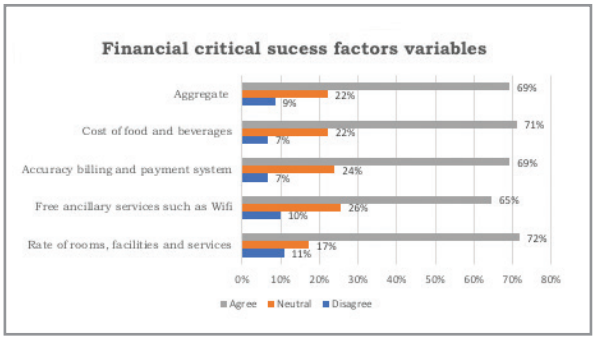


Figure 1: Critical success factors for financial growth

These financial critical success factors used included rate of rooms, facilities, and services (n=232, 71.8%); the cost of food and beverages (n=224, 71, 1%),

Table 1: Association between financial and non-financial critical success factors and hotel SME's growth

Factors	Chi-square	df	p
Overall Critical success factors	667.646	16	.000
Financial critical factors	677.235	16	.000
Customer critical factors	605.093	16	.000
Internal business process	612.324	16	.000
Learning and growth factors	1072.835	16	.000

NB: df - degree of freedom p≤ .01

accuracy billing and payment system (n=217, 69.3%), and free ancillary services such as Wi-Fi (n=223, 64.6%).

The study's main objective was to examine the critical success factors that contribute to growth in hotel and restaurant SMEs. The study results revealed that the critical success factors that contribute to the hotel SME's financial growth are the rate of rooms, facilities, and services. The results suggest that the sector should benchmark its fees, facility standards, and services against other similar businesses in Eswatini and South Africa. This analysis is consistent with the findings of Wang and Hung (2015), who found that customers consider room and bathroom amenities, as well as comfortable bedding, to be critical success factors for increasing sales per room per day. The findings of this study also revealed that customers in the hotel and restaurant SME sector prefer facilities with free ancillary services such as Wi-Fi. The analysis also suggests that free ancillary services such as Wi-Fi can be used as differentiation strategies by hotel and restaurant SMEs to command a high price premium that would increase the profit margin (Sitawati, 2015). The results of the study also revealed that accurate billing and payment are critical success factors for financial performance measures in the hotel and restaurant SME sector. This analysis confirms previous studies that have shown that customers compare hotel rates with other competitors who offer the same services, as they can view rates on search engines such as TripAdvisor or Booking.com (Wang and Hung, 2015). The findings of this study also revealed that the cost of food and beverages is another critical success factor for financial performance in the hotel SME sector. The analysis suggests

Critical success factor for customer growth

Figure 2 also shows that respondents agreed that customer services critical success factors influenced hotel SMEs growth (n=238, 73.7%), neutral (n=57, 17.6%) and disagreed (n=28, 8.7%). Specifically, the respondents indicated the main customer critical success factors hotels and tourism excel at included customer satisfaction (n=248, 77.0%), well known organizational brand (n=241, 75.6%), repeat customers (n=243, 74.7%), facilities being attractive (n=241, 74.6%), convenient customer location (n=225, 70.3%) and customer loyalty (n=228, 70.2%).

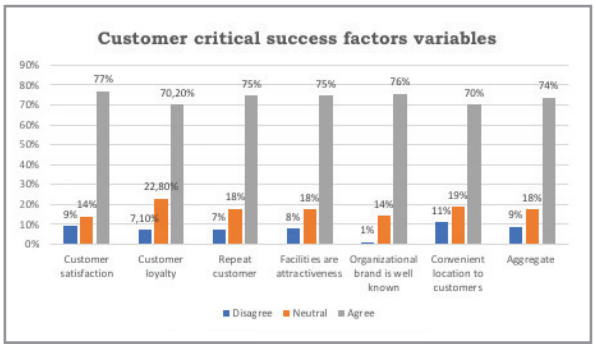


Figure 2: Critical success factor for customer growth

Customer service is another critical success factor for hotel and restaurant SME growth. The study results revealed that customer service was a critical success factor for hotel and restaurant SME growth. The analysis of the results indicated that organizations were very particular about customer service. The results also revealed that customer loyalty is another critical success factor for hotel and restaurant SME customer growth. This analysis suggested that trustworthiness is a characteristic that motivates customers to book at an establishment. The study further confirmed that a thriving hotel and restaurant SME sector focused on how customers perceived the quality of service and set customer performance measures that enhanced customer satisfaction (Kala and Bagri, 2014). The follow-up interview with managers and owners concurred with the quantitative results that customer satisfaction was critical for business success.

Furthermore, the results supported Travel and Council's (2018) suggestion that in today's globalized market, the size of the flow of tourists to a particular destination is determined by the world tourism industry, represented by tour operators, travel agents, and transport services in the countries of tourists' origin. Further, the results also indicated that service innovation was a source of competitive advantage for organizations since new services could attract new customers, increase customer loyalty, build new market opportunities, and increase sales and profitability growth (Tang et al., 2013). Furthermore, the results revealed that repeat customers are another critical success factor for customer growth in the hotel and restaurant SME sector. This analysis concurred with previous studies that showed that repeat customers did not prefer the hotel or tourism establishment and talked about the service they

received from the hotel or tourism to their friends, family members, and others back in the country of origin (Christie; et al., 2013).

The study's findings revealed that facility attractiveness and safety are critical success factors for customers' growth in the hotel and restaurant SME sector. This analysis suggested that most organizations focused on

Critical success factors for internal business processes effectiveness

Figure 3 also presents that respondents agreed that internal business processes critical success factors influence hotel SMEs growth (n=227, 69.5%), neutral (n=62, 194%) and disagree (n=32, 9.84%).

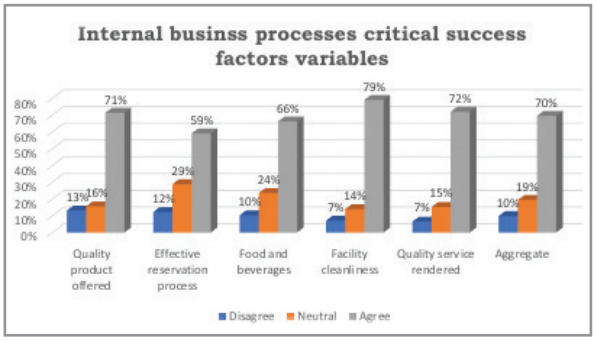


Figure 3: Internal Business processes critical success factors

Expressly, the respondents indicated that facility cleanliness (n=255, 79.0%), quality service rendered (n=252, 72.0%), and quality products offered (n=228, 71.3%) were the topmost internal business processes critical success factors for hotel SMEs growth in Eswatini. The least internal business processes critical success factors included were food and reservations (n=211, 66.2%) and effective reservation (n=189, 59%), which need to improve.

Internal business processes were another critical success factor for the hotel and restaurant SME sector. The study results revealed that the sector emphasized quality products or services, effective reservation processes, facility cleanliness, and quality service delivery as attributes that contribute to business success. For instance, the analysis revealed that hotel and restaurant SMEs offered high-quality products to customers, which led to an increase in the number of customers visiting hotel establishments annually. Before the COVID-19 pandemic exploded in 2020, the Eswatini Tourism Authority reported that, on average, 86% of European visitors were first-time visitors, while 14% were repeat visitors. Also, 84% of North American visitors were first-time visitors, while 16% were repeaters (Authority, 2018).

Furthermore, the study results indicated that the majority of organizations in the hotel and tourism sector were very effective in processing reservations. The analysis confirmed that central reservation systems (CRSs) not only provided Destination Management Organizations (DMOs) with new sources of revenue but also provided the ongoing accommodation and attraction booking process, which creates rich databases that, when mined, can provide DMOs with relevant and timely performance measures (Elliot and Joppe, 2016). The results also revealed the importance of cleanliness in hotel and restaurant SMEs as a critical factor because it attracted more customers to the business. This analysis was in line with previous studies where customers complained about dirt in specific establishments, including dirty towels and messy and dirty courtyards, as critical factors that caused failure in hotel SMEs (Wang and Hung, 2015).

Other internal business processes critical for hotel and restaurant SME growth were food and service quality. The results revealed that quality food and beverages were critical success factors contributing to hotel and restaurant SME growth. The analysis implied that hotel SMEs had qualified people who cooked food for customers. This analysis concurred with the findings of Sitawati (2015), who found that customers preferred hotel and tourism establishments with qualified staff members who prepared tasty meals and had all required beverages. Service quality was another critical success factor for hotel SME growth. The results revealed that most hotel SMEs offered high-quality service to customers. The analysis suggested that hotels and tourism should put forward the concept of how to satisfy customers with better quality service.

Learning and growth Critical success factors

Respondents agreed (Figure 1) that learning and growth critical success factors also contribute to hotels and the tourism sector growth (n=186, 62.8%). However, there were the neutral respondents (n=74, 23.3%) and disagreed (n=49, 15.4%).

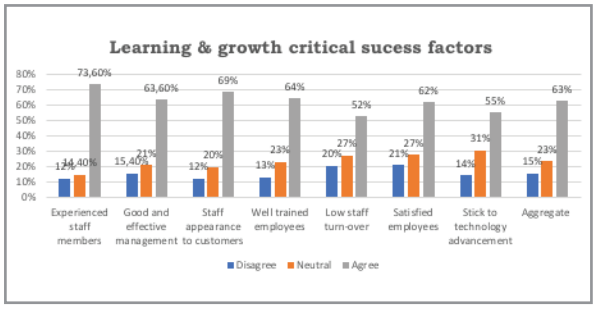


Figure 4: Learning and growth critical success factors

Specifically, the respondents indicated that experienced staff members were the topmost learning and growth critical success factors (n=246, 73.6%) for hotels and the tourism sector growth in Eswatini. Other learning and growth critical success factors included staff appearance to customer (n=224, 68.5%), well trained employees (n=202, 64.1%), good and effective management (n=206, 63.6%) and satisfied employees (n=165, 68.1%). The least learning and growth critical success factors included stick to technology advancement (n=176, 55.3%) and low staff turnover (n=164, 52.4%).

Learning and growth was another critical success factor for hotel and restaurant SME growth in Eswatini. The study results revealed that experienced staff members, effective management, staff appearance, well-trained employees, low staff turnover, satisfied employees, and technology advancement contributed to hotel and tourism small and medium enterprise growth before COVID-19.

The results revealed that all hotels and tourism establishments prefer well-experienced staff members. This analysis suggests that most organizations recruit and retain experienced staff members to improve the quality of their services. This is in line with the findings of the study on internal business process critical success factors.The results also revealed that good and effective management is crucial for the growth of the hotel and restaurant SME sector. This analysis implies that hotel and restaurant SMEs require effective and proper management to be successful in business. Effective managers should be exposed to the balanced scorecard (BSC) to manage and measure business performances in small and medium enterprises.

Moreover, the results revealed that staff appearance is another critical success factor for hotel and restaurant SME learning and growth. The analysis suggested that most hotel and tourism organizations emphasize a proper dress code and the cleanliness of staff when serving customers in Eswatini. Well-trained employees are another critical success factor for hotel and restaurant SME sector growth. The industry considers well-trained employees to be essential for its learning and growth strategy. Hotel and restaurant SMEs need to invest comprehensively in selection, training, performance appraisal, and compensation (Sitawati, 2015).

Low staff turnover also contributes to hotel and restaurant SME growth in Eswatini. The study results revealed that low staff turnover can be a competitive strategy for hotel and restaurant SME learning and growth in the sector. The analysis also suggests that the working experience and the unemployment rate could affect staff turnover.

Qualitative results

The qualitative research was collected and analyzed based on the quantitative results. The overall findings of the qualitative research indicated that both financial and nonfinancial critical success factors contribute to the growth of hotel SMEs in Eswatini.

In the follow-up interviews, participants were asked to explain why hotel SMEs consider customer critical success factors to be the most important for business growth. They gave many reasons. Eight participants stated that customer satisfaction is a critical success factor because without customers, there would be no business. For example, two hotel participants said, "Different customers have different needs, therefore the industry tries its best to be better than yesterday trying to meet customers' needs." Another participant claimed that if customer service is not a critical success factor, visitors are not bound to the booking they made and are free to leave and seek accommodation elsewhere. One participant stated that customer service is critical because customers can view and learn about the establishment's service through feedback given by previous customers on Trip Advisor and Booking.com.

Participants also stated that customer service is essential because it establishes a relationship between customers and the staff of hotel and restaurant mall

and medium enterprises. They explained that the relationship allows staff members to understand the customers' trust culture and services, making them aware of cultural diversities. Another participant highlighted that building a good relationship with customers leads to accepting feedback from loyal customers and making corrective measures due to their high level of trust. They said that based on feedback from tourists, the hotel and tourism sector is compelled to train employees on the specific tasks highlighted in customers' responses

Participants were also asked to explain why there was a significant association between financial and nonfinancial critical success factors and hotel SME growth. They gave many reasons based on the number of bookings and customer service response rates.

First, there were reasons given related to the association between the number of bookings and customer satisfaction. Eleven participants agreed that there was an association between the two. They gave different reasons. For example, three participants stated that the number of bookings depends on customer satisfaction. Through word-of-mouth, customers can either portray good or bad publicity if the service standard meets or falls below their expectations. This can either discourage or attract potential customers who intend to book at the establishment. One participant claimed that high customer satisfaction builds loyal customers who will continually book with the hotel or tourism SME. Another participant claimed that very few customers will choose to use an establishment in the near future where customer satisfaction is below their expectations.

One participant stated that although the number of bookings is associated with customer satisfaction, most ratings occur when the customer is checking out of the hotel or tourism establishment, which may not be enough time to reflect on their experiences and honestly present their views. On the other hand, another participant argued that customer satisfaction is the main driver of the number of bookings because customers who book online may not view previous feedback from other customers who have stayed or used the establishment.

Two participants argued that the number of bookings in hotel and tourism SMEs is not associated with customer satisfaction. They claimed that the number of bookings is associated with marketing the establishment on different websites such as Booking.com and TripAdvisor, attending tourism conferences such as the Durban Tourism Indaba, attending international trade fairs, and being visible at national events such as the Incwala and Reed Dance (Mhlanga) festivals. One establishment owner stated that the number of bookings is associated with customer satisfaction and benchmarking the accommodation against South African establishments that offer the same services.

The cited reasons can be categorically associated with customer good or bad publicity, repeat customers, rating services, online bookings, and marketing strategies. Different reasons were significant in terms of the number of bookings associated with customer satisfaction. However, most participants confirmed that there was a significant association between the two variables.

Furthermore, participants noted that the response rate to customer service is associated with the actual quality of service. All fourteen participants confirmed that there is an association between the two. For example, one hotel manager said, "When a customer complains about a service such as Wi-Fi, we respond promptly because the customer should be in a conducive environment." Another participant stated that when a service is not available, customers are notified in advance before they book to avoid confusion when they make the request after checking in. Another participant highlighted that the response rate to customer service is directly associated with the actual quality of service rendered because customers can damage the reputation of the business if they are not served according to their expectations. This view of the response rate to customer service associated with the quality of service implies that managers put customers first when staff members respond quickly to customer demands. Where managers cannot afford to offer a service, it would be stipulated during the booking so that customers can decide whether or not to take the room. The cited reasons were categorized into a conducive environment, prior notification, avoidance of bad publicity, and enhancement of customer-first trust culture.

Conclusion and recommendation

Critical success factors for financial growth

The study also suggests that hotel SMEs should benchmark their fees, facility standards, and services against other hotel and restaurants SMEs in Eswatini and other countries. These findings are consistent with previous studies, which have shown that customers value room and bathroom amenities, comfortable bedding, free Wi-Fi, and accurate billing and payment. The recommendations for hotel and restaurants SMEs in Eswatini include setting competitive rates, invest in high-quality facilities and services in order to attract and retain customers and ensure accurate billing and payment. Lastly hotel and restaurant SMEs sector should carefully manage their food and beverage costs in order to maximize profits. These recommendation could improve their financial performance and achieve their business goals.

Critical success factors for customer growth

Furthermore, these findings are consistent with previous studies, which have shown that customers value good customer service, loyalty programs, innovative services, and a sense of safety and security are critical success factors for choosing a hotel or restaurant. Results suggest that a strong brand reputation and convenient locations are important for attracting and retaining customers. Recommendations for improving customer services include provision excellent customer service, develop loyalty programs to reward repeat customer, be innovative in the services and market hotel or restaurant brand effectively by using a variety of channels, such as online advertising, social media, and public relations. Lastly, choose a convenient location and invest in facility attractiveness and safety.

Critical success factors for internal business process:

Hotels and restaurants SMEs in Eswatini should focus on quality products and services, implement an effective reservation process, ensure that facilities are clean and well-maintained, provide excellent customer service and invest in training for staff and use technology to improve efficiency and productivity. This could involve using a central reservation system, a point-of-sale system, or other software solutions. Some of specific recommendations for hotel and restaurant SMEs in Eswatini include review and streamline internal business processes, invest in training for staff on all aspects of internal business processes and use technology to automate tasks and improve communication. This can free up staff to focus on more important tasks, such as providing customer service. Eswatini hotel and restaurant SMEs sector should benchmark internal business processes against other hotel and restaurant SMEs. This can help to identify areas where you can improve.

Critical success factors for learning and growth

The conclusions and recommendations for learning and growth in the hotel and restaurant SMEs sector in Eswatini should invest in training and development for their staff. This will help to ensure that staff have the skills and knowledge they need to provide excellent customer service and to help the business grow, they should create a positive work environment for their staff. This will help to motivate staff and to reduce staff turnover and they should embrace technology to improve their operations and to provide a better customer experience. Recommendations include, develop a culture of learning and innovation whereby management should encourage staff to learn and to innovate. Hotel and restaurant should benchmark against other businesses, set goals and targets. Create a work environment where staff feel valued and respected, embrace technology and invest in technology to improve r operations and to provide a better customer experience.

Practical implications

From management perspectives, these findings will help management of hotel and restaurant SMES to secure affordable billing and payment system that is accurate. This will help to avoid customer disputes and ensure that the hotel receives all of the revenue. Good financial system will also assist to manage costs effectively for hotel and restaurant SMEs, particularly the cost of food and beverages which could help them to maximize profits.

The findings of the study implies that management or owners should focus on customer service. Customer service is essential for any business, but it is especially important for hotel and restaurant SMEs, where customers expect to be treated well. Hotel and restaurant SMEs can build customer loyalty by providing excellent customer service, offering rewards programs, and developing relationships with customers. Invest in facilities and safety. Customers want to stay in hotels and eat at restaurants that are clean, safe, and comfortable. Owners and managers should develop a strong brand reputation that can help hotel and restaurant SMEs to attract customers and command a premium price. This could be done by providing excellent customer service, offering high-quality products and services, and marketing their businesses effectively.

The results of the study implies that owners and management of hotel and restaurant SMEs pay more attention on facilities , quality of service rendered ad quality of product offered. However, management and owners of the hotel and restaurant reservation process for facilities is lower critical success factors. Therefore this requires hotel and restaurant SMEs to make it easy for customers to book rooms and tables in the restaurants. They may consider using a central reservation system (CRS). For example, they can use a CRS to manage reservations, and they can use online ordering systems to take orders from customers.

The findings also have the number of practical implications for hotel and restaurant SMEs in Eswatini. These include staff appearance to customer, well trained employees, good and effective management and satisfied employees were critical success factors for hotel and restaurant SMEs in Eswatini. For continuously improvement in learning and growth, hotel and restaurant SMEs invest in staff training and development, develop a culture of learning and innovation. Furthermore, the results implies that management and owners of hotel and restaurant should should embrace technology to improve their operations and to provide a better customer experience. This may involve using technology for reservations, payments, and marketing. By focusing on these factors, hotel and restaurant SMEs in Eswatini can improve their learning and growth and achieve their business goals.

Limitations and future research

One limitation of this study is that it was conducted in Eswatini, a small kingdom country in Southern Africa, where the hotel and restaurant small and medium enterprises sector is still relatively undeveloped compared to other countries in the region, such as South Africa. Additionally, the study only focused on the Manzini-Mbabane corridors and did not cover all regions of the country.

To address these limitations, future studies could replicate the study in other countries, such as South Africa, to test whether the findings are generalizable. Future studies could also include customers in surveys and interviews to ensure unbiased responses. This would help to balance the perspectives of managers, owners, and staff.

References

Ahmad, A., Khaled, A., Mohammad, A.-L., Ahmad Jais, A. A. & Ibrahim, R. 2019. Budget Hotels' Online Guest Reviews Regarding Customer Satisfaction. The Journal Of Social Sciences Research, 522-534.

Al-Azzam, A. F. M. 2016. Impact Of Customer Relatiohsions International Journal Of Business And Social Science, 7.

Authority, E. T. 2018. Eswatini-Eswatini-Tourism-Research-Annual-Report-2018.

Boone;, H. N. & Boone, D. A. 2012. Analyzing Likert Data. Journal Of Extensions, 50, 1-5.

Chavan;, D. P. & Kulkarni, D. R. V. 2017. Role Of Non Parametric Test In Managment And Social Scienceresearch. Quest International Multidisciplinary Research Journal, Vi, 2-16.

Chiun Lo, M., Chai Wang, Y., Justin Wah Constance, R. & Ramayah, T. 2016. The Critical Success Factors For Organizational Performance Of Smes In Malaysia: A Partial Least Squares Approach. Review Of Business Management, 18, 370-391.

Christie;, I., Fernandes;, E., Messerli;, H. & Twining-Ward, L. 2013. Africa-Tourism-Report-2013-Overview.Pdf. World Bank, Tourism In Africa: Harnessing Tourism For Growth And Improved Livelihoods, 1-12.

Ćorluka, G., Mikinac, K. & Peronja, I. 2017. Compensation_And_Entitlement_Frame_Work_For_Swailand_Rail_Link_Project. Tourism In Southern And Eastern Europe, 4, 1-82.

Creswell, J. W. & Cresswell, J. D. 2018a. Research Design

Qualitative, Quantitative, And Mixed Methods Approaches, Los Angeles, Sage Publications.

Creswell, J. W. & Cresswell, J. D. 2018b. Research Design_ Qualitative, Quantitative, And Mixed Methods Approaches, Los Angeles, Sage Publications.

Elliot, S. & Joppe, M. 2016. Innovative Performance Measures To Assess Destination Competitive. Travel And Tourism Research Association: Advancing Tourism Research Globally.

Gesage, M. B., Kuira, J. & Mbaeh3, E. K. 2015. A Balanced Scorecard Approach To Measuring Performance Of Five Star Hotels In Nairobi, Kenya -2018 Reference.Pdf. African Journal Of Tourism, Hospitality And Leisure Studies, 1, 1-28.

Halcomb;, E. J. & Hickman, L. 2015. Mixed Methods Research. Nursing Standard: Promoting Excellence In Nursing Care,, 29, 41-47.

Ifeanyi, O., Ezimma, N. & Pat, A. 2020. Critical Success Factors For Smes Performance: Empirical Evidence. International Journal Of Advanced Academic Research, 1-17.

Johnson, R. B. & Onwuegbuzie, A. J. 2004. Mixed Methods Research.Pdf. American Educational Research Association, 33.

Kala, D. & Bagri, S. C. 2014. Balanced Scorecard Usage And Performance Of Hotels: A Study From The Tourist State Of Uttarakhand, India. Asia-Pacific Journal Of Innovation In Hospitality And Tourism, 3, 153-173.

Kaplan, R. S. & Norton, D. P. 1996. Using The Balanced Scorecard As A Strategic Management System. Havard Review Journal

Kori Faith Wangui, Muriithii Simon & Eric, N. 2018. Effects Of Internal Branding Practices On Brand Performance. Int Journal Of Social Sciences Management And Entrepreneurship, 2, 159 -176.

Marais, M., Du Plessis, E. & Saayman, M. 2017. Critical Success Factors Of A Business Tourism Destination: Supply Side Analysis. Acta Commercii, 17.

Mishra, P., Pandey, C. M., Singh, U. & Gupta, A. 2018. Scales Of Measurement And Presentation Of Statistical Data. Ann Card Anaesth, 21, 419-422.

Neirotti, P., Raguseo, E. & Paolucci, E. 2016. Are Customers' Reviews Creating Value In The Hospitality Industry? Exploring The Moderating Effects Of Market Positioning. International Journal Of Information Management, 36, 1133-1143.

O'gorman, K. & Macintosh, R. 2015. Methodsmap-Researchmethods2nded-August2015.Pdf, 26 Home Close, Wolvercote, Oxford, Goodfellow Publishers Limited.

Sitawati, R. 2015. Competitive Strategy And Sustainable. Social And Environmental Accounting, Vol. 9, 51-75.

Tang, T.-W., Wang, M. C.-H. & Tang, Y.-Y. 2013. Developing Service Innovation Capability In The Hotel Industry. Service Business, 9, 97-113.

Travel;, W. & Council, T. 2018. Travel & Tourism Economic Impact 2018 Sub Saharan Africa

Walsh;, I., Holton;, J. A., Bailyn;, L., Fernandez;, W., Levina;, N. & Glaser;, B. 2015. A Critically Reflective. Organizational Research Method, 1-19.

Wang, S. & Hung, K. 2015. Customer Perceptions Of Critical Success Factors For Guest Houses. International Journal Of Hospitality Management, 48, 92-101.

Determining the Nexus between Entrepreneurship Education and Self-efficacy on Students' Entrepreneurship Interest in South Africa

Ngozi Blessing Enebe; 36037214@mynwu.ac.za
Calvin Mahlaule; calvin.mahlaule@nwu.ac.za
Lilian Ifunanya Nwosu; 23012064@nwu.ac.za
School of Accounting Sciences, North-West University, South Africa
Corresponding author;
Email: 36037214@mynwu.ac.za

Abstract

Purpose: This study aims to explore the intricate relationship between entrepreneurship education, self-efficacy, and undergraduate students' interest in entrepreneurship. With youth unemployment escalating in South Africa, entrepreneurship education emerges as a potential remedy to this economic challenge. Recognized as a catalyst for economic growth and innovation, entrepreneurship demands fostering an entrepreneurial mindset and skill set among higher education students, accompanied by the cultivation of self-efficacy to ignite entrepreneurial interest. Given the pivotal role of entrepreneurship interest in motivating and facilitating post-graduation business start-ups, understanding this dynamic is crucial. However, scant attention has been paid to investigating the nexus between entrepreneurship education, self-efficacy, and students' entrepreneurship interests.

Methodology: This study adopts an Integrative Literature Review (ILR) approach and regulatory focus theory to synthesise existing research and insights on this topic.
Result: The study found that students have two motivational orientations; promotion and prevention orientations. Promotion-focused individuals tend to be more proactive and risk-tolerant, thus exhibiting higher levels of self-efficacy in entrepreneurial endeavours. Conversely, prevention-focused individuals may prioritize security and stability, potentially leading to lower self-efficacy in entrepreneurial contexts. Recognizing these differences in regulatory orientation can inform the design of tailored interventions to enhance self-efficacy among students with diverse motivational profiles.

Originality: By delving into diverse perspectives and theoretical frameworks, this review shed light on the multifaceted interactions shaping students' entrepreneurial aspirations within the South African context. Through an integrated approach, this study aims to offer fresh insights and recommendations for educators, policymakers, and practitioners seeking to nurture entrepreneurship potential among South African youth.

Keywords:
entrepreneurship education; self-efficacy; entrepreneurial interest; regulatory focus theory.

Introduction

Entrepreneurship education serves as a cornerstone in fostering economic development and innovation, particularly within the context of burgeoning youth unemployment rates and economic disparities. While its significance is well-recognized, disparities exist in the implementation and effectiveness of entrepreneurship education programs, particularly between developed and developing countries. In developed economies such as the United States, Canada, and China, entrepreneurship education has been pivotal in driving private sector growth and contributing significantly to Gross Domestic Product (GDP) (Audretsch & Thurik, 2001; Carree & Thurik, 2003; Thornton, 2002). However, the narrative shifts when considering the implementation and impact of entrepreneurship education in many developing and underdeveloped countries.

In contrast to their developed counterparts, many developing countries struggle to establish comprehensive and effective entrepreneurship education curricula. The disparity lies not only in the content but also in the delivery and practical orientation of these programs. While developed nations have refined and practical-oriented entrepreneurship curricula supported by robust infrastructures, developing countries often grapple with theoretical approaches that lack real-world applicability (Hannon, 2005).

Research has demonstrated a clear link between the structure of entrepreneurship education programs, the availability of resources, and students' self-efficacy beliefs (Chen et al., 1998; Liñán & Chen, 2009). In developed economies, where entrepreneurship education is more practical-oriented and well-supported, students tend to develop stronger self-efficacy beliefs regarding their entrepreneurial capabilities. Conversely, in developing economies where theoretical approaches dominate, students may lack the confidence and practical skills necessary to embark on entrepreneurial endeavors (Fayolle & Gailly, 2015).

The existing body of literature has made commendable strides in investigating the complex interplay between entrepreneurship education, self-efficacy, and entrepreneurial intention across various contexts. Noteworthy studies, such as Li, Cao, and Jenatabadi (2023) delved into the direct influence of entrepreneurial education and creativity on entrepreneurial intent among university students in China. This research uncovered a positive effect and emphasized the mediating roles of entrepreneurial inspiration, mindset, and self-efficacy. In a similar vein, Saoula et al. (2023) investigated the complex interplay that shapes entrepreneurial intention through entrepreneurial self-efficacy, motivation, family support, and entrepreneurial education. Investigating the effects of entrepreneurship education on self-efficacy, the need for achievement, and entrepreneurial intention among Pakistani commerce students. Soomro and Shah's study (2022) achieved important advances. Their research showed that entrepreneurship education had a favorable impact on self-efficacy and entrepreneurial intention, especially in the areas of opportunity recognition and acquiring entrepreneurship knowledge.

Despite the valuable insights provided by these studies, there remains a gap in understanding the intricate relationship between entrepreneurship education, self-efficacy, and students' interest in entrepreneurship, particularly within the South African context. The current conceptual article aims to address this gap by focusing specifically on South African undergraduate students and their interest in entrepreneurship, on the background of rising youth unemployment in South Africa. While the previous studies offer valuable insights from diverse contexts, they do not fully capture the nuances of the South African higher education landscape and its unique socio-economic challenges.

By adopting an Integrative Literature Review (ILR) approach, the current study intends to synthesize existing research and insights on the relationship between entrepreneurship education, self-efficacy, and students' entrepreneurship interests within the South African context. Through this comprehensive review, the study seeks to shed light on the multifaceted interactions shaping students' entrepreneurial aspirations in South Africa. By offering fresh insights and recommendations for educators, policymakers, and practitioners, the study aims to contribute to the ongoing discourse on entrepreneurship education and its role in fostering entrepreneurial mindsets and skill sets among South African youth. Ultimately, the study endeavors to provide actionable recommendations to nurture entrepreneurship potential and mitigate youth unemployment in South Africa.

Theoretical Framework

Regulatory Focus Theoretical Framework

The Regulatory Focus Theoretical Framework offers a lens through which to understand how individuals regulate their behaviors and pursue goals based on their motivational orientation. According to this theory, which Higgins (1997) proposed, people have two different regulatory orientations: preventative emphasis and promotion focus.

The Principles of Regulatory Focus Theoretical Framework

Promotion Focus: Individuals with a promotion focus are oriented toward achieving gains, aspirations, and growth. They are driven by a desire for advancement, accomplishment, and the pursuit of opportunities. Promotion-focused individuals tend to emphasize the attainment of positive outcomes and focus on maximizing gains (Higgins 2012; Zou et al., 2014).

Prevention Focus: Conversely, the prevention focus are concerned with individuals avoiding losses, failures, and setbacks. They are motivated by a desire for security, safety, and the prevention of negative outcomes. Prevention-focused individuals prioritize risk avoidance and strive to maintain stability and security (Higgins 2012; Scholer et al. 2010).

The Implication of Regulatory Focus Theoretical Framework on Self-Efficacy

The Regulatory Focus Theoretical Framework has significant implications for self-efficacy beliefs, which represent individuals' perceptions of their capabilities to successfully perform tasks and achieve desired outcomes (Keling & Sentosa, 2019). Promotion-focused individuals tend to have higher self-efficacy in situations where success is framed in terms of gains and accomplishments. Their optimistic outlook and focus on opportunities contribute to a sense of confidence and competence in their abilities to achieve their goals. On the other hand, prevention-focused individuals may exhibit higher self-efficacy in situations framed in terms of avoiding losses and preventing failures (Bux & Vuuren, 2019). Their cautious approach and emphasis on risk mitigation contribute to a sense of control and mastery over challenging situations.

The Regulatory Focus Theoretical Framework on Student Interest in Entrepreneurship

The Regulatory Focus Theoretical Framework provides valuable insights into students' interest in entrepreneurship by elucidating their motivational orientations toward entrepreneurial endeavors (Yusuf & Efendi, 2019). Promotion-focused students are more likely to be attracted to entrepreneurship due to its potential for growth, innovation, and the pursuit of opportunities. They are driven by the possibility of achieving success, making a meaningful impact, and realizing their aspirations through entrepreneurial ventures (Molden & Higgins, 2004). Prevention-focused students, on the other hand, may approach entrepreneurship with caution and risk aversion. They may be more inclined to weigh the potential risks and uncertainties associated with entrepreneurship and may be hesitant to pursue entrepreneurial opportunities unless they perceive a high level of security and stability (Shah et al. 1988). Understanding students' regulatory focus orientations can inform entrepreneurship education initiatives by tailoring interventions and pedagogical approaches to align with students' motivational orientations. Promotion-focused students may benefit from experiential learning opportunities, mentorship programs, and initiatives that emphasize creativity, innovation, and growth. Prevention-focused students may require support in risk management, resilience building, and strategies for mitigating potential setbacks and failures (Higgins et al. 2001). By leveraging insights from the Regulatory Focus Theoretical Framework, educators and policymakers can design more effective entrepreneurship education programs that resonate with students' motivational orientations and foster their interest and engagement in entrepreneurship.

Methodology

Research Design

This study adopts an Integrative Literature Review (ILR) approach to explore the nexus between entrepreneurship education and self-efficacy on students' entrepreneurship interest in South Africa. The ILR methodology allows for the synthesis of existing research, theoretical frameworks, and insights related to the research topic, providing a comprehensive

understanding of the complex relationships among variables without collecting new empirical data (Torraco, 2005; Whittemore & Knafl, 2005).

Literature Search and Selection

An integrative literature search was conducted across various electronic databases, including but not limited to Google Scholar, Scopus, Web of Science, and relevant academic journals in entrepreneurship education, self-efficacy, and entrepreneurship studies. The search encompass peer-reviewed articles, books, book chapters, conference proceedings, and reports published within the last two decades to ensure the currency and relevance of the literature.

The search strategy employed keywords and Boolean operators to capture relevant literature on entrepreneurship education, self-efficacy, entrepreneurship interest, and South African context Key search terms will include "entrepreneurship education," "self-efficacy," "entrepreneurship interest," "South Africa," "youth entrepreneurship," and related variations.

Inclusion and Exclusion Criteria

Selected literature were included based on importance to the research title and alignment with the study's objectives. Inclusion criteria encompassed studies focusing on entrepreneurship education, self-efficacy theory, entrepreneurial interest, and studies conducted within the South African context. English-language publications was prioritized due to accessibility and comprehensibility.

Literature selection excluded studies that do not directly address the link among entrepreneurship education, self-efficacy, and entrepreneurship interest.

Data Extraction and Synthesis:

Selected literature ware critically appraised and synthesized to identify key themes, theoretical frameworks, and empirical findings relevant to the research topic. Data extraction involved categorizing literature based on conceptual frameworks, methodologies, key findings, and implications for entrepreneurship education and policy.

The synthesis process employed thematic analysis techniques to identify recurring patterns, theoretical perspectives, and gaps in the literature regarding the relationship between entrepreneurship education, self-efficacy, and students' entrepreneurship interest within the South African context.

Ethical Considerations:

As an Integrative Literature Review, this study does not include primary data collection from human participants; therefore, ethical approval is not required. However, ethical considerations will focus on citation integrity, respect for intellectual property rights, and transparent reporting of synthesized literature to ensure academic rigor and credibility.

Literature Review

Conceptualising Entrepreneurship Self-Efficacy

Although self-efficacy's significance in entrepreneurship has been extensively explored in the literature, opinions on its definition, assessment, causes, and effects are divided. While some academics contend that self-efficacy is a crucial factor in determining an entrepreneur's intention, actions, and outcomes, others contend that it is a multifaceted concept that differs depending on the situation and area. We want to summarize the research on self-efficacy's function in entrepreneurship in this review of the literature and to provide some divergent perspectives on its theoretical underpinnings, measurement, causes, and effects. Additionally, we support the notion that self-efficacy plays a significant role in entrepreneurship and discuss some implications for entrepreneurship education and training.

"People's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" is the definition of self-efficacy (Bandura, 1994, p. 2). Social cognitive theory states that people's decisions, objectives, efforts, persistence, and coping mechanisms when faced with challenges are all influenced by their sense of self-efficacy (Bandura, 1997). The theory of planned behavior (TPB), which holds that intentions are the best predictors of conduct and are influenced by attitudes, subjective norms, and perceived behavioral control, also views self-efficacy as a crucial element (Ajzen, 1991). Similar to self-efficacy, perceived behavioral control expresses how easy or difficult a behavior is thought to be.

Entrepreneurial self-efficacy (ESE) is a specific form of self-efficacy that refers to "the strength of a person's belief that he or she is capable of successfully performing the various roles and tasks of entrepreneurship" (Chen et al., 1998, p. 295). ESE has been conceptualized as either a unidimensional or a multidimensional construct. The unidimensional approach treats ESE as a global belief in one's ability to perform entrepreneurial tasks in general, while the multidimensional approach distinguishes between different domains or facets of ESE, such as opportunity recognition, product development, marketing, management, financial control, and growth (McGee et al., 2009). The multidimensional approach is more consistent with Bandura's (1997) view that self-efficacy is not a fixed trait but a dynamic and context-specific construct that varies across different domains and situations.

The antecedents of ESE can be classified into personal factors and environmental factors. Personal factors include demographic characteristics (such as age, gender, education, and experience), personality traits (such as need for achievement, locus of control, risk propensity, and innovativeness), cognitive abilities (such as creativity, problem-solving, and decision-making), and motivational factors (such as goal orientation, self-regulation, and intrinsic motivation). Environmental factors include social influences (such as role models, mentors, peers, and family), cultural influences (such as norms, values, and beliefs), institutional influences (such as policies, regulations, and support systems), and situational influences (such as opportunities, challenges, and feedback).

The outcomes of ESE can be categorized into cognitive outcomes, affective outcomes, behavioral outcomes, and performance outcomes. Cognitive outcomes refer to the effects of ESE on entrepreneurial intention, opportunity recognition, feasibility judgment, venture creation decision, and strategic orientation. Affective outcomes refer to the effects of ESE on entrepreneurial passion, satisfaction, commitment, stress, and well-being. Behavioral outcomes refer to the effects of ESE on entrepreneurial action, persistence, learning, adaptation, and innovation. Performance outcomes refer to the effects of ESE on venture survival, growth, profitability, and social impact.

The literature review reveals that there are conflicting views on the importance of self-efficacy in entrepreneurship. Some studies suggest that ESE is a positive predictor of entrepreneurial intention (Zhao et al., 2005; Kautonen et al., 2015), behavior (Boyd and Vozikis, 1994; Chen et al., 1998), and performance (Baum and Locke, 2004; Hmieleski and Baron, 2008), while others suggest that ESE is not a significant predictor of entrepreneurial intention (Krueger and Brazeal, 1994; Liñán and Chen, 2009), behavior (Markman et al., 2002; Kickul et al., 2009), and performance (Baum et al., 2001; Piperopoulos and Dimov, 2015). Some studies also suggest that ESE has negative or curvilinear effects on entrepreneurial outcomes, such as overconfidence, escalation of commitment, and venture failure (Forbes, 2005; Hayward et al., 2006; Hsu et al., 2014).

We argue that self-efficacy is important for entrepreneurship because it reflects the psychological readiness and capability of individuals to pursue entrepreneurial opportunities and overcome the challenges and uncertainties inherent in the entrepreneurial process. Self-efficacy is not only a predictor but also an outcome of entrepreneurship, as it can be enhanced or diminished by entrepreneurial experiences and feedback. Self-efficacy is also a moderator of the effects of other factors on entrepreneurship, such as personality traits, cognitive abilities, motivational factors, environmental factors, and situational factors. Self-efficacy is not a constant or homogeneous construct, but a heterogeneous and dynamic one that can be influenced by various antecedents and can influence various outcomes at different levels of analysis.

Self-efficacy for entrepreneurship education and training implies that they should aim to foster and enhance the self-efficacy beliefs of potential and existing entrepreneurs by providing them with relevant knowledge, skills, resources, support, feedback, and opportunities to practice and learn from their entrepreneurial endeavors. Entrepreneurship education and training should also take into account the multidimensionality and context-specificity of self-efficacy and tailor their interventions to the specific domains and situations that entrepreneurs face. Entrepreneurship education and training should also be aware of the potential pitfalls of self-efficacy, such as overconfidence, complacency, or rigidity, and help entrepreneurs to calibrate their self-efficacy beliefs with realistic expectations and feedback.

The Nexus of Entrepreneurship Education and Students' Entrepreneurship Interest

Entrepreneurship education (EE) is a process of developing entrepreneurial skills and mindsets among students, which can enable them to identify and pursue new opportunities, create and manage innovative ventures, and contribute to economic and social development (Kuratko, 2005). EE has become a strategic priority for many higher education institutions (HEIs) around the world, as they seek to foster innovation, competitiveness, and employability among their graduates (Audretsch, 2014). However, EE is not a one-size-fits-all approach; rather, it needs to be contextualized and differentiated according to the specific needs, characteristics, and goals of different students, disciplines, and regions (Xu & Mei, 2023). Therefore, it is important to understand factors that informs the definite of EE from varying perspectives, taking into account the diversity and complexity of the entrepreneurial phenomenon across different contexts.

One of the key challenges in conceptualizing EE lies in how it influences students' entrepreneurial interest, which is defined as the attraction or inclination towards entrepreneurial activities or careers (Liñán & Chen, 2009). Entrepreneurial interest is considered a crucial antecedent of entrepreneurial intention, which is the cognitive representation of one's willingness and plan to start a new venture in the future (Ajzen, 1991). Entrepreneurial intention, in turn, is a big determinant of entrepreneurial behavior and performance (Krueger et al., 2000). Therefore, by enhancing students' entrepreneurial interest, EE can potentially increase the quantity and quality of future entrepreneurs.

Notably, the impact of EE on students' entrepreneurial interest is not straightforward or homogeneous; rather, it depends on several factors that may vary across different contexts. For instance, the type of EE (elective versus. compulsory), the pedagogical methods used (experiential vs. theoretical), the duration and intensity of the course, and the characteristics of the instructors may affect the effectiveness and outcomes of EE (Lyons & Zhang, 2018; Naia et al., 2014; Rideout & Gray, 2013). Moreover, students' personal factors, such as their prior exposure to entrepreneurship (through family or role models), their personality traits (risk propensity or need for achievement), their attitudes and beliefs towards entrepreneurship (such as perceived desirability or feasibility), and their cultural background (such as individualism or uncertainty avoidance) may also influence their entrepreneurial interest and how they respond to EE (Hahn et al., 2020; Liñán & Chen, 2009; Roper, 2013).

Therefore, conceptualizing EE requires a comprehensive and integrative framework that can capture the multiple dimensions and interactions that shape students' entrepreneurial interest. A plausible structure stems from the theory of planned behavior (TPB) (Ajzen, 1991), which postulates that three primary factors influence entrepreneurial intention: attitude towards entrepreneurship (the extent to which an individual assesses entrepreneurship favorably or unfavorably), subjective norm (the perceived social pressure or encouragement to pursue entrepreneurship), and perceived behavioral control (the perceived simplicity or complexity of carrying out entrepreneurial activities). These factors are influenced by various antecedents, such as personal traits, background variables, contextual factors, and educational interventions. By applying this framework to EE from a global perspective, one can identify the key elements that need to be considered in designing and evaluating EE programs that can enhance students' entrepreneurial interest across different contexts.

Overview of Entrepreneurship Education in South Africa

In South Africa, entrepreneurship education is viewed as a possible remedy for the country's high unemployment rate and high startup failure rate. The South African government has worked to encourage entrepreneurship and help pupils adopt an entrepreneurial mindset. The efficacy of entrepreneurship education in public institutes of learning (PILs) and universities is a matter of concern, nevertheless. This is because, the current curricula in Public Interest Learning (PIL) programs face notable limitations in fostering an entrepreneurial mindset among students, primarily attributed to resource constraints and the scarcity of experienced and trained entrepreneurship educators (Ncube, 2022). These challenges hinder the effective delivery of entrepreneurship education within PIL programs, thereby limiting students' acquisition of essential entrepreneurial competencies.

One prominent obstacle is the absence of an inclusive model that adheres to requisite quality standards for effective pedagogy in entrepreneurship (Ncube & Lekhanya, 2023). Resource constraints exacerbate this challenge, particularly the dearth of experienced and trained entrepreneurship educators, thereby compromising the quality of instruction and student support (Mapaling et al., 2022). Consequently, students may lack the requisite skills and knowledge vital for successful entrepreneurship ventures. Moreover, research indicates that students often exhibit a dearth of awareness regarding entrepreneurship, hampering their interest and engagement in entrepreneurship education (Rankhumise & Letsoalo, 2023). This deficiency in awareness serves as a significant impediment to nurturing an entrepreneurial mindset and cultivating relevant skills among students.

Another notable barrier lies in the perception that entrepreneurship education inadequately equips students for engagement with the business sector (Mdiniso & Vorvornator, 2022). This perception underscores a potential misalignment between the content and delivery of entrepreneurship education and the practical demands of the business environment. Such dissonance may undermine the effectiveness of entrepreneurship education in preparing students to navigate real-world business challenges competently.

Despite these obstacles, students continue to appreciate university involvement in entrepreneurship education, and it continues to have a big impact on driven business students' life (Ncube & Lekhanya, 2023). According to research, a student's entrepreneurial intent in South African higher education is influenced by a number of factors, including subjective norms, perceived behavioral control, proactive personality, and attitude toward entrepreneurial education (Rankhumise & Letsoalo, 2023).

Entrepreneurship education and self-efficacy among undergraduate students in South Africa

Entrepreneurship education and the cultivation of entrepreneurial self-efficacy (ESE) among undergraduate students in South Africa are critical components of fostering a culture of innovation and enterprise. ESE, as defined by Brice and Spencer (2007), represents individuals' confidence in their abilities to initiate and successfully navigate the complexities of new business ventures. This confidence is shaped by various factors, including social learning, personal attributes, prior experiences, and educational exposure, as highlighted by Bandura (1997).

Research by Malebana and Swanepoel (2014) underscores the significance of entrepreneurship education in shaping students' perceptions of their ESE and fostering entrepreneurial intentions. Their study, involving 355 final-year commerce students from rural universities in the Eastern Cape and Limpopo provinces, revealed a positive correlation between exposure to entrepreneurship education and heightened levels of ESE and entrepreneurial intent. Employing survey methodology and statistical analysis using SPSS, the findings underscored the potential of entrepreneurship education in instilling confidence and motivation among students to pursue entrepreneurial endeavors. However, the efficacy of entrepreneurship education programs varies, necessitating a nuanced understanding of their impact on ESE and entrepreneurial intention. Bux and van Vuuren (2019) investigated the effects of different types of entrepreneurship education programs on ESE and entrepreneurial intention among 1,028 undergraduate students from four South African universities. Through a mixed-methods approach integrating questionnaires, focus groups, and interviews, they found that experiential learning initiatives, such as business plan competitions, mentorship programs, and incubators, wielded a more substantial influence on ESE and entrepreneurial intent compared to traditional classroom-based approaches.

Given the above findings, there is a compelling need to reevaluate entrepreneurship education paradigms within South African universities to optimize their efficacy and relevance for students. Nyamunda and van der Westhuizen (2020) proposed a Transformative Entrepreneurial Self-Efficacy (TESE) model, grounded in the Transformative Learning Theory (TLT), which advocates for a pedagogical approach focused on developmental transformation among students. Their model emphasizes critical reflection, dialogue, and action to foster shifts in beliefs, attitudes, and behaviors toward entrepreneurship. Testing their model through the SHAPE program, a 13-week social-technology initiative implemented among 30 studentpreneurs at the University of KwaZulu-Natal, resulted in significant enhancements in ESE and attitudes toward entrepreneurial action among participants.

In summary, entrepreneurship education emerges as a pivotal instrument in augmenting ESE and nurturing entrepreneurial intent among undergraduate students in South Africa. The effectiveness of such programs hinges on their design, content, and delivery methodologies, with experiential learning, social-technology interventions, and transformative pedagogies offering promising avenues for cultivating ESE and fostering entrepreneurial action among students.

Students' Entrepreneurship Interests in South Africa: Exploring Key Issues

South Africa grapples with a pervasive challenge: soaring unemployment rates, particularly among its youth. Statistics South Africa's data from the fourth quarter of 2020 revealed a staggering 46% unemployment rate among individuals aged 15 to 34 (Economics, 2021). In the aftermath of the Covid-19 pandemic, this statistic underscores the pressing need for innovative solutions to address unemployment and stimulate economic growth. Given that entrepreneurship offers a promising path to job creation and economic resilience, South African university graduates demonstrate minimal interest in pursuing entrepreneurship despite its potential for self-empowerment and innovation (Omoyajowo, 2022).

Students' entrepreneurial intents and behaviours are influenced by a wide range of factors, with entrepreneurship education playing a vital role. Mahlaole (2021) highlights how entrepreneurial education has a transforming effect on university students in South Africa. Mahlaole emphasizes the beneficial effects of entrepreneurship education on students' judgments on the attractiveness and viability of entrepreneurship through a survey given to 300 students. Similarly, university-based student entrepreneurship ecosystems (U-BEE) emphasize entrepreneurship education as a fundamental component to develop students' entrepreneurial acumen and promote an innovative culture (Entrepreneurship Development in Higher Education, EDHE, 2021).

Beyond formal education, the presence of role models and networks plays a pivotal role in shaping students' entrepreneurship interests in South Africa. The Global Entrepreneurship Monitor (GEM, 2021) highlights the significance of entrepreneurial role models in the South African context, with a substantial portion of entrepreneurs citing exposure to role models. However, formal networks and mentorship opportunities remain scarce for young entrepreneurs, impeding their access to guidance and support. The EDHE (2021) accentuates the importance of collaborative partnerships within U-BEEs by advocating for synergies between universities and various stakeholders to provide mentorship and create conducive environments for budding entrepreneurs.

Access to finance and a supportive ecosystem emerge as additional determinants of students' entrepreneurship interests in South Africa. GEM (2021) illuminates the arduous financing landscape faced by South African entrepreneurs, with limited utilization of traditional funding sources and prevalent operation within the informal sector. Moreover, institutional barriers such as bureaucracy and corruption hinder entrepreneurial endeavors, necessitating conducive environments for entrepreneurial growth. EDHE (2021) underscores the pivotal role of university environments in nurturing entrepreneurial aspirations, emphasizing the need for supportive cultures and co-curricular initiatives.

In summary, addressing the lack of students' entrepreneurship interests in South Africa demands a multifaceted approach that encompasses entrepreneurship education, role models, networks, finance, and supportive environments. Stakeholders ranging from government entities to educational institutions and community organizations must collaborate to foster a vibrant entrepreneurial ecosystem conducive to students' aspirations. By addressing these fundamental factors, South Africa can unlock its youth's entrepreneurial potential, driving sustainable economic development and job creation.

Data Extraction and Synthesis

A rigorous process of data extraction and synthesis was undertaken to distill relevant insights from the existing literature regarding the nexus between entrepreneurship education, self-efficacy, and students' entrepreneurship interest within the South African context. The data extraction process involved categorizing literature based on conceptual

frameworks, methodologies, key findings, and implications for entrepreneurship education and policy. Through thematic analysis techniques, recurring patterns, theoretical perspectives, and gaps in the literature were identified to inform the discourse on fostering entrepreneurial mindsets and skill sets among South African youth.

Theoretical Frameworks and Conceptual Perspectives

Key theoretical frameworks that support research in this field are essential to comprehending the relationship between students' interest in entrepreneurship, self-efficacy, and entrepreneurship education. With a focus on self-efficacy's impact on entrepreneurial intentions and behaviors, Bandura's Social Cognitive Theory offers insightful information on the role of self-efficacy as a behavior predictor (Bandura, 1994). Furthermore, the Theory of Planned Behavior (TPB) provides a framework for investigating how attitudes, subjective norms, and perceived behavioral control interact to influence students' intentions to pursue entrepreneurship (Ajzen, 1991). Furthermore, the multidimensional approach to entrepreneurial self-efficacy, as opined by Chen et al. (1998), delineates different domains of self-efficacy and their impact on entrepreneurial behaviors and outcomes, providing a nuanced understanding of the construct.

Empirical Findings on Entrepreneurship Education and Self-Efficacy

Empirical research sheds light on the effectiveness of entrepreneurship education programs in enhancing students' self-efficacy beliefs and entrepreneurial intentions within the South African context. Studies by Malebana and Swanepoel (2014) and Bux and van Vuuren (2019) underscore the positive effects of entrepreneurship education initiatives on students' perceptions of self-efficacy and intent to engage in entrepreneurial activities. Particularly noteworthy are findings highlighting the efficacy of experiential learning methods, such as business plan competitions and mentorship programs, in augmenting students' self-efficacy and fostering entrepreneurial intent (Bux & van Vuuren, 2019). Moreover, transformative pedagogies, as advocated by Nyamunda and van der Westhuizen (2020), offer promising avenues for cultivating shifts in students' beliefs and attitudes toward entrepreneurship, thereby enhancing their self-efficacy and readiness to pursue entrepreneurial endeavors.

Contextual Factors and Policy Implications in South Africa

The unique opportunities and obstacles within the South African landscape underscore the importance of contextualizing research findings and deriving actionable insights for policy interventions. Scholars have highlighted various challenges facing entrepreneurship education in South African universities, including resource constraints and ineffective pedagogical approaches (Ncube & Lekhanya, 2023). Moreover, the significance of entrepreneurial role models and supportive networks in shaping students' entrepreneurship interests has been underscored by studies such as those by the Global Entrepreneurship Monitor (GEM, 2021) and the Entrepreneurship Development in Higher Education (EDHE, 2021). These findings underscore the need for targeted policy interventions aimed at fostering a conducive environment for entrepreneurship education and student entrepreneurship in South Africa.

In synthesizing these key themes, this conceptual article contributes to the ongoing discourse on entrepreneurship education and its role in nurturing entrepreneurial mindsets and skill sets among South African youth. By offering fresh insights and actionable recommendations, this study aims to inform educators, policymakers, and practitioners in their efforts to foster entrepreneurship potential and mitigate youth unemployment in South Africa.

Conclusion

In conclusion, this conceptual article explored the intricate relationship between entrepreneurship education, self-efficacy, and students' entrepreneurship interest within the unique context of South Africa. Through a thorough examination of theoretical frameworks and empirical findings, several key insights have emerged.

Firstly, the Regulatory Focus Theoretical Framework offers a valuable lens through which to understand the dynamics of self-efficacy and students'

interest in entrepreneurship. The framework posits that individuals adopt either a promotion focus, characterized by aspirations for growth and advancement, or a prevention focus, centered on avoiding losses and maintaining security. This theoretical perspective underscores the nuanced interplay between motivational orientations and entrepreneurial behaviors, highlighting the importance of understanding students' regulatory orientations in designing effective entrepreneurship education programs.

Secondly, the principles of the Regulatory Focus Theoretical Framework emphasize the significance of goal pursuit and regulatory fit in shaping individuals' self-efficacy beliefs. Promotion-focused individuals tend to be more proactive and risk-tolerant, thus exhibiting higher levels of self-efficacy in entrepreneurial endeavors. Conversely, prevention-focused individuals may prioritize security and stability, potentially leading to lower self-efficacy in entrepreneurial contexts. Recognizing these differences in regulatory orientation can inform the design of tailored interventions to enhance self-efficacy among students with diverse motivational profiles.

Furthermore, the implications of the Regulatory Focus Theoretical Framework on self-efficacy underscore the importance of creating environments that align with individuals' regulatory orientations. By providing opportunities for goal attainment and emphasizing gains or losses relevant to students' regulatory focus, entrepreneurship education programs can foster a sense of competence and mastery conducive to the development of self-efficacy beliefs.

Moreover, the Regulatory Focus Theoretical Framework extends its influence to students' interest in entrepreneurship. Promotion-focused individuals are more likely to be drawn to entrepreneurial opportunities that promise growth and achievement, whereas prevention-focused individuals may exhibit greater interest in ventures perceived as secure and stable. Understanding students' regulatory orientations can inform the design of curricular and extracurricular activities that resonate with their motivational drivers, thereby enhancing their engagement and interest in entrepreneurship.

Recommendations

Based on the insights gleaned from this exploration, several recommendations can be made to enhance entrepreneurship education and stimulate students' entrepreneurship interest in South Africa:

Tailored Interventions: Develop entrepreneurship education programs that cater to the diverse motivational orientations of students, incorporating activities and initiatives that resonate with both promotion-focused and prevention-focused individuals.

Regulatory Fit Strategies: Emphasize the alignment between students' regulatory orientations and the goals and outcomes of entrepreneurship education, fostering a sense of regulatory fit that enhances self-efficacy and engagement.

Experiential Learning Opportunities: Provide students with hands-on experiences, such as internships, mentorship programs, and entrepreneurial projects, to cultivate practical skills and bolster self-efficacy in real-world contexts.

Role Modeling and Mentorship: Foster a supportive ecosystem of entrepreneurial role models and mentors who can inspire and guide students from diverse backgrounds, instilling confidence and motivation to pursue entrepreneurial ventures.

Policy Support: Advocate for policies that incentivize entrepreneurship education and create an enabling environment for student entrepreneurship, including access to funding, regulatory reforms, and institutional support.

By implementing these recommendations, stakeholders can contribute to the cultivation of a vibrant entrepreneurial ecosystem in South Africa, empowering students to unleash their innovative potential and drive sustainable economic growth and development.

References

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Audretsch, D. B. (2014). From the entrepreneurial university to the university for the entrepreneurial

society. The Journal of Technology Transfer, 39, 313-321.
Audretsch, D. B., & Thurik, A. R. (2001). What's new about the new economy? Sources of growth in the managed and entrepreneurial economies. Industrial and corporate change, 10(1), 267-315.
Bandura A 1997. Self-efficacy: The exercise of control. New York: Freeman.
Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), Encyclopedia of human behavior (Vol. 4, pp. 71-81). New York: Academic Press.
Bandura, A. (1997). Self-Efficacy; The Exercise of Control, VV. H. Freernan, 8.
Baum, J. R., & Locke, E. A. (2004). The relationship of entrepreneurial traits, skill, and motivation to subsequent venture growth. Journal of applied psychology, 89(4), 587.
Baum, J. R., Locke, E. A., & Smith, K. G. (2001). A multidimensional model of venture growth. Academy of management journal, 44(2), 292-303.
Boyd, N. G., & Vozikis, G. S. (1994). The influence of self-efficacy on the development of entrepreneurial intentions and actions. Entrepreneurship theory and practice, 18(4), 63-77.
Brice Jr, J., & Spencer, B. (2007). Entrepreneurial profiling: A decision policy analysis of the influence of entrepreneurial self-efficacy on entrepreneurial intent. Academy of entrepreneurship Journal, 13(2), 47-67.
Bux, S., & van Vuuren, J. (2019). The effect of entrepreneurship education programmes on the development of self-efficacy, entrepreneurial intention and predictions for entrepreneurial activity. Acta Commercii, 19(2). https://doi.org/10.4102/ac.v19i2.615
Carree, M. A., & Thurik, A. R. (2010). The impact of entrepreneurship on economic growth (pp. 557-594). Springer New York.
Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers?. Journal of business venturing, 13(4), 295-316.
Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. Organizational research methods, 4(1), 62-83.
De Noble, A. F., Jung, D., & Ehrlich, S. B. (1999). Entrepreneurial self-efficacy: The development of a measure and its relationship to entrepreneurial action. Frontiers of entrepreneurship research, 1999(1), 73-87.
Economics. (2021). Why South Africa needs more young entrepreneurs. Retrieved from https://economics.mandela.ac.za/News/Why-South-Africa-needs-more-young-entrepreneurs
EDHE. (2021). Entrepreneurship Development in Higher Education. Retrieved from https://edhe.co.za/
Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. Journal of small business management, 53(1), 75-93.
Forbes, D. P. (2005). Are some entrepreneurs more overconfident than others?. Journal of business venturing, 20(5), 623-640.
GEM. (2021). New GEM South Africa National Report: Early-stage Entrepreneurs are Growing into Established Businesses. Retrieved from https://www.gemconsortium.org/news/new-gem-south-africa-national-report%3A-early-stage-entrepreneurs-are-growing-into-established-businesses
Hahn, D., Minola, T., Bosio, G., & Cassia, L. (2020). The impact of entrepreneurship education on university students' entrepreneurial skills: a family embeddedness perspective. Small Business Economics, 55, 257-282.
Hannon, P. D. (2005). Teaching pigeons to dance: sense and meaning in entrepreneurship education. Education+ Training, 47(6), 416-428.
Hayward, M. L., Shepherd, D. A., & Griffin, D. (2006). A hubris theory of entrepreneurship. Management science, 52(2), 160-172.
Hmieleski, K. M., & Baron, R. A. (2008). When does entrepreneurial self-efficacy enhance versus reduce firm performance?. Strategic Entrepreneurship Journal, 2(1), 57-72.
Higgins, E. T. (2012). Beyond pleasure and pain: How motivation works. New York: Oxford University Press.
Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. European Journal of Social Psychology, 31(1), 3–23. doi:10.1002/ejsp.27.
Jardim, J., & Sousa, M. J. (2023). Research and Trends in Entrepreneurship Education. Education Sciences, 13(7), 673. https://doi.org/10.3390/educsci13070673

Keling, F. & Sentosa, p. 2019. The Influence of Entrepreneur Learning, Self-Efficacy and Creativity Toward Students Entrepreneurial Interests of Tarbiyah and Teachers Training Faculty, Universitas Islam Negeri Sumatera Utara (Indonesia). Advances in Economics, Business and Management Research, volume 124. 4th Padang International Conference on Education, Economics, Business and Accounting (PICEEBA-2 2019)

Krueger Jr, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. Journal of business venturing, 15(5-6), 411-432.

Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. Entrepreneurship theory and practice, 29(5), 577-597.

Lawrence Korsi Vorvornator, & Mdiniso, J. (2022). Higher Education and Entrepreneurship: The Way Forward to Curb and Combat Teeming Unemployment in South Africa. https://doi.org/10.20533/iice.2022.10.0014

Li, Y., Cao, K., & Jenatabadi, H. S. (2023). Effect of entrepreneurial education and creativity on entrepreneurial intention in college students: mediating entrepreneurial inspiration, mindset, and self-efficiency. Frontiers in psychology, 14, 1240910.

Liñán, F., & Chen, Y. W. (2009). Development and cross–cultural application of a specific instrument to measure entrepreneurial intentions. Entrepreneurship theory and practice, 33(3), 593-617.

Lyons, E., & Zhang, L. (2018). Who does (not) benefit from entrepreneurship programs?. Strategic Management Journal, 39(1), 85-112.

Mahlaole, S. T., & Malebana, M. J. (2021). The effects of entrepreneurship education on students'entrepreneurial intentions at a South African University of technology. Journal of Entrepreneurship Education, 24, 1-16.

Malebana, M. J., & Swanepoel, E. (2014). The relationship between exposure to entrepreneurship education and entrepreneurial self-effi cacy. Southern African Business Review, 18(1), 1-26.

Mapaling, C., Webb, P., & du Plooy, B. (2022). "I would help the lecturer with marking": Entrepreneurial Education Insights on Academic Resilience from the Perspectives of Engineering Students in South Africa. Transforming Entrepreneurship Education, 177–196. https://doi.org/10.1007/978-3-031-11578-3_10

Mdiniso, J., & Vorvornator, L. K. (2022). Higher Education and Entrepreneurship: The Way Forward to Curb and Combat Teeming Unemployment in South Africa. Ireland International Conference on Education, Virtual (Dún Laoghaire, Ireland).

Molden, D. C., & Higgins, E. T. (2004). Categorization under uncertainty: Resolving vagueness and ambiguity with eager versus vigilant strategies. Social Cognition, 22(2), 248.

Msosa, S. K., & Radebe, S. (2022). Antecedents of entrepreneurial intentions amongst higher education students in south africa. Business excellence and management, 12(2), 47–65. https://doi.org/10.24818/beman/2022.12.2-04

Mustar, P. (2009). Technology management education: Innovation and entrepreneurship at MINES ParisTech, a leading French engineering school. Academy of Management Learning & Education, 8(3), 418-425.

Naia, A., Baptista, R., Januário, C., & Trigo, V. (2014). A systematization of the literature on entrepreneurship education: challenges and emerging solutions in the entrepreneurial classroom. Industry and Higher Education, 28(2), 79-96.

Ncube, T. R., & Lekhanya, L. M. (2023). Entrepreneurship Education on Developing Entrepreneurship Competencies in University Students: KwaZulu Natal Government Funded Universities' Case Study. 280–303. https://doi.org/10.9734/bpi/mono/978-81-19315-19-2/ch13

Nyamunda, J., & Van der Westhuizen, T. (2020). Developing entrepreneurial self-efficacy: a transformative learning theory approach. Journal of Contemporary Management, 17(se1), 44-66.

Omoyajowo, A. J. (2022). The impact of entrepreneurship education on actual entrepreneurship intentions, practices and outcomes amongst students in a university of technology in the Western Cape. Etd.cput.ac.za. https://etd.cput.ac.za/handle/20.500.11838/3942

Rankhumise, E. M., & Letsoalo, M. E. (2023). The Effect of Entrepreneurial Education Program on Entrepreneurial Self-Efficacy in Some Selected South Africa's Universities: Students' Perception. Indonesian Journal of Innovation and Applied Sciences (IJIAS), 3(1), 1–11. https://doi.org/10.47540/ijias.v3i1.664

Rideout, E. C., & Gray, D. O. (2013). Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education. Journal of small

business management, 51(3), 329-351.
Roper, S. (2012). Entrepreneurship: A global perspective. Routledge.
Scholer, A. A., Zou, X., Fujita, K., Stroessner, S. J., & Higgins, E. T. (2010). When risk seeking becomes a motivational necessity. Journal of Personality and Social Psychology, 99(2), 215–231. doi:10.1037/a0019715.
Shah, J., Higgins, T., & Friedman, R. S. (1998). Performance incentives and means: How regulatory focus influences goal attainment. Journal of Personality and Social Psychology, 74, 285–293.
Thornton, P. H. (2002). The rise of the corporation in a craft industry: Conflict and conformity in institutional logics. Academy of management journal, 45(1), 81-101.
Xu, X., & Mei, W. (2023). Entrepreneurship Education from a Global Perspective: Successful Experience, Differentiation, and the Way Forward. In Comparative Entrepreneurship Education (pp. 235-252). Singapore: Springer Nature Singapore.
Yusuf, A. & Efendi, M. 2019. Student Entrepreneurial Interests that are influenced by Income Expectations, Entrepreneurship Education, and Self Efficacy (Indonesia). International Journal of Multicultural and Multireligious Understanding, 3(1), 34-52
Zou, X., Scholer, A. A., & Higgins, E. T. (2014). In pursuit of progress: Promotion motivation and risk preference in the domain of gains. Journal of Personality and Social Psychology, 106(2), 183–201. doi:10.1037/a0035391

The Impact of Technology and AI on Job Opportunities: Threat or Opportunity?

Thomas Habanabakize
SARChI Industrial Development
University of Johannesburg
Email: thabanabakize@uj.ac.za

Abstract

The impact of technology and artificial intelligence (AI) on both employment and the labour market has been extensively studied, yielding diverse perspectives. Some of traditional economic theories often posit an inverse relationship between technological advancement and job opportunities, suggesting a substitution effect where technology replaces human labour. Conversely, some other theories advocate for a complementary relationship, where technology enhances employment opportunities. Historical evidence from the Industrial Revolution indicates a net positive effect of technological progress on job opportunities, despite some temporary job losses. However, the emergence of AI has raised new concerns, potentially altering this dynamic. This study critically examines the existing literature on the influence of AI and advanced technologies on employment trends. The findings indicate a lack of consensus in empirical evidence regarding AI's overall effect on job opportunities; while some sectors experience positive impacts, others face significant challenges. Particularly, a substantial portion of the literature suggests that the negative effects, characterized by job displacement and automation, may overshadow the positive outcomes. Consequently, this research concludes that AI exerts a noticeable and dual impact on job opportunities. It destroys some jobs in some sectors and creates jobs in other sectors. To mitigate the adverse effects of AI and related technologies, it is essential to implement comprehensive reskilling and training initiatives, fostering collaboration among educational institutions, private enterprises, and policymakers.

Introduction

With the emergence of artificial intelligence (AI), automation, and other technological advancements, there was a widespread belief that computers would take over all aspects of work. While these technological improvements can help humans achieve remarkable results, it is unrealistic to assume that technology can replace human capabilities in every area of life. The benefits of AI and technological advancements include reduced human error, access to unbiased decision-making, savings in time and cost for production and service delivery enhanced human capabilities, and advancements in the banking system and e-commerce (Kar et al., 2022; Makridakis, 2017; Osiyevskyy et al., 2020; Choudhary, 2024).

The availability of vast data sets, combined with decades of experience and rapid advancements in AI, has enabled the integration of advanced technologies across various business sectors (Agarwal, 2018; Russell, 2019). However, the adoption of AI has sparked fear among members of the global labour force, with many believing that numerous jobs will be lost or taken over by robotic machines. Research supports the notion that advanced technologies and AI will displace jobs previously performed by humans. For instance, studies by Arntz et al. (2016), Frey and Osborne (2017), and Cazzaniga et al. (2024) suggest that shortly, between 9% and 40% of jobs could be at risk of automation. Even more alarming, a report from the McKinsey Global Institute indicates that by 2055, more than 50% of existing tasks could be performed by machines (Manyika et al., 2017). This projection implies that all else being equal, the current unemployment rate could more than double by 2055. Additionally, a report from Servion Global Solutions (2021) suggests that by 2025, the majority of jobs in the service sector – over 95% – will be carried out by AI, leading to a significant increase in global unemployment. Furthermore, Ivanov (2020) and Lu et al. (2020) argue that despite the transition of jobs, many positions in manufacturing have been replaced by technology, resulting in an imbalance between newly created jobs and those lost.

In contrast, other research argues that, despite the impact of AI and other technologies on the workplace, these innovations will not completely replace human contributions to the production process (McKinsey Global Institute, 2017). Instead, AI is likely to enhance human capacity and productivity. For example, a study by Rosete et al. (2020) examined the performance of robots in customer service and found that while robots efficiently handled a low volume of customer inquiries, they struggled during peak times when call volumes were high. While AI and other technologies can improve service delivery, they cannot replace all human roles, especially those requiring emotional intelligence and empathy, which machines lack. Additionally, Koperniak (2020) contends that industries adopting AI are more likely to see improvements in production and income, ultimately leading to job creation. Technological growth does not merely replace existing jobs; rather, it transforms the nature of work and the compensation associated with available roles. Instead of substituting jobs, technological advancements complement the labour force by enhancing productivity and increasing labour demand (Author, 2015).

Given the lack of concrete evidence regarding the implications of AI adoption on the future labour market and employment sustainability, the relationship between future job prospects and technological advancement remains a persistent and contentious topic. The primary objective of this study is to assess whether the rise of technology and AI poses a threat to job opportunities or acts as a catalyst for new employment prospects. In other words, this study will explore the dual impact of AI on the workforce, focusing on potential job displacement alongside the creation of innovative roles and increased efficiency across various industries.

Methodology

The present paper adopts a descriptive approach, aiming to evaluate the impact of Artificial Intelligence (AI) and other technological advancements on employment opportunities in the global market. This objective is designed to discern whether AI and related technological developments can be viewed as solutions to unemployment challenges or as obstacles to job creation. Unlike experimental studies that manipulate variables, this research focuses on analyzing and reporting the existing relationship between technology and employment. The articles and content reviewed for this study were sourced from reputable databases, including Scopus, Web of Science (WoS), and Google Scholar.

Findings and discussion

Interaction between employment and automation

The advent of technology growth especially automation played a significant role in the change of labour market behaviours. For instance, between 1900 and 2000, in the garniture sector labour demand shifted from 40 percent in 1900 to 2 percent of the workforce in 2000 (Autor 2014). Although the technology may reduce labour required per unit of produced output, it does not wipe out labour demand. Through the change of job type, those tasks that cannot performed by technology are complemented by the same technology. The production process involves various inputs that include brains and brawn; labour and capital, technical mastery and intuitive judgment; adherence to rules and discretion; creativity and repetition; and creativity and rote repetition (Autor 2015). In this process, each input plays its indispensable role and instead of being substitutes, they are compliments. The presented ideas of tasks in the production process in rooted in the O-ring production function as elucidated by Kremer (1993). In this production model, the success of the current step in the production chain depends on the success of the previous step. If we take labour and technology as the only input in the production process, then the success of labour production necessitates the success of AI and other technologies and vice versa. Unless, the labour force is providing tasks that are substitutes for AI tasks, artificial intelligence and other technologies have no harm to the employment rate. Building to the "cost disease"2 hypothesis of Baumol (1967) production growth from technology improvement will result in new employment creation for activities and tasks where labour intensive have a completive advantage. Nonetheless, following the "robocalypse" hypothesis, Autor and Salomons (2017) revealed that the industrial's employment rate declines if the industry is experiencing productivity growth from technology only. In this context, technological advancements primarily focus on enhancing production growth. Conversely, as aggregate production increases, employment will also rise. This suggests that the growth in aggregate productivity boosts revenues and consumption, ultimately leading to an increase in overall employment. This supports the hypothesis that there is a complementary relationship between technological growth and job creation.

It may seem irrational to dismiss the impact of artificial intelligence and other technological advancements on productivity and labour market disruptions. However, it would be equally hasty to conclude that technologies will outright replace or substitute human workers in their jobs. Employment consists of a diverse range of tasks, while technology or robots may be capable of performing certain functions, numerous tasks still require human skills and capabilities. Thus, when discussing the potential for AI and other technologies to substitute human labour, it is crucial to assess not only the number of jobs that may be eliminated or taken over by these technologies but also the number of new jobs they create. This comprehensive perspective allows for a more nuanced understanding of the dynamic relationship between technology and employment.

Displacement and reinstatement effects

Irrespective of the complementarity between AI and employment discussed in the previous section, the number of human jobs taken by AI has been increasing. As a result, several economists have emphasized the substitution effect on human employment (Acemoglu & Restrepo, 2016; Acemoglu & Restrepo, 2018).

These authors through the "Task-Based Approach and displacement effect" argue that AI has displaced humans from their previous employment. The approach hypothesises that an increase in per-work output production with the support of technologies does not proportionally increase labour demand. Additionally, if an industry or company add an extra robot, the latter performs the work that could previously be performed by thousands of workers. Consequently, technology adoption displaces workers (Chiacchio et al., 2018). Nonetheless, it is important to highlight that the displacement affects more low and medium-skilled workers and sometimes young people who just entered the labour force. Technology improvement increases the aggregate number of tasks that were previously performed by humans and are currently executed by machines. The displacement often happens in the manufacturing sector and thanks to the technology improvement and through its assistance new jobs are created in the service sector. However, technological innovation

can create jobs that cannot performed by machines but by humans. Thus, the displacement effect may go hand in hand with the reinstatement effect. These two approaches (displacement effect and reinstatement effect) play a role in task reallocation between machines and workers. However, their effect may differ from country to country because, irrespective of their high impact on productivity and economic growth, the adoption of AI and other technologies high investment and skilled users. Therefore, in the development phase, labour-intensive methods remain predominant due to the current state of their technological capabilities.

The AI and technology a threat to jobs and employment

Under the concept of job displacement, the primary concern, is that AI and automation technologies will replace humans and offset their careers. This was confirmed by the study conducted by McKinsey Global Institute (2017) suggesting that a large number of jobs are at risk of being automated within the next few decades. The study revealed that by 2030, up to 800 million global workers could be displaced by automation. As it can be seen this statistic highlights the gravity of the threat that AI and technology pose to traditional labour market structures. Employment risk caused by AI is not the same across all economic sectors, some are more affected than others. The most affected are those whose tasks can easily be automated or performed by technology without any interference. These industries include transportation, manufacturing and retail industries (Bessen, 2019). With the advent of AI and technological improvements in public transport and tracking, drivers are more likely to lose their jobs. Additionally, an increase in online shopping offset reduces the number of customers in physical shops and consequently leads to a reduction in workers' demand.

The impact of AI and other technologies goes beyond merely causing job loss; it also brings about substantial transformations in working conditions across digitizing industries. For instance, gig economy jobs often offer limited, if any, rights and protections for employees compared to traditional employment. This disparity can lead to increased instability and the potential for exploitation among workers (International Labour Organization, 2021).
AI and technological growth is not just a curse to jobs or employment growth. In other words, AI presents both threats and opportunities towards employment. Technology growth creates employment opportunities and enormously contributes to labour market transformation. History testifies to the creation of new jobs and new categories of employment as a result of technological improvement. A typical example is in jobs created by the advent of the internet where non-existent types of jobs required new experts such as data analysts, web developers and digital marketers. In this regard, it is expected that by 2025 AI and other technologies will create approximately 97 million new jobs (World Economic Forum, 2020).

Navigating Optimism and Pessimism on AI technologies and job opportunities

Previous sections focussed on task-based relationship between AI technologies and employment opportunities based on assumptions and some empirical studies. Technology is not a new concept but AI is. The question to answer here would be why AI be different from previous technologies, as history attests to the positive effect of technology on job creation. Taking general purpose technology (GPT) as a synonym for AI as suggested by Brynjolfsson and McAffee (2014), the former is described as a new process of invention and production with the potential capacity to radically change societies on socio-economic structures (Jovanovic & Rousseau, 2005). The study by Pessimists like Zhao, (2023), Cowen (2011), Gordon (2012), Memarian and Doleck (2024) revealed a technology-pessimist scenario where technology in some sectors such as manufacturing increases production while destroying existing jobs and increasing unemployment rate. In contrast, the study by Badet (2021) Koperniak (2020) Brynjolfsson and McAffee (2014), Nübler, (2016), and Pissarides (2018) suggested a technology-optimist scenario indicating that a rise in the unemployment rate is just caused by the speed of GPT that may outpace growth in demand. Similarly, the study by Brynjolfsson et al (2018) indicated a J-curve effect of AI or GPT on job-on-job opportunities. In other words, the study revealed that the initial negative impact of AI/GPT on employment is generated by heavy investments in technology which with time declines and eventually causes a positive effect on employment.

Author's Reflection

In light of the literature reviewed and the results presented in the prior sections of this study, this segment offers a reflective analysis of the transformative role of artificial intelligence (AI) and other technological advancements in shaping job opportunities. Contrary to widespread apprehensions regarding job displacement, the evidence suggests that AI possesses the potential to create more jobs than it eliminates. This paradox invites a deeper exploration of how technology can synergistically coexist with human labour to foster a more robust employment landscape.

The Necessity of Human-Machine Collaborative Teams

To optimize profitability, an essential objective for any business, future workplaces must embrace a hybrid model that amalgamates human capabilities with AI technologies. The unique strengths inherent in human workers (such as judgment, emotional intelligence, leadership, empathy, creativity, ethics, and teamwork) when integrated with the advantages offered by AI (such as speed, precision, and scalability) present a formidable pathway to success. This collaboration not only enhances efficiency and productivity but also catalyses the creation of new job opportunities. Organizations that cultivate hybrid teams are poised to dominate the global market and generate an abundance of roles for a skilled workforce.

Fostering Innovation and Advanced Problem-Solving

The effective integration of technology and human capabilities has been shown to significantly elevate organizational revenues. By incorporating AI into production processes, businesses can automate monotonous tasks that were previously the purview of human labour. This shift allows individuals to redirect their focus toward more complex problem-solving and innovative endeavours. As a result, companies are better equipped to tackle multifaceted challenges and leverage creative solutions that drive growth and sustainability.

Redefining Work Focus and Skills Transformation

Most existing research has concentrated on the dynamics of employment, unemployment, job creation, job displacement, and the influence of technological advancements, particularly AI. While these topics remain pertinent to discussions of economic and social well-being, it is crucial to recognize that the concept of work extends far beyond traditional employment or paid labour. Engaging in work does not necessarily require formal inclusion in the labour force. The rise of technology has ushered in an era of innovation where traditional roles may be displaced by automation. However, through skill improvement and innovative thinking, individuals can transition from one set of activities to another, often discovering roles that are less stressful and more rewarding than their predecessors. Emphasizing innovation, training, and rapid adaptation is vital to mitigating the adverse effects of AI and other technologies. Notably, while one job may be eliminated, the potential exists for the creation of multiple new tasks, jobs, or forms of work.

The Revolution and Creation of New Industries

The advent of the Fourth Industrial Revolution has illuminated new realms of employment that necessitate human cognitive involvement. Fields such as big data, cloud computing, data analysis, cybersecurity, data science, the Internet of Things, and software development are emerging as crucial areas for human expertise. These sectors are not only associated with the creation of new roles but also demand a level of human insight that machines alone cannot provide. Furthermore, established industries, including finance, manufacturing, healthcare, and transportation, have undergone significant transformations due to AI and technological advancements. Concurrently, entirely new industries like e-commerce, cybersecurity, social media specialization, and travel and hospitality are flourishing. These industries not only contribute to improved social well-being and the development of new business models but also generate a plethora of job opportunities, reinforcing the notion that technology can indeed be a catalyst for growth in the job market.

Conclusion and recommendation

The current study delved into the intricate relationship between emerging technologies, particularly artificial intelligence (AI), and their dual impact on employment opportunities. The literature review explicitly highlights the benefits and challenges that AI has brought to various aspects of human life. From restructuring processes and enhancing decision-making to accelerating innovation and improving accessibility, AI has the potential to revolutionize industries and societies. However, it is essential to acknowledge the potential challenges associated with AI adoption, including job displacement and skill mismatches. While AI can automate routine tasks and create new job roles, it is crucial to proactively address the transition period and invest in workforce development to ensure a smooth adaptation to the changing technological landscape.

Consequently, to maximize the benefits of AI while mitigating its potential negative impacts, governments and policymakers are recommended to prioritise policies such as are high investment in education and training programs to equip the workforce with the necessary skills to increase in an AI-driven economy; foster collaboration between industry and academia to bridge the gap between theoretical knowledge and practical applications; promote ethical AI development and use to ensure that AI is developed and used responsibly; and support social safety nets to protect workers who may be affected by job displacement due to automation.

References

Acemoglu, D., & Restrepo, P. (2016). The Race between Machine and Man: Implications of Technology for Growth, Factor Shares and Employment.22252.

Acemoglu, D., & Restrepo, P. (2018). Artificial intelligence, automation, and work. In The economics of artificial intelligence: An agenda (pp. 197-236). University of Chicago Press.

Agarwal, A., Gans,J.S & Goldfarb, A. (2018). Prediction machines: The simple economics of artificial intelligence. Cambridge, MA: Harvard Business Review Press.

Arntz, M., Gregory,T., & Zierahn, U. (2016). The Risk of Automation for Jobs in OECD Countries: AComparative Analysis (No. 189). OECD Publishing.

Autor, D. H. (2014). Skills, education, and the rise of earnings inequality among the "other 99 percent". Science, 344(6186), 843-851.

Autor, D., & Salomons, A. (2017). Robocalypse Now–Does Productivity Growth Threaten Employment? ECB Forum on Central Banking 02142, 1–74.

Autor, H. (2015). Why Are There Still So Many Jobs? The History and Future of Workplace Automation. Journal of Economic Perspectives 29 (3), 3–30.

Badet, J. (2021). AI, automation and new jobs. Open journal of business and management, 9(5), 2452-2463.

Baumol, William J. (1967). Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis. The American Economic Review 57 (3), 415–26.

Bessen, J. E. (2019). AI and Jobs: The Role of Demand. NBER Working Paper No. 24235.

Brynjolfsson, E., & McAfee, A. (2014). The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. WW Norton & Company.

Cazzaniga, M., Jaumotte, M. F., Li, L., Melina, M. G., Panton, A. J., Pizzinelli, C., & Tavares, M. M. M. (2024). Gen-AI: Artificial intelligence and the future of work. International Monetary Fund.

Chiacchio, F., Petropoulos, G., & Pichler, D. (2018). The impact of industrial robots on EU employment and wages: A local labour market approach (No. 2018/02). Bruegel working paper.

Choudhary, S. (2024). Artificial Intelligence and Its Impact on Economic Growth. Shodh Sari-An International Multidisciplinary, 10, 55, 44.

Cowen, T. (2011). The Great Stagnation: How America Ate All the Low-Hanging Fruit of Modern History, Got Sick, and Will (Eventually) Feel Better: A Penguin ESpecial from Dutton. Penguin.

Frey, C.B. and M.A. Osborne (2017). The future of employment: how susceptible are jobs to computerisation? Technological Forecasting and Social Change, 114, 254–80.

Gordon, R. J. (2012). Is US Economic Growth over? Faltering Innovation Confronts the Six Headwinds.

International Labour Organization. (2021). World Employment and Social Outlook 2021: Trends 2021. https://www.ilo.org/research-and-publications/world-employment-and-social-outlook/world-employment-and-social-outlook-trends-2021.

Ivanov, S. (2020). The impact of automation on tourism and hospitality jobs. Information Technology & Tourism, 22, 205-215.

Jovanovic, B., & Rousseau, P. L. (2005). General purpose technologies. In Handbook of economic growth, 1, 1181-1224.

Kar, A. K., Choudhary, S. K., & Singh, V. K. (2022). How can artificial intelligence impact sustainability: A systematic literature review. Journal of Cleaner Production, 376, 134120.

Koperniak, S. (2020). Artificial Intelligence and the Future of Work - MIT Work of the Future. MIT Work of the Future. https://workofthefuture.mit.edu/research-post/artificial-intelligence-and-the-future-of-work/.

Lu, V. N., Wirtz, J., Kunz, W. H., Paluch, S., Gruber, T., Martins, A., & Patterson, P. G. (2020). Service robots, customers and service employees: what can we learn from the academic literature and where are the gaps?. Journal of Service Theory and Practice, 30(3), 361-391.

Makridakis, S. (2017). The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. Futures, 90, 46-60.

Manyika, J.; Lund, S.; Chui, M.; Bughin, J.; Woetzel, J.; Batra, P.; Ko, R.; and Sanghvi, S. 2017. Jobs lost, jobs gained: Workforce transitions in a time of automation. McKinsey Global Institute: McKinsey and Company.

McKinsey Global Institute. (2017). Artificial intelligence: The next digital frontier? Unpublished manuscript, McKinsey Global Institute.

Memarian, B., & Doleck, T. (2024). (Un) employment of AI in Higher Education. SN Computer Science, 5(7), 812.

Nübler, I. (2016). New technologies: A jobless future or golden age of job creation. International Labour Office Research Department Working Paper, 13, 22-23.

Osiyevskyy, O., Bao, Y., & DaSilva, C. M. (2020). Using AI to improve economic productivity: a business model perspective. Handbook of artificial intelligence and robotic process Automation: policy and government applications, 57.

Pissarides, C. A. (2018). The impact of AI on the future of work: Technology and jobs in the digital era. Royal Society British Academy event: AI and the Future of Work.

Rosete, A., Soares, B., Salvadorinho, J., Reis, J., & Amorim, M. (2020). Service robots in the hospitality industry: An exploratory literature review. In Exploring Service Science: 10th International Conference, IESS 2020, Porto, Portugal, February 5–7, 2020, Proceedings 10 (pp. 174-186). Springer International Publishing.

Russell, Stuart. 2019. Human compatible: Artificial intelligence and the problem of control. New York: Viking.

Saini, R., Habil, M., & Srivastav, S. K. (2023). Role of artificial intelligence in the creation of employment opportunities. International Journal of Innovations & Research Analysis, 3(1), 12-18.

Servion Global Solutions. (2021). What Makes Emerging Technologies The Future Of Customer Experience? Servion Blog. https://servion.com/blog/what-emerging-technologies-future-customer-experience/.

Susskind, D. (2020). A world without work: Technology, automation and how we should respond. London: Penguin.

Zhao, B. (2023). Analysis on the negative impact of AI development on employment and its countermeasures. In SHS web of conferences (Vol. 154, p. 03022). EDP Sciences.

The Interplay of Technological Innovation, Energy Consumption, Economic Dynamics, Urbanization and CO_2 Emissions in South Africa

Thomas Habanabakize
SARChI Industrial Development
University of Johannesburg
Email: thabanabakize@uj.ac.za

Abstract

Sustainable development is an increasingly pressing global challenge, as many nations prioritize immediate economic gains without fully considering the long-term implications of their actions on the well-being of future generations. This study aims to explore the multifaceted impacts of various factors – specifically energy consumption, technological innovation, remittances, economic growth, urbanization, and natural resource rents – on carbon emissions (CO_2) in South Africa from 1980 to 2021. Applying advanced econometric techniques, including the Autoregressive Distributed Lag (ARDL) model and the Error Correction Model (ECM), this study analyses the relationship between these variables over both short and long-term horizons. The study findings reveal that the interplay among energy consumption, technology innovation, remittances, economic growth, urbanization, and natural resources rent has a significant effect on carbon emissions, underscoring the complex dynamics of environmental sustainability in the context of economic development. The study advocates for proactive government policies that promote renewable energy adoption and the development of rural infrastructure, highlighting the need to mitigate the adverse effects of urbanization while fostering lasting sustainable development. This research contributes to the discourse on balancing economic aspirations with ecological stewardship, positioning South Africa as a case study for similar emerging economies grappling with the nexus of growth and sustainability.

Keywords:
energy consumption, economic growth, technology innovation, economic growth, urbanization, carbon emissions

Introduction

Sustainable development and environmental degradation present formidable challenges within the contemporary global economy. Over the past two centuries, nations have strived to achieve desirable levels of development; however, environmental concerns have emerged as a critical bottleneck. The increasing prioritization of the nexus between development and climate change underscores the necessity of transitioning toward sustainable growth (Ozcan et al., 2019; Sarkodie et al., 2020). While production plays a pivotal role in economic advancement, it frequently entails substantial CO_2 emissions, which are widely recognized as a primary driver of environmental degradation due to their exacerbation of climate change (Bilgili et al., 2023; Li et al., 2023).

In both developing and developed economies, a multitude of factors significantly influences the interplay between production and CO_2 emissions. Key elements, including economic growth, energy consumption, natural resource utilization, technological innovation, and urbanization, contribute substantially to the increasing levels of greenhouse gas emissions, further complicating the issue of environmental degradation. Although the conventional wisdom posits that economic growth inevitably results in heightened carbon emissions, the Environmental Kuznets Curve (EKC) hypothesis offers a compelling counterargument. This hypothesis asserts that the detrimental impact of economic growth on environmental sustainability predominantly occurs in the early stages of development, while in more advanced stages, economic growth may facilitate emissions reductions through investments in renewable energy technologies and improvements in clean energy infrastructure (Wang et al., 2023; Hossain et al., 2023).

Considering the urgent need to mitigate carbon emissions and their deleterious effects on the environment, nations are increasingly endeavouring to curtail their consumption of natural resources while simultaneously promoting the adoption of renewable energy (Murshed et al., 2022). Nevertheless, achieving an optimal level of carbon emissions with minimal environmental impact remains a formidable challenge. Economic growth is inextricably linked to industrial development and energy consumption – both significant contributors to carbon emissions and environmental degradation (Martínez-Zarzoso & Maruotti, 2011).

The rapid pace of urbanization in developing countries further complicates the landscape of carbon emissions (Adebayo et al., 2021; Izakovičová et al., 2021). Urbanization not only directly impacts environmental degradation but is also closely intertwined with economic growth, energy consumption, and the exploitation of natural resources, culminating in adverse effects on environmental sustainability (Danish & Hassan, 2023). Consequently, urbanization exerts both direct and indirect effects on the environment, highlighting the necessity for comprehensive analyses of its implications.

In this context, South Africa – a prominent player on the African continent – faces the dual challenge of fostering economic growth while addressing the environmental repercussions of its energy consumption patterns. Notably, South Africa ranks as the country with the highest CO_2 emissions on the African continent (Republic of South Africa (RSA), 2023). Given the nation's significant reliance on fossil fuels and elevated levels of industrial activity, it is imperative to investigate the factors contributing to carbon (CO_2) emissions in South Africa. Furthermore, the existing body of research addressing this urgent topic within the South African context remains limited, thereby indicating a substantial gap in the literature that must be addressed.

This study is organized as follows: following this introductory section, the second section reviews relevant literature related to the study topic. The third section outlines the data and methodologies employed for the empirical analysis. The fourth section presents and discusses the findings of the research, while the final section provides a comprehensive summary of the conclusions drawn and offers policy recommendations aimed at mitigating carbon emissions and promoting sustainable development in South Africa. By elucidating the intricate dynamics between economic growth, urbanization, and carbon emissions, this study aspires to contribute valuable insights toward the attainment of a more sustainable future.

Literature review

The energy production landscape in South Africa is predominantly reliant on coal-fired power generation, which contributes approximately 93% of the country's total energy output, equating to about 42,000 MW (Ndlovu & Inglesi-Lotz, 2019). The environmental ramifications of coal dependency are substantial, as it not only exacerbates air

pollution but also significantly contributes to climate change. Reports from the United States Agency for International Development (USAID, 2017) and the Republic of South Africa (RSA, 2023) indicate that South Africa ranks as the highest emitter of CO_2 on the African continent and among developing nations worldwide. Despite significant investments in renewable energy, the country continues to grapple with the dual challenge of economic growth and the mitigation of CO_2 emissions. Consequently, the interplay between CO_2 emissions and various economic variables has emerged as a compelling area of inquiry for researchers. The following sections will present and critically evaluate empirical studies that explore the relationship between CO_2 emissions and selected variables pertinent to this research.

Natural Resources and CO_2 Emissions

Natural resources play a vital role in enhancing individual and national well-being, as they contribute to economic development, skill enhancement, and job creation. However, excessive and improper utilization of these resources can lead to detrimental environmental outcomes. Early stages of economic development often witness overexploitation of natural resources, resulting in increased CO_2 emissions and atmospheric pollution (Harbaugh et al., 2002). Hassan et al. (2019) employed the Autoregressive Distributed Lag (ARDL) technique to analyze the impact of natural resource utilization on the environment in Pakistan, revealing that natural resource exploitation correlates with CO_2 emissions. In a broader context, the study assessed the effects of natural resources, renewable energy, and economic development on CO_2 emissions within BRICS nations, utilizing the augmented mean group (AMG) panel algorithm. The findings indicated that the influence of natural resource endowment on CO_2 emissions varies significantly across countries; for instance, while it positively impacted the Russian economy and aided in emissions reduction, it exacerbated pollution and environmental degradation in South Africa. Conversely, Balsalobre-Lorente et al. (2018) identified an inverse relationship between natural resource utilization and CO_2 emissions.

Economic Growth and CO_2 Emissions

The relationship between economic growth and sustainable development is complex and multifaceted, primarily due to the interdependence of these two variables. It is challenging to foster economic development without negatively impacting the environment, and conversely, it is difficult to curb CO_2 emissions without hindering economic progress, particularly in developing nations. The extent to which economic activities influence environmental quality is contingent upon the environmental protection policies implemented by individual countries. Numerous studies have investigated this intricate relationship, yielding divergent findings; the nature of the relationship between CO_2 emissions and economic growth varies based on the specific economic context and the production approaches employed. Consequently, this relationship can manifest as either positive or negative (Azam et al., 2020; Baz et al., 2021; Garcia et al., 2020). For instance, Begum et al. (2020) utilized the Dynamic Ordinary Least Squares (DOLS) method and time series data from 1990 to 2016 to explore the impact of economic growth and forested areas on CO_2 emissions in Malaysia, concluding that rapid economic growth correlates with increased CO_2 emissions. Other studies, including those by Baloch et al. (2019), Dauda et al. (2019), and Wang et al. (2023), corroborate the existence of a positive association between economic growth and CO_2 emissions.

Energy Consumption and CO_2 Emissions

Economic development is often accompanied by increased energy consumption, with the type and volume of energy utilized playing a critical role in determining the extent of environmental degradation. Theoretically, energy production and consumption are expected to influence CO_2 emissions, subsequently leading to enhanced environmental degradation. However, this relationship may differ significantly when renewable energy sources are employed. Gungor and Simon (2017) examined the interplay between development, urbanization, industrialization, and energy consumption in South Africa, utilizing econometric methodologies on annual data spanning from 1970 to 2014. Their findings reinforced the notion that energy consumption adversely affects environmental sustainability. Similarly, Kartal (2022) indicated that energy sources such as coal and nuclear power significantly contribute to CO_2 emissions, with coal, oil, and natural gas being the primary drivers of carbon emissions. These studies underscore the

interaction between energy consumption and CO_2 emissions. To differentiate the effects of renewable versus non-renewable energy on environmental degradation, Sharif et al. (2019) explored the dynamic relationship between energy consumption and carbon emissions, concluding that high non-renewable energy consumption exacerbates environmental degradation, whereas renewable energy consumption can mitigate CO_2 emissions, positioning it as a viable solution for achieving sustainable development. The benefits of renewable energy for sustainability have also been supported by findings from Rasoulinezhad and Taghizadeh-Hesary (2022), Suki et al. (2022), and Wang et al. (2023).

Urbanization and CO_2 Emissions

Employing the ARDL bounds test alongside Johansen and Juselius and Gregory and Hansen structural break tests on time series data from 1972 to 2013, Sharif and Raza (2016) investigated the dynamic relationship between urbanization, energy consumption, and environmental degradation in Pakistan. Their study revealed unidirectional causation, indicating that urbanization drives an increase in CO_2 emissions, while the reverse effect is not observed. Wang et al. (2021) conducted a similar study to examine urbanization's impact on carbon emissions in OECD countries, finding that despite the implementation of environmental protection policies, urbanization continues to exhibit a positive correlation with CO_2 emissions. Conversely, research by Sun and Huang (2020) on urbanization's effects on carbon emission efficiency in China suggested that while the early stages of urbanization may correlate positively with emissions, mature urbanization can contribute to economic growth while simultaneously promoting green energy initiatives and reducing CO_2 emissions.

Technological Innovation and CO_2 Emissions

Technological innovation can exert dual effects on environmental sustainability and CO_2 emissions. Innovations prioritizing green technologies can help mitigate CO_2 emissions, while those focused solely on economic growth may exacerbate environmental degradation. Acemoglu et al. (2012) distinguish between two categories of technologies: "gray" technologies, which contribute to CO_2 emissions and environmental pollution, and "green" technologies, which facilitate emissions reduction (Xu et al., 2021). Several studies have investigated the relationship between technological innovation and economic growth, revealing a nuanced impact on environmental sustainability. Research by Lin and Ma (2022), Santra (2017), and Zhang and Liu (2022) indicate that green technological innovations significantly reduce CO_2 emissions and enhance sustainability. Conversely, Ali et al. (2022) found that technological innovation can lead to increased CO_2 emissions, while Bilal et al. (2022) demonstrated a negative association between technological innovation and CO_2 emissions in One Belt One Road Initiative (OBOR) economies, juxtaposed with a positive association in the Middle East, North Africa (MENA), and European countries. Given these conflicting results, further research is imperative to evaluate the impact of technological innovation on CO_2 emissions within the South African context, specifically to ascertain whether the technological advancements are predominantly "gray" or "green" in nature.

Data and Methodology

The study utilized secondary data covering a period of over two decades, from 1980 to 2023. Sample selection was guided by the availability of data. As shown in Table 1 below, all analyzed series were sourced from the World Development Indicators (WDI 2024).

Table 1: Data Description

S/N	Variable name	Measurement	Source	Code
1	Carbon emissions	metric tons per capita	WDI	CO2
2	Energy consumption	kg of oil equivalent per capita	WDI	ENC
3	Natural resources rents	Percentage of GDP	WDI	NRR
4	Urbanisation	urban population (% of total population)	WDI	URB
5	technological innovation	Yearly No of patent applications	WDI	TIN
6	Personal remittances received	current US$	WDI	REM
7	Economic growth	In 2015 US$	WDI	GDP

Unit Root Test

To prevent spurious results, we assessed the unit root properties of the study series using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. These tests not only helped evaluate the stationarity of the variables but also determined their order of integration. This is crucial, as the Autoregressive Distributed Lag (ARDL) model cannot be applied to variables that are integrated of order two, or I(2).

Empirical Model Specification

The primary purpose of this study is to investigate the relationship between the relationship between technological innovation, energy use, remittances, economic growth, and environmental sustainability in South Africa. To achieve this objective, the subsequent model was formulated:

$$CO_2 = f(ECN, NRR, URB, TIN, REM, GDP) \quad (1)$$

Where CO_2, ENC, NRR, URB, TIN, REM and GDP represent carbon emissions, energy consumption, natural resources, urbanization, technological innovations, remittances and economic growth respectively. To normalise the distribution of data, reduce the likelihood of heteroscedasticity and outliers, and facilitate coefficient interpretability, variables were transformed into natural logarithms and empirical assessment adopted the log-linear formation. Therefore, the relationship between variables in the log-linear function is presented as follows:

$$CO_{2t} = \propto_t + \beta_1 lnENC_t + \beta_1 lnNRR_t + \beta_2 lnURB_t + \beta_3 lnTIN_t + \beta_1 lnREM_t + \beta_1 lnGDP_t + e_t \quad (2)$$

Estimation Techniques

The study employed a bounds test for cointegration, Autoregressive distributed lag (ARDL) and error correction model (ECM) models to assess the empirical relationship between variables. The general form of the employed model is expressed as follows:

$$\Delta lnY_t = \varphi_0 + \sum_{i=1}^{k} \varphi_1 \Delta lny_{t-i} + \sum_{i=1}^{k} \delta_1 \Delta lnx_{t-i} + \gamma_1 lny_{t-1} + \gamma_2 lnx_{t-1} + u_t \quad (3)$$

Where φ_1 and δ_1 denote the short-run coefficients, while γ_1 and γ_2 represent the long-run coefficient. Additionally, k and u_t are the determinants of an optimal number of lags and error correction terms respectively. As indicated above, and given its capacity to analyse a single equation relationship, the ARDL model was employed to estimate the cointegration between variables. In an extension of Equation 3 the following equation was formulated to establish both long-run and short-run relationships.

$$\Delta lnCO2_t = \varphi_0 + \sum_{i=1}^{k} \varphi_1 \Delta lnCO2_{t-i} + \sum_{i=1}^{k} \varphi_2 \Delta lnENC_{t-i} + \sum_{i=1}^{k} \varphi_3 \Delta lnURN_{t-i} + \sum_{i=1}^{k} \varphi_4 \Delta lnNRR_{t-i} + \sum_{i=1}^{k} \varphi_5 \Delta lnTIN_{t-i} + \sum_{i=1}^{k} \varphi_6 \Delta lnREM_{t-i} + \vartheta_1 ln\Delta ENC_{t-1} + \vartheta_2 ln\Delta NRR_{t-1} + \vartheta_3 ln\Delta URB_{t-1} + \vartheta_4 ln\Delta TIN_{t-1} + \vartheta_5 ln\Delta REM_{t-1} + \vartheta_6 ln\Delta GDP_{t-1} + u_t \quad (4)$$

In Equation 4 as it is in Equation 3, the symbol Δ represents the operator of the first difference. The null hypothesis for the cointegration test (H_0:ϑ_1=ϑ_2=ϑ_3=ϑ_4=ϑ_5=ϑ_6=0) suggests the absence of cointegration while the alternative hypothesis suggests the presence of cointegration (H_0:ϑ_1≠ϑ_2≠ϑ_3≠ϑ_4≠ϑ_5≠ϑ_6≠0). The presence or absence of cointegration is determined by comparing the computed F-statistics with the critical values from the Pesaran (2001) bounds test. A long-run or cointegration relationship is confirmed if the computed F-statistics exceeds the upper bounds of critical values. In case the computed F-statistic values lie between the lower bounds and upper bounds critical values, the results are not interpreted as they are equivocal. The ECM is used to determine the short-run dynamics and the speed of adjustment towards the long-run equilibrium, and it is expressed as follows:

$$\Delta lnCO2_t = \varphi_0 + \sum_{i=1}^{k} \varphi_1 \Delta lnCO2_{t-i} + \sum_{i=1}^{k} \varphi_2 \Delta lnENC_{t-i} + \sum_{i=1}^{k} \varphi_3 \Delta lnURN_{t-i} + \sum_{i=1}^{k} \varphi_4 \Delta lnNRR_{t-i} + \sum_{i=1}^{k} \varphi_5 \Delta lnTIN_{t-i} + \sum_{i=1}^{k} \varphi_6 \Delta lnREM_{t-i} + \omega ECT_{t-1} + u_{2t} \quad (5)$$

Where ECT denotes the error correction model, ω is the coefficient of the error term and u_2t is the error term in the error correction model.

Empirical Findings and Discussion of Results

Descriptive Statistics and Correlation Analysis

Table 2, Panel A, displays the properties of the study variables, while Panel B provides the correlation matrix. The results indicate that urbanization (LNURB) exhibits the highest mean and median, whereas carbon emissions (LN CO_2) possess the lowest mean and median within the analysed sample. This suggests that LN CO_2 has a relatively small average compared to other variables, while LNURB has the largest average.

Additionally, the results indicate that LNENC has the smallest standard deviation among the examined variables, indicating that energy consumption is less variable. Furthermore, it is important to note that LN CO_2, LNENC, and LNREM exhibit negative skewness, while LNGDP, LNNRR, LNTIN, and LNURB are positively skewed. All variables, except for LNNRR, are platykurtic since their kurtosis values fall below three. The Jarque-Bera test yields favourable results, with a probability value greater than 0.05. A strong and positive correlation exists between LNENC, LNGDP, LNREM, LNURB, and the dependent variable LN CO_2, while LNC CO_2 is negatively influenced by LNNRR and LNTIN.

Table 2: Descriptive Statistic and Correlation Results

PANEL A							
	LNCO2	LNENC	LNGDP	LNNRR	LNREM	LNTIN	LNURB
Mean	5.900015	7.827272	26.19406	5.910823	19.38881	7.011171	57.42405
Median	5.875709	7.854079	26.13788	4.942281	19.49898	6.801827	57.12950
Maximum	6.184918	7.973940	26.60793	13.52731	20.87032	8.543640	67.84700
Minimum	5.492236	7.659773	25.79461	2.488591	17.38543	4.927254	48.42500
Std. Dev.	0.214889	0.071880	0.287076	0.633557	0.153898	0.848082	0.127180
Skewness	-0.160022	-0.307147	0.171656	1.210651	-0.205349	0.239029	0.093276
Kurtosis	1.613880	2.287964	1.427843	3.785198	1.508049	2.986747	1.741472
Jarque-Bera	3.541577	1.547616	4.531698	11.33868	4.190535	0.400251	2.832714
Probability	0.170199	0.461253	0.103742	0.003450	0.123037	0.818628	0.242596

PANEL B							
LNCO2	1						
LNENC	0.866104	1					
LNGDP	0.764044	0.663677	1				
LNNRR	-0.412313	0.115023	-0.344949	1			
LNREM	0.740228	0.562907	0.952114	-0.355974	1		
LNTIN	-0.587537	0.020717	-0.523967	0.640811	-0.631993	1	
LNURB	0.842086	0.560934	0.983239	-0.443148	0.936798	-0.599929	1

Table 3: ADF Unit Root Test Results

At Level								
		LNCO2	LNENC	LNGDP	LNNRR	LNREM	LNTIN	LNURB
Constant	t-Statistic	-2.0469	-2.0891	-0.2823	-3.8693	-0.8175	-1.9708	0.3558
	P-value	0.2665	0.2499	0.9188	0.0049***	0.8032	0.2981	0.9783
Constant & Trend	t-Statistic	-0.5740	-2.1355	-2.1396	-3.6660	-3.2113	-1.7960	-5.1755
	P-value	0.9753	0.5114	0.5089	0.0363**	0.0967*	0.6884	0.0007***
At First Difference								
		d(LNCO2)	d(LNENC)	d(LNGDP)	d(LNNRR)	d(LNREM)	d(LNTIN)	d(LNURB)
Constant	t-Statistic	-5.7817	-6.2159	-5.1892	-9.2765	-4.2749	-5.5336	-3.7800
	P-value	0.0000***	0.0000***	0.0001***	0.0000***	0.0016***	0.0000***	0.0064***
Constant & Trend	t-Statistic	-6.1165	-6.1171	-5.1049	-9.4704	-4.2115	-5.5562	-3.4013
	P-value	0.0000***	0.0000***	0.0009***	0.0000***	0.0098***	0.0002***	0.0659*

Notes: (, ** &***) Significant at the 10%; 5%; and 1% respectively.*

Unit Root Test Results

As the ARDL approach generates spurious results when applied to I(2) variables, the ADF unit root test was conducted to exclude the inclusion of the I(2) series in the analysis. The results presented in Table 3 confirm that the ARDL model's preconditions are met, as the variables under consideration are a combination of I(0) and I(1) when the unit root test includes both intercepts and trends in the series.

Bound Test and Cointegration

To determine the existence of a long-run relationship among the variables, we performed the bounds test for cointegration. The results displayed in Table 4 indicate that the computed F-statistic is approximately 3.14, exceeding all upper bound critical values at the 10%, 5%, 2.5%, and 1% significance levels. Thus, the null hypothesis of no cointegration is rejected, suggesting that a long-run relationship exists among carbon emissions, energy consumption, technological innovation, remittances, economic growth, urbanization, and natural resource rents. Any changes in the explanatory variables have long-term implications for carbon emissions.

Long-Run Relationship, Short-Run Dynamics and Residuals Diagnostic

Table 5 presents the long-run coefficients of all explanatory variables. The bounds test results indicate that the explanatory variables collectively exert a significant influence on CO_2 behaviour. The findings reveal that all independent variables, except for LNNRR, significantly influence CO_2 emissions in the long run. In particular, the results suggest that increases in energy consumption, technological innovation, remittances, economic growth, and urbanization contribute to environmental degradation in the long

Table 4: ARDL Bound Test Results

Estimated model	Lower bounds	Upper bounds	Significance levels
F_c (ECN, NRR,URB,TIN,REM,NRR, GDP)	2.12	3.23	10%
F=3.13737	2.45	3.61	5%
K 6	2.75	3.99	2.5%
1%	3.15	4.43	1%

Table 5: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNENC	1.082744	0.099365	10.896652	0.0017
LNGDP	0.330984	0.064475	5.133505	0.0143
LNNRR	-0.015953	0.001426	-11.188655	0.0015
LNREM	0.074028	0.002800	26.435359	0.0001
LNTIN	0.037401	0.001595	23.449610	0.0002
LNURB	0.011528	0.002139	5.389955	0.0125
C	-11.837112	0.875869	-13.514698	0.0009

run. Notably, energy consumption and economic growth emerge as the most significant contributors to environmental degradation compared to the other variables in the model. Specifically, a 1% increase in energy consumption (LNENC) results in a 1.083% increase in CO_2 emissions, while a 1% increase in economic growth (LNGDP) leads to a 0.33% increase in CO_2 emissions. Conversely, a 1% increase in received remittances (LNREM), technological innovation (LNTIN), and urbanization (LNURB) correspond to increases in CO_2 emissions of 0.074%, 0.037%, and 0.012%, respectively. These results suggest that advancements in technological innovation, enhanced economic activities, higher urbanization rates, and energy consumption, supported by increased remittances, may improve socio-economic well-being, albeit at the expense of environmental sustainability. The positive relationship between these variables and CO_2 emissions is consistent with existing empirical findings by Balsalobre-Lorente et al. (2022), Dauda et al. (2019), Fan et al. (2020), Villanthenkodath and Mahalik (2020), and Yang et al. (2021).

In contrast to LNENC, LNGDP, LNREM, LNTIN, and LNURB, which exhibit positive associations with environmental degradation via CO_2 emissions, natural resource rents display an inverse relationship with CO_2 emissions. While the utilization of natural resources is generally expected to positively impact CO_2 levels, this study's findings suggest otherwise. This observation aligns with Balsalobre-Lorente et al. (2018), which posits that natural resources may reduce pollution levels. If this holds true in the South African context, it raises questions about the predominance of renewable natural resources; however, this assertion necessitates further empirical investigation.

The short-run dynamics and error correction results are displayed in Table 6. Consistent with the long-run findings, the short-run outcomes suggest that all assessed independent variables significantly impact CO_2 emissions in the short run. Notably, the lagged value of CO_2 serves as a critical determinant of current environmental degradation, indicating that the accumulation of past CO_2 emissions significantly influences current and future levels of environmental degradation. Additionally, energy consumption and urbanization emerge as the dominant variables driving CO_2 emissions in the short run. Moreover, economic activities leading to economic growth, technological innovation, and natural resources also play significant roles in elevating CO_2 emissions in the short run. However, the findings in Table 6 indicate that remittances exert a significant but negative effect on CO_2 emissions in the short run.

The error correction results presented in Table 6 indicate that the error term (ECT) is negative and statistically significant at the 5% level, with a probability value of 0.0124. The negative sign of the coefficient (0.837724) suggests that approximately 84% of short-run shocks are corrected each year.

The model's robustness and the result's reliability were confirmed through various diagnostic tests. As shown by the results in Table 7, the model residuals are homoscedastic, normally distributed and free of serial correlation. The Ramsey RESET test results also confirm the model is well specified while the (CUSUM) results attest that the model is stable.

Table 6: Short-Dynamics and ECM Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCO2(-1))	7.133291	1.728097	4.127831	0.0258
D(LNENC)	2.402911	0.668378	3.595137	0.0369
D(LNGDP)	0.837724	0.155021	5.403936	0.0124
D(LNNRR(-1))	0.066457	0.017810	3.731367	0.0335
D(LNREM(-2))	-0.455584	0.124441	-3.661053	0.0352
D(LNTIN(-1))	0.237826	0.022411	-10.61178	0.0007
D(LNURB(-3))	1.854291	0.533035	3.478744	0.0401
ECT (-1)	-0.837724	0.155021	-5.403936	0.0124

Table 7: ARDL Diagnostic Test

Performed Test	F-statistic	P-Value
Normality (Jarque-Bera)	3.407	0.182
Heteroscedasticity (Breusch-Pagan-Godfrey	5.329	0.095
Breusch-Godfrey Serial Correlation (LM)	6.400	0.269
Functional (Ramsey RESET)	1.1401	0.397

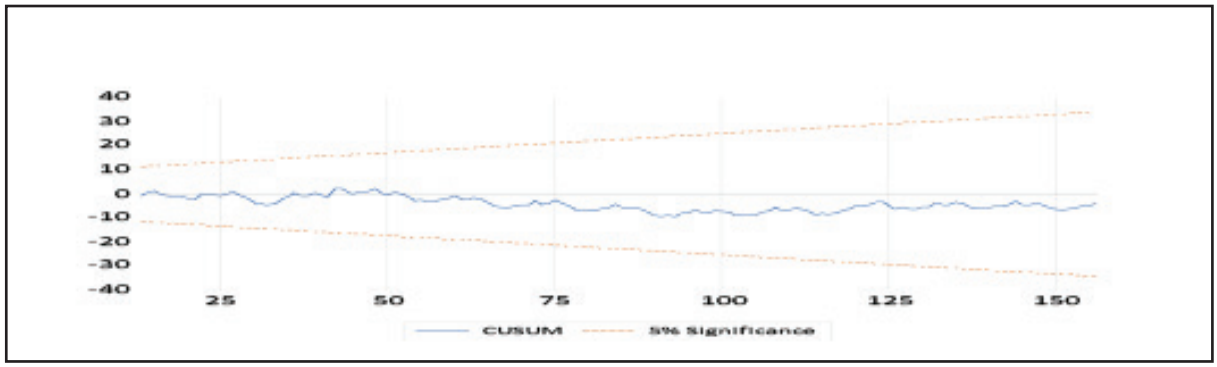


Figure1: CUSUM plot

Conclusion and Policy Recommendations

Environmental sustainability remains a pressing concern in the contemporary era of industrialization and technological advancement. This study assessed the effects of economic growth, remittances, energy consumption, natural resources, technological innovation, and urbanization on CO_2 emissions in South Africa. The Autoregressive Distributed Lag (ARDL) model and error correction model were employed to achieve the study's objectives. The findings revealed a cointegration among the assessed variables. All variables, apart from natural resources, positively influenced carbon (CO_2) emissions in South Africa. Furthermore, the short-run results indicated that, apart from remittances, all other explanatory variables significantly contributed to environmental degradation, manifesting as increased CO_2 emissions in South Africa. Additionally, the short-run findings underscored the critical roles of lagged CO_2 levels, energy consumption, technological innovation, and economic growth in driving CO_2 emissions in the short run.

Based on these findings, South African policymakers should initiate or enhance policies that promote the preservation of natural resources in favour of eco-friendly production. Moreover, the government should encourage investments and provide subsidies for renewable energy production. To mitigate the adverse effects of urbanization on the environment, South African authorities should invest in improving rural infrastructure. Population growth, particularly in developing countries, represents another significant factor contributing to environmental degradation; however, it was not included in this study. Future research may incorporate this variable and expand the sample to enrich the literature.

References

Acemoglu, D., Aghion, P., Bursztyn, L., & Hemous, D. (2012). The environment and directed technical change. American Economic Review, 102(1), 131-166.

Adebayo, T. S., Ramzan, M., Iqbal, H. A., Awosusi, A. A., & Akinsola, G. D. (2021). The environmental sustainability effects of financial development and urbanization in Latin American countries. Environmental Science and Pollution Research, 28(41), 57983-57996.

Ahmad M, Ul Haq Z, Khan Z, Khattak SI, Ur Rahman Z, Khan S. (2019). Does the inflow of remittances cause environmental degradation? Empirical evidence from China. Econ Res-Ekonomska Istrazivanja 32(1):2099–2121.

Ali, M., Kirikkaleli, D., Sharma, R., & Altuntaş, M. (2022). The nexus between remittances, natural resources, technological innovation, economic growth, and environmental sustainability in Pakistan. Environmental Science and Pollution Research, 29(50), 75822-75840.

Azam, A., Rafiq, M., Shafique, M., Zhang, H., & Yuan, J. (2021). Analyzing the effect of natural gas, nuclear energy and renewable energy on GDP and carbon emissions: A multi-variate panel data analysis. Energy, 219, 119592.

Baloch, M. A., Mahmood, N., & Zhang, J. W. (2019). Effect of natural resources, renewable energy and economic development on CO2 emissions in BRICS countries. Science of the Total Environment, 678, 632-638.

Baz, K., Cheng, J., Xu, D., Abbas, K., Ali, I., Ali, H., & Fang, C. (2021). Asymmetric impact of fossil fuel and renewable energy consumption on economic growth: A nonlinear technique. Energy, 226, 120357.

Begum, R. A., Raihan, A., & Said, M. N. M. (2020). Dynamic impacts of economic growth and forested area on carbon dioxide emissions in Malaysia. Sustainability, 12(22), 9375.

Bilal, A., Li, X., Zhu, N., Sharma, R., & Jahanger, A. (2021). Green technology innovation, globalization, and CO_2 emissions: recent insights from the OBOR economies. Sustainability, 14(1), 236.

Bilgili, F., Balsalobre-Lorente, D., Kuşkaya, S., Alnour, M., Önderol, S., & Hoque, M. E. (2024). Are research and development on energy efficiency and energy sources effective in the level of CO_2 emissions? Fresh evidence from EU data. Environment, Development and Sustainability, 26(9), 24183-24219.

Danish, & Hassan, S. T. (2023). Investigating the interaction effect of urbanization and natural resources on environmental sustainability in Pakistan. International Journal of Environmental Science and Technology, 20(8), 8477-8484.

Dauda L, Long X, Mensah CN, Salman M (2019) The effects of economic growth and innovation on CO2 emissions in different regions. Environ Sci Pollut Res 26(15):15028–15038.

Du, K., Li, P., & Yan, Z. (2019). Do green technology innovations contribute to carbon dioxide emission reduction? Empirical evidence from patent data. Technological Forecasting and Social Change, 146, 297-303.

Fan H, Hashmi SH, Habib Y, Ali M (2020) How do urbanization and urban agglomeration affect of CO_2 emissions in South Asia?

Testing non-linearity puzzle with dynamic STIRPAT model. Chin J Urban Environ Stud 8(1).

Garcia, L. E., Illig, A., & Schindler, I. (2020). Understanding Oil Cycle Dynamics to Design the Future Economy. Biophys. Econ. Sust Sustainability 5, 15.

Hassan, S. T., Xia, E., Khan, N. H., & Shah, S. M. A. (2019). Economic growth, natural resources, and ecological footprints: evidence from Pakistan. Environmental Science and Pollution Research, 26, 2929-2938.

Hossain, M.R., Rej, S., Awan, A., Bandyopadhyay, A., Islam, M.S., Das, N., Hossain, M.E. (2023). Natural resource dependency and environmental sustainability under N-shaped EKC: the curious case of India. Resour. Pol. 80, 103150.

Izakovičová, Z., Petrovič, F., & Pauditšová, E. (2021). The impacts of urbanisation on landscape and environment: The case of Slovakia. Sustainability, 14(1), 60.

Kartal, M. T. (2022). The role of consumption of energy, fossil sources, nuclear energy, and renewable energy on environmental degradation in top five carbon producing countries. Renewable Energy, 184, 871-880.

Kwakwa, P. A., Alhassan, H., & Adu, G. (2020). Effect of natural resources extraction on energy consumption and carbon dioxide emission in Ghana. International Journal of Energy Sector Management, 14(1), 20-39.

Li, M., Zhang, K., Alamri, A. M., Ageli, M. M., & Khan, N. (2023). Resource curse hypothesis and sustainable development: evaluating the role of renewable energy and R&D. Resources Policy, 81, 103283.

Lin, B., & Ma, R. (2022). Green technology innovations, urban innovation environment and CO_2 emission reduction in China: Fresh evidence from a partially linear functional-coefficient panel model. Technological Forecasting and Social Change, 176, 121434.

Martínez-Zarzoso I.A & Maruotti, A. (2011). The impact of urbanization on CO_2 emissions: evidence from developing countries. Ecol Econ, 70(7):1344–1353.

Murshed, M., Saboori, B., Madaleno, M., Wang, H., Do˘gan, B. (2022). Exploring the nexuses between nuclear energy, renewable energy, and carbon dioxide emissions: the role of economic complexity in the G7 countries. Renew. Energy 190, 664–674.

Ndlovu, V., & Inglesi-Lotz, R. (2019). Positioning South Africa's energy supply mix internationally: Comparative and policy review analysis. Journal of Energy in Southern Africa, 30(2), 14-27.

Ozcan B, Tzeremes P, Dogan E (2019) Re-estimating the interconnectedness between the demand of energy consumption, income, and sustainability indices. Environ Sci Pollut Res 26(26):26500–26516.

Pesaran MH, Shin Y, Smith RJ (2001) Bounds testing approaches to the analysis of level relationships. J Appl Econ 16(3):289–326.

Rasoulinezhad, E., & Taghizadeh-Hesary, F. (2022). Role of green finance in improving energy efficiency and renewable energy development. Energy Efficiency, 15(2), 14.

Republic of South Africa (RSA). (2023). South Africa's 5th biennial update report (bur-5) to the United Nations framework convention on climate change (UNFCCC). https://unfccc.int/sites/default/files/resource/Fifth%20Biennial%20Update%20Report%20%20of%20South%20Africa%20Submission%20to%20UNFCCC.pdf.

Santra, S. (2017). The effect of technological innovation on production-based energy and CO2 emission productivity: evidence from BRICS countries. African Journal of Science, Technology, Innovation and Development, 9(5), 503-512.

Sharif, A., & Raza, S. A. (2016). Dynamic relationship between urbanization, energy consumption and environmental degradation in Pakistan: Evidence from structure break testing. Journal of Management Sciences, 3(1), 1-21.

Sharif, A., Raza, S. A., Ozturk, I., & Afshan, S. (2019). The dynamic relationship of renewable and nonrenewable energy consumption with carbon emission: a global study with the application of heterogeneous panel estimations. Renewable energy, 133, 685-691.

Suki, N. M., Suki, N. M., Sharif, A., Afshan, S., & Jermsittiparsert, K. (2022). The role of technology innovation and renewable energy in reducing environmental degradation in Malaysia: a step towards sustainable environment. Renewable Energy, 182, 245-253.

Sun, W., & Huang, C. (2020). How does urbanization affect carbon emission efficiency? Evidence from China. Journal of Cleaner Production, 272, 122828.

USAID (2016) Greenhouse Gas Emissions in South Africa. Available from: http://www.users/cqwanzcho/downloads/ghg%20emissions%20fact%20sheet%20south%20africa%20-%207-516%20usaidsacomm_rev08-26-16_clean%20.

Villanthenkodath MA, Mahalik, M.K (2020) Technological innovation and environmental quality nexus in India: Does inward remittance matter? J Public Aff. https:// doi. org/ 10. 1002/ pa.2291.

Wang, J., Shahbaz, M., Dong, K., & Dong, X. (2023). Renewable energy transition in global carbon mitigation: Does the use of metallic minerals matter? Renewable and Sustainable Energy Reviews, 181, 113320.

Wang, W. Z., Liu, L. C., Liao, H., & Wei, Y. M. (2021). Impacts of urbanization on carbon emissions: An empirical analysis from OECD countries. Energy Policy, 151, 112171.

Wang, Z., Hu, D., Sami, F., & Uktamov, K. F. (2023). Revisiting China's natural resources-growth-emissions nexus: Education expenditures and renewable energy innovation. Resources Policy, 85, 103923.

Wang, Z., Hu, D., Sami, F., & Uktamov, K. F. (2023). Revisiting China's natural resources-growth-emissions nexus: Education expenditures and renewable energy innovation. Resources Policy, 85, 103923.

Yang B, Jahanger A, Ali M (2021) Remittance inflows affect the ecological footprint in BICS countries: do technological innovation and financial development matter? Environ Sci Pollut Res 28(18):23482–23500.

Zhang, M., & Liu, Y. (2022). Influence of digital finance and green technology innovation on China's carbon emission efficiency: empirical analysis based on spatial metrology. Science of the Total Environment, 838, 156463.

Does Electronic Tracking Invoicing System in the Departments of Water and Sanitation Matter?

Nqwenelwa Nyangintsimbi,
Durban University of Technology
Email: 22290215@dut4life.ac.za

Jean Damascene Mvunabandi (PhD)
Durban University of Technology
Email: JeanM2@dut.ac.za

Abstract

The evidence revealed that there has been burning issues of no utilizing electronic tacking invoice system in African countries especially South Africa- KwaZulu Natal Province. This study aims to investigate the challenges on no-adoption of e-TIS as a tool for quick tracking invoice record in the Department of Water and Sanitation (DWS) and to propose the model to overcome such challenges associated with manual tracking invoice system. The systematic literature reviews were used as a methodology for this research. A total of 8 articles were selected for this research study from 20 identified through various database searches such Google Scholar was gathered followed by Preferred Reporting Items for Systematic Reviews and Meta-Analyses from 2019 to 2023. The study used conceptual, theoretical, and empirical literature. The Resource based and Potent institutional theories were adopted in studies. Overall, the research results showed the challenges in the use of eTIS instead of manual system benefits of DWS and suppliers implying the DWS to use eTIS than the Manual system when they made payment of invoices. The research findings indicate that most of African countries were used manual tracking invoice system. There are few journals emphasized about in the use e-TIS. This study contributes to the body of knowledge, it also contributes to the broader understanding of the challenges on no-adoption of e-TIS as a tool for quick tracking invoice record in the Department of Water and Sanitation and urgently calls on policymakers, South African government, academia. The study contributed to theoretical and practical contributions and proposes the e-TIS framework to assist Department of Water and Sanitation to use e-TIS. This study has also provided a plan for future researchers.

Keywords:
Electronic Tracking Invoice System, framework, Department of Water and Sanitation (DWS)

Introduction to Background

The purpose of this study is to investigate and model the e-TIS system used by the Department of Water and Sanitation (DWS)-KwaZulu Natal Provincial Operation office to quickly manage invoice records and make supplier payments on time. The primary motivation for researching e-TIS is to track a specific invoice from the moment it is received by the DWS until it is paid. DWS can monitor the progress of each supplier payment using the manual tracking invoice system (Cedillo et al. (2019). Other DWS districts outside of KwaZulu Natal province as well as other corporate government sectors in South Africa (SA) are impacted by this e-TIS. This study will be useful in determining whether e-TIS is a faster way to track invoice records nationwide as compared to manual systems. The department will not switch from manual systems to e-TIS for processing bills if the study is not completed. Repayment deadline of thirty days. This system provides details on the due date, length of time that an invoice has been unpaid, and late fees associated with each amount that has been invoiced, typically organized by client and invoice number, (Bahrami et al., 2020). According to L. Liu (2021), important data such as front-end business issuance, red flushing, and uploading can be easily tracked and statistically assessed, along with e-TIS acceptance requests. The electronic tracking invoice system, an automated and efficient method of processing invoices, will benefit the Department. with the following: enhance the tracking of invoices during the various phases of invoice processing; enhance the processing of the supplier's supplied invoices; and increase visibility into the status of invoice approval. Additionally, unless there is a disagreement between two parties and both agree that an invoice will not be deemed non-compliant if it is paid within 30 days of receipt, it will assist the Department in meeting the 30-day turnaround time target for invoice payment as stated in Treasury Regulation (TR) paragraph 8.2.3. It will provide a fast track to invoice processing, easy detection of errors, potentially fraudulent activities, and efficient and effective reporting procedures.

Problem Statement

In 2021 and 2022, DWS failed to pay invoices on time as required by National Treasury (NT) because of its manual invoice tracking system, which causes delays in the tracking of records and the completion of supplier payment processes. Despite this, invoice tracking is essential for financial management and growth and development. Using a manual tracking invoice system is one of the reasons why the department of Water and Sanitation contributed R2.9 billion in Rand Value of 4745 invoices paid after 30 days and R397 million in Rand Value of 181 invoices older than 30 days and not paid, according to the National Treasury Annual Report on non-compliance within payment of supplier's invoices paid within 30 days during 2020/2021 financial year.

Modelling e-TIS is expected expedite the administration of invoices and the payment process within 30 days unless it is stated in a contract or other arrangement. Public Finance Management Act, 1999 (PFMA), section 38(1)(f) and Treasury Regulation 8.2.3 mandates that, after receiving an invoice, the accounting officers should make sure that all payments owed to creditors are made within a month. "All payments due to creditors must be settled within 30 days of invoice receipt, or, in the case of civil claims, the date of settlement or court judgement, unless otherwise specified in a contract or other agreement." In accordance with section 81 of the PFMA, failure to comply with this requirement is considered financial misconduct. This study aims to investigate the challenges on no-adoption of e-TIS as a tool for quick tracking invoice record in the DWS to propose the model to overcome such challenges associated with manual tracking invoice system.

Significance of the study

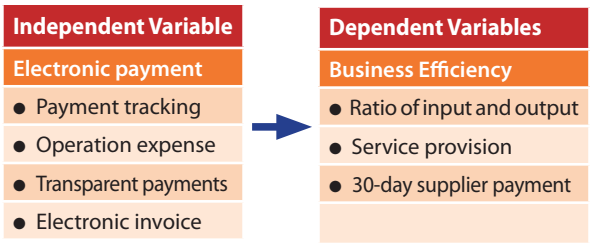
It could provide information to the DWS especially Finance, Supply Chain Management (SCM), Compliance or Internal Control, Transport section and DWS Service providers. It could help DWS to have an accurate information pertaining the status of invoices and identifying duplicates invoices. Suppliers will benefit as e-TIS monitor the routing and tracking of invoices for speeding the processes of invoices to avoid 30 days non-compliance

Literature Revie

Conceptual Literature

The classification and explanation of concepts that are relevant to the topic are referred to as conceptual literature because it demonstrates how those concepts relate to one another. The term "modelling" in this study refers to the process of representation of

business processes or workflow diversity of techniques or instruments used by the DWS to assess and judge the value and volume of invoices sent to department suppliers (Peters et al., 2019). DWS uses a manual and automated invoice tracking system to control cash flow. The complete spectrum of financial transactions is included in the concept of an e-TIS. From the time the end-user issues a payment instruction until the transaction is settled in full, a variety of techniques, institutions, technology systems, policies, guidelines, and legal requirements apply.



Electronic payment, often known as "e-payment," is frequently utilized to boost business productivity. It is the variable that depends, and the operational costs, expense visibility, payment security, and electronic bills are some examples of the measurement instruments. When government agencies evaluate their input, output, service delivery, and 30-day timeframes for supplier payments, they become more efficient.

Theoretical literature

To be able to organize the internal resources and talents to create opportunities and hazards for the external environment, the Resource Based Theory (Peters, et al. 2019,) will be applied in this study.

Resource Based Theory

The RBV of the firm suggests that the competitive advantage of a company comes from its possession of valuable, rare, inimitable, and non-substitutable resources. Intellectual capital, which includes human capital, relational capital, and structural capital, is considered a key strategic asset that can enhance a company's performance (Setyawati, 2023). This theory is linked to my study as the researcher is classifying e-TIS as a substitution of a manual invoice system as an internal organization resource of DWS.

Institutional Theory

This study also applies the influential and potent Institutional Theory (Barath Kumar et al., 2022). as an explanation for organizational action. The important and powerful Institutional Theory discusses how organizational structure affects social norms, behaviors, and connection patterns to connect a larger social and cultural context. This theory is linked to my study as the researcher is contrasting the use of manual invoice system and eTIS as pattern of an organizational practice to user friendly as an invoice payment between DWS and external suppliers. The main cause of administrative corruption in payment systems is lost financial resources, which reduces the productivity of potential investments both domestically and internationally (Tadadjeu et al., 2022).

Empirical literature

The smart billing or invoicing system for water consumption is constrained by the time needed to generate the bill, which requires a little extra time and involves some manual work, according to a study by Alagarsamy et al. (2022) on Pattern. The results of a study on the adoption of invoice services in Africa conducted by (Olaleye & Sanusi, 2019) show that efforts expectation, social influence, trust in e-government, and perceived risk have a significant impact on the intention to adopt e-invoicing. This contradicts earlier literature on the adoption of e-government services, which has focused on traditional web-based online services.

The foundation of empirical research theory is the researcher's own observation and measurement of phenomena (Pandey & Pandey, 2021). The aim of empirical theory is to evaluate usefulness of businesses' use of the Electronical Tracking Invoice System (Kim et al., 2021) and its use in the e-government system to assist governmental agencies and businesses in managing their operations and cutting expenses (Panayiotou & Stavrou, 2021).

Harland (2021) describes electronic payments as users that use ICT (information and communication technologies), like telecommunications networks and cryptography, to make financial transactions easier. It is imperative that clients have the capacity to keep track of their account balance. The researcher's findings suggest that important factors including

reliability, cost, flexibility or universality, efficiency, security, ease of use, privacy, consumer interest, and infrastructure should be given top priority when designing electronic payment systems. The results of the study indicate the adoption of electronic payment methods can significantly advance effectiveness of procurement procedures.

Additionally, this study will provide a comprehensive map of electronic invoice processes, which is essential to show various points of process complexity, incorporation, and optimization. Because they stimulate the usage of considerable amounts of flexible power and encourage suppliers to engage with customers and service providers, Electronic Tracking Invoice System procedures are being pushed upon DWS (Chatanga & Seleteng-Kose, 2021).

Payment systems need to meet several criteria, including cost, cost-effectiveness, anonymity, control, acceptance, and traceability. Because of this, academics are now more interested in the properties of the data being moved across the network than in the specifics of the many electronic payment systems. They begin by enumerating the characteristics, advantages, and disadvantages of every kind of electronic payment system before comparing them. The results of the study show that the efficiency of purchase processes is much increased when digital payment methods are used.

Research Methodology

This investigation is drawing a line to formulate material, inputs, and method of the information synthesis and to clarify of and validate on how methods to design the collective data (Shaw et al., 2019). According to Patel & Patel, 2019 who indicated that the methods and procedures taken from appropriate data will match with the aim of the research. To this study, the literature review was used as a foundation for instruments used (design materials, input, and method for data analysis) to address the objectives of this study. The Google Scholar and Science Direct will be used to select the relevant journals that used to this study, and it will be synthesis in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The PRISMA was selecting as a suitable methodology of synthesizing of this study (Chatzigeorgiou & Andreou, 2021). The PRISMA will used in this study to scan the literature and screening of selecting relevant articles for a period of (4 years) from 2019 to 2023 analyzing and reporting results (Zhang & Liu, 2020). The inclusion and exclusion criteria for this study will be used to assess the modelling of Electronical Tracking Invoice System in the Department of Water and Sanitation.

This part of the topic aligns the research methods clarify and justify the methods employed while data collecting (Shaw et al., 2019).The plan for gathering, systematising, and combining data is vital for result or end-result can be reached (Merriam & Grenier, 2019). This chapter of the research described the approaches and methods taken data to match the employed objective of the research. This segment argues the portions of the experimental study including the section on the research approaches.

Inclusion and exclusion criteria

The inclusion and exclusion criteria were employed in this review to define the articles that were considered and not considered. The examination involved studies that were written and published in English from different sources. The predetermined standard of title and abstract was an important requirement in this review. The excluded articles were not considered in this review because their contents were not focusing on Electronical Tracking invoice System. The other articles were excluded due to publication were not fall under Africa. Electronic tracking invoice system was used terms or keywords used in the literature review search

Data Validity

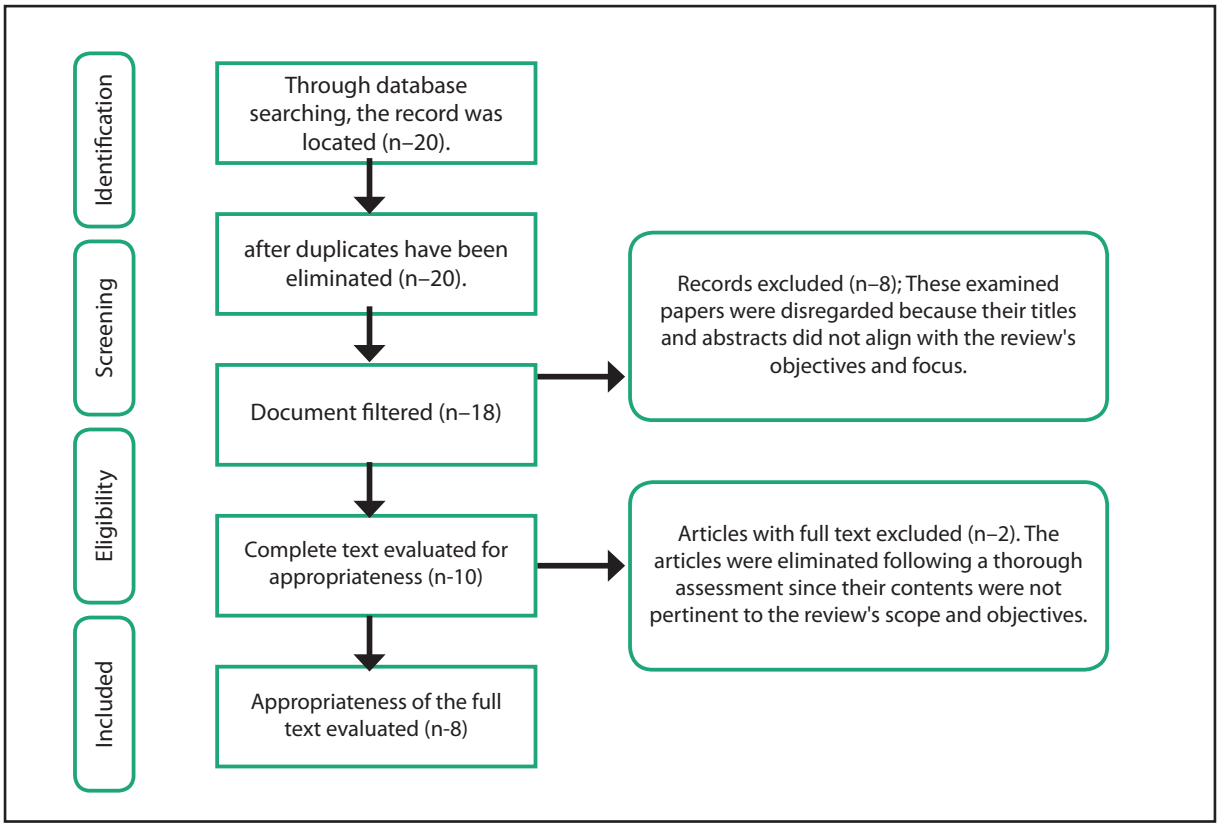
1) To ensure the validity and credibility in this research study, only peer-reviewed articles were considered.

Data Analysis

2) Data gathered was entirely analysed to show: the challenges on no-adoption of e-TIS as a tool for quick tracking invoice record in table 1.

PRISMA diagram flow

PRISMA diagram flow of literature retrieval on the challenges on no-adoption of e-TIS as a tool for quick tracking invoice record is set out in Figure 1 below.



Source: Adapted from Segotso et al. (2024:140)

Figure 1: PRISMA diagram flow of literature retrieval

RESULTS DISCUSSION

Table 1: Details of the Ten (8) Selected articles on the challenges on no-adoption of e-TIS as a tool for quick tracking invoice record

Study Identify	Author (Year)	Title	Overview
S1	(Kganyago & Mhangara, 2019)	The Role of African Emerging Space Agencies in Earth Observation Capacity Building for Facilitating the Implementation and Monitoring of the African Development Agenda: The Case of African Earth Observation Program, South Africa	In order to support sustainable development, the paper outlined potential and obstacles for EO and related features to be adopted more widely in Africa. It also showed how strategic alliances might increase prospects for African new space organizations.
S2	(Matekere, 2019)	Contribution of electric business practices on performance of supermarket procurement function in Tanzania	The findings suggest that e-payments have a detrimental impact on the efficiency of the supermarket procurement function, even though they significantly lower costs and lead times.

Study Identify	Author (Year)	Title	Overview
S3	(Mondo, 2020)	The role of electronic inventory control system in the competitiveness of e-Retailers in South Africa.	The study's conclusions have led to the formulation of the framework for implementing EICS, which will assist e-retailers become more competitive by enhancing their inventory control performance.
S4	(Mathayan, 2020)	Electronic fiscal device effects on tax revenue collection in Tanzania	The Tanzania Revenue Authority (TRA) and Tanzanian government at large are perceived to be experiencing several obstacles and disappointments that the Electronic Fiscal Devices (EFDs) are thought to address and overcome.
S5	(NDEI, 2021)	Electronic Procurement and Performance of Non-Governmental Organizations in Kenya. Empirical Evidence from Pathfinder International, Kenya	In order to generate analysis, the gathered data was coded and input into a computer using the Statistical Package for Social Sciences (SPSS) Version 24.
S6	(Senyo et al., 2021)	Digital Platformisation as Public Sector Transformation Strategy; A case Ghana's paperless port	The implementation of digital platformization has promise for enhancing public sector transformation by reducing corruption and increasing efficiency.
S7	(Oduwole et al., 2022)	Enhancing Routine Childhood Vaccination Uptake in the Cape Metropolitan District, South Africa: Perspectives and Recommendations from Point-of-Care Vaccinators	This study details the initiatives and outcomes taken by the Cape Metro's point-of-care vaccinators to innovatively address both typical and unique obstacles they face while performing their jobs.
S7	(Awan, 2023)	Impact of Electronic Invoicing on Cost Saving and Operational Efficiency in Logistics	The amazing speed at which e-invoicing expedites the invoicing process is among its most notable benefits.
S8	(Owuor et al., 2023)	Influence of Electronic Payment on Business Efficiency in Petrol Stations in Nyanza Region, Kenya	Respondents said that because online invoices have safety features, the firm thinks about using an electronic payment system.

Trends analysis of e-TIS selected review publications in 2019-to-2023-year period.

The past trends analysis of e-TIS research selected review publications for a period of 5 years between the year period from 2019 to 2023 are outlined in Figure 2. From 2019 to 2023, the number of published papers is between 1 to 2, and there is an increase in 2023 to a peak of 2 publications. The number of published papers influenced the trends analysis of e-TIS research over 5 years. The research for the e-TIS suggests there is a demand to be applied in the world market and has led to the reduction of 30 days non-compliance and possible fraudulent activities.

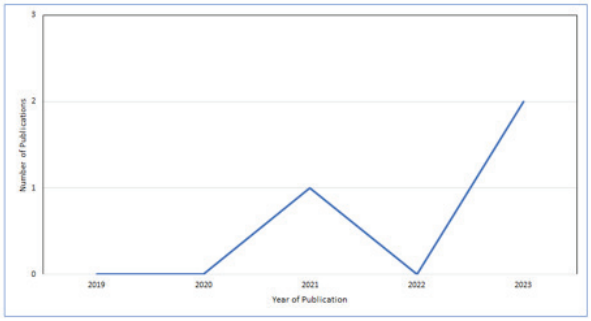


Figure 2: Trends analysis of e-TIS selected review publications in 2019-to-2023-year period.

Geospatial distribution of e-TIS published selected journals reviewed

Considering the e-TIS research described in Figure 1, the patterns evaluate for geospatial distribution of three published selected journals assessed were taken into deliberation. It displays the locations in Africa and the nations where these investigations were carried out. Africa has a distinct perspective in the context of e-TIS because of the influence management system, which produces informative data to direct organizational actions. A company can monitor the frequency of suppliers, examine payment trends, and identify any possible inefficiencies or bottlenecks in the invoicing procedure.

Secondly, Figure 2 illustrates those 8 reviewed journals of this study in the context of e-TIS have an impact on Tracking Invoice System on the 3 African countries.

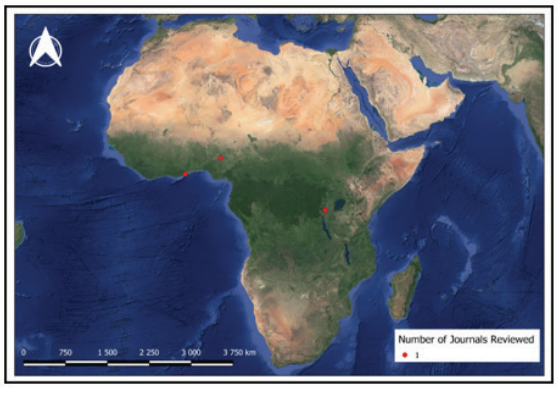


Figure 2:Geospatial distribution of publications on the Electronical Tracking Invoice System.

Contribution to the body of Knowledge

This article adds to the understanding of invoice processing. The finance and SCM procedures will benefit from the information management support this study will offer. It increases awareness of the importance of paying bills on time and makes it possible for the DWS to implement the e-TIS and use it for quick invoice tracking. The e-TIS framework -based conceptualised model is proposed and presented in the Figure 3 below

Source: Authors' compilation

Figure 3: Invoice tracking flow

Conclusion, Limitations and Recommendations

The conclusion was based on the research objective. The main objective of this article was to investigate the challenges on no-adoption of e-TIS as a tool for quick tracking invoice record in the Department of Water and Sanitation (DWS) and to propose the model to overcome such challenges associated with manual tracking invoice system. This study adopted scoping review strategy and preferred Reporting items for Systematic Reviews and Meta-Analysis (Scoping review of literature methodological framework). Overall, the research results showed the challenges in the use of eTIS instead of manual system benefits of DWS and suppliers implying the DWS to use eTIS

than the Manual system when they made payment of invoices. The research findings indicate that most of African countries were used manual tracking invoice system. There are few journals emphasized about in the use e-TIS. The conclusion was arrived at because the results from 8 published studies in the area of the challenges on no-adoption of e-TIS. The study recommends the encouragement of management systems to produce insightful data that will track supplier frequency, determine any bottlenecks or inefficiencies in the invoicing process, and inform payment patterns. There are not enough journals in this topic that are pertinent to it, so we cannot conduct a literature review. The literature reviews that were chosen for publishing were conducted in underdeveloped African countries, which lack the necessary resources for publication. In Africa, manual invoicing is most common. Moreover, another difficulty is that systematic lacks accuracy when we perform exercises of inclusion and exclusion. First and foremost, the researcher's ability to make an informed choice or study suggestion was impacted by the distinct methodologies employed by the chosen journals when synthesizing the data. The proposed invoice tracking system prediction model for payment determinist would more accurately depict the uncertain nature of paying suppliers within 30 days due to the unequal invoice lag time. This study could be expanded to include journals from throughout the globe in future research. Moreover, primary data from the system's user population must be used in this study instead of systematic literature studies (using pared-experimental analysis). It is suggested that to help the government minimize the difficulties associated with utilizing manual systems, particularly regarding South Africa, the government should step in and fund research on electronic tracking invoicing systems in the future. In addition, it will resolve the issue of dishonest and fraudulent activity and reimburse providers within the allotted 30-day period. there was little information on electronic tracking invoice systems in most African literature. The journals that were downloaded have a e-procurement focus, e-invoicing which is the electronic invoice system and revenue billing. More studies could be conducted using in South Africa and globally using primary data.

REFERENCES

Awan, U. A. (2023). Impact of Electronic Invoicing on Cost Saving and Operational Efficiency in Logistics.

Bahrami, M., Bozkaya, B., & Balcisoy, S. (2020). Using behavioral analytics to predict customer invoice payment. Big data, 8(1), 25-37.

Barath Kumar, B., Vinoth Kumar, C., Suguna, R., Vasim Babu, M., & Madhusudhan Reddy, M. (2022). An Implementation Perspective on Electronic Invoice Presentment and Payments. International Conference on Image Processing and Capsule Networks,

Cedillo, P., García, A., & Cárdenas-D, J. D. (2019). Towards an architecture for electronic notifications services on the cloud: A model driven approach. 2019 Sixth International Conference on eDemocracy & eGovernment (ICEDEG),

Kganyago, M., & Mhangara, P. (2019). The role of African emerging space agencies in earth observation capacity building for facilitating the implementation and monitoring of the African development agenda: The case of African earth observation program. ISPRS International Journal of Geo-Information, 8(7), 292.

Kim, S., Lee, H., & Lim, S. (2021). The Effects of Green SCM Implementation on Business Performance in SMEs: A Longitudinal Study in Electronics Industry. Sustainability 2021, 13, 11874. In: s Note: MDPI stays neutral with regard to jurisdictional claims in published ….

Matekere, A. (2019). Contribution of Electronic Business Practices on Performance of Supermarket Procurement Function in Tanzania A Case of Selected Supermarkets in Dar es Salaam Mzumbe University].

Mathayan, W. (2020). Electronic Fiscal Device Effect on Revenue Collection in Tanzania.

Merriam, S. B., & Grenier, R. S. (2019). Qualitative research in practice: Examples for discussion and analysis. John Wiley & Sons.

Mondo, S. N. (2020). The role of electronic inventory control system in the competitiveness of e-retailers in South Africa Cape Peninsula University of Technology].

NDEI, F. M. (2021). ELECTRONIC PROCUREMENT AND PERFORMANCE OF NON-GOVERNMENTAL ORGANIZATIONS IN KENYA. A CASE OF PATHFINDER INTERNATIONAL KENYA.

Oduwole, E. O., Laurenzi, C. A., Mahomed, H., & Wiysonge, C. S. (2022). Enhancing routine childhood vaccination uptake in the Cape Metropolitan District, South Africa: Perspectives and recommendations from point-of-care vaccinators. Vaccines, 10(3), 453.

Olaleye, S. A., & Sanusi, I. T. (2019). The need for green companies in Nigeria: a study of electronic invoicing. The African Journal of Information Systems, 11(1), 1.

Owuor, R. O., Kiongera, F., & Kwendo, E. (2023). Influence of Electronic Payment on Business Efficiency in Petrol Stations in Nyanza Region, Kenya.

Panayiotou, N. A., & Stavrou, V. P. (2021). Government to business e-services–A systematic literature review. Government Information Quarterly, 38(2), 101576.

Pandey, P., & Pandey, M. (2021). Research Methodology Tools and Techniques. Buzau: Bridge Center. In.

Peters, E., Subar, K., & Martin, H. (2019). Late payment and nonpayment within the construction industry: Causes, effects, and solutions. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 11(3), 04519013.

Segotso, T., Mvunabandi, J. D., & Phesa, M. (2024). A Systematic Literature Review of the Challenges of Adopting and Implementing IFRS for SMEs in South Africa. International Journal of Economics and Financial Issues, 14(5), 131-147.

Senyo, P. K., Effah, J., & Osabutey, E. L. (2021). Digital platformisation as public sector transformation strategy: A case of Ghana's paperless port. Technological Forecasting and Social Change, 162, 120387.

Shaw, R. L., Bishop, F. L., Horwood, J., Chilcot, J., & Arden, M. (2019). Enhancing the quality and transparency of qualitative research methods in health psychology. British Journal of Health Psychology, 24(4), 739-745.

Tadadjeu, S., Njangang, H., Ningaye, P., & Nourou, M. (2022). Oil dependence and access to water and sanitation in African countries: Does the Extractive Industries Transparency Initiative matter? African Development Review, 34(1), 54-67.

Gender Distribution of SMEs productivity in Africa: A Quantile-Based Approach

Anthanasius Fomum Tita
University of the Western Cape
atita@uwc.ac.za
https://orcid.org/0000-0003-3718-669X

Adefemi A. Obalade *
University of the Western Cape
aobalade@uwc.ac.za
https://orcid.org/0000-0001-6062-1632

Abstract

The debate as to whether there is a productivity gap between female and male-owned businesses is yet to be settled as the available evidence is mixed and dominated by mean estimators. This study applies a distributional technique to analyze the difference in the distribution of productivity between female and male-owned enterprises in Africa. That is an unconditional quantile average treatment effect and a combination of a reweighting strategy with recentered influence function regression-based Oaxaca decomposition technique. The results revealed a positive and statistically significant average treatment effect of female-owned firms at the 10th, 20th, 70th, and 90th percentiles suggesting a higher distribution of labour productivity for females than male-owned businesses. For total factor productivity, the average treatment effects are negative and significant at the 40th to the 80th percentiles confirming a lower distribution of total factor productivity for females than male-owned businesses. Additionally, evidence from Oaxaca recentered influence function decomposition of labour and total factor productivity revealed on average a gender difference in the distribution of productivity of 2.2 to 3 percent across all the estimated quantiles. Overall, the difference in the distribution of the productivity gap between female and male-owned enterprises is minimal. The policy implication from these findings is that there are little gains from addressing entrepreneurship challenges in Africa through a gender lens. Policymakers should focus attention on easing barriers of entry into entrepreneurship by addressing legal, regulatory, and equalizing gender access to finance and lending.

Keywords:
Productivity gap, Oaxaca-recentered influence function decomposition, unconditional quantile regression, enterprises

JEL Classification:
D2, L2, L25, C5, C18

Introduction

Small and medium size businesses (SMEs) play a fundamental role in both developed and developing economies and are the backbone of entrepreneurship. In Africa and the Middle East and North Africa, SMEs constitute 69 and 68 percent of all enterprises respectively (World Bank Enterprise Survey, 2021), and serve as a catalyst for job creation and economic growth. The World Bank (2019) alluded that without entrepreneurship, there will be little creative disruptions, low productivity, and fewer jobs will be created. Entrepreneurship in Africa is ranked high as a career choice, with approximately 76 percent of the population aspiring to be entrepreneurs. For instance, 50 percent of women in the non-agricultural labour force are entrepreneurs, and this figure place Africa as the only region where female are more likely than men to be entrepreneurs (World Bank, 2019, p.6). However, the majority of female businesses operate in the informal sector and a wide gender gap exists in the registration of formal limited liabilities companies.

Entrepreneurship data from company registrars on the number of newly registered firms for 14 African countries from 2014 to 2018 showed huge gender gap. For example, the mean share of female limilted liabilities (LLC) business owners is 0.18 relative to 0.82 for male, the mean share of female sole proprietors is 0.66 copmared to 2.1 for male and the mean share of female directors of new LLC is 0.18 versus 0.82 for male (World Bank, 2019). This suggests that female entrepreneurs in Africa experienced some form of discrimination relative to their male counterparts in the formalization of businesses. However, empirical literature is scant on whether this gender gap in new business registration manifest in performance gap particularly for small formal businesses.

Fostering the growth of female enterpreneurship is not only important for inclusion, poverty reduction, gender equality, and employment, but is equally central for development effectiveness. It has been established that when men and women have equal opportunities to influence their lives and contribute to their families, communities and countries, it improves overall productivity and quality business performance (World Bank, 2019). Similarly, Statistics showed that women re-invest approximately 90% of every extra dollar of income earned on their families' education, nutrition, and health compared to 30% to 40% for men (GPFI & IFC, 2011 and VanderBrug, 2013). This confirm the growing importance of female-owned businesses relative to their male counterparts (Sweida & Reichard, 2013 and GEM, 2017) and affirms that women entrepreneurship is no longer a niche market (Edelman et al., 2018). Bardasi et al. (2007, p. 70) alludes that women are one of Africa's hidden growth reserves contributing to most of the region's labour, nevertheless, inequality in economic participation slow down their contributions job creation.

One way to understand the differences between female and male-owned businesses is through the liberal and socialist feminist theories. The basic premise of these theories is that observed differences between female and male-owned businesses can be explained by barriers to economic opportunities and differences at birth between male and female (Fischer et al., 1993). Gender gap in firm performance has received some scholar attention in the literature, however, mean estimators are the dominant methodoloies employed which are susceptible to outlier observations. For example, businesses operating in the highly competitive and low value added service sectors does not mean under performance compared to businesses in high-tech and manufacturing sectors with tight competition and high value added. Thus, when businesses are aggregately analysed using mean estimators, the gender gap in performance is likely to be under or over-estimated. A robust and nauce empirical strategy is required to help deepen understanding of whether a gender gap in firm performance exist and at what level of the distribution?

This study investigates the overal and regional gap between female and male-owned formal SMEs in Africa using distributional techniques that are robust to outlier observations. Specifically, the study employ unconditional quantile regression and a combination of a reweighting strategy with a recentered influence function (RIF) regression-based quantile decomposition technique popularised by (Firpo, Fortin, & Lemieux, 2009, 2018). Besides, descriptive statistics are used to provide deeper insights into questions the following questions. (a) what is the contribution of each SMEs economic activitty to job creation in Africa? (b) what is the proportional distribution of SMEs economic activity by gender

per region in Africa, (c) what is the proportion of jobs created by gender per region in Africa? (d) what is the average total sales of SMEs by gender per region?, and (e) what is SMEs average value added per worker by gender per region in Africa?

The advantages of this chosen strategy is that it provides a linear approximation to nonlinear functions (Rios-Avila, 2020, p. 73) and the quantiles are determined pre-regression (Killewald & Bearak, 2014). Secondly, the strategy offers the possibility to obtain detailed contributions of individual covariates on the aggregate decomposition (Rios-Avila, 2020, p. 73). The study hypothesize that the difference in performance between female and male-owned business if it exists is not constant but vary across the production distribution function.

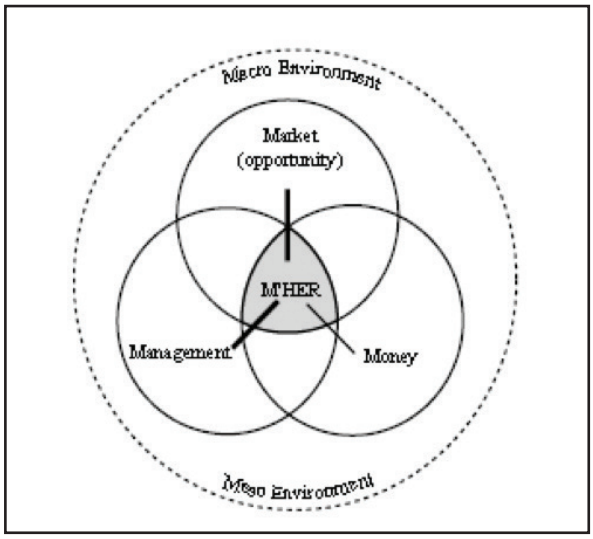
Literature Review

The feminist theoretical framework

Scholars have used the two dominant theories, namely feminist liberal and social feminism, each with differing views, to explain the reasons for observed differences between male and female-owned businesses (Fischer, Reuber, & Dyke, 1993). The liberal feminist theory is rooted in the liberal political philosophy and based on the basic principles of equality of all beings and human beings as rational and self-interest-seeking agents. Liberal feminist theory argues that women are disadvantaged relative to men due to open discrimination that deprives them of accessing essential opportunities such as education and business training (Fischer et al., 1993). Thus, the liberal feminist theory assumes that men and women are equal and that rationality, not sex is the basis for individual rights (Ali, 2016). Therefore, the psychological differences between men and women are not inborn but rooted in the barriers preventing women from developing their full capacities. If these barriers are eliminated, these psychological differences will disappear resulting in widespread androgyny (Ali, 2016; Fischer et al., 1993). The social feminist theory posits that men and women are seen to be different (Ahl, 2006) and that differences between men and women experienced through socialization methods from the earliest moments of life results in fundamentally different ways of viewing the world (Fischer et al., 1993). Accordingly, female socialization creates different perspectives, goals, and choices for women Brush (2006 in Ali, 2016, p. 34) and they choose their business field accordingly. Women have strong ties with work and family rather than considering their businesses as a separate economic entity (Ali, 2016). They view their businesses as interconnected with family, society, and personal relationships. This integrated approach explains many of the differences between male and female businesses (Brush, 1992). Robb & Watson (2012) however, argued that these differences do not necessarily imply that female-owned businesses will underperform relative to their male counterparts, provided that appropriate performance measures are adopted and differences in key demographic factors are controlled in the analysis.

An institutional perspective is however, missing from the feminist theoretical framework. Brush, De Bruin and Welter (2009) recently developed a gender-aware theoretical framework for women's entrepreneurship that draws on institutional theory to highlight the household and family context of female entrepreneurs and the meso/macro-environment. This theoretical perspective captures issues beyond the market such as expectations of society and cultural norms (macro) and the intermediate structures and institutions (meso) (Brush et al., 2009, p. 9). Building on Bates, Jackson, and Johnson's (2007) "3Ms" – market, money, and management required for an entrepreneur to launch a successful venture, Brush et al. (2009) add motherhood and meso/macro environment to extend the 3Ms to 5Ms framework. According to Bates et al. (2007, p. 10), these 3Ms are the fundamental blocks of business viability. Motherhood in the 5M model represent the family context and reflect the fact that work-family can either facilitate or constrain the growth of female-headed firms (Jennings & Mcdougald, 2007). The macro and meso environment captures issues beyond the market and include such things as expectations of the society and cultural norms. Specifically, the macro-environment includes national policies, strategies, and economic influences whereas meso environment capture the interaction between the micro and macro environment (Brush et al., 2009; Dopfer, Foster, & Potts, 2004). Brush et al. (2009, p. 13) use a Venn diagram to illustrate the interconnectedness of the 5Ms

Figure 1: Interconnectedness of the 5Ms framework



Source: Brush et al. (2009, p.13)

Figure 1 depicts the 5Ms and how they relate to each other. The market is at the top and also includes opportunity which is the cornerstone for all entrepreneurs. The entry and survival into the market require access to finance (money) and human capital to manage the money. Thus, money and management are regarded as enablers of opportunity exploitation. The macro and meso environment surrounding these circles mediate and influence other components. For instance, at the macro level legal, social and cultural norms could mediate motherhood by conditioning the household division of labour and access to external finance for their businesses (Carter, Shaw, Lam, & Wilson, 2007). Similarly, the mediating institutions at the meso level could influence any of the other 4Ms such as the gender segregation of occupational network, particularly the dominance of women in certain occupation could reduce women's access to finance (money) and markets (Brush et al., 2009).

Empirical Literature review

A survey of existing literature on whether the gender of an entrepreneur influences the performance of the business has produced mixed results both in advanced and emerging economies. Some studies found that female-owned businesses underperform their male counterpart (Fairlie & Robb, 2009; Gottschalk & Niefert, 2013; Inmyxai & Takahashi, 2010), while others provide evidence of female outperforming male-owned businesses (Campbell & Minguez-Vera, 2010; Kalnins & Williams, 2014). Conversely, scholars such as Bruhn (2009); Kalleberg and Leicht (1991); Watson (2002); Robb and Watson (2012) and Bardasi et al. (2007) do not find any gender-based difference in entrepreneurship performance.

Overwhelmingly, the evidence indicates that female-owned businesses tend to be concentrated in low value-added and services sectors rather than capital intensive manufacturing industries and are smaller in sizes relative to male-owned businesses (Klapper & Parker, 2011 and DuRietz & Henrekson, 2000). These sectors are highly competitive and the growth opportunities and profitability are limited. In Latin America Sabarwal and Terrell (2009) found that female-owned businesses underperformance was strongest only for large firms. However, among small and medium firms, female entrepreneurs outperform their male counterpart in terms of growth. Additionally, male-owned businesses perform better in terms of overall size and valued-added in the event of technology adoption and innovation, corroborating the findings of Fernandes et al. (2017) that female entrepreneurs are not competitive in terms of innovation and internationalization. Similarly, Kepler and Shane (2007) and Watson (2002) found that when several factors such as the reason to start a business, hours work, motivation, and preferences are accounted for, gender does not affect new ventures and business performance and observed differences can be attributed to differences in business scale. This finding corroborates Bardasi et al. (2007); Bruhn (2009) and Shava and Rungani (2016) who found no significant difference after accounting for other factors. Furthermore, Aterido and Hallward-Driemeier (2011) argued that although female businesses in SSA are smaller in size and unaffiliated with other businesses, no evidence of gender gap in performance is observed between female and male-owned businesses. Nevertheless, Fairlie and Robb (2009) found that female businesses on average have worse outcomes and are less successful relative to their male counterparts because of differences in startup capital, hours work, and preference. Bardasi et al. (2011) also found a significant gap between female and male-owned businesses in terms of firm size but a much smaller gap in terms of efficiency and growth in Europe and Central Asia (ECA), Latin America (LA), and Sub-Saharan Africa (SSA). Nevertheless, they observed a gender gap in total factor productivity in ECA and LA but not in SSA and no evidence of a gender gap in access to finance in ECA, LA, and SSA regions. This

result concurs with Aterido et al. (2013) who equally documented no gender difference in access to finance in SSA after accounting for individual characteristics and geographic location.

Male and female-owned businesses have also been compared in terms of survival and business successes across different industries, organizational, and attributes of owner-operators. In their sample in the USA South of Central Indiana, Kalleberg and Leicht (1991) found that women-headed businesses within the computer sales and software, food and drinks industry were no more likely to fail and were just as successful as men headed businesses. Furthermore, the determinants of survival and success operated in the same way for men and women. This indicates that the processes underlying small business performance are similar irrespective of an entrepreneur's gender. Robb and Watson (2012) used the three measures of performance closure rates, return on asset and risk-adjusted ratio (Sharpe ratio) and found no significant difference between female and male new ventures in terms of overall four-year survival rates, return on assets or risk-adjusted returns in the USA. On the contrary, using Weibull and hazard regression, Kalnins and Williams (2014) found that female-owned businesses out-survived male-owned businesses in a variety of industries such as educational service, dance studios, clothing and alcohol sales. Thus, Marlow and Mcadam (2013) argued that given the masculine nature of entrepreneurship, women businesses are often described as underperforming because it is generally expected that female businesses will underperform as a result of perceived stereotype. This gender stereotype exert significant influnce on the financing of new business ventures with female-led businesses viewed by angel investors to lack ligitimacy and leadership (Edelman et al., 2018). In Sweden, Malmstrom, Johansson, and Wincent (2017) using discourse analysis, to examine entrepreneurs' potential to benefit from state venture capital support. They found that the entrepreneur's attributes discussed during the evaluation vary based on gender stereotypes, with women's potential undermined while men's potential underpinned. In a scenario when no stereotype information is presented, men evaluated opportunity more favourably than women, however, the gap widen when entrepreneurship was linked to masculine stereotypical information. Similarly, when entrepreneurship is linked to feminine stereotypical information, the gap reverses in favour of females and when entrepreneurship is linked to gender-neutral characteristics, the difference in opportunity evaluation disappeared (Gupta et al., 2014). An earlier study to examine the role of gender in business plan development by Cook, Belliveau, and Lentz (2007) showed that men and women had similar overall business plan scores, however, women scored significantly higher in presenting their plans to judges. Thus, Sweida and Reichard (2013) opines that gender role and negative stereotyping impact women's entrepreneurial self-efficacy and intention to start high growth businesses. They argue that reducing the masculine stereotype related barriers linked with entry into high growth businesses and increasing women's high growth entrepreneurship self-efficacy is sufficient to increase women's intention to venture into high growth businesses. Gender stereotype equally extends to networking where women are assumed to create fewer networks than men. Watson (2011) investigated this issue using a sample of male and female SME owners in Australia. The results revealed little difference in the network assessed by men and women after controlling for education, experience, industry, age, and size. Also, the majority of both formal and informal networks assessed by SME owners except for external accountants did not appear to be associated with firm performance. However, Kalafatoglu and Mendoza's (2017) study in Turkey, Egypt, Saudi Arabia, Lebanon, and Morocco found that women entrepreneurs who face severe barriers in highly patriarchal societies due to cultural and social norms, tend to benefit from networking. They found that networking is a key factor for women entrepreneurs to overcome barriers like legal restrictions to incorporate a company as the sole owner, to access capital, training, and new business opportunities in male-dominated industries.

Furthermore, several scholars have confirmed that firms managed by female CEOs and directors outperformed their male counterparts in the USA (Conyon & He, 2017; Jalbert, Jalbert, & Furumo, 2013) and Turkey (Kılıç & Kuzey, 2016). Additionally, Khan and Vieito (2013) observe that the risk level of firms is lower when the CEO is female relative to their male counterpart. Similarly, the Spanish stock markets react positively in the short run to the announcement of the appointment of a female on the board of directors. The results from regression analysis affirm that female board appointments are positively associated with firm's value over a sustained period (Campbell & Minguez-Vera, 2010). On the contrary, Singhathep and Pholphirul (2015) documented that women CEOs in the manufacturing sector in Thailand exert negative effects both on the short term performance and long-run development indicators of the firm.

Nevertheless, the negative effect reduces when the CEO has a college degree. Thus the lack of consensus on the gender-firm performance and specifically for studies from the SSA region means there remains a need for further research on the topic.

Methods

Data sources and descriptive statistics

This study source firm level data from the World Bank Enterprise Survey (WBES) and the firm-level estimate of total factor productivity. The two datasets were merged using the identifier idstd available in the methodological note (Francis et al., 2018) to arrive at a sample of 41 African countries. The WBES covers several topics of the business environment - access to finance, corruption, infrastructure, crime, competition, and performance measures. Since 2006, the WBES has followed a global methodology that allows for cross-country comparison and approximately 133,000 face-to-face interviews have been conducted with top managers and business owners in 139 economies under this methodology. Accountants and human resource managers are also interviewed to answer questions related to the sales and labour section of the survey. The survey follows a stratified random sampling with location (within a country), business sector, and firm size as the strata and only formally registered firms employing five and more workers are sampled from manufacturing and services (Francis et al., 2018).

This study uses a measure of productivity, the World Bank estimation of total factor productivity using the Cobb Douglass production function and labour productivity (deflated by USD 2009). This study uses two measures of gender. Gender is measured by recoding question b4 "Amongst The Owners Of The Firm, Are There Any Females? (Yes/NO). A binary variable was created taking the value of 1 for female ownership and zero for male-owned firms. A second measure of gender, question b4a "the percentage of firms owned by females" had fewer observations, consequently, it was dropped from the analysis. Table 1 below provides a summary of all the variables used in the analysis.

Table 1: Descriptive Statistics of SMEs in Africa (N = 24721)

	Male ownership			Female ownership		
	N	Min.	Max.	N	Min.	Max.
Ownership of SMEs in Africa	16769	0.0	1.0	5462	0.0	1.0
Total factor productivity based on VAKL model	5040	-0.9	9.1	1346	-1.1	9.2
Total sales per worker (in USD 2009)	14561	2.4	18.9	4783	3.1	18.6
Log of manager's years of experience	16474	0.0	5.4	5384	0.0	4.9
Senior mgt time spend dealing with regulation	15411	0.0	1.0	5019	0.0	1.0
Formal access to line of credit or loan	16384	0.0	1.0	5288	0.0	1.0
Entity visited by tax officials past 12 months	11055	0.0	1.0	3571	0.0	1.0
Formal firm compete with informal firms	14600	0.0	1.0	4619	0.0	1.0
% of firms paying for security	16721	0.0	1.0	5443	0.0	1.0
% of Firms exporting at least 10% of sales	16350	0.0	1.0	5301	0.0	1.0
Experience power outages	16646	0.0	1.0	5426	0.0	1.0
Access to overdraft	15653	0.0	1.0	5179	0.0	1.0
Exp loss due to theft	16690	0.0	1.0	5454	0.0	1.0
Firms offering formal training	14177	0.0	1.0	4400	0.0	1.0
Financially constrained firms	14224	0.0	1.0	4365	0.0	1.0
Firms with audited annual fin statement	16556	0.0	1.0	5387	0.0	1.0
% of annual sales paid after delivery	14399	0.0	1.0	4574	0.0	1.0
percentage of private foreign individuals	16530	0.0	1.0	5333	0.0	1.0
Log of firm's age	16411	4.1	7.6	5349	7.5	7.6
Log of firm's age squared	16411	16.8	57.9	5349	57.0	57.9
Firms using email to communicate with clients	13363	0.0	1.0	4681	0.0	1.0
Firms with owned website	16717	0.0	1.0	5446	0.0	1.0

Source: By Authors (2025)

Figure 2: SMEs sectoral job creation (%) in Africa

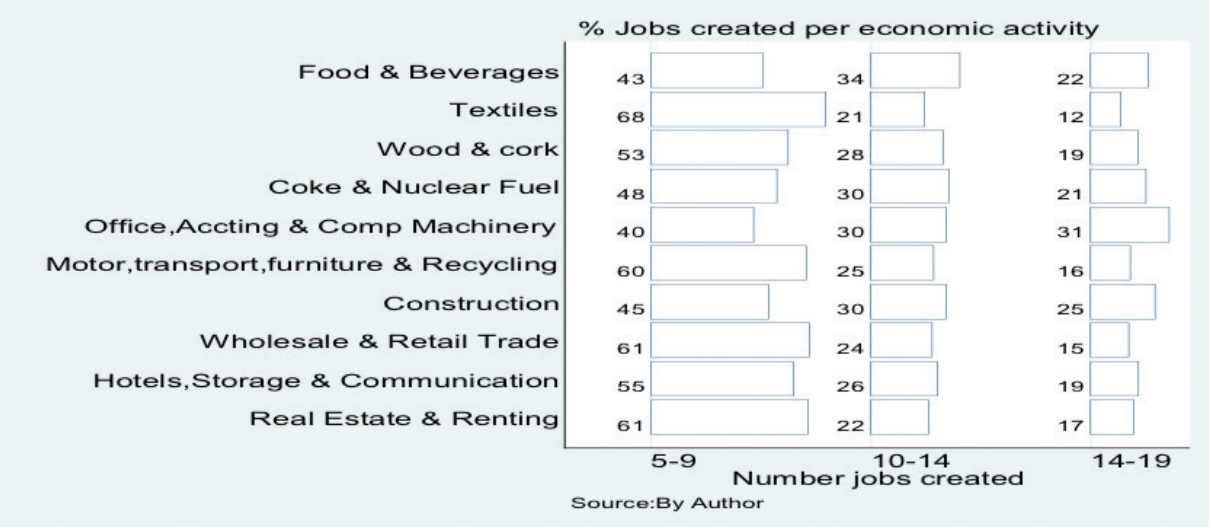


Figure 3: Gender sectoral distribution of SMEs per region in Africa

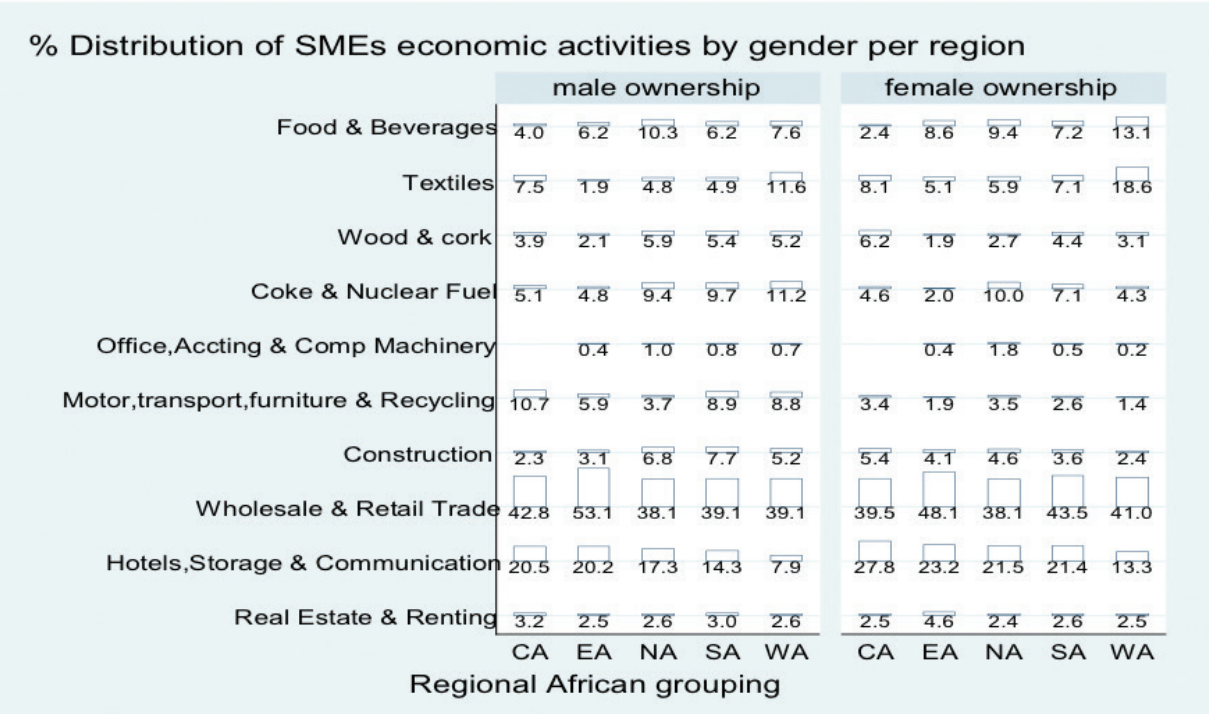


Figure 4: SMEs gender job creation(%) per region

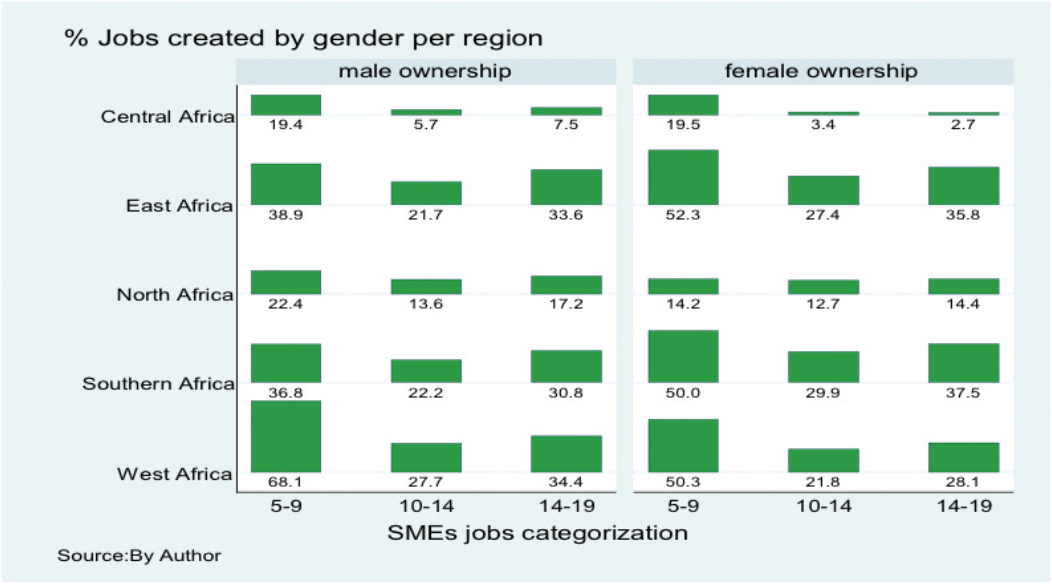
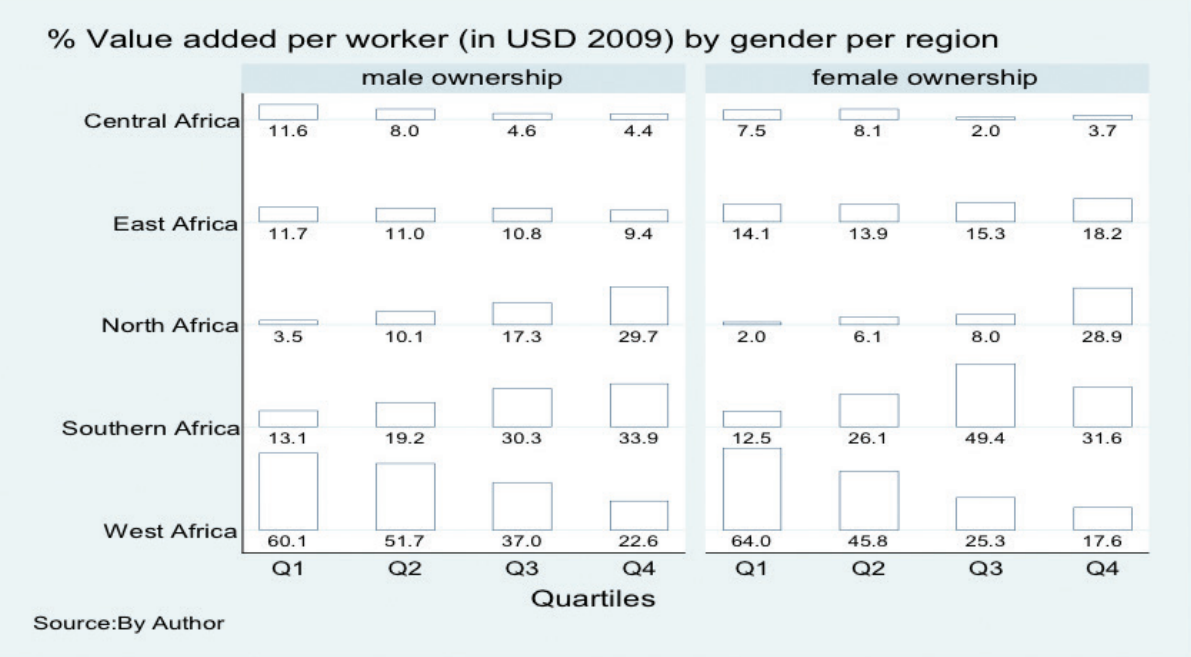


Figure 5: Gender SMEs performance per region



The recentered influence function decomposition technique

The study employs the RIF-regression framework to estimate unconditional quantile treatment effect and regression-based quantile decomposition purposed by Firpo et al., (2009, 2018). This methodology allows the decomposition of the differences in the distributions of productivity between male and female into the composition and structural effects. The composition effect is linked to differences in covariates between the two groups, while the structural effect is associated with differences in the return to these covariates between the two groups (Fortin, Lemieux, & Firpo, 2011; Firpo, Fortin, & Lemieux, 2018). Following the seminal works of Oaxaca (1973) and Blinder (1973), henceforth OB, the decomposition method has gained traction in applied economics and their settings have become the standard toolkit in labour, health, and development economics. Several extensions and refinements of the original OB method to other distributional statistics besides the mean have been proposed in the literature (see Fortin et al., 2011). As discussed by Firpo et al. (2018), and cited in Rios-Avila (2020, p. 73), using RIF regressions together with the reweighting strategy proposed by Dinardo, Fortin, and Lemieux (1996) provides a feasible methodology to decompose differences in distributional statistics beyond the mean.

Let's begin by assuming a joint distribution that describes the relationship between firm productivity Y, the exogenous characteristics X, and male and female-owned firms (T-dummy variable) that identifies the group membership of the population $(f_{Y,X,T})$.The cumulative distribution of productivity Y conditional on gender ownership of firms *(T)* can be written as

$$F_{Y|T=K} = \int F_{Y|X,T=K} dF_{X|T=k} \tag{1}$$

To analyze the differences between male (group 0) and female (group 1) owned firms, the cumulative conditional distribution of Y can be used to calculate the gap in the distributional statistic v (productivity gap).

$$\Delta v = v_1 - v_0 = v(F_{Y|T=1}) - v(F_{Y|T=0}) \tag{2}$$

$$\Delta v = v\left(\int F_{Y|X,T=1} dF_{X|T=1}\right) - v\left(\int F_{Y|X,T=0} dF_{X|T=0}\right) \tag{3}$$

From equation 3, a productivity gap Δv between male and female-owned firms can arise because of differences in the distribution of X $\left(dF_{X|T=1} \neq dF_{X|T=0}\right)$ or because of differences in the relationships between productivity Y and X $\left(dF_{Y|X,T=1} \neq dF_{Y|X,T=0}\right)$. In the OB framework, this corresponds to comparing average differences in characteristics (composition effect) and coefficients (structural effect). The identification of how differences in the composition and structural effects explain the overall gap in the distribution of productivity between male and female-owned firms requires the construction of a counterfactual scenario. That is, the distribution of productivity that would prevail for female-owned businesses if they had assumed the distributional of characteristics of male-owned businesses. Let define the counterfactual statistics v_C as

$$v_C = v\left(F_Y^C\right) = v\left(\int F_{Y|X,T=0} dF_{X|T=1}\right) \tag{4}$$

Using this counterfactual, the productivity gap can be disaggregated into two components

$$\Delta v = \underbrace{v_1 - v_C}_{\Delta v_S} + \underbrace{v_C - v_0}_{\Delta v_X} \tag{5}$$

Where Δv_X reflects the gap in the distribution of productivity attributed to differences in characteristics and Δv_S reflects the differences attributed to the relationships between productivity Y and X (regression coefficients). The greatest challenge of this strategy is how to truly identify the counterfactual statistics because the combination of characteristics and outcomes are not observed in the data (Rios-Avila, 2020). Following Firpo et al., (2009; 2018) and Fortin et al., (2011), two conditions ignorability and overlapping support are required to identify the parameters of the counterfactual distribution. Ignorability assumes that the distribution of the unobserved explanatory factors in the productivity determination models are the same between men and female firm owners, once condition on a set of observed variables. However, ignorability is a very strong assumption, and when in doubt, instrumental variables are used to correct for the effect of unobservable. The study includes a variety of control variables as a remedial measure.

Additionally, Fortin et al. (2011, p. 87) pointed out that the aggregate decomposition remains valid even when the ignorability assumption is not fully satisfied. For example, if the unobserved innate ability is correlated with firm owner's experience and this correlation is the same for male and female firm owners, then the aggregate decomposition remains valid because there are no systematic differences in innate ability between the two groups once we have controlled for firm owner's experience. Furthermore, overlapping support is assumed in the unobservable and observable characteristics between female and male firm owners thereby ruling out the possibility differences in covariates between the two group's productivity functions. If general equilibrium effects are ruled out, then the traditional OB decomposition method using linear regressions and approximation can be used to identify v_C . This implies estimating separate RIF regressions for each group, such that the counterfactual statistic can be identified as follows:

Female: $v_1 = E\left[RIF\left\{y, v\left(F_{Y|T=1}\right)\right\}\right] = \bar{X}_1'\hat{\beta}_1$ (6)

Male: $v_0 = E\left[RIF\left\{y, v\left(F_{Y|T=0}\right)\right\}\right] = \bar{X}_0'\hat{\beta}_0$ (7)

Counterfactual: $v_C = \bar{X}_1'\hat{\beta}_0$ (8)

Equation 8 is similar to the standard OB decomposition where $\Delta v_X = \left(\bar{X}_1' - \bar{X}_0\right)'\beta_0$ and $\Delta v_S = \bar{X}_1'\left(\hat{\beta}_1 - \hat{\beta}_0\right)$. . However, there are limitations associated with the traditional OB strategy as pointed by Barsky, Bound, Kerwin, Charles, and Lupton, (2002, p. 663). That is, the parametric estimation approach is likely to yield incorrect estimates of the conditional mean especially when the model is misspecified. Barsky et al. (2002) proposed the use of a nonparametric reweighting approach as in DiNardo et al. (1996), to identify the counterfactual distribution $F_{Y|X,T=0}dF_{X|T=1}$ based on the observed data. However, since the distribution of the outcome and the characteristics assumed by the counterfactual $F_{Y|X}^C$ cannot be directly observed, Rios-Avila (2020, p. 75) purposed an approximation for the counterfactual distribution by multiplying the observed distribution of characteristics $dF_{X|T=0}$ with a factor $\omega(X)$ so that it resembles the distribution $dF_{X|T=1}$ as defined below:

$$F_Y^C = \int F_{Y|X,T=0}dF_{X|T=1} \cong \int F_{Y|X,T=0}dF_{X|T=0}\omega(X) \quad (9)$$

The counterfactual distribution $F_{Y|X}^C$ is identified by estimating the reweighting factor $\omega(X)$ using parametric or nonparametric methods to estimate the conditional probability $P(T=1|X)$. In practice, a probit or logit model can be used to estimate this conditional probability. Once these reweighting factors are obtained, Equation 8 can be estimated using weighted least squares.

Counterfactual: $v_C = E\left[RIF\left\{y, v\left(F_Y^C\right)\right\}\right] = \bar{X}_1'\hat{\beta}^c$ (10)

The decomposition components are now defined as

$$\Delta v = \underbrace{\bar{X}_1'\left(\hat{\beta}_1 - \hat{\beta}_C\right)}_{\Delta v_S^P} + \underbrace{\left(\bar{X}_1 - \bar{X}_C\right)'\hat{\beta}_C}_{\Delta v_S^e} + \underbrace{\left(\bar{X}_C - \bar{X}_0\right)'\hat{\beta}_0}_{\Delta v_X^P} + \underbrace{\bar{X}_C'\left(\hat{\beta}_C - \hat{\beta}_0\right)}_{\Delta v_X^e} \quad (11)$$

Where the components $\Delta v_S^P + \Delta v_S^e$ correspond to the OB aggregate structural effect whereas $\Delta v_X^P + \Delta v_X^e$ corresponding to the composition effect. The structural and composition effects are further decomposed into a pure structural effect (Δv_S^P) and a pure composition effect (Δv_X^P), and two additional components used to evaluate the overall fitness of the model. That is, the reweighting strategy (Δv_S^e) . A large significant reweighting error implies that the counterfactual is not well identified and that the specification of the probit/logit model used for the estimation of reweighting factors may need to be modified. Conversely, the specification error Δv_X^e assesses the quality of the model specification and the RIF approximation. A large significant specification error is an indication that the RIF regression is mis-specified or that the RIF is providing a poor approximation to the distributional statistics v (Rios-Avila, 2020). The analysis is implemented using Rios-Avila (2020) Stata community contribution.

Discussion of results

The estimation of the average treatment effects of female-owned businesses

As a first step to complement the recentered influence function decomposition analysis, the study used the RIF regression framework to estimate the treatment effects of female-owned businesses using the two measures of productivity. The analysis is executed using Rios-Avila (2020) Stata command *rifhdreg* with the option "over" and the logit model is used in the

estimation of the reweighting factors and standard errors are bootstrapped using 50 replications. The summary results depicted in Table 2 revealed that the average treatment effect of female-owned businesses is positive and statistically significant at the 10th, 20th, 70th and 80th percentiles suggesting a higher difference in the distribution of labour productivity for female-owned enterprises relative to their male counterparts. At the 30th to the 60th and 90th percentiles, the average treatment effects of female-own firms are positive but insignificant indicating no significant difference in the distribution of labour productivity between female and male-owned enterprises. The next paragraph discusses the results of total factor productivity.

Table 3 showed that the average treatment effects of female-owned businesses are negative and statistically significant at the 40th to the 80th percentiles indicating a lower difference in the distribution of total factor productivity for female-owned businesses relative to male-owned firms. However, at the 10th to 20th and 30th, 90th percentiles, the average treatment effects are positive and negative

Table 2: Estimation of average treatment effects of female using Labour productivity

	RIF	RIF	RIF	RIF	RIF	RIF	RIF	RIF	RIF
	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Female	0.259***	0.127***	0.070	0.034	0.024	0.032	0.075*	0.094**	0.076
	(4.19)	(2.65)	(1.63)	(0.84)	(0.56)	(0.72)	(1.83)	(1.98)	(1.31)
Constant	6.043***	6.936***	7.442***	7.811***	8.156***	8.584***	9.042***	9.436***	10.432***
	(37.25)	(51.89)	(78.07)	(85.06)	(94.32)	(101.29)	(107.26)	(81.53)	(92.49)
N	11669	11669	11669	11669	11669	11669	11669	11669	11669
RMSE	3.177	2.214	1.939	1.879	1.905	1.965	1.982	2.303	2.981
R2adjusted	0.059	0.082	0.111	0.125	0.128	0.131	0.118	0.107	0.062
MEAN	7.021	7.821	8.299	8.718	9.121	9.536	9.965	10.483	11.278

t-statistics are in parentheses, and standard errors are bootstrapped using 50 replications, *, **, * represents 10%, 5%, 1% respectively**

By Authors (2025)

Table 3: Estimation of average treatment effects of gender using total factor productivity

	RIF	RIF	RIF	RIF	RIF	RIF	RIF	RIF	RIF
	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Female	0.078	0.056	-0.025	-0.088**	-0.127**	-0.150**	-0.184**	-0.182**	-0.260
	(1.60)	(1.36)	(-0.61)	(-2.22)	(-2.29)	(-2.37)	(-2.45)	(-2.11)	(-1.60)
Constant	1.324***	1.822***	2.191***	2.399***	2.429***	2.759***	2.991***	3.241***	4.171***
	(9.72)	(18.54)	(24.67)	(23.04)	(22.29)	(18.90)	(22.18)	(20.69)	(12.09)
N	4620	4620	4620	4620	4620	4620	4620	4620	4620
RMSE	1.714	1.507	1.435	1.415	1.496	1.708	1.982	2.330	4.030
R2 adjusted	0.003	0.006	0.007	0.007	0.012	0.012	0.015	0.019	0.022
MEAN	1.351	1.804	2.125	2.417	2.686	3.009	3.404	3.905	4.811

t-statistics are in parentheses, and standard errors are bootstrapped using 50 replications, *, **, * represents 10%, 5%, 1% respectively**

By Authors (2025)

respectively but statistically insignificant suggesting no significant difference in the distribution of total factor productivity between female and male-owned enterprises. Thus, evidence from Table 2 & 3 suggests that the difference in the distribution of productivity between female and male-owned formal businesses depends on the measure of productivity. The next section presents the quantile regression-based decomposition technique to quantify the difference in the distribution of productivity

Oaxaca-recentered influence function (RIF) decomposition result

The results of the decomposition with reweighting for the two measures of productivity are presented in Tables 4 and 5. The composition and structural effects are further decomposed into a pure composition and structural effects plus two additional terms to assess the overall fitness of the model and evaluate the quality of the reweighting strategy. The results

Table 4: Oaxaca-RIF decomposition of Labour productivity with reweighting

	RIF	RIF	RIF	RIF	RIF	RIF
	Mean	q10	q40	q50	q75	q90
Aggregate						
Male	9.175***	7.197***	8.766***	9.154***	10.157***	10.157***
	(422.02)	(202.78)	(398.27)	(478.39)	(370.99)	(370.99)
Counterfactual	9.185***	7.298***	8.761***	9.130***	10.203***	10.203***
	(326.35)	(144.69)	(218.38)	(238.14)	(318.26)	(318.26)
Female	9.375***	7.414***	8.924***	9.313***	10.428***	10.428***
	(311.79)	(163.82)	(261.89)	(259.30)	(245.55)	(245.55)
Total difference	-0.201***	-0.218***	-0.157***	-0.159***	-0.271***	-0.271***
	(-5.91)	(-3.51)	(-3.89)	(-4.23)	(-5.76)	(-5.76)
Total Composition effect	-0.190***	-0.117***	-0.163***	-0.184***	-0.225***	-0.225***
	(-11.73)	(-3.89)	(-6.00)	(-7.41)	(-6.72)	(-6.72)
Total Structure effect	-0.011	-0.101	0.005	0.025	-0.046	-0.046
	(-0.33)	(-1.55)	(0.12)	(0.60)	(-1.19)	(-1.19)
Composition effect						
Total composition effect	-0.190***	-0.117***	-0.163***	-0.184***	-0.225***	-0.225***
	(-11.73)	(-3.89)	(-6.00)	(-7.41)	(-6.72)	(-6.72)
Pure Composition effect	-0.182***	-0.174***	-0.185***	-0.198***	-0.202***	-0.202***
	(-10.66)	(-9.37)	(-8.19)	(-9.21)	(-8.49)	(-8.49)
Specification error	-0.008*	0.057**	0.022	0.015	-0.023	-0.023
	(-1.69)	(2.10)	(1.28)	(0.76)	(-1.02)	(-1.02)
Structure effect						
Total structure effect	-0.011	-0.101	0.005	0.025	-0.046	-0.046
	(-0.33)	(-1.55)	(0.12)	(0.60)	(-1.19)	(-1.19)
Reweighting error	0.002	0.004	0.002	0.001	-0.001	-0.001
	(0.45)	(1.06)	(0.51)	(0.21)	(-0.22)	(-0.22)
Pure structure effect	-0.012	-0.105	0.003	0.024	-0.045	-0.045
	(-0.38)	(-1.62)	(0.07)	(0.57)	(-1.17)	(-1.17)
No. of observations	10861	10861	10861	10861	10861	10861

t-statistics are in parenthesis and *, **, * represents 10%, 5% and 1% respectively. Bootstrap standard errors with 50 repetitions.**

By Authors (2025)

showed that female-owned firms outperformed male-owned businesses across all the quantiles and mean. Specifically, women-owned enterprises have higher labour productivity of 2.2%, 3%, 1.8%, 1.7% 2.7% and 2.2% at the mean, 10th, 40th, 50th, 75th, and 90th percentiles than their male counterparts (Table 4). This is contrary to the 11 percent lower labour productivity for women-owned businesses relative to men in SSA and Ethiopia (Islam et al., 2018; Essers et al., 2019). Furthermore, the result supports the results of Davis, Babakus, Englis, and Pett (2010) that female-led firms marginally outperform their male-led counterparts in transmitting market performance into financial performance. The counterfactual labour productivity that would prevail for female-owned businesses if they had assumed the distributional of characteristics of male-owned businesses is statistically significant and the estimated coefficients are almost identical to the labour productivity of male-owned businesses. Thus, the difference in the distribution of labour productivity between women and men-owned enterprises is very small suggesting that on average, no significant difference in the distribution of productivity gap between the two groups.

The results from Table 4 revealed that the small difference in the distribution of labour productivity observed between female and male-owned businesses can be explained by the composition effect. The composition effect is related to the differences in covariates between female and male-owned enterprises and reflects the role that observed and unobserved characteristics play in driving labour productivity. This includes such things as differences in management experience, education, marketing strategy, the legal status of the business, size, and age of the business between female and male-owned enterprises. The factors that drive the composition effects are quality certification, business communication (email and website), paying for security, the experience of managers, and access to finance. Conversely, the structural effects which capture the differences in the returns to the same set of characteristics between female and male-owned businesses are statistically insignificant. This suggests that the differences in the distribution of return to observed and unobserved characteristics in labour productivity between the two groups are not due to differences in the regression coefficients but to other factors. For example, culture and traditional rights, and motherhood effects.

The specification errors are statistically insignificant except at the 10th percentile, thus, the RIF-regression does relatively well in approximating the composition effect using the reweighting procedure. It also indicates that the RIF-regression is well specified and provides a good approximation to the mean and percentiles corresponding to the composition effect. Similarly, the reweighting errors are statistically insignificant and approach zero indicating that the reweighting strategy does perfectly well in identifying the counterfactual distribution and the logit model is well specified.

Secondly, Table 5 reports the decomposition results of total factor productivity. The results revealed that the distribution of total factor productivity is higher for female-owned enterprises than their male counterpart only at the 10th percentile, however, from the 40th to the 90th percentiles, men-owned enterprises exhibit higher distribution in total factor productivity relative to women-owned businesses. The counterfactual distribution of total factor productivity that would prevail for female-owned businesses is statistically significant with estimated coefficients slightly smaller than the distribution for male-owned businesses. Thus, confirming a slightly lower distribution of total factor productivity among female-owned businesses than their male counterpart. Notwithstanding, the total differences are statistically insignificant except for a marginal significance of 10% at the 40th and 75th percentiles representing a distribution of total factor productivity gap of approximately 3%. Again, no significant difference is observed at the aggregate level.

The composition effect is marginally significant at the 50th and 75th percentiles suggesting only minimal differences in the distribution of covariates between female and male-owned businesses. This means that there are no major differences in the distribution of observed and unobserved characteristics between the two groups except at the 50th and 75th percentiles. However, much of the observed difference in the distribution of total factor productivity between women and men-owned enterprises can be explained by the structural effect. The structural effect is statistically significant at 5% and 1% level at the 10th to the 75th percentiles indicating that the gender difference in the distribution of total factor productivity can be attributed to differences in the regression coefficients between the two groups. Factors that are driving the structural effect

Table 5: Oaxaca-RIF decomposition of total factor productivity with reweighting

	RIF	RIF	RIF	RIF	RIF	RIF
	Mean	q10	q40	q50	q75	q90
Aggregate						
Male	2.914***	1.306***	2.457***	2.741***	3.695***	4.850***
	(113.40)	(40.30)	(117.27)	(124.03)	(99.19)	(60.22)
Counterfactual	2.826***	1.403***	2.362***	2.614***	3.519***	4.640***
	(80.32)	(30.35)	(62.29)	(56.70)	(64.03)	(40.82)
Female	2.862***	1.364***	2.384***	2.661***	3.583***	4.718***
	(78.89)	(27.79)	(67.11)	(57.67)	(60.64)	(39.85)
Total difference	0.052	-0.057	0.072*	0.080	0.112*	0.132
	(1.31)	(-1.07)	(1.76)	(1.61)	(1.81)	(0.92)
Total Composition effect	-0.036**	0.039	-0.023	-0.047*	-0.064*	-0.078
	(-2.22)	(1.33)	(-1.28)	(-1.78)	(-1.89)	(-1.34)
Total Structure effect	0.088**	-0.096*	0.095**	0.127***	0.176***	0.210
	(2.23)	(-1.81)	(2.23)	(2.70)	(3.00)	(1.52)
Composition effect						
Total composition effect	-0.036**	0.039	-0.023	-0.047*	-0.064*	-0.078
	(-2.22)	(1.33)	(-1.28)	(-1.78)	(-1.89)	(-1.34)
Pure composition effect	-0.029*	0.038	-0.020	-0.046**	-0.061**	-0.078*
	(-1.92)	(1.52)	(-1.27)	(-2.17)	(-2.20)	(-1.80)
Specification error	-0.007	0.001	-0.003	-0.002	-0.002	-0.000
	(-1.08)	(0.04)	(-0.23)	(-0.11)	(-0.11)	(-0.00)
Structure effect						
Total structure effect	0.088**	-0.096*	0.095**	0.127***	0.176***	0.210
	(2.23)	(-1.81)	(2.23)	(2.70)	(3.00)	(1.52)
Reweighting error	-0.003	-0.004	-0.003	0.000	-0.001	-0.010
	(-0.64)	(-1.22)	(-0.89)	(0.02)	(-0.22)	(-0.96)
Pure structure effect	0.091*	-0.092*	0.098**	0.127***	0.177***	0.220
	(2.24)	(-1.72)	(2.25)	(2.69)	(2.98)	(1.59)
Number of observations	4480	4480	4480	4480	4480	4480

t-statistics are in parenthesis and *, **, * represents 10%, 5% and 1% respectively. Bootstrap standard errors with 50 repetitions.**

By Authors (2025)

are website, firm size, age, and losses from theft. The specification errors are insignificant and close to zero implying that the RIF-regression performs exceedingly well in capturing the composition effect using the reweighting strategy. Additionally, the reweighting errors are equally insignificant and very close to zero thus confirming that the reweighting strategy appropriately identified the counterfactual distribution.

Overall, the difference in the distribution of labour productivity for female-owned businesses on average is 2.3% higher than their male counterpart whereas the difference in the distribution of total factor productivity of male-owned enterprises on average is 3% higher than their female counterpart. However, only the aggregate difference in the distribution of labour productivity between women and men-owned businesses is statistically significant

across all the quantiles. Regarding the total factor productivity, the aggregate difference in the distribution is only marginally significant at the 40th and 75th percentiles. These results strongly affirm previous findings of no significant gender-based performance difference in SSA (Aterido & Hallward-Driemeier, 2011; Bardasi et al., 2007; Bardasi et al., 2011; Chirwa, 2008; Shava & Rungani, 2016) and emerging economies (Bruhn, 2009). Thus, women-owned businesses in Africa are at least as productive as those of their male counterparts as measured by labour and total factor productivity.

Conclusion

This paper has investigated whether and how the distribution of labour and total factor productivity differ between female and male-owned formal enterprises in Africa. The World Bank enterprise survey and the firm estimate of total factor productivity from enterprise surveys were merged to produce the final datasets of 38 African countries. The recentered influence function regression framework was used to estimate unconditional quantile average treatment effects. Secondly, a combination of a reweighting strategy with recentered influence regression-based quantile decomposition technique was implemented to quantify the difference in the distribution of the productivity gap. This empirical approach addresses the limitations of previous studies based on the mean estimation productivity gap by providing a complete analysis of the distribution of productivity between female and male-owned enterprises.

The findings indicate that differences in the distribution of the productivity gap between female and male-owned enterprises depend on how productivity is measured. The results revealed a positive and significant average treatment effect of female-owned enterprises at the 10th, 20th, 70th and 90th percentiles indicating a higher distribution of labour productivity for females than male-owned businesses. For total factor productivity, the average treatment effects are negative and significant at the 40th to the 80th percentiles confirming a lower distribution of total factor productivity for females than male-owned businesses.

The decomposition results from labour productivity corroborate the average treatment effect results and revealed on average 2.3% higher distribution of labour productivity for female-owned firms relative to their male counterpart. Conversely, the decomposition of total factor productivity showed on average 3% higher distribution in the total factor productivity of male-owned enterprises than their female counterpart. However, these distributional gaps are relatively smaller compared to the 11% and 12% lower labour productivity for female-owned enterprises than their male counterpart in SSA (Islam et al., 2018) and Ethiopia (Essers et al., 2019). Based on the small differences in the distribution of labour and total factor productivity between female and male formal owned enterprises in Africa, it suffices to conclude that there is little to be gained from addressing entrepreneurship challenges in Africa through a gender lens.

These results provide insightful lessons to policymakers in Africa to address barriers that limit women's economic participation. Currently, for the 17 African countries with sex-disaggregated data on entrepreneurship, on average, there is a gender gap of 62.4%, 48.8%, 62% for new business creation, sole proprietor, and directors of new limited liabilities companies. Focusing policy attention to ease entry into entrepreneurship by addressing legal, regulatory, and equalizing gender access to finance and lending is likely to exert a positive influence on women entrepreneurship. This will accelerate Africa's attainment of the 2030 SDG one, five, eight, and ten. Failure to close this gender gap of entry into entrepreneurship means the available human capital is not being fully utilized and potential loss of output as a consequence of suboptimal utilization of human resources.

One limitation of this study is that the productivity analysis is done across the country, however, the study can be expanded by investigating gender differences in productivity across region blocs.

Disclosure requirements

There is no conflict of interest and no funding was received.

Acknowledgement: The manuscript has benefited from the expert review of Rios-Avila, Fernando particularly of the application and interpretation of the empirical methodology.

Reference

Ahl, H. (2006). Why Research on Women Entrepreneurs Needs New Directions. Entrepreneurship Theory and Practice, 30(5), 595–621. https://doi.org/10.1111/j.1540-6520.2006.00138.x

Ali, R. S. (2016). Feminist theory and its influence on female entrepreneur's growth intentions. In: M. Kosała, M. Urbaniec & A. Żur (Eds.). Entrepreneurship: Antecedents and Effects "Przedsiębiorczość Międzynarodowa," 2(2), 27–42.

Aterido, R., Beck, T., & Iaconvone, L. (2013). Access to Finance in Sub-Saharan Africa: Is There a Gender Gap? World Development, 47, 102–120. https://doi.org/10.1016/j.worlddev.2013.02.013

Aterido, R., & Hallward-Driemeier, M. (2011). Whose business is it anyway? Closing the gender gap in entrepreneurship in Sub-Saharan. Small Business Economics, 37(4), 443–464. https://doi.org/10.1007/sll

Bardasi, E., Blackden, C. M., & Guzman, J. C. (2007). Gender, entrepreneurship, and competitiveness in Africa. In the World Bank, and African Development Bank (Eds.): Africa Competitiveness Report, (pp. 69–85). World Economic Forum.

Bardasi, E., Sabarwal, S., & Terrell, K. (2011). How do female entrepreneurs perform? Evidence from three developing regions. Small Business Economics, 37((2011)), 417–441. https://doi.org/10.1007/s11187-011-9374-z

Barsky, R., Bound, J., Charles, K. K., & Lupton, J. P. (2002). Accounting for the black-white wealth gap: A nonparametric approach. Journal of the American Statistical Association, 97(459), 663–673.

Bates, T., Jackson, W. E. I., & Johnson, J. H. J. (2007). Introduction: Advancing research on minority entrepreneurship. The Annals of the American Academy of Political and Social Science, 613, 10–17. https://doi.org/10.1177/0002716207303405

Blinder, A. S. (1973). Wage Discrimination: Reduced Form and Structural Estimates. The Journal of Human Resources, 8(4), 436–455.

Bruhn, M. (2009). Female-Owned Firms In Latin America : Characteristics, Performance, And Obstacles To Growth. In World Bank Policy Research Working Paper (No. 5122). http://documents.worldbank.org/curated/en/491141468045040504/pdf/WPS5122.pdf

Brush, C. G. (1992). Research on women business owners: Past trends, a new perspective and future directions. Entrepreneurship Theory and Practice, 16(4), 5–30. https://cemi.com.au/sites/all/publications/Brush 1992.pdf

Brush, C. G., De Bruin, A., & Welter, F. (2009). A gender-aware framework for women's entrepreneurship. International Journal of Gender and Entrepreneurship, 1(1), 8–24. https://doi.org/10.1108/17566260910942318

Campbell, K., & Minguez-Vera, A. (2010). Female board appointments and firm valuation: short and long-term effects. Journal of Management and Governance, 14(1), 37–59. https://doi.org/10.1007/s10997-009-9092-y

Carter, S., Shaw, E., Lam, W., & Wilson, F. (2007). Gender, entrepreneurship, and bank lending: The criteria and processes used by bank loan officers in assessing applications. Entrepreneurship Theory and Practice, 31(3), 427–444. https://doi.org/10.1111/j.1540-6520.2007.00181.x

Chirwa, E. W. (2008). Effects of gender on the performance of micro and small enterprises in Malawi. Development Southern Africa, 25(3), 347–362.https://doi.org/10.1080/03768350802212139

Conyon, M. J., & He, L. (2017). Firm performance and boardroom gender diversity: A quantile regression approach. Journal of Business Research. https://doi.org/10.1016/j.jbusres.2017.02.006

Cook, R. G., Belliveau, P., & Lentz, C. (2007). The role of gender in US microenterprise business plan development. Journal of Small Business and Enterprise Development, 14(2), 241–251. https://doi.org/10.1108/14626000710746673

Davis, P. S., Babakus, E., Englis, P. D., & Pett, T. (2010). Orientation and Performance in Service Small and Medium-Sized Service Businesses. Journal of Small Business Management, 48(4), 475–496. https://doi.org/10.1111/j.1540-627X.2010.00305.x

DiNardo, J., Fortin, N. M., & Lemieux, T. (1996). Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric. Econometrica, 64(5), 1001–1044.

Dopfer, K., Foster, J., & Potts, J. (2004). Micro-meso-macro. Journal of Evolutionary Economics, 14((2004)), 263–279. https://doi.org/10.1007/s00191-004-0193-0

DuRietz, A., & Henrekson, M. (2000). Testing the female underperformance hypothesis. Small Business Economics, 14(1), 1–10.

Edelman, L. F., Donnelly, R., Manolova, T., & Brush, C. G. (2018). Gender stereotypes in the angel investment process. International Journal of Gender and Entrepreneurship, 10(2), 134–157. https://doi.org/10.1108/IJGE-12-2017-0078

Essers, D., Megersa, K., & Sanfilippo, M. (2019). The

productivity gaps of female-owned firms: Evidence from Ethiopian census data. Forthcoming: Economic Development and Cultural Change. https://doi.org/10.1086/703098

Fairlie, R. W., & Robb, A. M. (2009). Gender differences in business performance: evidence from the Characteristics of Business Owners survey. Small Business Economics, 33((2009)), 375–395. https://doi.org/10.1007/s11187-009-9207-5

Fernandes, M., Alves, R., Vasconcelos, S., Galina, R., Macini, N., & Costa, T. (2017). Internationalization and innovation in nascent companies: does gender matter? Journal of Small Business and Enterprise Development, 24(4), 887–906. https://doi.org/10.1108/JSBED-01-2017-0020

Firpo, S., Fortin, N. M., & Lemieux, T. (2009). Unconditional Quantile Regressions. Econometrica, 77(3), 953–973. https://doi.org/10.3982/ECTA6822

Firpo, S. P., Fortin, N. M., & Lemieux, T. (2018). Decomposing wage distributions using recentered influence function regressions. Econometrics, 6(2), 1–40. https://doi.org/10.3390/econometrics6020028

Fischer, E. M., Reuber, A. R., & Dyke, L. S. (1993). A theoretical overview and extension of research on sex, gender, and entrepreneurship. Journal of Business Venturing, 8(2), 151–168. https://doi.org/10.1016/0883-9026(93)90017-Y

Fortin, N., Lemieux, T., & Firpo, S. (2011). Decomposition methods in economics. In O. A. and D. Card (Ed.), IN HANDBOOK OF LABOR ECONOMICS (., Vol. 4A, pp. 1–102). Elsevier B.V. https://doi.org/10.1016/S0169-7218(11)00407-2

Francis, D. C., Karalashvili, N., Cusolito, A. P., & Meza, J. R. (2018). Firm level productivity estimates. In Methodological Note.

GEM. (2017). Women's Entrepreneurship 2016/2017 Report. https://www.babson.edu/Academics/centers/blank-center/global-research/gem/Documents/GEM 2016-2017 Womens Report.pdf

Gottschalk, S., & Niefert, M. (2013). Gender differences in business success of German start-up firms. International Journal of Entrepreneurship and Small Business, 18(1), 15–46.

Gupta, V. K., Goktan, A. B., & Gunay, G. (2014). Gender differences in evaluation of new business opportunity: A stereotype threat perspective. Journal of Business Venturing, 29(2), 273–288. https://doi.org/10.1016/j.jbusvent.2013.02.002

Inmyxai, S., & Takahashi, Y. (2010). Performance contrast and its determinants between male and female-headed firms in Lao MSMEs. International Journal of Business and Management, 5(4), 37–52. www.ccsenet.org/ijbm

Islam, A., Gaddis, I., Palacios Lopez, A., & Amin, M. (2018). The Labor Productivity Gap between Female and Male-Managed Firms in the Formal Private Sector. In Policy Research Working Paper (No. 8445). http://www.worldbank.org/research.

Jalbert, T., Jalbert, M., & Furumo, K. (2013). The Relationship Between CEO Gender, Financial Performance, And Financial Management. Journal of Business & Economics Research, 11(1), 25–34. http://www.cluteinstitute.com/

Jann, B. (2016). Assessing inequality using percentile shares. The Stata Journal, 16(2), 264–300. http://topincomes.parisschoolofeconomics.eu/.

Jennings, J. E., & Mcdougald, M. S. (2007). Work-Family interface experiences and coping strategies: Implications for entrepreneurship research and practice. The Academy of Management Review, 32(3), 747–760.

Kalafatoglu, T., & Mendoza, X. (2017). The impact of gender and culture on networking and venture creation An exploratory study in Turkey and MENA region. Cross Cultural & Strategic Management, 24(2), 332–349. https://doi.org/10.1108/CCSM-04-2016-0090

Kalleberg, A. L., & Leicht, K. T. (1991). Gender and Organizational Performance: Determinants of Small Business Survival and. The Academy of Management Journal, 34(1), 136–161. https://about.jstor.org/terms

Kalnins, A., & Williams, M. (2014). When do female-owned businesses out-survive male-owned businesses? A disaggregated approach by industry and geography. Journal of Business Venturing, 29((2014)), 822–835. https://doi.org/10.1016/j.jbusvent.2013.12.001

Kepler, E., & Shane, S. (2007). Are Male and Female Entrepreneurs Really That Different? U.S. SBA-Office of Advocacy Working Paper, 309, 1–61. www.sba.gov/advo/rsslibrary.

Khan, W. A., & Vieito, J. P. (2013). Ceo gender and firm performance. Journal of Economics and Business, 67((2013)), 55–66. https://doi.org/10.1016/j.jeconbus.2013.01.003

Killewald, A., & Bearak, J. (2014). Is the motherhood penalty larger for low-wage women? A comment on quantile regression. American Sociological Review, 79(2), 350–357. https://doi.org/10.1177/0003122414524574

Kılıç, M., & Kuzey, C. (2016). The effect of board gender diversity on firm performance: evidence from

Turkey. Gender in Management:An International Journal, 31(7), 434–455. https://doi.org/10.1108/GM-10-2015-0088

Malmstrom, M., Johansson, J., & Wincent, J. (2017). Gender stereotypes and venture support decisions: How governmental venture capitalists socially construct Entrepreneurs' potentiale. Entrepreneurship Theory and Practice, 833–860. https://doi.org/10.1111/etap.12275

Marlow, S., & Mcadam, M. (2013). Gender and entrepreneurship: Advancing debate and challenging myths; exploring the mystery of the under-performing female entrepreneur. International Journal of Entrepreneurial Behavior & Research, 19(1), 114–124. https://doi.org/10.1108/13552551311299288

Oaxaca, R. (1973). Male female wage differentials in urban labor markets. International Economic Review, 4(3), 693–709.

Rios-Avila, F. (2020). Recentered influence functions (RIFs) in Stata: RIF regression and RIF decomposition. The Stata Journal, 20(1), 51–94. https://doi.org/10.1177/1536867X20909690

Robb, A. M., & Watson, J. (2012). Gender differences in firm performance: Evidence from new ventures in the United States. Journal of Business Venturing, 27, 544–558. https://doi.org/10.1016/j.jbusvent.2011.10.002

Sabarwal, S., & Terrell, K. (2009). Access to credit and performance of female entrepreneurs in Latin America (Summary). Frontiers of Entrepreneurship Research, 29(18), 1–2. http://digitalknowledge.babson.edu/fer/vol29/iss18/6

Shava, H., & Rungani, E. C. (2016). Influence of gender on SME performance in emerging economies. Acta Commercii, 16(1), 1–9.

Singhathep, T., & Pholphirul, P. (2015). Female CEOs, Firm Performance, and Firm Development: Evidence from Thai Manufacturers. Gender, Technology and Development, 19(3), 320–345. https://doi.org/10.1177/0971852415596865

Sweida, G. L., & Reichard, R. J. (2013). Gender stereotyping effects on entrepreneurial self-efficacy and high-growth entrepreneurial intention. Journal of Small Business and Enterprise Development, 20(2), 296–313. https://doi.org/10.1108/14626001311326743

VanderBrug, J. (2013). The Global Rise of Female Entrepreneurs. Harvard Business Review, September. https://hbr.org/2013/09/global-rise-of-female-entrepreneurs

Watson, J. (2002). Comparing the Performance of male and female controlled business: Relating outputs to inputs. Entrepreneurship Theory and Practice, 26(3), 91–100. http://journals.sagepub.com/doi/pdf/10.1177/104225870202600306

Watson, J. (2011). Networking: Gender differences and the association with firm performance. International Small Business Journal, 30(5), 536–558. https://doi.org/10.1177/0266242610384888

World Bank. (2021). Entrepreneurship Data. The World Bank Doing Business. https://www.doingbusiness.org/en/data/exploretopics/entrepreneurship

WorldBank. (2019). Profiting from parity: Unlocking the potential of women's businesses in Africa. https://openknowledge.worldbank.org/handle/10986/31421

Performance Motives, Earning Manipulation and Market Sentiments in South Africa: A Case of JSE Listed Companies

Joseph Olorunfemi Akande
Department of Accounting Science, Walter Sisulu University,
Mthatha, South Africa
Email: AkandeJ@ukzn.ac.za

Abstract

The study investigated the interacting effects of earning manipulation, firm performance and market sentiment among JSE-listed firms in South Africa. The objective of the study is to understand how market sentiment through earning manipulation can impact on firms' performance (vice versa) among the 181 listed firms under investigation in South Africa. Vector autoregressive model through impulse-response analysis was adopted as the study's estimating technique. The study adopted unrestricted VAR as the appropriate technique since the test result revealed that the variables failed to exhibit possible co-movement together at the long run; hence the adoption of an unrestricted VAR to analyze the model. The VAR result revealed that the first lag of earning manipulation, the second lag of market sentiment and returns to assets contemporaneously impacted earning manipulation at a 1 percent level of significance. The past value of market sentiment caused a 12.4 percent decrease in the current market sentiment on average. Furthermore, one percentage variation in the earning manipulation on average caused past sales manipulation and firms' profitability to increase by 18.8 and 0.72 per cent. Policy implications suggest that sales manipulation affects returns on assets contemporaneously and impacts market sentiment at a 1 percent level of significance. Investors' effective policy on the management of manipulation would impact firms' performance in the current period and the long run.

Keywords:
Earnings manipulation, firm's performance, market sentiment, VAR, scandal

JEL Classification:
G23, G32, G11

Introduction

The rising scandal of earning manipulation and its consequences on a firm's performance is of growing concern among investors in South African listed firms and other countries around the world. Consequently, this paper investigates whether earning manipulation by managers of listed firms impact on firms' performance by studying whether the manipulation of earning essentially impact on optimal investment decisions in South Africa.

The interaction between earning manipulation and its consequences on performance and market sentiment has been analysed by many research studies (Jones, 1991; Dechow et al., 1995; Kothari et al., 2005; Roychowdhury, 2006; Mizik and Jacobson 2007; Cohen and Zarowin, 2010 as cited by Doan, Foster & Yang, 2018). For instance, Dechow et al. (2010) noted that managers normally distort the firm's financial information and inflate earnings by manipulating either real activity earnings or accrual earnings. Notably, both outcomes possibly impact the long-term firm's performance. Earnings manipulation reduces the information quality regarding earnings utilised by external shareholders, resulting in misleading sentiment and performance (Garel et al., 2018; Kim and Sohn, 2013). Consequently, earning manipulation negatively affects prospective stock returns and earnings (Garel et al., 2018).

Although a deluge of literature has considered the concepts of firms' performance, earnings management, reporting quality, market sentiments and some of their possible interactions (Anusakumar et al., 2017; Saona et al., 2020), yet there has been less focus on the relationship among these performance motives, earning manipulations and market sentiments. Lack of adequate information on the nexus is not without their consequences. Some of such consequences are misinformation about real market conditions and biased investment decisions.
Earning manipulations could portray a serious threat to business existence and they most often result in the misspecification of corporate reporting decisions. The action of managers is guided by misspecification as such investors' sentiment-driven expectations of future earnings become uncertain (Baker and Wurgler, 2012; Jaiswall and Bhattacharyya 2016). From the foregoing, the interaction of investor sentiment, performance motive and earning manipulation must be studied, as this might throw more light on how earning games are played by managers in the stock market and their consequences on a firm's performance.

Previous studies (Jaiswall and Bhattacharyya 2016; Ali and Gurun, 2009 as cited by Simpson 2013) emphasise that managers enjoy upward earnings during periods of high investor sentiment, analysts' expectations and optimistic individual investors. Hence, literatures remain inconclusive of the exact standing relationship among the financial variables. Again, the combination of Performance Motives, Earning Manipulation, and Market Sentiments within a single study is not only correct and grounded in the literature but also necessary for a comprehensive understanding of financial behaviors in the context of the Johannesburg Stock Exchange (JSE) listed companies. The synergistic exploration of these constructs offers a multidimensional view of corporate conduct and investor reactions, which is crucial for assessing the integrity of financial markets in South Africa.

Literature Review

Conceptually, earnings management (EM) uses techniques in accounting to report financial statements that reveals an overly positive state of an organisation's financial position and business activities. EM sometimes takes advantage of how tecinhniques in accounting are applied to benerate financial statements that smooth earnings or inflate it. Some evidences show that some organisations may be adopting EM techniques for the distortion of the organisational financial statement and figures: Cases of such is the claims in the growth of revenue that failed to come with a corresponding flow in the growth of cash. Another case is when managers report earnings activities that took place during the periods of the final quarter of the fiscal year (Svabova, 2021). In this study, accrual adequately measures earning manipulation. On the other hand, Performance motive refer to the underlying drivers that compel management to achieve certain financial outcomes, which often hinge on the expectations of shareholders and the broader investment community. These motives are central to corporate governance and strategic financial decision-making (Healy and Wahlen, 1999). Understanding performance motives is imperative as they can precipitate earning manipulation, which involves the intentional skewing of financial statements to meet certain benchmarks or expectations (Jones, 1991).

Earning manipulation can distort market sentiments, defined as the attitudes and expectations of investors regarding the future performance of the market or a particular stock (Baker and Wurgler, 2007). When viewing performance from the perspective of individual employee in a given organization. Employee performance is the final result of particular tasks which was made by employee, which is employee responsible for and which will be evaluated. In other words, performance defines the outcomes of some specified task within an expected quality and time frame. Numerous opinions exist on the attempt to explan performance. It could be regarded as records of achieved success. Kane, Marks, Zaccaro & Blair, (1996) argued, that performance is that thing that an individual left behind and that exists separately from the purpose. Stareček, Koltnerová, Vraňaková, Kubišová, Jurík, Ďuriš, & Krchnáková, (2021) suggest that performance is the work outcomes, sincce it offfers the strongest link to the firm's strategic objectives, economic benefit to the firm, and customer's satisfaction (Stareček et al, 2021). This study measures the performance of 181 listed firms in South Firms in South Africa through the use of panel data estimating technique. How is this performance impacted upon by other internal environment of earning management and market sentiment.

To justify why sentiments play a significant role in the financial markets. Skiftesvik, & Vasshus, (2021) argued that market sentiment is the overall investors' attitude toward a particular financial market or security . It is the tone of a market or feeling, or perhaps the crowd psychology, as shown through the price movement and the activity of the securities traded in the market. The interplay between these elements is pivotal; for instance, performance motives can lead to earning manipulation when management is pressured to meet short-term targets, potentially misguiding market sentiments and leading to mispricing of stocks (Healy and Palepu, 2001). This misalignment can have significant implications for investment decisions and market efficiency. In summary, falling prices is an indication of bearish market sentiment while rising prices indicate a bullish market sentiment (Skiftesvik& Vasshus, 2021). Literature on sentiment indices vary based on the kinds of available market data/ market numbers of which their data resembles market sentiment. Consequently, the indices could compose of everything. Market sentiment has not been adequately defined. Currently, absolute way to express which market number depicts market sentiment does not exist. Howevver, the economics literatures are more interested in the sentiment indices' predictive power rather than adopting the information for being active on the market alone (Skiftesvik& Vasshus, 2021). This study adopted accrual to proxy earning manipulation and sales management to proxy market sentiment since one could predict high and low market periods through it. Dechow et al. (2010) discovered that managers usually dilate accrual earnings and distort the firm's financial information through the manipulation of either accrual or real activities. The adoption of sales management to proxy sentiment was premissed upon the argument that sentiment indicators gauge market psychology in the form of consumer behavior and beliefs that may influence the market which sales management truly satisfies.

Earning manipulation relates to investors' sentiment and performance motive with a wide set of acceptable processes as spelt out by accounting standards (Healy, Serafeim, Srinivasan, & Yu, 2014). The opportunistic attitude of the managers negatively impacts earnings, leading to an unreliable measure of performance in organisations (Dechow, 1994). Teoh et al. (1998) argued that with the initial public offer of very high accruals by managers, most firms suffer from poor performance of returns on the stock in the subsequent years. Kothari (2001) further noted that some double-standard managers adopt accounting discretion to fraudulently alter accruals for personal benefits. For instance, this process occurs by putting off write-off of assets, adjusting the rate of depreciation of assets and under-provision for bad debt might form the basis for decreasing or increasing cash income strategies. Earnings manipulation as argued by Schipper (1989) is an attempt to deliberately interfere with the reports of financial activities in an organisation before its open declaration to external users for personal benefits. Healy and Wahlen (1999) justified further that earning manipulation takes place when managers adopt judgment in structuring transactions and in the financial reporting to alter financial reports to influence the contractual outcome that depends on reported accounting numbers or to mislead the investors about the underlying economic performance of the firm.

The study's theoretical foundation relies on the framework of agency and managerial power theory. Agency theory offers a conceptual relationship

between the principal (first party) being entrusted with financial responsibility another the agent (second party). The theory attempts to portray the conduct of a global organisation by emphasising an ideal relationship between the management of a company as principal shareholders and the agents employed to engage in some tasks for the organisation (Zogning 2017). Agency relationship could be justified on the opinion that it is a contractual relationship in which an individual or a group of people otherwise known as the principal engage another individual called the agent to perform some decision-making responsibility on behalf of shareholders. This relationship as mirrored by agency theory indicates that problem often surfaces in firms as a result of separation of power between the managers and owners of firms. Consequently, the theory emphasised on how this problem could be minismised. The theory developed policy principles for governance mechanisms to control the agents' action in the jointly held organisations. In a joint stock company, the ownership is held by groups or individuals in the form of stock with shareholders (principals) delegates the authority to the managers (agents) to run the business on their behalf (Ross, 1973), Again, at the central corporate governance is the shareholders' theory that requires the maximisation of wealth to the owners, thereby giving agents adequate incentives to manage their earnings to ensure that this mandate is fulfilled with consequences for the information reported in the business financial statement (Harvey Pamburai, Chamisa, Abdulla, & Smith, 2015). Naturally, manipulation occurs due to the conflict of interests between the investors (also known as principals) and the agent's personal divergent opinion which often leads to an agency problematic relationship. Agency cost is incurred due to suspicion between the principal and agent due to disparity in the interest between the managers and the principal as occasioned by the separation of ownership from control (Agarwal et al., 2014). Since the level of suspicion cannot be ascertained without any cost, both the principal and the agent assume monitoring and obligation costs (Zogning, 2017). The promoter of the managerial power theory indicates that the control of managers over pay structure often leads to remarkable distortions which are costly to both the shareholders, the organisation, and the economy (Barkema & Pennings, 1998). It deteriorates the motivation to improve the value of shareholders and encourages activities that inversely impact the firm value in the long run.

Another fundamental implication of managerial power theory is that many of the executives get paid more than the market efficiency and maximal shareholder value prescribed. Consequently, high executive remuneration aggravates agency problems rather than decreasing them. A significant area where this occurs is in the area of stock options for the top executives. The structure of the stock options empowers the executives to exercise their immediate rights. It also empowers them to enjoy the benefit from the excess profit above the general market returns. These opportunities create an avenue for executives to misreport financials and manipulate earnings. The board of directors may not be able to control any of these major decisions because directors are allowed to enjoy independent economic and non-economic inducements which include reappointing the board, fixing the director's remuneration, and engaging the director's firm for businesses (Barkema & Pennings, 1998).

Earnings manipulation consequences and types have been investigated by numerous research studies (Strakova, 2021; Goel, 2016; Nia et al, 2015; Rahman et al 2013; Gill et al 2013; Makhaiel & Sherer, 2017). Strakova, (2021) investigated the possible motives behind practices of earnings management among firms in a global setting with the aims showing individual techniques adopted to achieve the individual motives. The study adopted method of classification of technical terms alongside description analysis to specify the techniques and motives of earnings management adopted in the context of global environment. Evidence has shown that value added exist strong the motives that impact on global environment for managers aiming at practicing earnings management. Such motives include beating analysts' expectations, better pricing of securities, avoid negative earnings, better compensation of managers, reflection of better performance than past, external finance attraction, tax evasion, favorable contracts from suppliers, concealment of poor performance, customers/ employees avoiding technical default on debts covenants. Further results revealed that earnings management could impact on the stress level of managers builds-up as a result of expectations of stakeholders' improved performance.

Goel (2016) contributes to the extant literature by indicating market preference to accrual principles of accounting as motivated by aspiration for earnings management. It examines the performance of sample

units in relations to cash-indicators versus accrual-indicators together with prevalence on stock pricing in India., Corporate ownership model is the Promoter Dominated Shareholders Model in India. The study's hypothesis was that the accounting data were either derived from a cash-flow accounting system or an accrual accounting system. Three accounting indicators were computed for the sample companies in the study which includes the common equity per share/stock price (CEP), the cash flow per share/stock price (CFP) and the earnings per share/stock price (EPSP) for the years 2003-04 to 2007-08. The indices on return were adopted for a comparison of the relative merits of cash and accounting accrual. Result indicates that cash based indicators more variability than accrual based indicators. This indicates market preferences for accrual based indicators in pricing of securities. Further, EPSP shows the earning potential of the company and the earnings management is easier and more lucrative with income figures than cash-flow accounting data. As a result, EPSP finds a favour from the market.

This made the study unique in addressing motivation of earnings management. The units show a market preference for accrual numbers and motivation for earnings management as clear in their stock pricing behavior. I hope the study improves investors' perception of the reliability of a firm's performance, as measured by earnings. It is of use to the users of financial accounting and corporate finance globally for rationalizing the motivation behind earnings manipulation by the management.

Nia et al (2015) investigated the concept of earnings management from the perspective of techniques, motives and consequences. An approach of earnings management is considered legitimate once it thoroughly discloses financial statements and complies with Generally Accepted Accounting Principles (GAAP). By implication, an approach is said to be otherwise once it violates the GAAP. The study appraised some literatures on the managers' incentives and the corresponding earnings management techniques. The extent and types of earnings management are determined by certain factors, such as stock market incentives, personal incentives, and regulatory motives. The study deduced that the earnings management consequences could be injurious to any organization once the managers diverted the opportunities in the earnings management for personal gains rather than for the stockholders' benefit. Earnings management is assumed beneficial and ethical once the managers operates with discretion over earnings within Generally Accepted Accounting Principles sole aim of safeguarding shareholders' interests.
Rahman et al (2013) focused on quality of earnings, earnings management, and various techniques that were adopted to manage earnings in the business environment. Type and extent of earnings management relies on personal incentives, stock market incentives, regulatory & political motives. In conclusion, the paper argued that awareness of audit committee, severe accounting standard, corporate consciousness and governance alongside the morality of the stake holders are fundamental in controlling earning management.

Gill et al (2013) tested whether the earnings management practices that impacts and are benefitial to Indian company's management impacted on a firms' performance. It also investigated whether earnings management impacted on other stakeholders. Co-relational research design were adopted in the study as the appropriate estimating technique. 250 firms were sampled from the top 500 listed Companies on the Bombay Stock Exchange (BSE) over a period of 4 years from 2009 to 2012. The study's outcome showed that the more intense the earnings management practices are, the more the adverse impacts on the corporate rate of return on assets in the year following. The study also observed that to a great extent, the management responds to the market with selfish motives and through corporate market value to lower share prices. The study contributes to the body of knowledge on the relationship between several features of firm performance, earnings management, and the firm's value.

Makhaiel & Sherer (2017) drew on new institutional sociology (NIS) theory and interpretive methodology to identify which external factors motivate Egyptian company managers to adopt earnings management to modify financial statements. The study adopted an interview methods and interpretative methodology. Interview were administered on 34 participants, grouped into four various categories; executives, auditors. financial analysts, and stock exchanges' authorities. The provided evidence on which of the external factors motivates corporate executives in Egyptian to adjust certain earnings number in financial statements. The external factors under

considerations include the investors' expectations, employees and lenders, beating an earnings target, the effects of stock exchange listing rules, and privatisating key state-owned industries.

From the reviewed literature, it is evident that not much research work has been conducted on earning manipulation, firm's performance motive and investor sentiment particularly among the developing economies. The ability of the study to explore these three financial indicators by adopting South African data from 181 listed firms fills a gap in the literature.

Consequently, the study aims at providing empirical evidence whether accounting misrepresentation and misstatement essentially motivated by market expectations and compesation targets has implications on firms' performance. Therefore, the study hypotheses (i) investor sentiment has no significant relationship with earning manipulation among the 181 listed firms in South Africa. (ii) Earning manipulation has no significant relationship with performance motives among the 181 listed firms in South Africa market sentiment has no significant relationship with performance motives among the 181 listed firms in South Africa.

Method

This study investigates the asymmetry relationship between earning manipulation, firm performance and investors' sentiment among 181 JSE-listed firms in South Africa for the period 2004 – 2019.

Model specification

To model the relationship among performance motives, earning manipulations and market sentiments in South Africa, with the use of a vector autoregressive approach, the study adopted a model from Garel et al., (2018). Consequently, the three variables for the vector auto-regressive (VAR) models can be specified as follows:

$$ROA_{it} = \beta + \sum_{n=1}^{k} \partial ROA_{it-1} + \sum_{x=1}^{k} \emptyset SMN_{it} + \sum_{y}^{k} \pi ACC_{it} + \alpha_{it} \quad (1)$$

$$SMN_{it} = \beta + \sum_{n=1}^{k} \partial SMN_{it-1} + \sum_{x=1}^{k} \emptyset ROA_{it} + \sum_{y}^{k} \pi ACC_{it} + \alpha_{it} \quad (2)$$

$$ACC_{it} = \beta + \sum_{n=1}^{k} \partial ACC_{it-1} + \sum_{x=1}^{k} \emptyset ROA_{it} + \sum_{y}^{k} \pi SMN_{it} + \alpha_{it} \quad (3)$$

Where return on asset (ROA) is to proxy firms' performance motive, accrual (ACC) is to proxy earning manipulation and SMN is to proxy market sentiments in South Africa. $\beta, \partial, \emptyset, \pi$ are the coefficients of elasticity that aid in the measurement of the three financial variables. α_{it} is the random variable used to capture the unspecified variables in the model

All data on accrual (earning management), market sentiment and ROA were sourced from S&P Capital IQ and (Bloomberg 2018). All listed firms were sampled from Johannesburg Stock Exchange (JSE) between 2004 and 2019 subject to data availability to compute the adopted models. Data from a total of 181 listed firms were collated for analysis. Consequently, 181 listed firms where Anglo American, Sasol chemical company, Shoprite Holdings (food retails) and MTN group representing the telecommunication are the price leaders of the companies are here investigated.

Justification for the use of impulse response Analysis

The dynamic system in an impulse response function (IRF), generates an output when signalled with an input, otherwise known as impulse (δ(*t*). Specifically, an impulse response is the dynamic reaction in response to some external changes. The impulse response describes the reaction of the system as a function of time (with respect to the study; a function of some other independent variables that parameterizes the behavior dynamics in the study's model) (Mohr, 2020; Iorngurum, & Nwaobi, 2021; Omolade, Nwosa, & Ngalawa, 2019). The study tested the Performance Motives, Earning Manipulation and Market Sentiments on the 181 JSE Listed Companies South Africa using impulse response function (IRF) to generate reactions. The three variables were checked for the longrun cointegration or movement among variables. The test result reveals that the variables failed to exhibit possible co-movement together at the long run; hence the adoption of an unrestricted VAR to analyze this study becomes inevitable. For instance, Model 1 $ROA_{it} = \beta + \sum_{(n=1)}^{k} \partial ROA_{(it-1)} + \sum_{(x=1)}^{k} \emptyset SMN_{it} + \sum_{y}^{k} \pi ACC_{it} + \alpha_{it}$ specified what response can be generated on Performance Motives (ROA) when Earning Manipulation (ACC) and Market Sentiments interact (SMN). Model 2

$SMN_{it} = \beta + \sum_{(n=1)}^{k} \partial SMN_{it-1} + \sum_{(x=1)}^{k} \emptyset ROA_{it} + \sum_{y}^{k} \pi ACC_{it} + \alpha_{it}$ specified what response is expected on market

Table 1: Variables adopted, definitions and expected measurement based on the theories

Variables	Definitional Terms	Expected measurement
Return on Assets (ROA)	It's an indicator of how well the company is managing its available resources and assets to net higher profits. It is a good measure of a firm's performance. ROA = Net Profit / (Beginning Total Assets + Ending Total Assets) / 2	An effective measure of profitability ratio
Earning management	The conventional argument from the accrual concept is that revenue is recorded when they are earned and expenses are recorded when they are incurred. One could predict high and low market periods. Dechow et al. (2010) discovered that managers usually dilate accrual earnings and distort the firm's financial information through the manipulation of either accrual or real activities.	The study proxied earning management with accrual $Accruals_{it} = \partial_0 + \partial_1 (\frac{1}{ATS_{it-1}}) + \partial_2 (\Delta SS_{it} - \Delta RC_{it}) + \partial_3 PE_{it} + \partial_4 RA_{it} + \mu_{it}$ Accrula = estimated as Δ in non-cash assets at current period minus Δ in liabilities at current period when current long-term debt has been deducted, minus amortisation and depreciation, divisible by total assets of preceeding year. ATS_{it-1} = lagged total assets, ΔSS_{it} sales in the current year less prior sales in year divisible by lagged total assets of one year, ΔRE_{it} = account receivable in the current year less the account receivable at the prior year divisible by lagged total assets of one year, PE_{it} = net property at current year.
Market sentiment	Bormann, (2013) strongly argued that literature still remain unclear as to what and how to measure sentiment indice. A sentiment index according to Bormann, (2013:6) could be any form of available data so long the researchers are convinced that the available data depict the market sentiment since there are no officially acceptable definitions.	The study followed literature (Bormann, (2013)) in its estimation of market sentiment using either the manipulation of accruals or real activities with the following indices $\textbf{Sent} = \frac{N^+ - N^-}{N^+ - N^- + N^0}$

Source: Author's Computation, 2023

sentiments, when performanace motive interplay with earning manipulation. Finally, Model 3 $ACC_{it} = \beta + \sum_{(n=1)}^{k} \partial ACC_{it-1} + \sum_{(x=1)}^{k} \varnothing ROA_{it} + \sum_{y}^{k} \pi SMN_{it} + \alpha_{it}$ specified what response can result on earning manipulations when Performance Motives (ROA) and market sentiment are regressed together as the model applied autoregressive (AR) in its estimations.

Result

The descriptive statistics as presented in Table 1 show the sample size, mean values, median, standard deviation, Skewness and Kurtosis of the variables under investigation. Descriptive statistics is necessary as it shows some unique statistics peculiarity of variables and whether the data sets used are normally distributed (Pindyck and Rubinfeld, 1998 cited by Chonco, 2019). One of the simplest ways to test for normality is by checking if the mean and median are nearly equal and whether the skewness and kurtosis are approximately zero respectively. Statistical Jarque-Bera (JB) is a more preferred method of testing for normality. Jarque-Bera (JB) is a joint test for kurtosis coefficient (K) and the skewness coefficient (S). The study failed to accept the null hypothesis for pssible presence of normality in the model if the Jarque-Bera

Table 2: Descriptive Statistics Table

	ACC	Sentiment (SMN)	ROA
Mean	0.039367	0.275499	0.399330
Median	0.000000	0.075029	0.086159
Maximum	160.7636	352.6785	300.2361
Minimum	-123.0346	-33.40944	-7.648507
Std. Dev.	4.384042	6.979837	7.658839
Skewness	13.52207	49.04089	32.14881
Kurtosis	990.6577	2475.087	1110.950
Jarque-Bera	1.07E+08	6.70E+08	1.35E+08
Probability	0.000000	0.000000	0.000000
Sum	103.4577	724.0122	1049.439
Sum Sq. Dev.	50490.47	127982.5	154094.1
Observations	2628	2628	2628

Source: Author's Estimation, 2023

statistic is more than the chi-square's critical value or if the probability value appear lower than 5% (Pindyck and Rubinfeld, 1998).

Table 2 presented the descriptive statistics result of the three financial variables of accruals (ACC), market sentiment (SMN) and returns on assets (ROA) (Yulita, 2022). It showss that variables under investigations possess a positive mean value ranging between 0.4 and 0.04 with 2628 observations. The mean and median for the three data sets are not close to each other. Therefore, the argument for a normally distributed series is debunked. This was also confirmed by the significance level of the probability of the Jarque-Bera statistics for the normality test as well as the none zero skewness for the symmetric test. Moreover, the standard deviation is used to assess how risky or volatile a particular series is. The higher the dispersion level, the more volatile is such financial assets. From the result, the study found that the three data sets have high standard deviations (in comparison to their averages). This suggests that investing in these data sets can be very volatile. Again, the positive skewness values for the three data imply that most of the observed data lie on the right part of the mean and median values.

The kurtosis for all the series is Laptokurtic because they are all greater than 3. This suggests that there were lots of outliers in the observations. Finally, The JB normality tests are asymptotic tests adopted to test based on the residual, for the joint hypothesis which indicates that kurtosis and skewness are 3 and 0 respectively (Chonco, 2019 as cited in Gujarati 2004). A probability value of more than 5% for the Jarqua Bera test reveals that the series is normally distributed, otherwise, it is not. Since the probability values of the JB statistics are all less than 5%, we reject the null hypotheses of normality.

The correlation test was used to verify that no variable/regressor has a perfect or exact linear relationship with each other; otherwise, the problem of multicollinearity becomes inevitable. Therefore, when two regressors in a correlation result reveal a magnitude of relationship that is up to 80 per cent and above, it suggests that there could be the presence of a multicollinearity problem and as such most of the parameter estimates of these regressors are likely to be inefficient and biased. Apart from its biasedness, most of the estimates will not be significant and as such, the model will not be good for policy implication.

Table 3: The Correlation Test

	ACC	SMN	ROA
ACC	1.000000	0.523196	0.000888
SMN	0.523196	1.000000	0.000482
ROA	0.000888	0.000482	1.000000

Source: Author's Estimation, 2023

From the correlation estimate as presented in Table 3, our result reveals that our model is free from the problem of multicollinearity. That is, no two variables have a correlation coefficient of positive or negative 80 per cent and above as the highest correlation is recorded between accruals and sales simulations at positive 52.3%. Moreover, the series follows the theoretical prior expectation since it is expected that as sales increase, earning manipulations (accruals) are more likely going to increase. Likewise, the positive correlation between returns to assets and sales also follows prior expectations.

Empirical analyses are best interpreted when the data series are stationary. The unit root tests are used to ascertain if the variable has a random walk. In other words, it is used to verify whether a particular series is stationary or not. This is necessary for this study because a regression model with a non-stationary series yields a spurious result. Moreover, the stationarity tests were also used to ascertain the right estimation technique to be used as discussed above.

Two different estimation tests were used to conduct the tests stationarity in this article. They include Fisher-type augmented Dickey-Fuller and the Im, Pesaran and Shin tests for stationarity. We could not employ the Levin, Lin and Chu stationarity test because it requires a strongly balanced series. Therefore since our series has gaps, we resort to Fisher-type augmented Dickey-Fuller (2000) and the Im, Pesaran and Shin unit root tests. These tests are necessary to accommodate the uniqueness of each other and augment their weaknesses. For instance, the Fisher-type ADF unit root test assumes that the slopes are homogenous while Im, Pesaran and Shin assume that the slopes are heterogeneous. Provided the values of the probability table are lower than 1 per cent or 5 per cent significant level, it therefore implies that the variables are stationary at order one or zero, one but no order two.

These tests can be conducted with the use of the following formular:

$$\Delta x_{it} = \alpha_i + \rho x_{i,t-1} + \sum_{k=1}^{\rho_i} \delta_i L\Delta x_{i,t-k} + \varepsilon_{it} \quad i = 1, 2, \ldots, N; \; t = 1, 2, \ldots, T \quad (4)$$

Equation (1.1) starts with the autocorrelation clearing effect of the differenced lag structure of each variable to be tested Δxit . Followed by the cross-sectional (αi) effects and ρi is the unknown lag order. First, Δxit is regressed on its lags and the exogenous regressors αi , and βt to obtain the residuals e1it. The results of the two tests are therefore presented in Table 3. The result reveals that all the series are stationary at level. This conclusion is reached by the two tests, therefore we can apply the vector autoregressive estimation technique to analyze the data.

Table 4: Panel Unit Root Results

Variables	Fisher-type augmented Dickey-Fuller (2000) Unit Root Test		IPS Unit Root Tests	
	Level	First Diff.	Level	First Diff.
ACC	Stationary	NA	Stationary	NA
SMN	Stationary	NA	Stationary	NA
ROA	Stationary	NA	Stationary	NA

Source: Author's Estimation, 2023

Table 5: The Kao Residual Cointegration Test

Series: ACC SMN ROA		
Null Hypothesis: No co-integration; Included observations: 2896		
	t-Statistic	**Prob.**
ADF	0.551468	0.2907
Residual variance	11.12639	
HAC variance	10.88134	

Source: Authors' Estimation, 2023

Having ascertained the order of variable integration, we proceed to test whether the variables move together in the long run. That is, we want to verify if they are co-integrated. A co-integrated series will suggest that the errors or the short-run disequilibrium among the variables move together also in the long run; hence we adopt a vector error correction model to gauge the error and see if it can be corrected in the long run at a particular speed. Otherwise, we employ the use of an unrestricted vector autoregressive model to merely see how the variables respond to each other. The Kao co-integration test was employed and the result is presented in table 5.

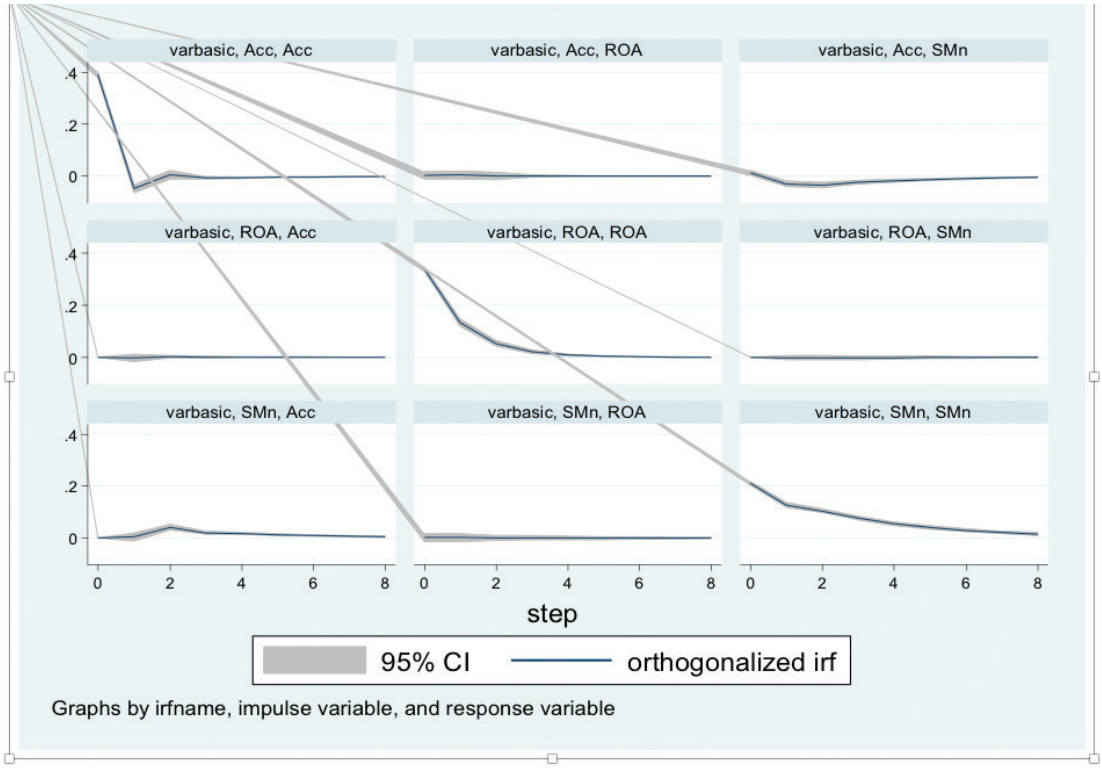
The outcome of the Kao Residual Cointegration test, indicates that the probability value for the Kao co-integration test is more than 5%. This means that the study failed to reject the null hypothesis that there are no co-integration among variables in the model. In other words, the test result reveals that the variables failed to exhibit possible co-movement together at the long run; hence the adoption of an unrestricted VAR to analyze this study becomes inevitable.

The analyses of the property dynamics of the Vector Auto Regressive model will be interpreted by adopting functional impulse response analysis alongside the variance decomposition. The lag selection order criteria of this analysis were based on the Akaike and the final prediction information lag order selection. These two lag length selections settled for three (3) lags and the result is presented under Table A of the appendix section while the VAR result estimate is also presented under Table B in the appendix section. The VAR result reveals that the previous period (first lag) of earning manipulation among managers of the listed companies, the second lags of market sentiment and profitability (returns to assets) contemporaneously impact on the current earning manipulation at a 1% significance level. The past values of earning manipulation (accruals) are associated with a 12.4 per cent decrease in its current levels on average, ceteris paribus. Furthermore, a percentage increase in the past realizations of Market Sentiments (SMN) and returns to assets (ROA) accounts for an 18.8 and 0.72% increase respectively in earning manipulation on average ceteris paribus. The result clearly revealed that the three financial variables interrelate and activities of one in the financial market can triger others contemporaneously.

On the other hand, it is the past realizations of accruals and sales manipulation that significantly drive the contemporaneous levels of sales. Whereas a percentage increase in accruals significantly dampens it, past levels of sales significantly raise their current values. The result further shows that only the past realization of returns to assets accounts for a 39.4% increase in returns to assets contemporaneously on average, ceteris paribus. The dynamic properties of this VAR estimate are further discussed and interpreted with the adoption of functional impulse response technique alongside with the variance decomposition are hereby summarised below. Figure 1 showcases the result of impulse responses for all the interacting variables in the model, while Table 5 presents the results of the variance decomposition. With three variables (ACC, SMN, ROA) that respond in turns to each other, we have a total of six impulse response functions. The x-axis presents the time horizon while the y-axis shows the percentage of variations in the response variable away from its baseline level. The black tiny line is the estimated response while the shaded dark region represents the one standard error confidence bound around the estimate. In other words, it is the 95 per cent

confidence region that the responses are significant. The simulations of Monte Carlo on the unrestricted Vector Auto Regressive (VAR) has been adopted to produce the impulse response coefficients' standard errors. The intervals produced by normal approximation confidence bands for the response function are 95%. General consensus on explicit criterion for the level of significance in a Vector Auto Regressive (VAR) framework. Sims (1987) argued that significance could be crudely gauged for impulse responses, on how much the function deviates away from zero, whereas Runkle (1987) further proposes a probability range above 10% for the variance decompositions.

The impulse response graph results truly reflected the market activities among the various listed firms in South Africa. For instance, it showed that the response of earning manipulation by managers of those listed firms to a standard innovation directly relates to its market shock in the the short-run; it further fluctuates and later became stable around the equilibrium and maintained the stability along the horizon into the long run. Thus, the true position of unstable business circle in the South Africa market was authenticalted around the period under investigation, given the frequency of their fluntuations. The response of earning manipulation by the managers of those firms to one standard innovation in profitability margin as suggested by the result of return on assets (ROA) indicates that it stabilises around the equilibrium both during the short-run and long run. In other words, in the south Africa's market investors' sentiments arising from information received from the firms' performance do not trigger any significant changes in their decision over time. The impulse response of Accrual Concept of firms to a standard deviation in Market Sentiments (SMN) shows a declined response of inverse shock at the preliminary period with minimal fluctuation along its horizon as it gradually reverts from negative to stable equilibrium in the long run. It shows that the managers of the listed firms' earning manipulation/sales manipulation



Source: Author's Estimation, 2023

Figure 1: The Impulse Response Function of ACC, ROA and SMN

deters the investors' decision, especially during the short-run, however, such influence dies down in the long run.

From the impulse response graph, we also found that the response of profitability motive (ROA) of the listed firms to one standard shock in earnings manipulation slightly fluctuates in the short run but remains relatively stable afterwards in the same short-run and continues to maintain market stability into the long run. This response is similar to that of earnings manipulation to ROA where the responses are stable on the origin both during the short-run and long-run. This suggests that managers' earnings manipulation and firms' performance do not cause each other. This explains why their correlation coefficient is highly insignificant at 0.09%. Therefore, we could conclude that firms' performance is not influenced by managers' earnings manipulation both during the short-run and long-run. The impulse response function ROA to shocks arising from itself is positive in the short-run and gradually fluctuates downwards and then becomes stable and maintains a stable trend along the horizon in the long-run. This means that previous levels of firms' performance positively influence their current performance level in the South African market in a decreasing way during the short-run and then remains stable in the long-run. The response of ROA to Market Sentiments remains stable along the horizon from short-run into the long-run. This connotes that changes in sales manipulation do not drive returns to assets either positively or negatively at any time among the South African markets. The variance decomposition test will be used to support or debunk this assertion.

Finally, the response of Market Sentiments to shocks arising from investors'/managers' manipulation, returns to assets (ROA) and its shock is presented under the last column of Figure 1. The results showed that market sentiment had a positive response to shocks due to earning management effectiveness during the short-run which gradually fluctuated and became stable along the horizon into the long-run. The implication is that the decisions of investors (sentiment) directly affect sales earnings, especially during the short-run in the South African markets. This is partly supported by the argument of Dechow et al. (2010) who suggested that one could predict high and low market periods. Again, result from figure 1 explains why the correlation coefficient between these two were highly insignificant at 0.05%. Therefore, one can conclude that the performance of firms does not determine their earnings from sales and vice versa in the South African market. While this can be a very hard conclusion to draw, attention should be given to how the profits in the South African firms are shared and how they reinvest their undistributed corporate profit which could serve as a deterrent to future sales earnings and vice versa in the country. The last impulse response function is the response of Market Sentiments to shocks arising from itself. The result shows that it had a positive but declining response from the short-run period into the long-run. The declining sales due to Market Sentiments could be traced to poor sales forecasts and/or asymmetric information about sales. This will further be investigated using the variance decomposition test.

The complementary variance decomposition offers information on the behavioural dynamics of the variables in the study's model. This complementary result is necessary because variations in each of the variables may be decomposed into the contributions by each of the different shocks. The results are therefore presented in a tabular form for each of the variables. When estimating structural shocks, the variance decomposition offers information on the relevance of how different structural shocks explains the variability of the forecast error among the variables. The summarized result as shown in the below table 5 revealed the variance decomposition over the long-term (5-10 years), medium-term (3-4 years) and short-term period (1-2 years).

The result from table 5 section 1 reveals that the variance decomposition of earning management shows that the result accounts for most of the variability in itself through the entire period. The variation ranges from 100% during the short-run to 97% in the long-run. The shock of earning management to Market Sentiments shows an increasing pattern from the first period at 0% to 2.7% in the tenth period. Moreover, there is a strong exogenous impact of profitability motive on the forecast error variance in earning management both during the short-run all through the long-run period. This is because their forecasting power is below 1% for all periods. This further accentuates to the results obtained from Cohen and Zarowin (2010) and Kothari et al. (2016) on the impulse response function where shocks from ROA could not explain the variability in earning management.

Table 6: The Variance Decomposition Table

Variance Decomposition of ACC:				
Period	S.E.	ACC	ROA	SMN
1	0.380123	100.0000	0.000000	0.000000
2	0.385795	99.60526	0.001913	0.392832
3	0.390231	97.37781	0.003679	2.618511
4	0.390274	97.37518	0.003747	2.621077
5	0.390418	97.31078	0.004083	2.685141
6	0.390483	97.27862	0.004132	2.717251
7	0.390504	97.26865	0.004201	2.727153
8	0.390518	97.26203	0.004244	2.733729
9	0.390525	97.25897	0.004265	2.736760
10	0.390528	97.25749	0.004277	2.738232
Variance Decomposition of ROA:				
Period	S.E.	ACC	ROA	SMN
1	0.348038	0.010399	99.98960	0.000000
2	0.370195	0.021484	99.97822	0.000295
3	0.374687	0.023395	99.96191	0.014697
4	0.375572	0.023729	99.95892	0.017350
5	0.375751	0.023847	99.95700	0.019155
6	0.375786	0.023875	99.95629	0.019835
7	0.375794	0.023887	99.95547	0.020646
8	0.375796	0.023897	99.95507	0.021034
9	0.375797	0.023905	99.95485	0.021243
10	0.375797	0.023909	99.95474	0.021356
Variance Decomposition of SMN:				
Period	S.E.	ACC	ROA	SMN
1	0.193226	0.957754	8.82E-05	99.04216
2	0.213630	1.129149	0.011776	98.85908
3	0.222794	1.565269	0.041048	98.39368
4	0.227586	1.657604	0.057530	98.28487
5	0.229767	1.704675	0.067533	98.22779
6	0.230862	1.727104	0.073298	98.19960
7	0.231403	1.737530	0.076320	98.18615
8	0.231668	1.742805	0.077892	98.17930
9	0.231799	1.745392	0.078693	98.17592
10	0.231864	1.746664	0.079097	98.17424

Cholesky Ordering: ACC ROA SMN

Source: Author's Computation, 2023

The variance decomposition of ROA shocks reveals that it accounts for most of the variability in itself over all the periods which stood at about 99% in the short-run and remain stable along the horizon into the long-run. This implies that variations in firm's profitability exhibit a strong endogenous influence on itself. The influence of other variables in the model had no significant impact on the variability in firm's profitability for all periods. That is, they had the least exogenous impact on firms' performance. This suggests that firms' performance might not be responsible for investors' sentiments or sales manipulation but rather for some internal and possibly macroeconomic ratios and indicators among the South African listed firms. Further studies in this area should try to investigate other determinants of firms' performance.

Finally, on this note, results from the variance decomposition of sales manipulation reveal that it is strongly endogenous among the listed firms under investigation. In other words, its variations were accounted for by its shocks and changes more compared to other variables in the model. its strong impact stood at an average stable rate of 98% from the short-run to the long-run periods. However, the fact that it could not explain all the 100 per cent variations in itself suggests that the influence of other variables is inevitable in accounting for its shock. The result reveals that between earning management and firm's performance, the former reveals a relatively stronger endogenous impact on market sentiment compared to the latter. The reason is that earning management accounts for about 1.74% of variations in market sentiment in the long-run. In other words, the innovations of market sentiment to earning management and firm's performance account for the forecast error variance ranging from 0.95% to 1.74% and 0.00008% to 0.08% respectively from short-run to long-run in the South African listed firms. The result corroborates the findings of (Teoh et al. 1998; Garel et al., 2018). Hence, we conclude that investors' sentiments and firms' performance have responded less to sales manipulation in the South African listed firms. This poor response could be attributed to asymmetric information and/or moral hazards in the market.

From the foregoings, study's hypotheses that Market Sentiments has no significant relationship with earning manipulation, Earning manipulation has no significant relationship with performance motives, Investor sentiment has no significant relationship with performance motives among the 181 listed firms in South Africa has been tested and we have provided evidence through available estimating techniques that there are interacting effects among earning manipulation, firm performance and Market Sentiments among JSE-listed firms in South Africa.

Discussion

The result of the vector auto-regresive model (VAR) showed that the previous investors' altitude (market sentiment) has impacted on the current investors' decision making in most of the 181 listed firmed in South Africa under investigation. The result further showed that variabilities of the earning manipulation by the manager of the listed firms altered firms' profitability in the current period in South Africa. The case of manipulation resulting into scandal attributed to Steinhoff International that occurred in 2017 South Africa is typical to the study's result (Rossouw, 2017; Rossouw and Styan, 2019). Rossouw (2017) argued that the Steinhoff scandal was quite enormous because it is an indication of serious gap in the control mechanisms of investment management space. The findings further supported the work of Jones, (1991); Dechow et al., (1995); Kothari et al., (2005); Roychowdhury, (2006); Mizik and Jacobson, (2007); Cohen and Zarowin, (2010) as they all observed that managers normally distort earnings and dilate the organisation's financial information through the manipulation of either real or accrual activities, this action results in wrong outcomes of market sentiment.

The results showed further that firms' profitability positively response to shocks from market sentiment during the short-run which gradually fluctuates and became stable along the horizon into the long-run. As it was the case of telecommunication firms in South Africa during COVID-19 in 2019. This means that the decisions of investors (sentiment) directly affect sales earnings, especially during the short-run. There was huge profitability margin due to shocks coming from the outbreak of the pandemic in South Africa. The study's investigated 181 listed firms in South Africa are majorly house hold consumption companies. The result implies that total households' consumption responds immediately and persistently to an unexpected increase in the stock returns. Apart from the fact that this study comforms with the conducted study by Teoh et al. (1998). This result

followed apriori expectation as the result showed that shocks from any profitable firm should exact no significant impact on sales manipulation both in the short-run and long-run. This again explains why the correlation coefficient between these two where highly insignificant at 0.05%. Therefore, one can conclude that the performance of firms does not determine their earnings from sales and vice versa. While this can be a very hard conclusion to draw, attention should be given to how the firm's profits are shared and how they reinvest their undistributed corporate profit which could serve as a deterrent to future sales earnings and vice versa.

Conclusion

The study investigated the asymmetric relationship between earning manipulation, a firm's performance and Market Sentiments. The VAR result revealed that the first lag of earning manipulation, the second lag of sales manipulation and returns on assets contemporaneously impact earning manipulation at a 1 per cent level of significance. The past value of market sentiment caused a 12.4 per cent decrease in the current market sentiment on average. Furthermore, a one per cent variation in the earning manipulation on average causes past sales manipulation and firms' profitability to increase by 18.8 and 0.72 per cent respectively. On the other hand, it is the past realisations of Market Sentiments and sales manipulation that significantly drive the contemporaneous levels of performance. Whereas a percentage increase in sentiment significantly dampens it, past levels of sales significantly raise its current values. The result further shows that only the past realisation of returns on assets accounts for a 39.4% increase in returns on assets contemporaneously on average, ceteris paribus.

The outcome of the study revealed that Market Sentiments and firms' performance have responded less to sales manipulation. This poor response could be attributed to asymmetric information and/or moral hazards in the market. The variance decomposition of ROA shocks revealed that it accounts for most of the variability in itself over all the periods which stood at about 99% in the short-run and remain stable along the horizon into the long-run. The results show that sales manipulation had a positive response to shocks from Market Sentiments during the short-run which gradually fluctuates and became stable along the horizon into the long-run. This means that the decisions of investors (Market Sentiments) directly affect sales earnings, especially during the short-run. Policy implications suggest that sales manipulation affects returns on assets contemporaneously and it impacts market sentiment at a 1% significance level. To be more precise, past values of market sentiment are associated with a 12.4 per cent decrease in its current levels on average, ceteris paribus. Investors' effective policy on the management of manipulation would impact firms' performance in the current period and long-run.

Furthermore, a 1 percent increase in the past realisations of sales and returns on assets (ROA) accounts for 18.8 and 0.72% increase respectively in Market Sentiments on average. Implying that information gotten from firms' records on profit and manipulation could impact market sentiment. Consequently, investment policy must be based on thorough monitoring of sales manipulation to avoid negative consequences.

References

Anusakumar, S. V., Ali, R., & Wooi, H. C. (2017). THE EFFECT OF INVESTOR SENTIMENT ON STOCK RETURNS: INSIGHT FROM EMERGING ASIAN MARKETS. Asian Academy of Management Journal of Accounting & Finance, 13(1).

Ali, A., & Gurun, U. G. (2009). Investor sentiment, accruals anomaly, and accruals management. Journal of Accounting, Auditing & Finance, 24(3), 415-431.

Baker M and Wurgler J (2012) Behavioral corporate finance: An updated survey. Handbook of the Economics of Finance, Vol. 2, George M. Constantinides, Mitton Harris, and Rene M. Stulz, eds. Elsevier Press.

Barkema, H. G., & Pennings, J. M. (1998). Top management pay: Impact of overt and covert power. Organization studies, 19(6), 975-1003.

Bloomberg, (2018). Top 10 biggest corporate scandals and how they affected shareprices. H t t p s : / / www.ig.com/za/news-and-trade-ideas/top-10-biggest-corporate-scandals-and-how-they-affected-share-pr-181101.

Bormann, S. K. (2013). Sentiment indices on financial markets: What do they measure? (No. 2013-58). Economics Discussion Papers.

Chonco, D. S. (2019). The effects to corporal punishment to maintain learner discipline in secondary schools in king Cetshwayo district (Doctoral dissertation, Doctoral thesis).

http://uzspace. unizulu. ac. za: 8080/xmlui/bitstream/handle/10530/1774/The%20effects%20of%20alternatives%20to%20corporal%20punishment%20to%20maintain%20learner%20discipline%20in%20secondary%20schools%20in%20King%20Cetshwayo%20Dist rict. pdf).

Cohen DA and Zarowin P (2010) Accrual-based and real earnings management activities around seasoned equity offerings. Journal of Accounting and Economics 50(1): 2-19.

Dechow P, Ge W and Schrand C (2010) Understanding earnings quality: A review of the proxies, their determinants and their consequences. Journal of Accounting and Economics 50(2): 344-401

Dechow PM, Sloan RG and Sweeney AP (1995) Detecting Earnings Management. The Accounting Review 70(2): 193-225.

Doan, B., Foster, F. D., & Yang, L. (2018). Do investors differentiate between uncertainty and risk: Evidence from trading around US macroeconomic news. Working paper]. Auckland Centre for Financial Research. https://acfr. aut. ac. nz/__data/assets/pdf_file/0006/186963/Do-investors-differentiatebetween-uncertainty-and-risk_Bao-Doan. pdf.

Garel A, Martin-Flores J, Petit-Romec A, et al. (2018) Distracted Investors and Earnings Management.

Gill, A., Biger, N., Mand, H. S., & Mathur, N. (2013). Earnings management, firm performance, and the value of Indian manufacturing firms. International Research Journal of Finance and Economics, 116(1), 121-131.

Goel, D. S. (2016). The earnings management motivation: Accrual accounting vs. cash accounting. Australasian Accounting, Business and Finance Journal, 10(3), 48-66.

Gujarati, D. N. (2022). Basic econometrics. Prentice Hall.

Harvey Pamburai, H., Chamisa, E., Abdulla, C., & Smith, C. (2015). An analysis of corporate governance and company performance: a South African perspective. South African Journal of Accounting Research, 29(2), 115-131.

Healy PM and Wahlen JM (1999) A Review of the Earnings Management Literature and Its Implications for Standard Setting. Accounting Horizons 13(4): 365-383.

Healy, P., Serafeim, G., Srinivasan, S., & Yu, G. (2014). Market competition, earnings management, and persistence in accounting profitability around the world. Review of accounting studies, 19, 1281-1308.

Jaiswall SSK and Bhattacharyya AK (2016) Corporate governance and CEO compensation in Indian firms. Journal of Contemporary Accounting & Economics 12(2): 159-175.

Jones JJ (1991) Earnings management during import relief investigations. Journal of Accounting Research 29(2): 193.

Kane, T. D., Marks, M. A., Zaccaro, S. J., & Blair, V. (1996). Self-efficacy, personal goals, and wrestlers' self-regulation. Journal of sport and exercise psychology, 18(1), 36-48.

Kim J-B and Sohn BC (2013) Real earnings management and cost of capital. Journal of Accounting and Public Policy 32(6): 518-543.

Kothari SP, Leone AJ and Wasley CE (2005) Performance matched discretionary accrual measures. Journal of Accounting and Economics 39(1): 163-197.

Iorngurum, T., & Nwaobi, G. (2021). An impulse response function analysis of the impact of modern payment technologies on money demand in Nigeria. Theoretical & Applied Economics, 28(2).

Makhaiel, N., & Sherer, M. (2017). In the name of others: an investigation of earnings management motives in Egypt. Journal of Accounting in Emerging Economies, 7(1), 61-89.

Mizik N and Jacobson R (2007) Earnings inflation through accruals and real activity manipulation: Its prevalence at the time of an SEO and the financial market consequences. Available at SSRN 1031006.

Mohr, F. X. (2020). An introduction to impulse response analysis of VAR models.

Nia, M. S., Huang, C. C., & Abidin, Z. Z. (2015). A Review of Motives and Techniques and their Consequences in Earnings Management. Malaysian Accounting Review, 14(2).

Omolade, A., Nwosa, P., & Ngalawa, H. (2019). Monetary transmission channel, oil price shock and the manufacturing sector in Nigeria. Folia Oeconomica Stetinensia, 19(1), 89-113.

Rahman, M. M., Moniruzzaman, M., & Sharif, M. J. (2013). Techniques, motives and controls of earnings management. International Journal of Information Technology and Business Management, 11(1), 22-34.

Rossouw J (2017) Steinhoff scandal points to major gaps in stopping unethical corporate behaviour. In: Conversation T (ed).

Rossouw J and Styan J (2019) Steinhoff collapse: a failure of corporate governance. International Review of Applied Economics 33(1): 163-170.

Roychowdhury S (2006) Earnings management through real activities manipulation. 42(3): 335-370.

Runkle D. E.(1987). Vector Autoregressions and Reality, Journal of Business and Economic Statistics, 5(4), 437-442.

Saona, P., Muro, L., & Alvarado, M. (2020). How do the ownership structure and board of directors' features impact earnings management? The Spanish case. Journal of International Financial Management & Accounting, 31(1), 98-133.

Skiftesvik, D. S., & Vasshus, Ø. K. (2021). Market sentiment and its predictive abilities in the stock market: empirical study of leading indicators derived from market sentiment (Master's thesis).

Simpson, A. (2013). Does investor sentiment affect earnings management?. Journal of Business Finance & Accounting, 40(7-8), 869-900.

Sims, C. (1987). Bayesian Skepticism on Unit Root Econometrics, Journal of Economic Dynamics and Control, 12, 463-474.

Schipper K (1989) Earnings management. Accounting horizons 3(4): 91.

Ross, S. A. (1973). The economic theory of agency: The principal's problem. The American economic review, 63(2), 134-139.

Stareček, A., Koltnerová, K., Vraňaková, N., Kubišová, E., Jurík, L., Ďuriš, D., & Krchnáková, M. (2021). Performance Motivation and Employees of Different Generations in Slovak Industrial Enterprises.

Strakova, L. (2021). Motives and techniques of earnings management used in a global environment. In SHS Web of Conferences (Vol. 92, p. 02060). EDP Sciences.

Svabova, L. (2021). Detecting the manipulation of earnings in the company: triangulation of methods. In SHS Web of Conferences (Vol. 92, p. 02061). EDP Sciences.

Teoh, S. H., Welch, I., & Wong, T. J. (1998). Earnings management and the long-run market performance of initial public offerings. The journal of finance, 53(6), 1935-1974.

Yulita, S. (2022). The Effect of Corporate Social Responsibility, Firm size, and Financial Aspects Towards Stock Returns of Telecommunication Companies Listed on Indonesia Stock Exchange 2016-2021.

Zogning F (2017) Agency Theory: A Critical Review. European Journal of Business and Management 9(2).

APPENDIX

APPENDIX A: Selection-order criteria

lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-1988.66				.001747	2.16367	2.16698	2.17266
1	-1107.38	1762.6	9	0.000	.000677	1.21605	1.22932	1.25202
2	-1072.49	69.775	9	0.000	.000658	1.18793	1.21114*	1.25087*
3	-1059.11	26.76*	9	0.002	.000655*	1.18317*	1.21633	1.27309
4	-1058.06	2.0967	9	0.990	.000661	1.19181	1.23491	1.30871

Endogenous: Acc SMn ROA Exogenous: _cons

Source: Author's Computation

APPENDIX B: The Result of the Unrestricted VAR Estimate

No. of obs	= 2024					
Log likelihood	= -1356.24			AIC	= 1.369802	
FPE	= .0007897			HQIC	= 1.400331	
Det(Sigma_ml)	= .0007667			SBIC	= 1.452996	
Equation	**Parms**	**RMSE**	**R-sq**	**chi2**	**P>chi2**	
Acc	10	.390012	0.0673	146.0692	0.0000	
SMn	10	.211223	0.6275	3409.869	0.0000	
ROA	10	.339163	0.1614	389.5451	0.0000	
	Coef.	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
Acc						
Acc						
L1.	-.1241443 .	0212093	-5.85	0.000	-.1657137	-.0825749
L2.	-.0059804	.0214275	-0.28	0.780	-.0479776	.0360168
L3.	.0000306	.0025377	0.01	0.990	-.0049432	.0050044
SMn						
L1.	.0203397	.0395523	0.51	0.607	-.0571814	.0978608
L2.	.188438	.0400031	4.71	0.000	.1100335	.2668425
L3.	-.000297	.0013744	-0.22	0.829	-.0029906	.0023967
ROA						
L1.	-.00822	.0229876	-0.36	0.721	-.053275	.036835
L2.	.0071756	.0014928	4.81	0.000	.0042498	.0101014
L3.	.0018628	.0011583	1.61	0.108	-.0004073	.004133
cons	-.0055508	.009577	-0.58	0.562	-.0243213	.0132197
SMn						
Acc						
L1.	-.0935948	.0114865	-8.15	0.000	-.1161079	-.0710816
L2.	-.0581889	.0116047	-5.01	0.000	-.0809338	-.0354441
L3	.0002618	.0013744	0.19	0.849	-.0024319	.0029555
SMn						
L1.	.6035806	.0214207	28.18	0.000	.5615968	.6455644
L2.	.1339509	.0216648	6.18	0.000	.0914886	.1764131
L3.	.0008697	.0007443	1.17	0.243	-.0005891	.0023286
ROA						
L1.	-.0082362	.0124496	-0.66	0.508	-.032637	.0161647
L2.	-.0006088	.0008085	-0.75	0.451	-.0021934	.0009757
L3.	.0007011	.0006273	1.12	0.264	-.0005284	.0019305
Cons	.0273082	.0051867	5.27	0.000	.0171425	.0374739

APPENDIX B: The Result of the Unrestricted VAR Estimate

	ROA					
Acc						
L1.	.0079127	.018444	0.43	0.668	-.028237	.0440623
L2.	.0004311	.0186338	0.02	0.982	-.0360905	.0369527
L3.	.0005897	.0022068	0.27	0.789	-.0037356	.004915
SMn						
L1.	.0048349	.0343955	0.14	0.888	-.062579	.0722489
L2.	-.0038149	.0347875	-0.11	0.913	-.0719971	.0643673
L3.	.0001232	.0011952	0.10	0.918	-.0022192	.0024657
ROA						
L1.	.3938137	.0199905	19.70	0.000	.354633	.4329944
L2.	-.0001743	.0012981	-0.13	0.893	-.0027187	.00237
L3.	.0004299	.0010072	0.43	0.670	-.0015442	.0024041
cons	.0689564	.0083283	8.28	0.000	.0526332	.0852797

Source: Author's Computation

BUSINESS RESCUE UNIT

School of Accounting, Economics and Finance
University of KwaZulu-Natal
University Road
Private Bag X54001
Westville
Durban
4000
South Africa

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

BRU BUSINESS RESCUE UNIT

INSPIRING GREATNESS