THE INFLUENCE OF FINANCIAL AND NON-FINANCIAL SUSTAINABILITY ON FIRM PERFORMANCE

by

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ABSTRACT

The importance of the synergy between a firm's financial and non-financial sustainability performance is becoming increasingly crucial due to the shift towards enhancing its financial and non-financial performance. The synergy involves maximising profit, enhancing companies' reputations, fulfilling their social responsibility, and fostering a corporate culture of integrity and competence. Both the financial and non-financial dimensions of sustainability performance play pivotal roles in creating value for firms. In this study, the financial sustainability performance dimension encompassed three elements, namely growth opportunities, operational efficiency and innovation capabilities, measured using market-to-book value of equity, return on equity and research and development respectively. Similarly, the non-financial sustainability performance dimension consisted of three elements, namely environmental, social and governance, measured using the performance scores from the well-known Refinitiv Eikon database. This study adopted a multi-theoretic model to acknowledge the contributions of both financial and non-financial sustainability performance in creating an overall performance framework for firms. This approach integrated shareholder wealth maximisation theory, stakeholder theory, resource dependence theory and organisational legitimacy theory.

The study investigated the relationships between financial and non-financial sustainability performance and firm performance, measured using five proxies of measurement, namely Tobin's Q, total shareholder return, weighted average cost of capital, market value added and economic value added. A deeper understanding of these relationships was obtained by considering the interaction effects among the three elements within each dimension of sustainability performance, demonstrating their potential to enhance firm performance.

To analyse the data, the estimated generalised least squares (EGLS) method was applied to the regression model, with period seemingly unrelated regression weightings and using White (diagonal) standard errors and covariance estimation methods. Therefore, the problems associated with autocorrelation and heteroscedasticity were mitigated. Regression analyses were conducted on the data

for each of the five dependent variables representing firm performance. In addition to the regression analyses, the change in variance contribution of each independent variable was examined to identify the variable that explained the largest percentage of variation of the dependent variable in the regression models. Interaction terms were then introduced to the regression models to account for the overall interaction between financial and non-financial sustainability performance, as well as the interaction between individual elements within each dimension. This analysis covered a full sample of firms listed on the Johannesburg Stock Exchange from 2011 to 2021.

The results of the study indicated that the performance of a firm was most profoundly influenced by its financial sustainability performance. On its own, non-financial sustainability performance did not exert a significant influence on firm performance. The combined influence of financial and non-financial sustainability suggested that the pursuit of non-financial sustainability efforts could potentially detract from firm performance because these efforts involved reallocating funds from shareholders to other stakeholders. However, the effects of non-financial sustainability initiatives became more evident when they interacted with financial sustainability performance.

DECLARATION

I, Rholé Coetzee, declare that the research work reported in this thesis is my own, except where otherwise indicated and acknowledged. It is submitted for a PhD (Financial Management Sciences) at the University of Pretoria, Gauteng. This thesis has not, either in whole or in part, been submitted for a degree or diploma to any other academic institution. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references at the end of this document.

Signature

9 October 2023
Date

Pretoria
Signed at

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
CSR	corporate social responsibility
DY	dividend yield ratio
ENV	environmental score
EPS	earnings per share
ESG	environmental, social and governance
EVA	economic value added
EY	earnings yield ratio
FAGE	firm age
FLEV	financial leverage
FSIZE	firm size (market capitalisation)
GOV	governance score
IoDSA	The Institute of Directors South Africa
IIRC	International Integrated Reporting Council (previously Committee)
INDUS	industry
IRCSA	Integrated Reporting Council of South Africa
JSE	Johannesburg Securities Exchange
MBVE	market value to book value of equity
MVA	market value added
NYSE	New York Stock Exchange
PCA	principal component analysis
ROA	return on assets
ROE	return on equity
R&D	research and development
SALES	sales revenue
SOC	social score
SRI	socially responsible investing

TBL; 3BL	triple bottomline
TQ	Tobin’s Q
TSR	total shareholder return
WACC	weighted average cost of capital

LIST OF DEFINITIONS

Analytical	Relating to or using analysis or logical reasoning
Antecedent	A thing that existed before or logically precedes another
Empirical	Based on, concerned with, or verifiable by observation or experience rather than theory or pure logic
Environmental	Climate, biodiversity, water, energy, waste, etc.
Governance	Executive compensation, proxy resolutions, board make-up, board independence, board skills, board diversity, critical issues management, and oversight of the firm's key functions
Material	Significant; important
Social	Employee retention, training, community engagement, human rights, labour contracts, and benefits
Sustainability	The ability to be maintained at a certain rate or level
Integrated	With various parts or aspects linked or coordinated
Corporate governance	The system of rules, practices and processes by which a firm is directed and controlled; essentially involves balancing the interests of a firm 's many stakeholders, such as shareholders, management, customers, suppliers, financiers, government and the community
Triple Bottom Line	*Triple bottomline* (or otherwise noted as TBL or 3BL) is an accounting framework with three parts: social, environmental (or ecological) and financial
Johannesburg Securities Exchange	The oldest existing and largest stock exchange in Africa
Mandatory	Required by law or mandate; compulsory
Voluntary	Done, given, or acting of one's own free will

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND

> *Twenty years from now, a typical firm that's only looking for financial return won't exist. (Hughes, 2019).*

Michigan Ross School of Business Professor, Gautam Kaul, as quoted in Hughes (2019).

The sustainability of a firm has emerged as one of the most contentious topics of the twenty-first century (Ng and Rezaee, 2015). A firm should consider sustainability from both a financial and non-financial context to ensure the firm remains viable into the future. The concept of *sustainability performance* suggests that a firm must extend its focus beyond maximising short-term financial performance by considering the long-term impact of its operations, financial and non-financial, for the benefit of all stakeholders including the community, society and the environment (Freeman, 1984).

A firm's management should take into consideration the benefits to different stakeholders when making business decisions (Ng and Rezaee, 2015). In the context of stakeholder theory, the strategy of management should include engaging in business activities that generate long-term financial sustainability, i.e. maximising financial performance; as well as activities that result in the achievement of environmental, social and governance sustainability, i.e. protecting the interests of all stakeholders (Jensen, 2001). The basic principle is that the long-term market value of a firm cannot be maximised if any of the stakeholders of the firm are ignored or mistreated (Jensen, 2010).

In today's competitive market environment, reporting a firm's environmental, social and governance (ESG) responsibilities and its value creation process has become a high-profile imperative. The value creation process has strategic importance for firms, being an integral part of acceptable business practice (Cheng et al., 2014; De Villiers et al., 2014; Luo and Bhattacharya, 2006; Servaes and Tamayo, 2013; Simnett and Huggins, 2015). Firms act on the premise that corporate social responsibility is not merely the "right thing to do", but also leads to "doing better" through its positive quantitative and qualitative impacts on key

stakeholder groups (Bhattacharya and Sen, 2004). With increasing media attention on ESG issues around the world, firms are forced to take direct and visible steps not only to communicate their environmental, social and governance initiatives, but also to inform various stakeholders of how they perform in terms of their stated environmental, social and governance initiatives (Aydogmus et al., 2022; Luo and Bhattacharya, 2006).

Previous studies indicated that financial (Koskinen et al., 2020; Richardson and Welker, 2001) and non-financial (Aydogmus et al., 2022; M. Cheng et al., 2014; Dhaliwal et al., 2011; Mackey et al., 2007) dimensions of sustainability are interrelated and their impact on shareholder wealth and influence on firm performance should be investigated together.

Business sustainability is a concept that still needs to be explored, therefore the literature needs to be extended (Kantabutra and Ketprapakorn, 2020; Rezaee, 2017). *Business sustainability* is defined as the process of focusing on the attainment of economic, environmental, social, ethical and governance dimensions of sustainability (Brockett and Rezaee, 2012; Rezaee, 2016; 2017; 2018). Therefore, business sustainability focuses on activities that generate both financial (economic) and non-financial (environmental, social, ethical and governance) sustainability to the benefit of all stakeholders, emphasising that a firm should create long-term success and, in turn, create stakeholder value (Rezaee, 2018). Worldwide, firms confront difficulties of adapting appropriate sustainability strategies, procedures and practices to react viably to environmental, social and governance matters, while simultaneously improving their financial performance in creating value for all their stakeholders (Aydogmus et al., 2022; Rezaee, 2018). The role of firms has progressed from profit maximisation to value creation and the protection of the interests of not only shareholders, but all interested parties. Therefore, the focus should be on business activities that generate long-term financial sustainability for shareholders, as well as activities that result in the achievement of non-financial sustainability for other stakeholders (Jensen, 2001; 2002; 2010).

Management should consider the benefits to all stakeholders when making business decisions; therefore, basing their decisions on stakeholder theory (Freeman, 1984; Freeman et al., 2010; Jensen, 2001). According to Schaltegger et al. (2019), it is no surprise that stakeholder theory has become one of the most frequently used theoretical approaches in

the management of a firm's sustainability, playing a significant role in explaining why firms are taking care of business sustainability in general (Carroll and Buchholtz, 2014; Clark et al., 2015; Frynas and Yamahaki, 2016; Kuhndt et al., 2002; Montiel and Delgado-Ceballos, 2014; Perrini and Tencati, 2006; Post et al., 2002; Van Marrewijk, 2003; Weber and Marley, 2012).

Schaltegger et al. (2019) state that it is problematic to separate the financial and non-financial sustainability dimensions of a firm and that the vision of a firm lacks completeness when satisfying one group of stakeholders through financial benefits and creating sustainability for them, but overlooking the needs and importance of other stakeholders. Therefore, business sustainability can be better informed by stakeholder theory if the optimal sustainability solution is favourable for all stakeholders and not at cost of some stakeholders.

1.2 RESEARCH PROBLEM

Pulatovich (2019) maintains that financial sustainability is crucial for the sustainable development of a firm. Sustainable development is a way of managing a firm by taking into account both the necessities present and those of the future required by the firm to exist in the long term (Ali et al., 2018; Brundtland, 1987; Carter and Rogers, 2008; Dubey et al., 2017). Firms play an important role in a national economy. Therefore, increasing the financial performance of firms can contribute towards sustainable development in a country (Koskinen et al., 2020; Pulatovich, 2019). The financial performance dimension is the most important component of sustainability, because the primary motivation of firms is to maximise economic performance in creating shareholder value (Koskinen et al., 2020; Rezaee, 2017). Following the financial mayhem that was experienced since the start of the twenty-first century, with the financial crisis in 2007 to 2009 and the coronavirus pandemic in 2020, financial theories were challenged to give room to alternative principles of corporate financial management (Taskinsoy, 2021). Zabolotnyy and Wasilewski (2019) define *financial sustainability* as a firm's ability to create value for shareholders and other stakeholders, ensuring continuity of operations in the foreseeable future, emphasising that the financial sustainability element covers various financial variables that can create a relationship between firm performance and business continuity. Ng and Rezaee (2015) highlight that

every firm must investigate its financial sustainability measures to create value for shareholders, while protecting the interests of all stakeholders. Investors focus their attention on the financial sustainability of firms as a way of dealing with the moral hazard as reflected in the shareholder wealth maximisation theory, where management's incentive is to achieve short-term performance, while the shareholders desire long-term financial sustainability (Rezaee, 2017).

Dhaliwal et al. (2011) and El Ghoul et al. (2011) state that non-financial sustainability initiatives improve a firm's future financial performance. Previous research in the fields of finance, accounting and economics found that the link between corporate social responsibility performance and aspects of financial performance could have a positive effect on firm performance (Clarkson et al., 2011; Dhaliwal et al., 2011; El Ghoul et al., 2011; Mackey et al., 2007; Ng and Rezaee, 2015). Researchers in South Africa have mainly focused on corporate social responsibility and corporate governance separately, with the emphasis on disclosure, overlooking the financial performance effect (Jordaan et al., 2018; Mans-Kemp et al., 2017; Marcia et al., 2015; Tshipa et al., 2018). Corporate social responsibility focuses mainly on two aspects of non-financial sustainability, namely the environmental and social, ignoring the important aspect of corporate governance (Carroll and Shabana, 2010; Dahlsrud, 2008). Given South Africa's well-developed corporate governance framework as set out by the Institute of Directors (IoDSA, 2016), the application of sound corporate governance policies, practices and performances is often at a prominent level of environmental, social and governance performance consideration in South Africa. According to Linnenluecke and Griffiths (2010), it is of the utmost importance for corporate leaders to consider all three aspects of environmental, social and governance sustainability to ensure the creation of a sustainable firm. Aguinis and Glavas (2012) and Huang and Watson (2015) provided comprehensive corporate social responsibility literature on a total of 102 books and 588 published papers and they found that there were significant knowledge gaps in the corporate social responsibility and environmental, social and governance literature related to micro-foundations and interactions of corporate social responsibility and environmental, social and governance performance. These knowledge gaps indicate that previous studies were conducted in isolation and therefore, do not reflect the integrated impacts of financial and non-financial sustainability on firm performance.

Prior research on the sustainability of a firm is fragmented, lacking an integrated approach to both the financial and non-financial dimensions of sustainability (Brockett and Rezaee, 2012; Jain et al., 2016; Kiron et al., 2015; Rezaee, 2016; 2017). The most relevant statements derived from previous studies are: (1) Environmental, social and governance initiatives are viewed by management as either expenditures with no future returns, or as investments with future returns (Ng and Rezaee, 2015; Rezaee, 2016), and (2) Financial sustainability and non-financial environmental, social and governance sustainability are interrelated, questioning their interrelated effects on firm performance in terms of cost of capital, value of shares and market liquidity (Brockett and Rezaee, 2012; Ng and Rezaee, 2015). The literature indicates that the link between financial and non-financial sustainability as well as their integrated effect on firm performance is an area that still needs to be investigated to establish the value of financial and non-financial performance indicators for the sustainability of firms (Rezaee, 2016).

The study investigated the problem that firms, when they did make an effort to consider non-financial sustainability, tended to focus on financial and non-financial sustainability separately, failing to see how these two dimensions interacted with each other to create financial wealth for the firm. Firms tend to be unsure about how much time, effort and money they should spend on both the financial and non-financial sustainability dimensions (Aydogmus et al., 2022; Koskinen et al., 2020; Ng and Rezaee, 2015; Rezaee, 2016; 2017) to reach the optimal sustainability benefit, which is favourable for the firm and all its stakeholders and not at cost of some stakeholders.

In the next section the purpose statement, research objectives and research hypotheses are stated to solve the research problem.

1.3 PURPOSE STATEMENT, RESEARCH OBJECTIVES AND RESEARCH HYPOTHESES

During the past decade, the concept of *performance* by a firm has expanded to include value creation by firms at financial and non-financial levels (Laptes and Sofian, 2016). The purpose of this study was to investigate the interlinked relationship between financial and non-financial sustainability and firm performance of listed South African firms.

To reach the purpose of the study, the main objectives were as follows:

- to indicate which variable for (1) growth opportunities and (2) operational efficiency was the strongest predictor of firm performance;
- to indicate which of the financial sustainability elements of (1) growth opportunities, (2) operational efficiency or (3) innovation capability contributed most to explaining firm performance;
- to indicate which of the non-financial sustainability elements of (1) environment, (2) social or (3) governance contributed most to explaining firm performance;
- to indicate which of the financial or non-financial sustainability dimensions contributed most to firm performance;
- to determine the effect of the interaction of the dimensions of financial and non-financial sustainability on firm performance; and
- to draw conclusions based on the findings of the study and make recommendations for future research.

The research objectives led to the following main hypotheses of the study:

H_1: *Financial sustainability leads to enhanced firm performance.*

H_2: *Non-financial sustainability shows a relationship with firm performance.*

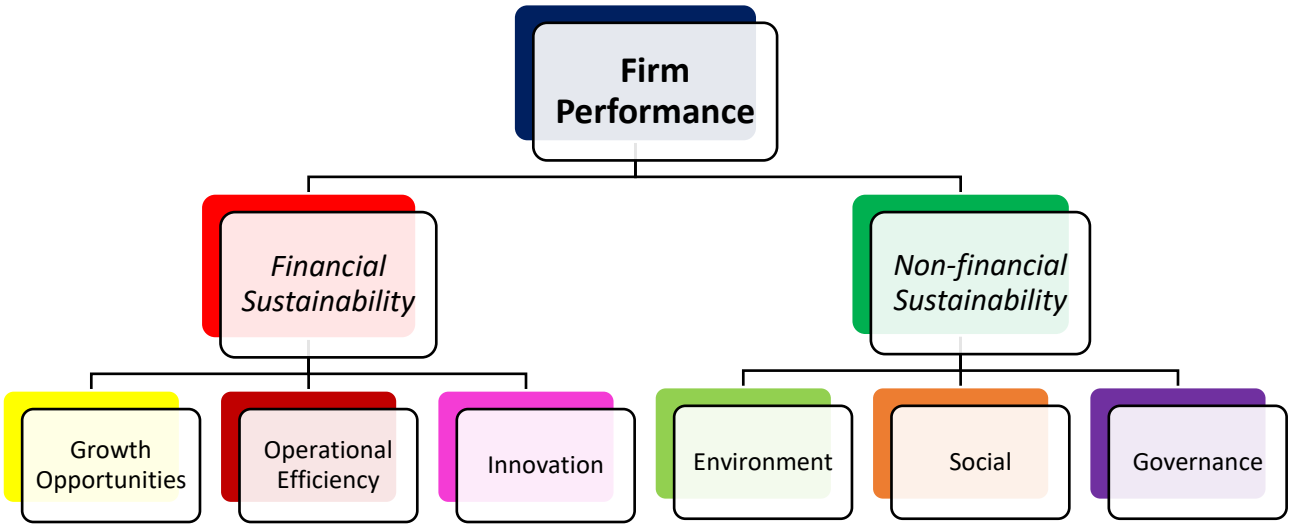
H_3: *Financial sustainability and non-financial sustainability show a relationship with firm performance.*

H_4: *The interaction effect of financial and non-financial sustainability elements shows a relationship with firm performance.*

The main hypotheses development, with each of their sub-hypotheses sets, based on the literature review, is set out in detail at the end of Chapter 5.

Figure 1-1 is an introductory visual presentation of the study.

Figure 1-1: Visual presentation of the study



Source: Author's own.

1.4 CONTRIBUTION AND BENEFITS OF THE STUDY

The study makes several noteworthy contributions. Firstly, it enhances the existing body of knowledge concerning the impact of both financial and non-financial sustainability on firm performance. Secondly, it serves to inform all stakeholders about the profound influence that environmental, social and governance performance can exert on firm performance, individually and in aggregate. Furthermore, the study furnishes empirical evidence elucidating the potential economic advantages or disadvantages that may accrue to firms based on their environmental, social and governance performance quality.

Thirdly, the study enriches the academic discourse by illuminating the intricate relationship between financial and non-financial sustainability performance, delving into its interdependent and interactive effects on firm performance.

Fourthly, the study offers insight into whether the different elements of financial sustainability performance measures, such as growth opportunities, operational efficiency and innovation capabilities, are associated with firm performance. Fifthly, the study discerns whether the three distinct elements of non-financial sustainability performance, encompassing

environmental, social and governance sustainability performance lead to value creation and affect firm performance, both in isolation and in aggregate.

Sixthly, the study gives feedback on whether the relationship between financial sustainability performance and firm performance is also affected by non-financial environmental, social and governance sustainability performance and to what extent non-financial environmental, social and governance practices interact with financial sustainability when determining firm performance. Lastly, investors and financial analysts stand to derive valuable insights from the study. The study's holistic assessment of firm performance, considering both financial and non-financial sustainability performance dimensions, may aid these stakeholders in making informed decisions.

1.5 DELIMITATIONS AND ASSUMPTIONS

Data for environmental, social and governance performance scores were obtained from Refinitv Eikon (previously known as Thomson Reuters Datastream) database. Data for financial statements and line items on financial statements were obtained from IRESS Expert and IRESS Research Domain, as well as firm websites for 11 years (2011 to 2021). Refinitiv Eikon, IRESS Expert and IRESS Research Domain are reliable suppliers of South African and international financial data. It was assumed that the financial statements of firms were a true reflection of a firm's financial position on the reporting date.

1.6 RESEARCH METHOD AND DATA USED

The study was conducted by including a structured large-sample measurement that was quantitative in nature. This study entailed an empirical research strategy, collecting and analysing secondary data. This research was descriptive to show the effect of financial and non-financial sustainability on a firm's performance.

The study included all South African firms listed on the Johannesburg Securities Exchange (JSE) excluding firms with missing data. The 2011 to 2021 financial years were included in the study, making use of regression analysis to test the validity of the relationship between

the dependent variable of interest, namely firm performance, and the two independent variables of interest, namely financial and non-financial sustainability.

The dependent variable of firm performance was measured using five measures, namely Tobin's Q, total shareholder return, weighted average cost of capital, market value added and economic value added.

Financial sustainability is a measure that captures short-term and long-term profitability. It was measured by using three different elements, namely growth opportunities (market-to-book value of equity), operational efficiency (return on equity) and innovation capabilities (research and development).

Non-financial sustainability refers to the environmental, social and governance performance of a firm. It was measured using the different performance measurement scores from the Refinitiv Eikon database, namely environmental score, social score and governance score.

1.7 STRUCTURE OF THE REMAINDER OF THE STUDY

The remainder of the thesis was structured as follows:

Chapters 2 to 5 cover the literature review of firm performance together with the theoretic underpinnings (Chapter 2), financial sustainability and its effect on firm performance (Chapter 3), non-financial sustainability and its effect on firm performance (Chapter 4), financial and non-financial sustainability synergy and its effect on firm performance (Chapter 5). These chapters review previous research and literature. Chapter 5 ends by providing the four main hypotheses as well as the further development of the hypotheses into sub-hypotheses.

Chapter 6 provides a detailed description of the research design and methods used in this study. It also includes the population and sample selection, the data sources and collection and the variable construction, discussing how the main variables and control variables were measured. The chapter ends with an evaluation of the quality, rigour and ethical considerations of the research.

Chapters 7 presents the analysis and results of identifying the variables for the financial sustainability dimension. The results are presented separately before the main results of the study are presented in Chapter 8.

Chapters 8 presents the results and a discussion of the results derived from the main equations of the study, considering the variables for the financial sustainability dimension as identified in Chapter 7.

Chapter 9 provides a comprehensive conclusion of the study with integrated findings. This section also discusses the gaps and limitations of the data, as well as the importance, significance and value that this study adds to existing literature. The chapter concludes with final recommendations for future research.

1.8 CHAPTER CONCLUSION

The main purpose of this study was to further the understanding of the relationship between financial and non-financial sustainability on firm performance. A firm should consider both financial and non-financial sustainability practices to remain sustainable in the future, considering the impact of its operations on the interests of all its stakeholders and not only its shareholders. The value creation process has strategic importance to firms and includes both the financial and non-financial sustainability performance dimensions.

Prior research on the sustainability of a firm has been fragmented, with an apparent lack of an integrated approach to both financial and non-financial dimensions of sustainability performance. Furthermore, there has been a lack of research on how firms perform when it comes to their environmental, social and governance initiatives, and not simply how they report on it. The literature indicates that firms are unsure about the contribution of each of the elements of financial sustainability and non-financial sustainability towards enhancing firm performance to get the optimal benefit for their firms and all their stakeholders.

CHAPTER 2
FIRM PERFORMANCE AND THEORETIC UNDERPINNINGS

2.1 INTRODUCTION

This research explores the relationship between financial and non-financial sustainability performance and their interactive and integrated influences on firm performance. Firm performance and how it can be maximised are increasingly important for value creation purposes. Enhanced financial and non-financial sustainability performance have the potential to improve firm performance and therefore to create value for a firm. A multi-theoretic contingency model was adopted in this study to acknowledge the roles of both financial and non-financial sustainability performance to create overall performance for the firm, by applying an integrated approach to shareholder wealth maximisation theory, stakeholder theory, resource dependence theory and organisational legitimacy theory. This chapter is the first of four literature review chapters, with this chapter dealing with the concept of value, aspects of firm performance and its measurements, and also examining relevant theory applicable to the study.

2.2 THE CONCEPT OF VALUE

In terms of how markets operate, people tend to make choices that provide them more value than another value they are willing to give up (Harrison and Wicks, 2013). When they can find a better deal (i.e. find more value than the value they are prepared to give up), people tend to shift from a previous choice to the better deal.

A firm's wealth and value are not defined by only considering the value created for shareholders in terms of an increased share price, dividends or profits. The economic (financial) and social (non-financial) purpose of a firm is to create value and wealth to all of its primary stakeholders, without favouring one group at the expense of others (Clarkson, 1995). According to Ecim and Maroun (2023), *value* can be understood broadly as not only the monetary benefits inherent in a firm, but balancing the economic, environmental and social imperatives in the interest of sustainable development over time. The International Integrated Reporting Council (2021) adds to the concept of *value*, stating that it allows for

financial return for investors and creditors, but must also be generated responsibly so as not to compromise the quality of life of future generations.

Different stakeholders have their own expectations and goals with regard to sustainability, which are sometimes in line with each other and sometimes contradict each other (Schaltegger et al., 2019). According to Hahn and Aragón-Correa (2015), creating sustainable firms may be further complicated if management is unwilling to admit that there exists some trade-offs, meaning that some elements of non-financial sustainability can only be achieved when financial resources are given up and vice versa. This leads to the limitations of a narrow view of management in contrast to a holistic view in achieving a sustainable firm. Management must recognise these limitations so that firms can move towards a broader perspective of all-inclusive stakeholder sustainable firms (Schaltegger et al., 2019). The challenge for management to create all-inclusive stakeholder sustainable firms is to enable integration between financial and non-financial goals, which will create value for all stakeholders and therefore bring profit maximisation in line with pursuing environmental, social and governance goals (Hörisch et al., 2014; Schaltegger et al., 2019; Windolph et al., 2014).

Firms engaging in non-financial activities and initiatives in dealing with environmental, social and governance concerns, beyond traditional financial performance metrics, could portray a value decrease for investors. A value decrease occurs because of non-financial sustainability activities requiring a considerable amount of resource allocation that could conflict with shareholder wealth maximisation objectives. On the one hand, firms that effectively manage both financial and non-financial sustainability, can altogether improve their financial performance, enhance their reputation, fulfil their social responsibility, and promote a corporate culture of integrity and competence. On the other hand, it seems that firms can only survive, keep their heads above water and generate sustainability when they continue to generate short-term profits and create value for their shareholders (Rezaee, 2017). Considering all of this in determining the performance of the firm, financial and non-financial sustainability should supplement each other and should not be mutually exclusive (Ng and Rezaee, 2015; Rezaee, 2016; 2017).

2.3 FIRM PERFORMANCE AND ITS MEASUREMENTS

Firm performance forms a vital part of the strategic planning and performance management of a firm (Selvam et al., 2016; Teeratansirikool et al., 2013). Performance management consists of the management of all business activities that generate financial and non-financial sustainability to ultimately maximise firm value (Golden et al., 2020; Rezaee, 2017). A firm's success is explained by its performance and sustainability over time (Al-Matari et al., 2014).

Firm performance is moving away from isolated and opportunistic efforts with a main focus on either financial or non-financial performance, towards a more integrated, holistic and strategic approach embracing both financial and non-financial performance, which affects all stakeholders (Kiron et al., 2015). Shareholders consider both dimensions of sustainability, namely financial and non-financial sustainability, when making investment analyses. Prior research clearly shows that financial and non-financial sustainability dimensions are related and that they both have an integrated effect on firm market performance, and as a result, influence a firm's cost of capital and firm value (Golden et al., 2020).

In an ever-changing world, it becomes difficult to predict the future performance of a firm accurately (Selvam et al., 2016; Taouab and Issor, 2019), where firms face severe competitive pressure to do things better, faster and lower-priced (Taouab and Issor, 2019). Firm performance is a multidimensional concept that has more than one dimension that can be used as a form of measurement (Ramadani et al., 2017; Selvam et al., 2016). Most firms seek to improve their firm performance in any way possible, with the winning card being held by those firms who endeavour to innovate, to obtain efficiency and good corporate governance, and most important, to sustain their performance (Taouab and Issor, 2019).

Nowadays, firm performance has become a relevant concept in strategic management and is frequently used as a dependent variable (Taouab and Issor, 2019). A firm's performance can be measured on various bases (Garcia-Castro et al., 2010; Mas-Tur and Soriano, 2014; Richard et al., 2009).

Accounting information and measurements are readily available, easy to understand and simple to calculate, as all information can be obtained from the financial statements of the firm (Richard et al., 2009). However, this form of measurement does have a few limitations, of which the biggest is that it focuses on historical data and activity rather than on future performance and expectations (Keats, 1988; McGuire et al., 1986). Therefore, accounting measures reflect what has already happened (historical financial data) and can be limited in anticipating and revealing expectations about the future performance of a firm. Other limitations are that these measures can be misleading by accounting policies, containing a great degree of manipulation by managers and also having errors (Benston, 1982; Briloff, 2010; Fisher, 1997; Fisher and McGowan, 1983; Jacobson, 1987; Livingstone and Salamon, 1970; McGuire et al., 1988; Solomon, 1970; Watts and Zimmerman, 1978; 1990; Wu, 2006). A study on performance measurement in Vietnam by Luu et al. (2008) found that accounting measures are a biased reflection of performance and that they are not useful to capture firm performance because these measures cannot properly capture intangible relationships such as those with the various stakeholders of the firm (Barney, 1991; Dierickx and Cool, 1989; Itami and Roehl, 1991).

One of the most prominent market-based measurements of a firm’s performance is the weighted average cost of capital of a firm (WACC). WACC is a calculation of a firm's cost of capital in which each category of capital (equity and debt) is proportionately weighted. All capital sources are included in the calculation of a firm’s WACC, such as ordinary shares, preferred shares, debentures and any other long-term debt. The WACC of a firm is the rate of return which capital suppliers demand in exchange for their capital commitment towards the firm (Atan et al., 2018). Internally, firms assess the merit of capital projects by comparing it with their WACC. A capital project's value is determined by the required rate of return, and therefore, one of the most important criteria for choosing an investment which will lead to shareholder wealth maximisation and ultimately, have an effect on firm performance is by first calculating the WACC related to it (Rajesh and Rajendran, 2020). By knowing what the WACC is of a project, it assists the firm in weighing the costs, advantages and risks associated with various investment initiatives. Therefore, the WACC of a project or investment is often used as a performance measure by the management of firms to determine whether it is worthwhile to invest in it or not. Investors in the open market view the WACC as the required rate of return they anticipate when investing in a firm or one of

its projects (Dhaliwal et al., 2011). A firm's WACC is the overall required rate of return of the firm as a whole and, as such, it is often used internally by firm directors to determine the economic feasibility of expansionary opportunities and mergers. Generally, WACC increases when the investors (equity) and creditors (debt) of the firm require a higher reward for an increased risk taken on the capital that they invested (Atan et al., 2018).

Furthermore, financial performance together with high-quality accounting information reduces a firm's cost of equity capital, by influencing shareholders' assessments of any uncertainties that they may have about the future cash flow of a firm (Hou et al., 2012; Lambert et al., 2007; 2011). Enhanced financial performance reduces shareholders' uncertainty about a firm's sustainable profitability, which, in turn, reduces the WACC and increases firm performance and value (Healy and Palepu, 2001; Leuz and Wysocki, 2008).

The greatest strength of market-based measures is that they are forward-looking, and not backward-looking, representing the discounted present value of the future cash flows of a firm, having its basis in the previous, current and anticipated performance of the firm (Fisher and McGowan, 1983; Ganguli and Agrawal, 2009; Shah and Hussain, 2012; Shan and McIver, 2011). Therefore, market-based measures of performance are preferable to accounting-based measures because of the ability to capture the future value of income streams more appropriately (Lubatkin and Shrieves, 1986; Rappaport, 1992). Another strength of market-based measures is that they can be categorised as long-term, giving a measurement for sustainable performance, which is reliable in the long run (Al-Matari et al., 2014). Market-based measures also incorporate intangible assets more effectively than accounting-based measures (Lev, 2000). A big limitation of the use of market data as a performance measurement is that it evaluates the firm as a whole; therefore, it is less useful for research which focuses on performance in terms of a specific product or strategic business unit (Griffin and Mahon, 1997; Richard et al., 2009). In the present study, the firm as a whole will be evaluated and therefore, this limitation is not applicable.

The concept of value management resulted from a pursuit of the actual drivers behind performance and value, where the two performance measures, namely market value added and economic value added, are known fairly well and also widely used by firms all over the world (De Wet and Hall, 2004). On the one hand, market value added is used as a measure

of firm performance because it captures the relative success of firms in maximising shareholder wealth through effective allocation and management of a firm's scarce resources (Hillman and Keim, 2001). Market value added is a firm performance indicator that is forward-looking, incorporating and discounting the market's view of both the current and future performance of the firm as expressed by the trading of the firm's shares. Market value added is a proxy measure used to gauge the overall success or failure of a firm's ability to generate value and create shareholder wealth maximisation. From an investor's point of view, market value added is the best measure to use in determining a firm's performance (De Wet and Hall, 2004). According to Stewart (1991), market value added is a cumulative measure of firm performance and it represents the shareholder market's assessment from a particular time onwards of the net present value of all of the firm's past as well as forecasted capital projects. This makes the market value added measure a back- and forward-looking measure, considering the past and future performance of a firm.

On the other hand, economic value added is an internal performance measure that drives market value added (De Wet and Hall, 2004). Stewart (1991) defines *economic value added* as the fuel that fires up market value added. Economic value added takes into account the full cost of capital, including both cost of equity and cost of debt. The calculation of economic value added is similar to the well-known performance measure "residual income", which has been used as a benchmark of performance for divisions in a firm, with the popularity of using this measure for performance still growing (Datar and Rajan, 2018; Garrison et al., 2005). In an empirical study of economic value added, Chen and Dodd (1997) found that improving economic value added performance was associated with a higher stock return. Lehn and Makhija (1996) describe *economic value added* and related measures aiming to improve traditional accounting measures of performance by assessing a firm's economic profit. This is achieved by subtracting the after-tax profits from the cost of capital, which is employed to produce those exact same profits.

Therefore, market value added and economic value added are closely related, but Biddle et al. (1999) state that market value added has a stronger explanatory power than economic value added has. However, both performance measures were used in this study as dependent variables.

Another measure used as a market-based measure is total shareholder return[1] which is, according to Richard et al. (2009), the most dominant and preferred instrument to measure a firm's performance if the firm has perfect market information. But because the market delivers imperfect information and the market return represents a consensus forecast at a specific point in time, total shareholder return may be a biased estimate of firm performance (Richard et al., 2009). The most direct measure of shareholder wealth is total shareholder return, which can be broadly defined as capital growth plus dividends. O'Neill and Iob (1999) are of the same view in saying that total shareholder return is the best indicator of firm performance because it combines capital growth and cash flow (dividends) to provide ultimate returns to shareholders.

Mixed accounting-based and market-based measures are better at balancing the risk against operational performance issues that are sometimes lost in market-based measures and ignored by accounting measures (Richard et al., 2009). According to Richard et al. (2009), Tobin's Q is the earliest and most popular hybrid measure of a firm's performance. Making use of Tobin's Q as a measure of firm performance is preferred over making use of accounting-based measures because it does not rely on accounting profits that could have been altered (Singh et al., 2018).

This measure is broadly defined as the ratio of the market value of the firm's assets to their replacement cost and is a theoretically based measure of economic return (Singh et al., 2018; Tobin, 1969; Tobin and Brainard, 1976). Tobin's Q is designed to reflect the market's valuation of a firm's assets relative to their carrying amounts (Lang and Maffett, 2011). In essence, it reflects what cash flows the market thinks a firm will provide per rand invested in assets. It should be higher if future cash flows are expected to be greater.

According to McNichols et al. (2014), using Tobin's Q as a measure of firm performance displays substantial data for not only firms in the same industry but also for firms across different industries. Fu et al. (2016) also found that the higher the Tobin's Q value, the higher the firm performance. Therefore, multiple industries predict future firm performance by using Tobin's Q as a proxy for firm performance.

[1] Also known as *shareholder* return or stock return.

This study reviewed an extensive body of literature that used Tobin's Q as one of the proxies for firm performance (Adams and Santos, 2006; Allayannis and Weston, 2001; Aydogmus et al., 2022; Barth et al., 2017; Bielmeier and Hansson Nansing, 2013; Chen and Li, 2013; Daske et al., 2008; King and Lenox, 2001; Lang et al., 2012; Lang et al., 2003; Lang and Maffett, 2011; Lee and Yeo, 2016; Masulis et al., 2012; Vivel Búa et al., 2015). Furthermore, Al-Matari et al. (2014) found that Tobin's Q was used as a proxy for firm performance in 74 out of 95 studies (78%).

Therefore, accounting-based measures are used for short-term firm performance, whereas market-based measures are used to gauge a representation of future long-term performance (Al-Matari et al., 2014). Based on the reasons for and against accounting- and market-based measures, it is clear that market-based and mixed accounting and market-based measures should be included to follow a multivariate analysis, providing a clear picture of the long-term performance of the firm (Al-Matari et al., 2014; Lambrechts and Toerien, 2016). The literature review overwhelmingly points to Tobin's Q being the best proxy to measure the performance of a firm and therefore, Tobin's Q was used as one of the dependent variables in this study. Some other market-based measures were also included as dependent variables, namely weighted average cost of capital, market value added, economic value added and total shareholder return.

In the context of firm performance, the term encompasses a multitude of measures, such as Tobin's Q, Total Shareholder Return (TSR), Weighted Average Cost of Capital (WACC), Market Value Added (MVA), and Economic Value Added (EVA), reflecting a comprehensive evaluation that goes beyond a singular focus on firm value, incorporating various financial indicators to provide a more nuanced and holistic understanding of a company's overall financial and non-financial performance.

2.4 THEORETICAL UNDERPINNINGS

The concept of *performance* by a firm has expanded to include not only financial performance but rather value created by firms through both financial and non-financial dimensions (Laptes and Sofian, 2016). When looking into the political economy theory, which states that society, politics and economics cannot be separated, it is clear that the

financial and non-financial performance of a firm should be seen as one unit (Deegan, 2013). According to Deegan (2013), the political economy theory views financial accounting performance, which is disclosed in a firm's financial reports, as a document that constructs, sustains and legitimises the practices that contribute to the interests of the firm.

Ng and Rezaee (2015) state that the financial and non-financial dimensions of sustainability performance are interrelated and should be investigated together when analysing the impact on stakeholder value. They also maintain that the objective function for any firm is to create shareholder value, which follows the shareholder wealth maximisation theory, while protecting the interests of their shareholders as well as other stakeholders under the stakeholder theory.

Various theoretic approaches were adopted in previous studies of the financial and non-financial activities and performance to improve firm performance. Therefore, this study was based on the following main theories: stakeholder management theory, shareholder wealth maximisation theory, resource dependence theory and organisational legitimacy theory.

These theories attempt to resolve the integration between the financial and non-financial performance dimensions of sustainability, their connections and probable constraints on the primary objective of a firm in creating long-term value for the firm. These theories are interrelated and compatible and therefore, individually and collectively, deal with different dimensions of sustainability performance in creating value for all stakeholders and long-term value for the firm.

The following sections review current literature on the theories that support sustainability performance.

2.4.1 Shareholder wealth maximisation theory as a basis for financial sustainability

According to the agency theory, management acts as 'agents' for their stakeholders and the stakeholders' interests need to be protected by the board of directors (management) (Donaldson and Davis, 1991; Eisenhardt, 1988; 1989). Shareholder wealth maximisation theory posits that the primary objective of firms is to maximise shareholder profit, without

considering the needs of all stakeholders (Aydogmus et al., 2022). Shareholders want to be made aware of the strategies that the firm has in place for its future plans and also what actions the firm has implemented to ensure that the firm continues to be sustainable and legitimate (Deegan, 2013). The focus of shareholder wealth maximisation and agency theory is the determination of the optimal contract, which is behaviour (financial and non-financial performance in this study) versus outcome (firm performance in this study), between the firm and its stakeholders (Eisenhardt, 1989). Shareholder wealth maximisation theory recreates the importance of incentives and self-interest of a firm, when it comes to organisational thinking (Perrow, 1986).

Shareholder wealth maximisation theory highlights the misalignment of shareholders' interests and those of management (Jensen and Meckling, 1976). In as much as managers are firm stewards who should act in the best interests of the shareholders, they tend to put their own interests ahead of firm value creation. Dawar (2014) and Rezaee (2017) also note the misalignment of shareholders and management's interests, where the latter's actions target short-term performance that will be linked to their compensation and bonusses as opposed to long-term performance for the benefit of shareholders. In order for the managers to maximise the shareholders' value and act in the best interests of shareholders, they need to invest in projects that offer a positive net present value and any social projects that do not create value, should be avoided (Rezaee, 2017). The shareholder wealth maximisation theory regarding sustainability performance implies that management tends to focus on short-term performance targets as opposed to long-term sustainability performance affecting the performance of firms.

According to Rezaee (2016), the implications of shareholder wealth maximisation theory for the sustainability performance of a firm are that the incentives and activities of management sometimes focus on short-term profitability targets, which are normally linked to the compensation and bonuses of executives, resulting in the detraction of achieving sustainable and long-term performance for shareholders. While the shareholder wealth maximisation theory has traditionally been used to explain the principal-agent relation and has focused mainly on creating value and maximising value only for shareholders, the theory is appropriate and desirable under the financial sustainability performance dimension (Rezaee, 2016).

It is important to note that a related theory, called the shareholder primacy theory, can be linked to the shareholder maximisation theory. The definition of the shareholder primacy theory is that corporate directors have a fiduciary duty to maximise the wealth of the shareholders, with little consideration paid to the possibility that the same shareholders may prefer a different outcome (Lipton, 2019). Therefore, it is clear that the shareholder primacy theory goes a step further by asserting that shareholders' interests should be prioritised above all other stakeholders in corporate decision-making. Under the shareholder primacy theory, the well-being of shareholders takes precedence, and corporate actions and strategies should be oriented towards maximising shareholder value, even if it means sacrificing the interests of other stakeholders (Lipton, 2019).

For the purposes of this study, the preference for the shareholder wealth maximisation theory over the shareholder primacy theory is grounded in the recognition that although shareholders are prioritised above other stakeholders, it recognises that the success of the firm extends beyond purely financial considerations. Embracing a broader perspective that incorporates non-financial sustainability performance in this study will allow firms to address the concerns and interests of various stakeholders which includes shareholders. By also considering the impact on the environment, employees and communities a firm can foster long-term resilience and sustainability. Shareholder wealth maximisation, in this context, becomes a comprehensive strategy that not only benefits shareholders but also takes into account the broader well-being of society.

2.4.2 Stakeholder management theory as a basis for sustainability

Stakeholder management theory differs from shareholder-based theories in the sense that a firm’s management should consider the interests of all of the firm’s stakeholders rather than just those of its shareholders (Donaldson and Preston, 1995). Jensen (2001) concludes that a firm can only maximise value resulting from firm performance if it acknowledges the interests of all its stakeholders. It is important to understand what is meant by the term *stakeholder* to further the understanding of stakeholder theory. The term *stakeholder* is broadly defined by Freeman (1984) as any group or individual who can affect or may be affected by the achievement of the firm’s objectives. Stakeholder management theory

implies that firms have an obligation towards a number of constituencies, and should add value for all their stakeholders, including shareholders, customers, suppliers, employees, the environment, government, capital providers and society (Jensen, 2001). As can be seen from the broad definition as well as all the stakeholders included, practically any person or group of persons can affect or be affected by a firm's activities.

Freeman (1984) asserts that firms have reciprocal relationships with different constituent groups and that these stakeholders contribute to the firm's value creation and the firm's actions, activities and initiatives affecting their well-being. Jones (1995) concludes that firms conducting business with any of their stakeholders on the basis of trust and co-operation have an incentive to demonstrate a sincere commitment to ethical behaviour, including non-financial sustainability performance. Increased non-financial sustainability performance and good ethical behaviour will, in turn, enable firms to achieve a competitive advantage, because of the development of a lasting productive relationship with stakeholders. Stakeholder management theory states that there is a broader range of important stakeholders, other than creditors and shareholders of a firm, who are also interested in a firm's sustainability achievements and plans, such as customers and employees (Frias-Aceituno et al., 2013). Furthermore, according to the King IV report, the most recent version of South Africa's authoritative corporate governance code (IoDSA, 2016), firms are encouraged to issue integrated reports that are transparent and meaningful for all stakeholders and not only for the main group of stakeholders such as shareholders and creditors.

Some academics argue that it is not practical for a firm to attend to all the demands and interests of all stakeholders (Mitchell et al., 1997). One of these demands is that a stakeholder must have a claim against the firm (Hill and Jones, 1992); another is that stakeholder status should be determined based on the necessity of the firm-stakeholder relationship for the firm to survive (Clarkson, 1995). As a consequence of the broad spectrum of stakeholders of a firm, multiple (and sometimes conflicting) goals may arise (Harrison and Wicks, 2013). Therefore, it is the role and responsibility of management to attend to these conflicts in considering the best interests of all stakeholders to ultimately create as much as possible value for the firm. Effective stakeholder management by firms which include all stakeholders can create intangible, socially complex resources that may

improve firms' ability to outperform their competitors in terms of long-term value creation (Hillman and Keim, 2001).

The seminal study done by Miller and Modigliani (1961) states that the dividend policy and capital structure are irrelevant to firm value in a perfect market, and therefore stakeholders, which includes shareholders, would be more concerned with the firm's overall business strategy, investment decisions, and profitability rather than the specific details of how dividends are distributed or how the firm is financed.

Overall sustainability objectives are achieved when stakeholder theory is applied to the managerial processes of the firm (Donaldson and Preston, 1995; Freeman et al., 2010). According to stakeholder management theory, both financial and non-financial sustainability dimensions are viewed by the stakeholders of the firm as value-added activities, which create stakeholder value (Rezaee, 2016). Stakeholder management theory has become one of the most commonly used theoretical approaches in financial and non-financial sustainability research (Carroll and Buchholtz, 2014; Clark et al., 2015; Frynas and Yamahaki, 2016; Kuhndt et al., 2002; Montiel and Delgado-Ceballos, 2014; Perrini and Tencati, 2006; Weber and Marley, 2012). Since a firm's resources include environmental, social and governance performance, financial sustainability is not the only dimension that adds to the value of the stakeholders, and therefore, a synergy between financial and non-financial sustainability performance may add value for the firm. The performance of the firm, either from a financial sustainability or non-financial sustainability performance dimension, acts as the link between the firm and its stakeholders.

2.4.3 Organisational legitimacy theory as a basis for sustainability

Organisational legitimacy theory states that the justification of a firm's role in society depends on it being perceived as legitimate (Dowling and Pfeffer, 1975; Fernando and Lawrence, 2014). A firm is viewed as legitimate when it has a reputation of conforming to social norms, values and expectations of the society (Ashforth and Gibbs, 1990; Rezaee, 2016). Suchman (1995, p. 574) defines *legitimacy* as "a generalized perception or assumption that the actions of an entity are desirable, or appropriate within some socially constructed system of norms, values, beliefs, and definitions". Therefore, the legitimacy of

a firm depends on what perception society has of the value that a firm adds to the society (Setia et al., 2015). For a firm to be valuable to society and for it to ultimately achieve legitimacy in society, its value systems need to be in line with those of society (Deegan, 2013). According to Castelo Branco and Lima Rodrigues (2006), legitimacy theory states that firms in specific industries feel greater pressure to perform at a social and environmental level, explaining their non-financial sustainability, as they are more exposed to public and political analysis. It is also known that firms set up their non-financial sustainability disclosures based on the legitimacy theory, stating their non-financial sustainability performance in a way that meets the needs of their most influential stakeholders (Campbell, 2000).

Organisational legitimacy theory states that environmental and social sustainability initiatives of a firm and its related performance are desirable by all stakeholders of the firm (Rezaee, 2016). However, non-compliance with environmental requirements and social norms can be damaging to a firm's organisational legitimacy and financial sustainability, destroying overall firm performance (Guthrie and Parker, 1989; Tilling, 2004).

Suchman (1995) claims that a firm can manage its legitimacy by focusing on the firm's communication with various stakeholders, acting as agents for the firms. This is because a firm's legitimacy is a direct result of how stakeholders perceive the firm (Suchman, 1995), and if a firm omits to make stakeholders aware of the firm's sustainability performance, it can result in a legitimacy gap (Deegan, 2002). In turn, organisational legitimacy theory can be linked to stakeholder theory.

According to Rezaee (2017), firms face pressures from social, community and political spheres, which they have to respond to correctly to preserve their legitimacy. Legitimacy theory tends to validate the importance of a firm's performance on non-financial performance such as the social and environmental elements. Any deviations from these indicators due to non-compliance will threaten a firm's non-financial sustainability as well as its legitimacy. To guard against legitimacy threats and to operate sustainably, firms need to satisfy the expectations of the society by sharing the same value systems as the societies and conform to societal norms (Bae et al., 2018; Fernando and Lawrence, 2014).

To conclude, both financial and non-financial sustainability are considered an integral factor of management strategies, particularly when there is conflict between the corporate goals of a firm, such as maximising financial performance, and the social goals, such as fulfilling non-financial performance. Therefore, organisational legitimacy is important and relevant to achieve non-financial sustainability as it solidifies the firm's reputation, by making sure that its products and/or services are desirable and beneficial to all stakeholders rather than harming the environment and society (Suchman, 1995).

2.4.4 Resource dependence theory as a basis for sustainability

Resource dependence theory arose from the influential work done by Pfeffer and Salancik (2003). This theory is one of the most influential theories in organisational and strategic management (Hillman et al., 2009). Resource dependence theory characterises the firm as an open system, dependent on contingencies in the external environment (Pfeffer and Salancik, 2003). This dependence creates an element of uncertainty with the board of directors acting as a mechanism to minimise the uncertainty and also manage the dependence on external parties (Pfeffer, 1972), leading to the reduction of transaction costs arising from interdependencies, with the board of directors contributing to the survival of the firm through good corporate governance (Singh et al., 1986).

Resource dependence theory posits a direct relationship between the ability of the board of directors to provide access to resources resulting in firm performance (Hillman and Dalziel, 2003). Therefore, the board of directors is viewed as a vital link between the firm and external parties required by the firm to maximise financial and non-financial performance leading to a maximisation of firm performance (Pfeffer, 1972; Pfeffer and Salancik, 2003; Zald, 1969).

2.5 CONCLUSION

This chapter discussed the importance of the sustainable performance of a firm. Both financial and non-financial sustainability contribute to the performance of the firm and have the potential to create sustainability for the firm. Therefore, this study examined the relationships between financial and non-financial sustainability on firm performance. After considering numerous measures relevant to firm performance, the five measures for firm performance chosen for this study as dependent variables were Tobin's Q (TQ), total shareholder return (TSR), weighted average cost of capital (WACC), market value added (MVA) and economic value added (EVA).

As both financial and non-financial sustainability play a major role in the performance of a firm, a review of past studies examining firm performance was conducted. These studies neglected to use an integrated approach including both the financial and non-financial sustainability dimensions of a firm. To overcome this shortcoming, a multi-theoretic framework was adopted as a basis for this study, integrating stakeholder theory, shareholder wealth maximisation theory, resource dependence theory and organisational legitimacy theory to gain a better understanding of the financial and non-financial sustainability performance and its effect on firm performance.

Chapter 3 deals with the financial sustainability dimension and how it affects firm performance.

CHAPTER 3
FINANCIAL SUSTAINABILITY PERFORMANCE

3.1 INTRODUCTION

This research explored the relationship between financial and non-financial sustainability and their interactive and integrated impacts on firm performance. This chapter, the second of four literature review chapters, deals with aspects of financial sustainability performance, including how the performance creates value for the firm and the three different bases of financial sustainability, namely growth opportunities, operational efficiency and innovation capabilities.

Although shareholders are not a special constituency that ranks above other stakeholders, long-term share value, based on a firm's financial sustainability over time, remains an important determinant (along with the value of debt and other instruments) of total long-term firm value (Jensen, 2001). According to Rezaee (2017), the financial sustainability dimension is the most important component of the overall sustainability of a firm for most firms, as the primary purpose of these firms is to maximise economic performance to create value for shareholders. Financial sustainability reflects a firm's long-term profitability as measured in terms of earnings, market value, long-term operational effectiveness and efficiency, productivity, innovation and return on investment (Rezaee, 2016).

3.2 GROWTH OPPORTUNITIES, OPERATIONAL EFFICIENCY AND INNOVATION CAPABILITY

Various variables can be used as proxies to capture the financial sustainability of a firm (Gleißner et al., 2022; Ng and Rezaee, 2015; Zabolotnyy and Wasilewski, 2019). Financial sustainability and the measurement thereof through growth opportunities, operational efficiency and innovation capability, as done in this study, take into account investment for future growth (Golden et al., 2020; Ng and Rezaee, 2015).

Even though the conservative measures of cash flow, earnings and return on investment are all important when evaluating the financial performance of a firm, they do not reflect

financial *sustainability* and the future growth of a firm (Rezaee, 2017). Financial sustainability at firm level refers to the stability, security and viability of a firm (Zabolotnyy and Wasilewski, 2019). Firstly, financial stability refers to the ability of a firm to simultaneously generate profit, increase the value of capital invested in the firm and repay short- and long-term liabilities (Myšková and Hájek, 2017). Secondly, financial security refers to the state of the long-term financial equilibrium of a firm, which reflects the ability of the firm to resist the negative impacts of both internal and external threats (Delas et al., 2015). These two definitions are not commonly used in the context of the financial sustainability of a firm but attribute to the well-known concept of financial viability, which uses a broad spectrum of instruments to assess the financial strength of a firm (Matson et al., 2016). Therefore, Zabolotnyy and Wasilewski (2019) found that despite numerous attempts to explain financial sustainability, there was still a lack of research devoted to the methodology of the evaluation of financial sustainability for firms.

According to KPMG (2013), long-term financial sustainability is a significant contributor to the sustainable success of a firm and suggests the use of financial key performance indicators (KPIs), being drivers of overall sustainability. These KPIs include growth opportunities, operational efficiency and innovation capabilities. These are all to be derived from the internal factors of corporate culture, risk profile and the strategy of a firm as well as the external factors of reputation, use of natural resources and technology (Rezaee, 2017). Inclusion of these measures enables firms to create sustainable value not only for shareholders, but also to protect interests and create value for other stakeholders such as creditors, suppliers, customers, employees, society and the government (Ng and Rezaee, 2015; Rezaee, 2017).

3.2.1 Growth opportunities

The growth of firms is found to be one of the most reliable and valid measures of firm performance and its ongoing financial sustainability in the long term (Bolek et al., 2021; Brush and Vanderwerf, 1992; Chandler and Hanks, 1993; Murphy et al., 1996). Regardless of the size of a firm, the expansion and growth of a firm are indeed the creation of a healthy growing economy and of new job employment (Storey, 2016). According to Al Ahbabi and Nobanee (2019), a firm must be profitable to maintain sustainable financial growth, which,

in turn, affects the value of shares of the firm. Sustainable financial growth incorporates not only being profitable but also risk management and proper governance of funds (Al Ahbabi and Nobanee, 2019). Therefore, sustainable practices should also involve excellent corporate governance (discussed in Chapter 3 as part of non-financial sustainability).

Miller and Modigliani (1961), in their well-known study, state that firm performance and firm growth can be split into the value of assets in place and the value of growth opportunities. They define *growth opportunities* as the ability of a firm to make investments in the future, which will result in returns exceeding the cost of capital invested. The return on these investments, which can be seen as the most popular growth indicators, can be measured in several ways such as sales, earnings, equity and total assets (Bolek et al., 2021; Danbolt et al., 2011; Pietraszewski et al., 2023). The increase in these measures should be reflected in the growth of the value of the firm if it implements profitable investment projects (Seelos and Mair, 2007). Growth by a firm can still be achieved even though it has not made any investments or has made investments in negative net present value projects (Andrikopoulos, 2009; Carroll and Griffith, 2001; Jensen, 1986) Therefore, Danbolt et al. (2011), Rezaee (2018) and Pietraszewski et al. (2023) suggest that growth in earnings or growth in earnings per share should be used because it is a more reliable indicator of valuable firm growth. This measurement may be seen as a reliable indicator because it most clearly identifies firms that have undertaken valuable and positive net present value investment projects (Danbolt et al., 2011).

Another widely used proxy for future firm growth and the level of growth opportunities by studies is the market-to-book value ratio (Adam and Goyal, 2008; Burton, 2003; Chung and Charoenwong, 1991; Collins and Kothari, 1989; Danbolt et al., 2011; Gaver and Gaver, 1993; Jacquier et al., 2001; Kallapur and Trombley, 1999; Smith Jr and Watts, 1992). This ratio can be adjusted to reflect the ratio with equity or assets. The higher the ratio, the larger the value of growth opportunities (Danbolt et al., 2011). Furthermore, market-to-book value of equity is indicative of not only the efficiency of the utilisation of assets by the firm but also the future growth potential of a firm's performance (Sharma et al., 2013). Therefore, market-to-book value of equity is often used to analyse whether value is created or destroyed by the firm, indicating whether the firm is growing or not. According to Sharma et al. (2013), the

market-to-book value of equity measurement reflects the success of the firm's managers in delivering robust operating performance as well as growth in the net assets of the firm.
Two other proxies used to indicate the presence of potential growth opportunities are the earnings yield ratio (Chung and Charoenwong, 1991; Jacquier et al., 2001; Kallapur and Trombley, 1999; Kester, 1984; Penman, 1996) and the dividend yield ratio (Gaver and Gaver, 1993; Jacquier et al., 2001; Kallapur and Trombley, 1999; Rozeff, 1982; Smith Jr and Watts, 1992).

Ng and Rezaee (2015) also point to the market-to-book value of equity ratio as a measure of growth opportunities. Shareholders of the firm may trade their shares based on their expectations about the firm's future growth and performance and also to a great extent based on short-term considerations of earnings, which may cause changes in the value of shares independent of changes in what the true condition of the firm is about its long-term sustainable economic performance in terms of growth (Rezaee, 2017). Firms with a long history of financial sustainability may exhibit higher earnings growth than those firms with poor financial sustainability (Golden et al., 2020). Therefore, according to Golden et al. (2020), Rezaee (2018) and Danbolt et al. (2011), an appropriate measure of valuable growth is the growth in earnings or similarly, the growth in earnings per share.

The literature indicates that various variables are used to measure growth opportunities. In summary, the four variables that have emerged strongly are earnings per share, earnings yield ratio, dividend yield ratio and market-to-book value of equity. These variables and their construction are described in Section 6.7.2. Chapter 7 presents statistical testing to identify which one of these four variables would be the strongest predictor of firm performance for use in later analyses.

3.2.2 Operational efficiency

Efficiency can be explained as how well a relevant action is performed, i.e. doing things right, and *effectiveness* can be explained as selecting the best action, i.e. doing the right thing (Lee and Johnson, 2013). A firm is effective if it identifies and pursues appropriate strategic goals, and efficient if it achieves these strategic goals with minimal resources, according to Lee and Johnson (2013). Therefore, *operational efficiency* can be defined as

the ability of a firm to deliver its products or render its services to its customers/consumers in the most cost-effective manner possible, without sacrificing the quality thereof, with the use of minimal resources. The following questions arise when analysing operational efficiency (Hackman, 2007):

- How efficient is the firm in using its input to produce its output?
- Does the firm use the optimal mix of inputs to produce the optimal mix of outputs?
- How will the firm react when there is a price increase from a critical input?
- How efficient is the firm in managing the expansion of its operations?
- Was there an improvement in the productive capabilities of the firm's operations over a period?
- How does the firm compare with its competitors in terms of their operational efficiency?

A firm achieves competitive advantage through its operational capabilities and efficiency, which, in turn, influence the firm's market share and share price and ultimately, its financial performance and financial sustainability (Kanghwa, 2010). Cost and performance management are linked as they are both considered to be managerial functions, which require the discretion of management when using scarce resources. Therefore, management attempts to minimise potential costs and maximise potential benefits of sustainability developments and performance, through the execution of the firm's planned performance management strategies to achieve financial sustainability (Golden et al., 2020). A firm that is known to be financially sustainable, through financial growth, enhances the employees' enthusiasm to work for the firm. This is known to bring direct benefits to the firm in the form of increased self-esteem, productivity and operational efficiency (Camilleri, 2017).

Petersen and Schoeman (2008) state that return on assets is an indication of operational efficiency for banks, where return reflects the net profit after taxes of a firm. The return on assets provides information about the amount of profit generated on average by each unit of assets. Therefore, the return on assets is an indicator of how efficiently a firm is run (Petersen and Schoeman, 2008). Abraham et al. (2017) state that large firms strive for operational efficiency through higher return on assets and return on equity. Based on a broad sample of real estate investment trusts in the United States of America, Beracha et

al. (2019) found that return on assets and return on equity were both strongly related to firm operating efficiency. Their results also concluded that more efficient firms were associated with better operational performance and efficiency, and ultimately, higher firm performance. Ng and Rezaee (2015) and Gul and Ng (2017) came to the conclusion that operational efficiency could be measured by using one or several of the following measures: return on assets, return on equity and sales by taking into account an effective internal control environment in place by firms.

The value of a firm may be determined by the value of its resources, measured by the usefulness of its product leading to the efficiency of sales (Kennerley and Neely, 2002). The operating decisions that management makes relate to the products and services it offers and the prices it sets, but also include the operating and distribution costs with an overall consideration of the preferences of buyers and competition in the market (López Salazar et al., 2012). The results of these decisions have an effect on the growing dynamics of the sales of a firm (Pietraszewski et al., 2023).

Various variables are used to measure operational efficiency. In summary, the three variables most used are return on assets, return on equity and sales. These variables and their construction are described in Section 6.7.2. Chapter 7 presents extensive statistical testing to identify which one of these three variables would be the strongest predictor of firm performance.

3.2.3 Innovation capability

According to Rezaee (2017), financial sustainability does not only include growth opportunities and operational efficiency, as discussed in the previous sections, but also improved risk management and safety, and fostering collaboration with other innovative firms. Firms should focus on activities and innovations that will generate long-term sustainable firm profitability rather than short-term performance.

The standard neoclassical theory of investment (Abel and Eberly, 1993; Hayashi, 1982) was established more than 35 years ago, when firms mainly owned physical assets such as property, plant and equipment, and as a result, empirical research was concentrated almost

exclusively on physical capital (Peters and Taylor, 2017). Since then, firms have globally shifted towards service- and technology-based industries, making intangible assets such as innovative products, human capital, brands, patents, software, good customer relationships and databases increasingly more important (Crouzet and Eberly, 2019; Peters and Taylor, 2017). According to Peters and Taylor (2017), a firm develops knowledge capital when it spends money on research and development. Like physical assets, intangible assets help produce profits and for this reason, it makes sense to treat not only tangible assets but also intangible assets as part of the total capital of the firm to generate profit.

Innovation capability can be defined as the ability of a firm to apply its internal knowledge to come up with new technology, new products/services, and other new fronts (Crouzet and Eberly, 2019; Drucker, 1994; Griffin and Hauser, 1996). Smith (2005) describes *innovation capability* as the creation of something qualitatively new, through processes of learning and building of knowledge. More recently, the definition of *innovation* has been refined as the implementation of a new or significantly changed goods or services, or process of production or delivery, organisation and marketing (Gault, 2018). Being innovative also means that firms need to enhance their competences and capabilities by producing new performance outcomes (Smith, 2005). Furthermore, according to the exploration learning theory as seen in research by March (1991), innovation by a firm is crucial for its survival and success, as dynamic markets continuously get rid of players that lack the competence to explore new market opportunities (Gatignon and Xuereb, 1997; Schumpeter and Backhaus, 2003).

KPMG (2019) developed a long-term value framework, which was designed to help create long-term value for firms. One of the ten organisational capabilities, which KPMG identified to enhance a firm's capacity to blend short- and long-term thinking into strategy and performance management, is: "strategic planning, risk management and *innovation*". KPMG concludes that a firm needs to secure and enhance strategic intangible assets, such as data, partnerships, research and development, brands and customer and stakeholder relationships. These intangible assets increasingly determine the value of any firm. The investment in innovation through research and development activities is made by firms which are longer-term and sustainably oriented, because the costs thereof are incurred immediately but the returns take longer to materialise (Koskinen et al., 2020; Lerner et al., 2011; Meulbroek et al., 1990). Some other studies also show that a firm's research and

development expenditure enhances innovation activities and investor's evaluations of the firm (Chauvin and Hirschey, 1993; Gruca and Rego, 2005; McGuire et al., 1988). Furthermore, research and development is generally aimed at creating innovations to enhance profitability and ultimately, firm performance (Crouzet and Eberly, 2019; Koskinen et al., 2020; Rogers, 1998).

Firms which invest greatly in research and development tend to have high growth opportunities, which business managers want to fully exploit in the sustainable future (Chambers et al., 2002; Chan et al., 2001; Ho et al., 2006). Calls for firms to start with more long-term, innovative and sustainable thinking have become more widespread (Fink, 2019; Lipton et al., 2016). KPMG (2019) also argue that for firms to remain competitive, senior executives need to start thinking differently and innovatively about their business strategy and how they plan to manage their firms. Gault (2018) also makes it clear that innovation drives growth, advances sustainability and promotes social unity.

By far the longest-standing area for data collection and most extensively used proxy to measure innovation are research and development (Fu et al., 2016; Rogers, 1998; Smith, 2005). Rogers (1998) emphasise that due to its wide availability and its expected high correlation between research and development and a firm's innovation effort, research and development is a valuable proxy for innovation activity and capabilities of a firm. Research and development is the strongest variable used as an indicator to measure the innovative capability of firms in creating financial sustainability, without undermining the short-term performance of a firm (Gul and Ng, 2017; KPMG, 2019; Ng and Rezaee, 2015; Rezaee, 2017; 2018; Smith, 2005).

Therefore, only one variable is suitable for the measurement of innovation capabilities. The construction of the research and development variable is described in Section 6.7.2.

3.3 ASSESSING FINANCIAL SUSTAINABILITY

Financial sustainability is defined as the ability of a firm to fulfil and maintain its financial capabilities over a period of time (Bowman, 2011). Zabolotnyy and Wasilewski (2019) define *financial sustainability* as the potential to provide continuity of the operations of a firm together with the creation of value for the owners of the firm in the long term, by using the optimal combination of investments and sources of financing. The challenges that any firm faces to establish its financial capabilities and financial sustainability are central to the functioning of the firm (Bowman, 2011; Gleißner et al., 2022). Furthermore, a firm will constantly be short of cash flow when it is sustainable in the long term but unsustainable in the short term, according to Bowman (2011). On the contrary, a firm will have adequate cash flow in the short term, but inflation will cause the value of its assets to depreciate over time, when it is sustainable in the short term but not in the long term. For firms to remain competitive, senior executives need to start thinking differently about the strategy of their firms and the way they will be managing their firms in the future (KPMG, 2019). The strategic goal for a firm is to remain sustainable in the future, of which the key is to be sustainable not only in the short term, but also in the long term, through changing the way its executives manage the firm.

From an accounting point of view, financial sustainability satisfies the going-concern principle set out in the accounting framework, and from a financial management point of view, it satisfies the value maximisation for shareholders, developing a win-win situation for the firm and its stakeholders (Qaim et al., 2021; Zabolotnyy and Wasilewski, 2019).

Financial sustainability is communicated in the financial statements of a firm to all stakeholders, through the preparation and dissemination of the following key performance indicators: price/earnings ratio, market value of future products, growth or decline in sales/revenue/dividend/earnings, earnings and cash flow forecasts, liquidity ratios, profitability ratios (reported earnings, return on assets, return on equity) and operating income (Rezaee, 2017).

3.4 CREATING VALUE THROUGH FINANCIAL SUSTAINABILITY PERFORMANCE

3.4.1 Creating value through financial sustainability

According to various academic research studies, financial sustainability is essential in creating shareholder value (Barth et al., 2008; Brown Jr et al., 2006; Jain et al., 2016). Shareholder wealth maximisation theory advocates that management creates shareholder value by engaging in positive net present value projects that maximise shareholder wealth (Ng and Rezaee, 2015). Shareholder wealth maximisation theory specifies that shareholders are the owners of the firm, and that management has a fiduciary duty to act in their best interests to maximise their wealth. Shleifer and Vishny (1997) note that the enduring question is: "How do investors get the managers to give them back their money?"

Shareholder wealth maximisation theory proposes that management can maximise the interests of shareholders by engaging in positive net present value future cash flows that create shareholder value (Rezaee, 2016). From a shareholder wealth maximisation theory perspective, where the ultimate goal is financial gain, it is clear that non-financial sustainability activities and initiatives may be seen as the deterioration of a firm's resources in pursuit of activities that are not specifically in the best interests of shareholders, even though it is true that it may create value for other stakeholders (Rezaee, 2016).

A focus on financial sustainability can improve the performance of shares and equity (Eccles et al., 2014), improve financial resources (Wang and Tuttle, 2014), enhance firm competitiveness (Porter and Van der Linde, 1995), lower costs (Orens et al., 2010), improve productivity, and increase efficiency in operations (Maignan, 2001). More recent studies conducted by KPMG (2019) and Qaim et al. (2021) show that firms that prioritise long-term financial sustainability strategies and have decision-making processes in place to enhance financial sustainability do not waste their time, effort and money because they get higher share prices in return and have more stable financial performance than that of their competitors.

3.4.2 Positive and negative relationship between financial performance and firm performance (short-termism versus long-term innovative thinking)

Short-termism is the representation of decisions and consequences that follow a course of action that is best for short-term performance but at the cost of long-term performance (Laverty, 1996; Mio et al., 2020). Furthermore, short-termism focuses on short-term performance and the goal of meeting or exceeding short-term targets or analysts' forecast estimations, according to Rezaee (2017). Short-termism has a negative impact on management behaviour as it prevents management from directing their resources towards sustainable and lasting plans, activities and performance for the firm, which would have created sustainable shareholder value and firm financial performance.

According to a study conducted by KPMG (2019), short-termism could diminish financial performance and shareholder value both in the short and long term. Value can be unlocked and financial performance can be achieved once firms gain a better understanding of how short- and long-term sustainable business decisions and investments interact with each other (Gleißner et al., 2022; KPMG, 2019). According to Rezaee (2017), firms can only be sustainable when they continue to create shareholder value through profitability. Overall business sustainability focuses on business activities that generate long-term financial performance or firm performance maximisation by executives of firms responding effectively to having a competitive advantage for the sake of their own short- and long-term future success (KPMG, 2019; Rezaee, 2017).

The generally accepted primary objective of firms is the creation of value for shareholders, which can be achieved by focusing on financial sustainability. However, the focus on short-term financial performance has an unfavourable impact on long-term and sustainable shareholder value creation, and also reduces the expected value of future returns and thus current share prices (Rezaee, 2017). Koskinen et al. (2020) state that the revenue of the firm increases, costs decrease, and margins and profits increase when firms have a shift towards longer-term sustainable thinking.

Devotion to short-term considerations and quarterly profit-making is inevitable and sometimes even desirable for management because investors want quick profits and

increase in share prices and management expects performance bonuses (Narayanan, 1985), which can lead to financial fraud (Harford et al., 2018). However, the long-term creation of sustainable and enduring shareholder value should be the main goal and benchmark of success for firms (Barton et al., 2016; Koskinen et al., 2020; KPMG, 2019). Furthermore, firms are likely to succeed in the changing marketplace if they strive to blend short- and long-term innovative thinking in their business strategies and performance management, according to KPMG (2019). Business managers may be tempted to manifest short-term behaviour in contrast with the long-term view of business sustainability, especially regarding the financial sustainability of the firm. For a business to be sustainable in the long term, an integrated effort by management and a change in managerial focus from the short-termism of the tangible quick wins to the achievement of long-term, sustainable non-financial performance are required (Barton et al., 2016; Koskinen et al., 2020; KPMG, 2019). This integrated approach enables a firm to effectively compete in the global marketplace by achieving business sustainability. The achievement of business sustainability through financial sustainability calls for firms to solve the real problem facing them, which is a lack of a holistic view of business strategy. This means that firms tend to believe that the focus on short-term financial performance and investment in the long-term success of the firm are incompatible, or the focus on value creation other than financial returns (investment in non-financial sustainability) harms shareholder value creation (KPMG, 2019).

Concentrating on creating value in the short-term through financial performance alone may be viewed as short-sighted owing to the focus of management on short-term objectives, leading to the creation of value in the short term, but coming at a cost of destroying value in the long term (Aras and Crowther, 2008). Therefore, to create value in a sustainable manner, there needs to be a shift from short-term to long-term firm performance. Firms with a long-term business prospect have higher and more stable revenues, earnings and market capitalisation, both in the short and the long term (Braun et al., 2019), resulting in a successful strategy for firms by focusing on blending long-term value creation, and therefore, being financially sustainable, with shorter-term results (KPMG, 2019).

Firms struggle to have a holistic view of financial stability, meaning that they tend to focus on short-term financial performance, rather than to invest in the long-term health of the firm, and also believe that the creation of value other than through short-term financial returns will

harm shareholder value creation (KPMG, 2019). A lack of long-term thinking results in firms missing the opportunity to unlock additional value and enhance their financial performance.

The firms which will be at the top in the future are likely to be those with the ability to improve the long-term competitiveness and resilience of their business, without undermining their short-term financial performance (Gleißner et al., 2022; Koskinen et al., 2020; KPMG, 2019). Financial sustainability is essential in creating shareholder value, where the goal of firms should be the focus on long-term sustainability and enduring shareholder value creation, including growth opportunities, operational efficiency and innovation capabilities (each of which are discussed later in this chapter), rather than considering only short-term profitability (Golden et al., 2020; Ng and Rezaee, 2015).

KPMG (2019) concludes that firms need to focus on long-term innovative thinking by blending long-term value creation with a shorter-term results focus. For the financial sustainability dimension of business sustainability, the focus of management practices should include growth opportunities, operational efficiency and innovation capabilities to enhance firm performance in the long term, which is discussed in the next section.

Therefore, it is important for a firm to rather focus on long-term financial sustainability through performance in all three the elements of financial sustainability, namely growth opportunities, operational efficiency and research and development. Firms focusing solely on short-termism make decisions necessary for immediate problem-solving, which leads to missed opportunities and an increased vulnerability to financial instability. Financial sustainability of a firm mainly focuses on the long-term financial stability of a firm (Zabolotnyy and Wasilewski, 2019). Getting a balance between short-term financial needs and long-term financial sustainability is crucial for holistic financial well-being.

3.5 CONCLUSION

The financial sustainability dimension of sustainability performance is often considered to be the most important dimension for the sustainability of firms, especially by the investors of the firm (Rezaee, 2017). Firms should be financially sustainable for them to create value for shareholders to survive financially and continue into the future.

Firms lack a holistic view of financial stability if they focus on short-term financial performance, rather than to invest in the long-term health of the firm, believing that the creation of value other than through short-term financial returns will harm shareholder value creation. A lack of long-term thinking results in firms missing the opportunity to unlock additional value and enhance their financial performance.

Therefore, financial sustainability is created through firms not only focusing on short-term profit making, but also engaging in long-term sustainability activities, creating wealth for their shareholders. This could be achieved through the three elements of financial sustainability, namely growth opportunities, operational efficiency and innovation capabilities.

The growth opportunities element of financial sustainability can be measured using one of the following measures: earnings per share, earnings price ratio, dividend price ratio and market-to-book value of equity. The operational efficiency element of financial sustainability can be measured using one of the following three measures: return on equity, return on assets or sales. The innovative capability element of financial sustainability can be measured by research and development.

Despite many parties focusing on financial sustainability, overall business sustainability can only be enhanced if firms incorporate non-financial sustainability in their strategic plans. Chapter 4 considers the non-financial sustainability dimension and how it affects firm performance.

CHAPTER 4
NON-FINANCIAL SUSTAINABILITY PERFORMANCE

4.1 INTRODUCTION

This chapter presents the third of four literature review chapters, with this chapter dealing with aspects of non-financial sustainability performance, including how it creates value for the firm and the three different elements of non-financial sustainability, namely environmental, social and governance responsibilities.

Stakeholder theory advocates that non-financial sustainability activities of a firm improve the long-term value of the firm by meeting its environmental responsibilities, satisfying the firm's social obligations, having good corporate governance in place and ultimately, simultaneously enhancing its reputation and performance (Aydogmus et al., 2022; Ng and Rezaee, 2015). Therefore, non-financial sustainability refers to the sustainability of a firm in terms of its environmental, social and governance sustainability.

Numerous researchers have paid substantial attention to non-financial sustainability, causing it to become a prominent concept in the management literature (Brockett and Rezaee, 2012; Carter and Easton, 2011; Carter and Washispack, 2018; De Bakker et al., 2005; Dobers, 2009; Golden et al., 2020; Jain et al., 2016; Nejati and Ghasemi, 2012; Ng and Rezaee, 2015; Rajeev et al., 2017; Rezaee, 2016; 2017; 2018; Rezaee and Rezaee, 2014). In addition, firms have become increasingly active in engaging non-financial sustainability in practice, specifically in the context of supply chain management (Carter and Easton, 2011; Carter and Washispack, 2018; Dahlsrud, 2008; McWilliams et al., 2006; Rajeev et al., 2017; Rezaee, 2018). A broadly defined definition of *non-financial sustainability* is that firms must meet the expectations of society and all stakeholders when planning management strategies that impact the environment, social and governance responsibilities (Gössling and Vocht, 2007).

4.2 ENVIRONMENT, SOCIAL AND GOVERNANCE SUSTAINABILITY

Academics in the discipline of corporate social responsibility (CSR), later corporate sustainability, and more recently, non-financial sustainability, frequently deal with the question of how a firm should resolve new and increasingly non-financial sustainability challenges, which are associated with the financial objectives and performance of the firm (Ameer and Othman, 2012; Holliday et al., 2002; King and Lenox, 2001; Margolis and Walsh, 2003; Schaltegger and Synnestvedt, 2002; Stanwick and Stanwick, 1998). When considering the non-financial sustainability performance of a firm, the environmental, social and governance elements appear to be a widely acceptable measure of evaluation (Ahi et al., 2018; Aydogmus et al., 2022; Rajesh and Rajendran, 2020; Xiao et al., 2015).

4.2.1 Environmental

According to Goodland (1995), *environmental sustainability* can be defined as the endeavours society makes to "improve human welfare by protecting the sources of raw materials used for human needs and ensuring that the sinks of human wastes are not exceeded, to prevent harm to humans". According to Rosen and Sellers (1999), the environmental aspect of non-financial sustainability has become increasingly more important, due to the increasing scarcity and overuse of natural resources (Rockström et al., 2009). Widening sensitivities to the environment, together with ever-increasing environmental laws and regulations, necessitate management of firms to pay special attention to their firms' environmental practices, obligations and performance (Rezaee, 2017). The driving force behind the engagement into non-financial sustainability practices by firms is also the increase in consumers who are environmentally sensitive and who demand more sustainable and environmentally friendly products and services by firms (Gauthier, 2005; Van Beurden and Gössling, 2008).

The stakeholder theory, specifically environmental sustainability, may at first sound like a desirable but unrealistic wish, but in practice, it may create sustainability for various stakeholders (Schaltegger et al., 2019). For example, firms in the renewable energy industry contribute to non-financial environmental sustainability (climate change) and consequently, create multiple benefits for their stakeholders (Richter, 2012). This is in the form of additional

orders for their suppliers, short- and long-term returns to their shareholders, creation of jobs in a growing industry for potential employees, reduction of pollution for communities (this also has a positive impact on the social responsibilities which firms may have), creation of taxes for the state and also providing their customers with a sustainable product that they would like to purchase (Schaltegger et al., 2019). Another example of the environmental element of sustainability performance is the reduction of a firm's carbon footprint, and by doing this, it will create a better work environment and improve the water and air quality for society (Rezaee, 2017). Non-financial sustainability performance includes the investigation of potential negative impacts of economic activities on the environment both in emerging and advanced economies (Miras-Rodríguez et al., 2015; Welford and Gouldson, 1993). Many of the economic disasters in the past (for example, the BP oil spill), prove that firm environmental responsibilities are vital to the long-term sustainability of the firm, the well-being of society, now and for future generations.

Rezaee (2017) lists the following environmental strengths of and concerns for firms: manufacturing and rendering of beneficial products and services, having pollution policies in place, active recycling and usage of clean energy. However, environmental concerns include hazardous waste, infringement of regulations, usage of ozone-depleting chemicals or agricultural chemicals, substantial emissions and activities contributing to climate change. Rezaee (2017) emphasises that it is critical for firms to continue putting systems in place to maintain environmental performance and sustainability, and not only reporting on it, to ensure the success and livelihood of future firms and generations.

Environmental responsibilities link with social sustainability obligations (also see Section 4.2.2) in the sense that environmental initiatives and regulations have far-reaching consequences for how firms are viewed in society and held liable when they have inadequate environmental practices and considerations (Rezaee, 2017). Lovins et al. (1999) explain *natural capitalism* as an approach followed by a firm, where the firm makes simple changes to run its business, making resources more productive by using advanced techniques, yielding benefits both for today's stakeholders as well as for future generations, resulting in protecting the biosphere innovatively but at the same time improving profits and competitiveness. Natural capitalism links with financial sustainability in the sense that firms

need to extend their innovative capabilities, which will, in turn, give them a competitive advantage.

4.2.2 Social

Social sustainability can be defined as the ability of a firm to operate in a way that encourages the social well-being, equity and justice of the firm and all of its stakeholders, while also continuing to be profitable and competitive (Elkington and Rowlands, 1999). Social sustainability can further be explained when looking at the different factors it encompasses, namely fair and safe working conditions for employees, responsible sourcing and supply chain management and also the engagement with local communities. The social pillar score, as defined by Refinitiv (2022), includes the following themes and also helps to better understand what is meant by being socially sustainable: community engagement, human rights, product responsible marketing, product quality, data privacy of products, diversity and inclusion of the workforce, career development and training of employees, working conditions, and health and safety.

To build on the overall sustainability of firms, they need to have a strong social commitment to create valuable relationships with all stakeholders (Arayakarnkul et al., 2022). According to Schaltegger et al. (2019), an example of the stakeholder theory, specifically considering social sustainability under the product quality and community engagement themes, is the multinational pharmaceutical firm, Novo Nordisk, which follows a mission to solve societal problems, such as curing its customers by combating diabetes and, in doing so, creating multiple benefits for all of its stakeholders. Novo Nordisk does this by conducting research and development that serves its communities, creating meaningful and satisfactory jobs for its employees, paying taxes to the government, and also generating a return on investment for its financiers (Schaltegger et al., 2019; Strand and Freeman, 2015).

The employees of a firm, considering social sustainability under the workforce theme (diversity and inclusion of the workforce, career development and training of employees, working conditions, and health and safety) are more likely to identify with firms that build social value, making them feel good about their firm if they feel that they are taken care of by the firm. As a result, employees are more motivated to perform better, and thus have a

positive impact on society through better customer service (Korschun et al., 2016). Research has shown that social activities such as charitable giving, environmental programmes and ethical practices are likely to motivate frontline employees of a firm. Furthermore, it is also known that employee reactions to social actions have a positive impact on various employee-related outcomes, such as (1) firm attractiveness to prospective employees (Greening and Turban, 2000), (2) justice perceptions of employees (Rupp et al., 2006), (3) commitment towards a firm (Brammer et al., 2007), (4) job satisfaction (Herrbach and Mignonac, 2004; Valentine and Fleischman, 2008) and (5) loyalty of employees towards firms (Bhattacharya et al., 2008; 2011). One of the key pathways through which social activities can create value for a firm is by enhancing employee morale and reducing employee turnover (Bonini et al., 2009). Skilled, talented and motivated employees are critical factors for sustained firm success (Brammer et al., 2007; Greening and Turban, 2000).

4.2.3 Governance

Good corporate governance can be defined as the exercise of ethical and effective leadership by the governing body of a firm to achieve an ethical culture, firm performance, effective internal controls and legitimacy (IoDSA, 2016). This definition is also specific to South African firms because the King IV report is compulsory for all JSE-listed firms. Another broad definition of *corporate governance* by Brickley and Zimmerman (2010) states that corporate governance is the laws, regulations, institutions, markets, contract, and corporate policies and procedures which direct and influence the actions of top-level decision-makers in the firm, such as the shareholders, different boards and committees and the executives. In essence, corporate governance is the manner in which firms are controlled and managed.

Good corporate governance practices are one of the three important elements of non-financial sustainability. Owing to the growing interest in corporate governance globally, the Institute of Directors in South Africa (IoDSA) formed the King Committee on Corporate Governance in 1992 to contemplate corporate governance for firms in South Africa. The King report has since been revised with the fourth version being the latest version (IoDSA, 2016). King IV is a South African published report, containing principles and practices aimed at achieving good corporate governance outcomes and performance.

According to the JSE requirements, Paragraph 8.63(a) states that all firms listed on the JSE must adhere to the principles as set out in King IV (JSE, 2017). Even though King IV is a *voluntary* code, the requirement in the JSE, as mentioned above, mandated the application of King IV for all firms listed on the JSE on an "apply and explain" basis. The required 'explain' will encourage stakeholders to make informed decisions as to whether the firm is or is not achieving the good governance outcomes and performance as required by King IV. King IV is applicable to all firms, public and private, big and small, for-profit and non-profit (IoDSA, 2016).

The King IV Report (IoDSA, 2016) sets out 17 main principles by which a firm should embody the aspirations of the journey towards good corporate governance. One of the principles specifically focuses on an effective control environment in a firm which leads to operational efficiency:

- Principle 15: "The governing body should ensure that assurance services and functions enable an effective control environment..."

Principle 15 especially emphasises that a firm's governing body should assume responsibility for assurance, by setting the direction concerning the arrangements for assurance services and functions. These service providers include the external assurance service providers such as sustainability and environmental auditors, and external forensic fraud examiners and auditors. This responsibility includes overseeing that the audit committee makes sure that these arrangements are effective in achieving the objective of an effective internal control environment, which is a clear indicator of the operational efficiency of a firm. Principle 15 also emphasises the responsibility of the governing body to oversee the design and implementation of the combined assurance model to effectively cover the firm's significant risks.

Firms exist to create value and are managed and controlled with the goal of ensuring that an effective control environment exists (Aras and Crowther, 2008). Therefore, the primary goal of the management of a firm is to create value through positive corporate performance (IoDSA, 2016). King IV requires that the board of directors, when making decisions in the best interests of the firm, considers and promotes the interests and expectations of all the stakeholders of the firm and not only those of the shareholders (IoDSA, 2016).

From an assurance perspective and because all JSE-listed firms are mandated to comply with the JSE requirements, which includes complying with King IV, firms should ensure that they have good corporate governance practices and policies in place, which will lead to better performance of corporate governance. Management should also recognise that to create value for the firm through its performance, the board of directors need to take into account the interests of not only shareholders but those of all stakeholders.

4.3 ASSESSING NON-FINANCIAL SUSTAINABILITY OF GLOBAL AND LOCAL PERSPECTIVES AND MEASURES

4.3.1 Non-financial sustainability globally

Non-financial sustainability efforts are driven by two aspects: firstly, firms can be a powerful and positive force for change in society, and secondly, there are many different aspects of firm returns which firms can reap from having non-financial sustainability aspirations (Du et al., 2010). Marketplace polls as well as academic research indicated that key stakeholders of a firm, such as customers, employees and investors, would be increasingly likely to take actions to reward good corporate citizens and to penalise the bad ones, according to Du et al. (2010). A study conducted in the United States of America by Cone Communications (2017) showed a steady increasing trend in American citizens' expectations of firms when considering their non-financial sustainability activities. According to the most recent significant Cone Communications report of 2017, 79% of individuals expected businesses to continue improving their non-financial sustainability efforts. Also, 87% of consumers made it clear that they would purchase a product from a firm that advocated an issue they cared about, but 76% of consumers would refuse to buy a product from a firm who supported an issue against their beliefs. Consistent from 2013 to 2017, 86% of Americans continuously expected firms to do more than just generate a profit and be financially sustainable. Consumers tended to have a more positive image (92% in 2017 vs 85% in 1993), were more likely to trust (87% in 2017 vs 66% in 1998) and were more loyal (88% in 2017 vs 90% in 2013) to firms supporting non-financial sustainability issues. In a similar study done by Sphera (2021), 133 leaders across seven industries were surveyed to get a snapshot of the state of non-financial sustainability in their firms. Of the leaders of these firms, 44% saw their

firms as leaders in the area of non-financial sustainability, where another 34% of the leaders stated that sustainability efforts were helping them to optimise processes, boost innovation, increase productivity and help build brand value (Sphera, 2021).

Clearly, the consumers of today want firms to act and make sure that their personal well-being, the welfare of their employees, as well as the global community are being looked after (Cone Communications, 2017; Sphera, 2021). Non-financial sustainability in South Africa is discussed comprehensively in the next section.

4.3.2 Non-financial sustainability described in the King IV Report

The King IV report is the most recent version of South Africa's authoritative corporate governance code, developed by the Institute of Directors, South Africa with Prof Mervin King first spearheading the initiative in 1994. A fundamental concept of King IV is 'value creation', which is accomplished by firms through sustainable development. *Sustainable development* (which is also referred to as 'responsibility' or 'environmental, social and governance (ESG)' development) comes a long way and is defined as the "development that meets the needs of the present without compromising the ability of future generations to meet their needs", taking into account all three elements of non-financial sustainability, namely environmental, social and governance (Ali et al., 2018; Brundtland, 1987; Carter and Rogers, 2008; Dubey et al., 2017; IoDSA, 2016). The United Nations Sustainable Development Goals (agreed by all governments in 2015), the Africa 2063 Agenda and the South African National Development Plan 2030, all agreed upon this value creation theme (IoDSA, 2016).

It is a reality that operating firms and individuals are using natural assets faster than nature's ability to generate them. The population of the world could reach 9.8 billion people by 2050, according to the United Nations' Department of Economic and Social Affairs (United Nations, 2023). Consequently, the pressure on natural assets will increase year by year, as they are limited. It is no longer an option for firms to continue operating businesses without being a member of the corporate socially responsible community. In return, governing bodies of all countries have the challenge and responsibility of steering and guiding their firms to create value in a sustainable manner, making more with less in order to meet the needs of a growing population amid the reality of diminishing natural assets.

Even though the main focus of the King IV report is governance, principles and guidance are set out in the report, leading firms to also be environmentally and socially responsible. The first objective set out in King IV, which focuses on any firm, states that firms should: "Promote corporate governance[2] as integral to running an organisation and delivering governance outcomes such as ethical culture, superior performance, effective control and legitimacy." Another objective set out in King IV states that corporate governance should be presented not only as structure and process, but also with an ethical consciousness and conduct (IoDSA, 2016). Therefore, the fundamental concepts of King IV emphasise how a firm *performs* in the governance element of non-financial sustainability.

King IV (IoDSA, 2016) sets out 17 main principles by which a firm should embody (based on the "apply **and** explain" approach discussed earlier in this section) the aspirations of the journey towards good corporate governance. The three principles which focus on the total ESG performance of a firm are as follows:

- Principle 3: "The governing body should ensure that the organisation is and is seen to be a responsible corporate citizen."
- Principle 4: "The governing body should appreciate that the organisation's core purpose, its risks and opportunities, strategy, business model, performance and sustainable development are all inseparable elements of the value creation process."
- Principle 16: "In the execution of its governance role and responsibilities, the governing body should adopt a stakeholder-inclusive approach that balances the needs, interests and expectations of material stakeholders in the best interests of the organisation over time."

Principle 3 emphasises the fact that a firm should ensure that its *ESG performance and activities* are in line with being a good corporate citizen. More specifically, the governing body of a firm should oversee and monitor – on an ongoing basis – how the consequences of the organisation's activities and outputs affect its status of being a good and responsible corporate citizen. King IV identifies the following areas on which the governing body should measure its performance and targets:

[2] Corporate governance is defined in King IV as the exercise of ethical and effective leadership by the governing body towards the achievement of the following governance outcomes: ethical culture, good performance, effective control and legitimacy

- Workplace: fair remuneration; employment equity; and the health, safety, dignity, and development of employees.
- Economy: prevention, detection and response to fraud and corruption; economic transformation; and responsible and transparent tax policy.
- Society: community development; public health and safety; consumer protection; and the protection of human rights.
- Environment: responsibilities in respect of pollution and waste disposal; and protection of biodiversity[3].

Principle 4 emphasises that a firm should continually assess, monitor and respond to the negative consequences of its activities and outputs in which it operates, and the capitals which it uses and affects. This principle also focuses on the ESG performance and activities of a firm, but more specifically not only on how it acts (Principle 3) towards being a good corporate citizen but also how it reacts (Principle 4) to the negative consequences of its activities.

Principle 16 emphasises that the governing body of a firm should oversee the relationship with material stakeholders[4] and ensure that it results in the determination of the extent to which the stakeholders affect, or are affected by, the activities, outputs and outcomes of the firm.

From a King IV report view, which applies to all firms listed on the JSE (which is included in the population and sample selection of this study), the report states that South African firms listed on the JSE strive to comply with the mentioned principles and guidelines leading to enhanced firm performance through governance performance.

[3] The protection of the variety of plant and animal life, in particular their habitat.
[4] The stakeholders of a firm include “internal” and “external” stakeholders. Internal stakeholders include the firm’s governing body, management, employees and shareholders (internal stakeholders are always material stakeholders). External stakeholders include customers and consumers, civil society organisations, government and trade unions (external stakeholders may or may not be material stakeholders) (IoDSA, 2016).

4.3.3 Non-financial sustainability performance and reporting relationship

The information needs of stakeholders have been increasing over the past years. Therefore, there has also been an increase in the concerns that traditional accounting (which only accounts for the **financial** activities and performance of a firm) is insufficient to meet the information and *performance* needs of stakeholders (Ackers, 2017; Adams et al., 2011; M. Cheng et al., 2014; Cohen et al., 2012). The reason is that financial information alone does not satisfy all the needs of stakeholders, specifically in terms of environment, society and governance performance, which is needed to allow stakeholders to assess the historical, present and future performance of a firm's non-financial sustainability (Aydogmus et al., 2022; Flower, 2015; Simnett et al., 2009). After these concerns became known, firms responded by starting to enhance their environmental, social and governance performance together with the reporting of non-financial information, additional to their regular annual report and set of financial statements (Ackers, 2017; Cohen et al., 2012; KPMG, 2011).

4.3.4 Non-financial sustainability measurements

Refinitiv Eikon (formerly known as Thomson Reuters database) ESG scores are a widely accepted measure of ESG performance (Aydogmus et al., 2022; Barth et al., 2017; Pagano et al., 2018; Rajesh and Rajendran, 2020). The ESG performance measurements cover close to 9 000 public firms globally, represented as time series data, with history going back to 2002 (Refinitiv, 2022). There are five scores available per firm: one for each of the three separate pillars, namely environmental (ENV score), social (SOC score) and governance (GOV score), one for a combination of the three separate pillars (ESG score), and one for a combination of the three separate pillars but also including ESG controversies (ESGC score) to provide a comprehensive evaluation of a firm's non-financial sustainability influence and behaviour.

The ESG scores made available by Refinitiv Eikon are collected and designed to objectively and transparently reflect the relative performance, commitment and effectiveness towards the ESG of a firm, based on publicly reported information (Refinitiv, 2022). The three individual pillars use ten major themes, which include resource use, emissions and innovation (environmental score), workforce, human rights, community and product

responsibility (social score score), and management, shareholders and corporate social responsibility strategy (governance score).

The combined ESG score represents an overall measure of the aggregated performance of the firm based on the ten major themes. The ESGC score overlays the ESG score with ESG controversies, providing a comprehensive evaluation of the sustainability impact and conduct of the firm. The controversies scores check if a firm is involved and/or penalised for any scandals that affect its overall ESG performance and grading. The impact of the controversies is also measured for the following year to see if there are any development related to the negative event (Rajesh and Rajendran, 2020; Refinitiv, 2022). Refinitiv Eikon captures all the legal documentation and media coverage materials regarding the controversy process. Consequently, the ESG controversies have a negative impact on the ESG score and therefore, the ESGC score will be lower than the ESG score because it has a negative impact on the total sustainability performance of the firm. The main objective of the ESGC score is to discount the ESG score based on any negative media or controversies reports (Rajesh and Rajendran, 2020; Refinitiv, 2022).

4.4 CREATING VALUE THROUGH NON-FINANCIAL SUSTAINABILITY PERFORMANCE

Consideration of non-financial sustainability activities and performance can create both synergies and conflicts for firms (Rezaee, 2017). On the one hand, non-financial sustainability activities can enhance the long-term performance of a firm by meeting its environmental obligations, fulfilling its social responsibilities and creating good governance, ethical workplaces and ultimately, improving the firm's reputation. On the other hand, non-financial sustainability activities may require considerable resource allocation that could be in conflict with shareholder wealth maximisation objectives.

Firms generate various returns (i.e. positive, non-significant or negative) from their environmental, social and governance initiatives under different conditions (Luo and Bhattacharya, 2006), because the execution, support and exploitation of environmental, social and governance initiatives differ from one firm to the other (Brown, 1998; Sen and

Bhattacharya, 2001). Therefore, the question is: How are environmental, social and governance related to firm performance?

4.4.1 Creating or destroying value through non-financial sustainability performance

Globally, there is an increase in interest by investors and awareness by all stakeholders on the risks associated particularly with the environment, but also the social responsibilities of firms and whether they are properly governed, putting pressure on firms to increase their focus on and efforts towards the non-financial sustainability performance of these firms to create value for all stakeholders (Aydogmus et al., 2022). Therefore, non-financial sustainability performance is essential in creating stakeholder value, where the goal of firms should be the focus on long-term sustainability and enduring stakeholder value creation, which includes environmental protection, social responsibilities and creating good corporate governance, rather than considering only short-term goals of maximising profits (Aydogmus et al., 2022; Min and Mentzer, 2004; Studer et al., 2006).

Adding to the research problem, Eccles et al. (2012) point out that it is a challenge to understand the exact environmental, social or governance element that is most beneficial for a firm in terms of its creation of shareholder and stakeholder value. A key question on this issue in board meetings and relevant committees is whether an investment in environmental, social and governance initiatives makes financial sense (Aydogmus et al., 2022).

A recent meta-analysis study reported that for more than a 1 000 published papers from 2015 to 2020 which focused on the relationship between ESG performance and financial performance, 58% found a positive relationship between ESG and financial performance, 8% found a negative relationship, 13% found no relationship, and 21% found mixed results (Whelan et al., 2021). Clearly, while the majority of published papers indicated a positive relationship, results between ESG and firm performance indicated an ongoing disagreement on this issue.

4.4.2 Positive relationship between ESG performance and firm performance

Many studies on different countries reported a positive relationship between ESG performance and the value of the firm or its profitability, as follows: Velte (2017) found by measuring the ESG performance of firms in Germany using Tobin's Q that it had a positive relationship with firm performance. This research also found that under the three ESG elements, governance had the most significant effect on financial performance. It was found that the ESG performance of USA firms had a positive effect on the value of the firm (Fatemi et al., 2018). For listed energy firms in China, Zhao et al. (2018) found that better ESG performance had a great impact on the improvement of their financial performance. It was found that the ESG initiatives of Korean firms had a considerable positive effect on the performance of a firm, but the effect varied depending on the characteristics of the firm (Yoon et al., 2018). The performance of 65 firms in Italy was investigated and it was found that from 2015 to 2017, the ESG performance had a positive relationship with the financial success of these firms (Dalal and Thaker, 2019).

Wang and Sarkis (2013) found that sustainable environmental and social activities were positively associated with a firm's financial performance. Another study proved that the ESG elements of firms had a positive influence on the overall financial performance of the firm (Kocmanová and Dočekalová, 2012). Furthermore, when a firm performs well in terms of ESG, it could lead to an improvement of its financial performances and ultimately, be beneficial to investors, managers and other stakeholders of the firm, according to Zhao et al. (2018). In a similar study, Yoon et al. (2018) found that ESG activities and performance positively and significantly affected a firm's market valuation (Yoon et al., 2018). Firms that actively manage their ESG risks are often in a better position to create shareholder wealth as a result of lower risk exposure and ultimately, a lower cost of capital (Sassen et al., 2016).

Some multi-country studies investigated the effect of ESG performance on firm performance. Bhaskaran et al. (2020) investigated 4 887 firms from 2014 to 2018; De Lucia et al. (2020) investigated 1 038 firms from 22 European countries from 2018 to 2019; Naeem et al. (2021) investigated 1 042 firms from 2010 to 2019; Chairani and Siregar (2021) investigated listed firms from Indonesia, Malaysia, the Philippines, Singapore and Thailand

from 2014 to 2018. All these studies indicated that firms with a high performance on ESG tended to create more value for their firms; therefore, indicating a positive relationship.

Furthermore, firms that focus on the management and performance of their environmental, social and governance policies and practices are often perceived as less risky by the providers of debt and equity capital. These capital providers will most likely adjust their expectations about risk and return accordingly and are often willing to accept lower returns and lending rates when providing capital to firms with superior environmental, social and governance performance (Kölbel et al., 2017).

4.4.3 Negative relationship between ESG performance and firm performance

However, some researchers argue that an investment in ESG has a negative impact on the financial performance of a firm (Bower and Paine, 2017). The results of a study by Barnett (2007) indicated that firms could predict that, when investing in ESG initiatives, it would have a negative impact on the financial performance, and ultimately, on the survival of the firm, due to the reallocation of funds from shareholders to other stakeholders. Regarding the negative relationship between ESG and firm performance, UK firms which had a lower ESG performance, performed better in the market (Brammer et al., 2006). Italian firms had a negative relationship between ESG performance and financial performance (Landi and Sciarelli, 2018). The link between ESG performance and financial returns was analysed for firms in Canada and it was found that ESG performance did not protect any downturn of the performance of the firm (Folger-Laronde et al., 2022).

Two major multi-country studies found a negative relationship between ESG performance and firm performance. Duque-Grisales and Aguilera-Caracuel (2021) investigated 104 firms in Latin America from 2011 to 2015 and Garcia and Orsato (2020) investigated 2 165 firms (comparing emerging and developed countries) from 2007 to 2014. Both studies found a negative relationship between ESG performance and financial performance of the firm, especially in emerging markets.

4.4.4 Mixed relationship between ESG performance and firm performance

Furthermore, a group of researchers found a mixed relationship between ESG and firm performance. In a Korean study by Han et al. (2016), a positive relationship was found for the governance element, a negative relationship for the environment element and no relationship for the social element. In a study in Turkey, it was found that the environment and social elements had a negative relationship with financial performance, while the governance element had a positive relationship with financial performance (Saygili et al., 2022). A Norwegian study by Giannopoulos et al. (2022) also found mixed results with ESG performance having a negative relationship with profitability, but a positive relationship with overall firm performance by measuring it using Tobin's Q. Behl et al. (2022) also reported mixed results for firms in India.

4.5 CONCLUSION

This chapter dealt with an understanding of each of the elements of the non-financial sustainability dimension, namely environment, social and governance. The non-financial sustainability dimension of sustainability performance plays an immeasurable role in the overall performance of a firm. Non-financial sustainability considers not only shareholders (as with financial sustainability) but also all stakeholders of the firm.

The non-financial sustainability performance of firms refers to firms meeting the expectations of society and all stakeholders when planning management strategies and practices that will impact the environment, and their social and governance responsibilities. A firm that wants to be sustainable in the foreseeable future, wants to improve its long-term value and wants to improve its reputation needs to meet its environmental responsibilities, satisfy its social obligations and has good corporate governance in place. Therefore, non-financial sustainability is considered important for a firm to add value and also to remain sustainable in the future.

Chapter 5 considers the synergy between financial and non-financial sustainability and how it affects firm performance.

CHAPTER 5
SYNERGY BETWEEN FINANCIAL AND NON-FINANCIAL SUSTAINABILITY PERFORMANCE

5.1 INTRODUCTION

This chapter presents the last of four literature review chapters. The first chapter dealt with aspects of firm performance and underpinning theories, the second chapter dealt with aspects of financial sustainability performance, the third chapter dealt with aspects of non-financial sustainability performance, and this chapter deals with aspects of the synergy between financial and non-financial sustainability performance.

The primary goal of firms has been, and will continue to be in the foreseeable future, to earn profit in a way that is socially responsible by ensuring that they create value for all their stakeholders as well as achieve the desired rate of return (Rezaee and Rezaee, 2014). Firms that effectively manage both financial and non-financial sustainability, anticipate that they would be able to improve their financial and non-financial performance, enhance their reputation, fulfil their social responsibility and promote a corporate culture of integrity and competence. As early as 1979, Carroll (1979) identified the sustainability performance of a firm as the social responsibility of a firm with four components, namely economic responsibility to investors and consumers, legal responsibility to the government and law, ethical responsibility to society and discretionary responsibility to the community, summarised as the expectations that society and all stakeholders have of the firm at a given point in time. Therefore, the focus of the management of a firm should be a holistic view of performance, incorporating financial and non-financial sustainability performance.

The concept of *sustainability* has been a great concern for various firms around the globe over the past few decades (Qaim et al., 2021; Rezaee, 2017). Furthermore, apart from short-term goals, firms now aim to implement long-term sustainable strategies to survive for a longer period of time, according to Qaim et al. (2021). Therefore, firms must meet the needs of the society, financially and non-financially in terms of economic, environment, social and governance needs. Corporate sustainability focuses on the achievement of long-term and continuing financial and non-financial dimensions of sustainability in creating value for all

stakeholders (Rezaee, 2017). The true measure of success for firms should be determined not only by their financial sustainability performance, but also their environmental initiatives, social responsibilities and governance and ethical behaviour, according to Rezaee (2017).

Maximising short-term profit at the expense of long-term value creation is a definite way to destroy the value of a firm (Jensen, 2001). Managers should make all decisions to increase the total long-run market value of the firm. The objective of creating firm value through firm financial performance can be accomplished when management of an entity considers the interests of not only the shareholders, but all other stakeholders, by integrating financial and non-financial dimensions of sustainability into an entity's business model, corporate culture, managerial strategies and financial reporting (Rezaee, 2016). The effect of supply chain management performance, which includes all stakeholders from suppliers to customers, on the sustainability of a firm, leads to the achievement of a competitive advantage for firms and ultimately, the performance of a firm (Moktadir, Rahman, Rahman, Ali and Paul, 2018; Moktadir, Ali, Rajesh and Paul, 2018; Moktadir, Rahman, Jabbour, Ali and Kabir, 2018; Shibin et al., 2017). According to stakeholder theory, managers should make decisions to consider the interests of all stakeholders of a firm (Jensen, 2001; 2002; 2010).

Firms that diligently seek to serve the interests of a broad group of stakeholders by careful and significant effort will create more value over time (Campbell, 1997; Freeman, 1984; Freeman et al., 2010). Long-term firm value cannot be created without good relations with the firm's capital providers, customers, employees, suppliers, regulators and communities (Jensen, 2001). To maximise the value of a firm "managers must have a criterion for deciding what is better, and better should be measured by the increase in long-term market value of the firm" (Jensen, 2002, p. 236).

According to Qaim et al. (2021) and Kiron et al. (2015), research on sustainability suggests that business sustainability should be moving towards a more holistic and integrated approach, not only focusing on environmental, social and governance responsibilities, but also embracing all elements of sustainability, engaging all stakeholders. Clearly, there is a need for a certain model against which firms can recollect how much financial and non-financial sustainability the firm contributes towards long-term firm performance.

5.2 FINANCIAL AND NON-FINANCIAL SUSTAINABILITY PERFORMANCE SYNERGY

There exists an underlying assumption in studies that only financial (economic) sustainability performance measures capture the value created through appropriate treatment of all of the firm's stakeholders (Berman et al., 1999; Choi and Wang, 2009; Hillman and Keim, 2001; Preston and Sapienza, 1990). This creates the mindset that the value created for all stakeholders is only created by financial sustainability performance and that non-financial sustainability performance does not make any contribution. Without a doubt, financial returns and performance of a firm are fundamental to the core stakeholders of a firm, but most stakeholders want other things as well (Bosse et al., 2009). According to Schaltegger et al. (2019), the success of a firm will not be optimal if the firm creates sustainability for only a single group of stakeholders through financial benefits, but neglects the needs and importance of other stakeholders through non-financial benefits.

Sustainability in general should focus on the activities of a firm that generate both financial and non-financial sustainability performance through minimising environmental and social harms, maximising corporate governance effectiveness and above all, securing long-term success by creating stakeholder value (Rezaee, 2016). Porter and Kramer (2019) state that the goal of a firm, namely value maximisation, can be achieved by protecting the interests of all stakeholders including investors, customers, employees, creditors, suppliers, the environment and society.

The stakeholder theory (Freeman, 1984) recognises the maximisation of firm performance as well as the long-term value of the firm as the principles for balancing the interests of all stakeholders. This view is also supported by Kiron et al. (2013), who state that firms who "see sustainability information as both a necessity and opportunity, and change their business models in response, are finding success". Furthermore, Schaltegger et al. (2019) emphasise that financial and non-financial sustainability performance can be better informed by the stakeholder theory, if the fundamental idea of stakeholder theory is that all stakeholders of a firm will support the firm, if they get in exchange value, which is beneficial for all stakeholders, and not at the cost of some stakeholders.

International firms and investors use sustainability, including financial and non-financial sustainability, in making business and investment decisions (Rogers, 2015). In the United States, sustainable, responsible and impact (SRI) investing continues to expand at a healthy pace, with $12.0 trillion worth of investments being under management that uses SRI strategies, which is an increase of 38% from 2016 (Voorhes, 2019). According to a survey conducted by the Chartered Financial Analyst (CFA) institute in 2017, 73% of professional investors use sustainability performance information when they make investment decisions (CFA Institute, 2017).

According to Harrison and Wicks (2013), an all-inclusive stakeholder-based performance measure challenges firms to examine more broadly the value their firms create, from the perspective of all the stakeholders who are involved in creating it, and not only focusing on financial sustainability performance. According to a study by Huang and Watson (2015), many books and published papers deal with the non-financial sustainability dimension of business sustainability, its drivers and impacts on financial and market performance.

This study argues that firms which focus on financial and non-financial sustainability performance ought to exhibit enhanced firm performance, for the following reasons, supported by the literature:

- Financial and non-financial sustainability performance are associated with better communication and interaction with all the firms' stakeholders (Bénabou and Tirole, 2010; B. Cheng et al., 2014; Eccles et al., 2014);
- Shareholders' wealth maximisation goals cannot be reached while ignoring non-financial sustainability performance (Staub-Bisang, 2012);
- Firms focusing on non-financial sustainability performance could create opportunities for themselves to identify strategic, operational, reputational, compliance and financial risks that could affect their performance and value in the future (Kiron et al., 2013);
- Firms with better sustainability performance are more likely to disclose their financial and non-financial sustainability initiatives and activities to the market (Borghesi et al., 2014; Crifo et al., 2015; Dhaliwal et al., 2011) to signal their long-term commitment to sustainability and also to differentiate themselves from firms who are less sustainable (Bénabou and Tirole, 2010; Cheng et al., 2014; Spence, 1978);

- Anecdotal evidence suggests that the non-financial performance dimension of the sustainability performance of a firm is also important as is the financial sustainability performance (United Nations, 2013).

A study conducted over ten years by Clarkson (1995, p. 107) states the following:

> *The corporation's survival and continuing success depend upon the ability of its managers to create sufficient wealth, value, or satisfaction for those who belong to each stakeholder group, so that each group continues as a part of the corporation's stakeholder system.*

The wealth and value created by a firm should be fairly distributed and balanced to all its stakeholders to preserve the continuing participation of each stakeholder group, otherwise they may seek alternatives and ultimately withdraw from the firms' stakeholder system, and the firm's survival will be threatened (Clarkson, 1995).

Given the background of shareholder wealth maximisation theory and stakeholder theory, non-financial sustainability activities and initiatives of the firm can create both synergies and conflicts with financial sustainability performance. To explain further from a stakeholder theory point of view, non-financial sustainability activities and performance enhance the long-term value of the firm by (1) fulfilling the social responsibilities of the firm (Campbell, 2007), (2) meeting the environmental obligations of the firm (Clarkson et al., 2011) and (3) improving the reputation of the firm (Weber, 2008). Unfortunately, these non-financial sustainability activities and initiatives of the firm may require considerable resources, which could be in conflict with a firm's shareholder wealth maximisation objectives (Rezaee, 2016).

Kramer and Porter (2011) introduced the concept of *shared value* as policies and operating practices of the firm, enhancing the competitiveness of the firm, while simultaneously promoting the economic and social environments in the communities in which the firm operates, clearly sharing value between the firm and all its stakeholders. Nevertheless, firms following a business sustainability model try to maximise their profit in creating shareholder value and to optimise environmental and social activities to protect the interests of all their stakeholders (Rezaee, 2016).

5.3 INTEGRATING FINANCIAL AND NON-FINANCIAL SUSTAINABILITY PERFORMANCE

A clear connection between financial and non-financial sustainability performance occurs through firms having a holistic view of their performance when viewing both financial and non-financial sustainability performance to enhance overall firm performance. The ultimate success of a firm's sustainability development and firm performance depends on what corporate culture of integrated thinking the firm adopts and executes, as well as the tone of commitments from top management to promote both financial and non-financial sustainability performance dimensions (Rezaee, 2017).

The International Integrated Reporting Council (2021, p. 3) defines *integrated thinking* as the: "[…] active consideration by an organization of the relationships between its various operating and functional units and the capitals that the organization uses or affects. Integrated thinking leads to integrated decision-making and actions that consider the creation, preservation or erosion of value over the short-, medium- and long-term". Therefore, integrated thinking involves breaking down silos and barriers between financial and non-financial sustainability performance for firms to be able to achieve a more comprehensive and sustainable outcome for all stakeholders.

Nick Topazio, former head of corporate research at the global professional management accounting body, Chartered Institute of Management Accountants (CIMA), also believed in the adoption of integrated thinking and that firms should succeed in integrated thinking through their decision-making processes (CIMA, 2015). King IV, the South African authoritative corporate governance code, promotes integrated thinking, which takes into account the connectivity and linkage between the ranges of factors that affect the ability of a firm to create value over time (Deloitte, 2016). According to the IoDSA (2016, p. 24) and Deloitte (2016), *integrated thinking* strengthens the following:

a. seeing the firm as an integral part of society and thus as a corporate citizen;
b. the stakeholder-inclusive approach (Feng et al., 2017); and
c. sustainable development.

a. The firm as an integral part of society and corporate citizenship

A firm operates in social relations, which it influences and by which it is influenced. Every firm has a society in which it operates, namely internal[5] and external[6] stakeholders that all have a material stake in all its activities. Firms rely on their broader society to provide a conductive functioning environment and a feasible and successful customer base. Firms, in turn, contribute to society by creating wealth, providing goods, services and employment and developing human capital. The idea of the interdependency between a firm and the society is supported by the African concept of *ubuntu,* which means "I am because you are: you are because we are" (IoDSA, 2016, p. 24). In line with this expression, firms should take responsibility for what outcome their activities and outputs have on the environment, as the outcome affects society. A firm has a corporate citizenship status because of its integral part of society. This status confers not only rights but also obligations and responsibilities towards the natural environment and society on which society depends.

b. Stakeholder-inclusive approach

From a stakeholder theory point of view, a firm can be viewed as a set of interdependent relationships among primary stakeholders[7] (Chakravarthy, 1986; Donaldson and Preston, 1995; Evan and Freeman, 1988; Greenley and Foxall, 1996; Harrison and John, 1994; Hill and Jones, 1992; Jones, 1995; Kotter, 2008). King IV reports on a stakeholder-inclusive approach, where the governing body of each firm considers the most important stakeholders' needs, interests and expectations when they execute their duties. This approach not only prioritise the interests of the providers of financial capital, but also takes into account all other resources of value creation, which include social and relationship capital embodied by other respective stakeholders (IoDSA, 2016). According to King IV, the stakeholder-inclusive approach does not necessarily equate the best interests of only their shareholders, but a firm is represented through its directors by also including the interests

[5] According to the IoDSA (2016), "Internal stakeholders" are directly affiliated with the organisation and include its governing body, management, employees and shareholders.
[6] According to the IoDSA (2016), "External stakeholders" could include trade unions, civil society organisations, government, customers and consumers.
[7] Primary stakeholders are those stakeholders who bear some form of risk as a result of having invested some form of capital, human or financial, something of value, in a firm. These stakeholders are those without whose participation the firm cannot survive. Primary stakeholders include capital suppliers (shareholders and other), employees, suppliers, customers, governments, community residents and the natural environment (Clarkson, 1995).

of employees, consumers, the community and the environment. Therefore, directors are required to act in good faith in the best interests of the firm, which means that they must act within a blend of all these interests.

c. Sustainable development

Brundtland (1987, p. 37) defines *sustainable development* as: “Development that meets the needs of the present without compromising the ability of future generations to meet their needs”. The survival and success of firms are interweaved with three mutually dependent factors, which are the triple context of the economy (through financial performance and sustainability), society and the natural environment. This integrated approach is a guarantee for sustainable development and this is the reason that the core purpose of a firm, which includes its risks and opportunities, business model, strategy, sustainability and financial and non-financial performance, consists of inseparable elements of the value creation process, as presented in King IV (IoDSA, 2016).

5.4 CREATING VALUE THROUGH THE SYNERGY OF SUSTAINABILITY

The history of business is equal to a history of the creation of value (Schaltegger et al., 2019). Even in ancient times, the very first businesses fulfilled the function of providing each other with goods or services in exchange for negotiated goods, and therefore, providing each other with value (Cameron, 1993). According to King IV (IoDSA, 2016), the financial performance of a firm can no longer serve as a proxy for holistic value creation, and therefore, the value of being sustainable lies in both financial and non-financial sustainability performance. Since attitudes and expectations of society constantly change, firms are challenged to also adapt to the value creation process.

Firm organisational performance is the ultimate variable of interest for researchers concerned with just about any area of management (Richard et al., 2009). Market competition for customers, efforts by firms and capital invested make firm performance vital to the survival and success of the modern business. Measuring the performance of a firm is essential in allowing researchers and other stakeholders, such as the managers of the firm, to evaluate the specific actions of the firm and the managers and how they should evolve and perform over time, by creating value for all stakeholders.

5.4.1 Creating value through the resource-based view of the firm

From a resource-based point of view, a firm's ability to perform better than its competition depends on the unique interaction of human, organisational and physical resources over a period of time (Amit and Schoemaker, 1993; Barney, 1991; Dierickx and Cool, 1989; Lippman and Rumelt, 1982). The resources that may lead to a competitive advantage include socially complex and causally ambiguous resources such as reputation, corporate culture, long-term relationships with suppliers and customers and knowledge assets (Barney and Culture, 1986; Leonard-Barton, 1995; Teece, 1998).

To develop longer-term relationships with primary stakeholders such as customers, suppliers, communities, and current and future employees, firms must expand their set of value-creating relations with these groups of stakeholders. These relations should be beyond interactions that are only limited to market transactions between these stakeholders and the firm. Hillman and Keim (2001) point out that the value which can be created by interactions between firms and their stakeholders are *relational* rather than transactional. Transactional interactions can easily be duplicated by competitors and therefore, offer little potential for a competitive advantage.

The economic compass of many firms points in exactly the wrong direction. Most firms behave as if people are still scarce and nature in abundance (Lovins et al., 1999). Nowadays, the pattern of scarcity is shifting more and more: people and mechanisation are not scarce, but nature is (Lovins et al., 1999). In the industrial system, it is quite easy for most firms to exchange machinery for labour, but no technology or any amount of money can be a substitute for a stable or suitable climate and a productive biosphere. These problems are dealt with by natural capitalism where environmental, social and governance, and economic goals are integrated. Firms making the change, shifting from industrial capitalism to natural capitalism, have a competitive edge. Firms not making the shift will not be a problem for society, because ultimately, they will not be around anymore (Lovins et al., 1999).

5.4.2 Value creation for all stakeholders

There has been an increasing interest by investors in non-financial sustainability, as well as a global awareness of the risks associated with specifically the environment but also the other two elements of non-financial sustainability, namely social responsibilities and good corporate governance. This interest and awareness put pressure on firms to increase their focus and efforts on not only financial sustainability but also non-financial sustainability, affecting all stakeholders (Aydogmus et al., 2022). The stakeholders, namely investors, customers, suppliers, employees and government, increasingly expect firms to be keen on both financial and non-financial performances.

Business sustainability incorporates both financial and non-financial sustainability and can be viewed from the perspective of all stakeholders as a process of meeting the needs and protecting the interests of all stakeholders, not only in the present but also in the future (Rezaee, 2017). Therefore, business sustainability is built on and driven by the stakeholder theory with the emphasis on achieving both long-term and continuous financial and non-financial sustainability for all stakeholders. According to Freeman (1984), stakeholder theory holds that firms which are successful are the ones aligning the interests of all stakeholders, not compromising the one above the other, and therefore, they are more sustainable. This means that they do not only focus on profit maximisation for shareholders, but also consider the interests of all the other stakeholders (Aydogmus et al., 2022).

The main goal of value maximisation under business sustainability, for all stakeholders of a firm, can be achieved when the interests of all stakeholders are considered. The enlightened stakeholder theory promotes long-term enlightened value maximisation as a firm's objective to protect the interests of all stakeholders. In line with the enlightened stakeholder theory, is the definition by Rezaee (2017), stating that business sustainability is a process which enables firms to design and implement strategies that contribute to developing both the financial and non-financial sustainability dimensions. When firms focus on the achievement of long-term economic performance to maximise their firm performance, it ensures long-term profitability and a competitive advantage, and helps in maintaining the well-being of the planet, its people and society, all of these creating value for all stakeholders.

Value creation for all stakeholders can also be seen through *socially responsible investing* (SRI), which can be defined as investments made to enable investors to combine their financial objectives with their social values (Hill et al., 2007). Schueth (2003) provides another definition of SRI, namely the process of integrating personal values and societal concerns into investment decision-making. These social values and concerns refer to environmental, social and governance responsibilities. Therefore, the decision-making by investors for investments considers both financial and non-financial sustainability: investors have a dual objective when making an investment decision, namely making money and making a difference (Schueth, 2003). The consideration of both financial and non-financial sustainability leads to the creation of value for both the investor and other stakeholders of the firm.

5.5 HYPOTHESIS DEVELOPMENT

5.5.1 Hypothesis: Effect of financial sustainability on firm performance (H_1)

Financial sustainability is a key measure that ensures current profitability, as well as the sustainability and forecasts of a firm (Ng and Rezaee, 2015). Three proxies are used to represent financial sustainability, namely growth opportunities, operational efficiency and innovation capabilities. Financial sustainability is associated with firm performance (Ng and Rezaee, 2015). Financial sustainability performance makes investors aware of the firm's overall sustainability and enlarges its investor base, it may also improve risk sharing.

Therefore, based on the literature, the first set of hypotheses is as follows:
H_1: Financial sustainability leads to enhanced firm performance.

At the same time, different elements of financial sustainability performance may affect firm performance differently. These elements include growth opportunities, operational efficiency and research and development efforts. Therefore, the following three sub-hypotheses were formulated:

H_{1a}: Financial sustainability related to growth opportunities (GROWTH) leads to enhanced firm performance.

H_{1b}: Financial sustainability related to operational efficiency (OPERATE) leads to enhanced firm performance.

H_{1c}: Financial sustainability related to research and development (INNOVATE) leads to enhanced firm performance.

H_{1d}: Financial sustainability, as represented by a summated index, leads to enhanced firm performance.

5.5.2 Hypothesis: Effect of non-financial sustainability on firm performance (H_2)

Financial and non-financial sustainability dimensions are not mutually exclusive, they can supplement each other and trade-offs can also occur between them (achieving a balance between the two desirable but incompatible features; therefore, reaching a compromise (Ng and Rezaee, 2015). On the one hand, firms that are governed effectively and are also socially and environmentally responsible (perform on the ESG side) are expected to produce financial sustainability, create shareholder value and also gain investor confidence (Dhaliwal et al., 2011). On the other hand, firms that are more economically profitable are in a better position and have more resources to create jobs and wealth and better fulfil their ESG responsibilities (Artiach et al., 2010).

Although the primary goal of most firms is to enhance shareholder value through financial sustainability, firms must also effectively deal with their non-financial sustainability to ensure that they add value for their other stakeholders (Ng and Rezaee, 2015; Rezaee, 2016; 2017). One positive effect of non-financial sustainability on the financial sustainability of a firm and thus on the performance of the firm, is that being a corporate socially responsible (CSR) entity reflects an investment in intangible assets, such as the reputation and human capital of the firm (Ng and Rezaee, 2015). This investment in intangible assets contributes to enhancing firms' competitiveness and long-term financial sustainability.

A negative effect of being a socially responsible citizen is that ESG responsibilities are costly and its potential benefits are related to private benefits that management extracts at the expense of their shareholders (Ng and Rezaee, 2015). The hypothesis refrains from postulating a specific directional relationship due to conflicting findings present in the existing literature.

Therefore, the second set of hypotheses is as follows:
H_2: Non-financial sustainability shows a relationship with firm performance.

As with Hypothesis 1, different elements of non-financial sustainability may affect firm performance differently. These elements are environmental, social and governance sustainability. Therefore, the following three sub-hypotheses were formulated:

H_{2a}: Non-financial sustainability related to environmental (ENV) sustainability shows a relationship with firm performance.

H_{2b}: Non-financial sustainability related to social (SOC) sustainability shows a relationship with firm performance.

H_{2c}: Non-financial sustainability related to governance (GOV) sustainability shows a relationship with firm performance.

H_{2d}: Non-financial sustainability, as represented by a combined score, shows a relationship with firm performance.

5.5.3 Hypothesis: Effect of financial sustainability and non-financial sustainability on firm performance (H_3)

Based on the literature as well as the first two hypotheses, the third hypothesis tests the relationship of financial sustainability and non-financial sustainability on firm performance when considered simultaneously as follows (the hypothesis refrains from postulating a specific directional relationship due to conflicting findings present in the existing literature):

H_3: Financial sustainability and non-financial sustainability show a relationship with firm performance.

Different dimensions of sustainability may affect firm performance differently. These dimensions are financial sustainability and non-financial sustainability. Therefore, the following two sub-hypotheses were formulated:

H_{3a}: Individual financial sustainability and individual non-financial sustainability elements show a relationship with firm performance.

The combined financial sustainability variable was calculated based on the principal component analysis (PCA)[8] and applied to the three different elements of financial sustainability. The combined non-financial sustainability variable is the combined environmental, social and governance score, extracted from the Refinitiv Eikon database. These two variables are discussed in Sections 6.7.2 and 6.7.3 respectively.

H_{3b}: Combined financial sustainability and combined non-financial sustainability dimensions show a relationship with firm performance.

5.5.4 Hypothesis: Effect of financial and non-financial sustainability interaction on firm performance (*H_4*)

As it is known that financial sustainability can be influenced by non-financial sustainability and vice versa, the relationship between financial and non-financial sustainability on firm performance was investigated by introducing an interaction term. The hypothesis refrains from postulating a specific directional relationship due to conflicting findings present in the existing literature.

[8] Principal component analysis (PCA) is a variable reduction technique. It is used when variables are highly correlated. It reduces the number of observed variables to a smaller number of principal components, which account for most of the variance of the observed variables. It is used in studies with a large sample procedure (Suhr, 2005).

H_4: The interaction effect of financial and non-financial sustainability elements shows a relationship with firm performance.

H_{4a}: The interaction effect of the combined financial and non-financial sustainability dimensions shows a relationship with firm performance.

H_{4b}: The interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance.

5.6 CONCLUSION

The crux of this chapter was to obtain an understanding of the synergy of the effect of financial and non-financial sustainability performance on firm performance. Firms, together with their top management and other executives, should have various incentives to engage in financial and non-financial sustainability. These incentives include maximising long-term profit and firm performance, fulfilling their corporate social responsibilities, meeting environmental obligations, and enhancing their image and reputation.

Financial sustainability is strengthened when sustainability risks are controlled and lowered by a firm. These include strategic, operational, compliance, reputational, financial and security risks. The lowered risks also enhance the non-financial sustainability dimension of a firm. A proper balance between financial and non-financial sustainability must be established for firms to create shareholder value and to maximise firm performance (Rezaee, 2017).

Firms that are environmentally and socially responsible, governed effectively and conduct themselves ethically, are expected to produce sustainable financial performance, create shareholder value and gain investor confidence and public trust. This is in line with achieving both long-term financial sustainability as well as environmental, social and governance sustainability (Al Ahbabi and Nobanee, 2019; Ameer and Othman, 2012; Golden et al., 2020).

The last section of this chapter set out the four hypotheses and sub-hypotheses: financial sustainability performance, non-financial sustainability performance, a synergy between financial and non-financial sustainability performance and an interaction between financial and non-financial sustainability performance.

CHAPTER 6
RESEARCH DESIGN AND METHODS

6.1 INTRODUCTION

The preceding chapters reviewed the literature on financial sustainability, non-financial sustainability and the synergy between financial and non-financial sustainability. Various theories, measurements of variables, sustainability risks and firm performance were analysed to ultimately develop the hypotheses. This chapter highlights the research methodology applied to the study to achieve the research objectives and to resolve the research hypotheses.

As mentioned in Section 1.3, the purpose of the study was to investigate the interlinked relationship between financial and non-financial sustainability and firm performance of listed South African firms. To explore the purpose of the study, this chapter describes the research methodology adopted. When referring to the term *research methodology*, it means the broad approach which the researcher adopts to conduct a research study. Therefore, in this chapter, the grounds for the research methodology, together with the research design, are provided.

This chapter presents the research paradigm/philosophy, the broad research design, the sample, the variable construction for the dependent and independent variables, the data analysis, the assessment of the quality and the rigour of the research design and concludes by providing the research ethics of the study.

6.2 BROAD RESEARCH APPROACH

Empirical research studies are the collection and analysis of data based on direct observation or experiences in the research field. The research approach used in this study was quantitative in nature. This research approach tests research objectives, underlined by theories, by exploring the relationships between variables (Creswell, 1994). When researchers adopt a quantitative research approach, they would typically follow a deductive way of reasoning. Deductive reasoning means that the researcher will begin with one or

more expectations, which the researcher accepts to be correct, after which the researcher will apply logical reasoning to draw conclusions, which are supposed to be correct if the original expectations are correct (Leedy and Ormrod, 2005).

Statistical techniques can typically be applied to analyse data, which is measured in a numerical form, when following a quantitative research approach. The quantitative research approach used in this study was justified by the main purpose of the study, namely to investigate the interlinked relationship between financial and non-financial sustainability and firm performance of listed South African firms. The quantitative research approach was also suitable for the study because all the variables of the financial and non-financial sustainability performance dimensions used in the hypotheses were measured in numerical form, with statistical techniques applied to investigate the research problem.

6.3 RESEARCH PARADIGM/PHILOSOPHY

The research paradigm refers to the philosophical assumptions of the researcher, namely the world view that the researcher brings to the field of study (Creswell, 1994).

A paradigm is a shared interpretation, which represents the beliefs and values in a discipline and which guides how problems are solved (Schwandt, 2001). It is a way of describing a world interpretation that is informed by three philosophical assumptions about the (1) nature of social reality (also known as *ontology* – what do we believe about the nature of reality?), (2) ways of knowing (also known as *epistemology* – how do we know what we know?), and (3) ethics and value systems (also known as *axiology* – what do we believe is true?) (Quinn Patton, 2002). An understanding of the research paradigm helps the researcher to make appropriate choices about hypotheses or research questions for the study, what research instruments to use, data collection steps and the analysis and discussion of collected data (Khaldi, 2017).

This study was guided by the post-positivism paradigm. Positivism suggests that a scientific method is the only way to establish truth and objective reality. Therefore, positivists believe that science is the only foundation for true knowledge. Positivism reflects a strict empirical approach, claiming that knowledge is based directly on experience, it emphasises facts and

also the causes of behaviour (Bogdan and Biklen, 2007). Post-positivism moved away from the dogmatic view of positivism, turning the emphasis from absolute certainty to probability (Crotty, 1998). According to Crotty (1998), no matter how faithfully the scientist adheres to scientific method research, research outcomes are neither totally objective, nor unquestionably certain. This interpretation is known as post-positivism (also known as logical empiricism or interpretive approach) and can be summarised as *reality cannot be known with certainty*. This view describes a less strict form of positivism.

According to Antwi and Hamza (2015), positivist research supports a quantitative research methodology, which requires numerical data to be collected and presented in a quantitative form, measuring the variables and testing the hypotheses. Antwi and Hamza (2015) also indicate that a positivist research approach uses a quantitative approach of which the research purpose is numerical description or causal explanation.

The various measurements used in the study were positivist in the sense that the study assumed a process based on technical analysis, using a large sample of data and statistical methods to explain observable phenomena (Scherer and Patzer, 2011). Therefore, the measurements used in this study were objective in nature but not as rich as what might be acquired through personal participation.

The main ontological, epistemological and axiological assumptions were:

(1) Ontology (nature of reality) (Saunders et al., 2009): Post-positivists concur that reality does exist but that it can be known imperfectly due to the researcher's human limitations. Therefore, the researcher can only discover reality within a certain realm of probability (Mertens, 2008; Ponterotto, 2005). Ontology can be divided into two categories: objectivism and subjectivism. For the purposes of this study, objectivism was applied because the researcher remained objective and independent from the research.

(2) Epistemology (acceptable knowledge) (Saunders et al., 2009): Positivists and post-positivists view knowledge as statements of belief or facts that can be tested empirically, knowledge can be confirmed/verified or disconfirmed, is unchanging and can be generalised (Eichelberger, 1989). Knowledge in this paradigm field consists of hard data, it is objective and therefore, independent of the values, interest and

feelings of the researcher. The research approaches are quantitative and include experimental, quasi-experimental, correlational, causal comparative and survey designs. Data gathering are techniques such as questionnaires, observations, tests and experiments. Post-positivists specifically believe that perfect objectivity cannot be achieved but is approachable. The positivist research paradigm is more suitable to quantitative research than to qualitative research, and therefore, a positivist research paradigm was followed in this study.

(3) Axiology (values): Post-positivists believe that the researcher and subject of the study are independent knowing that the theories, hypothesis and background knowledge held by the investigator can have a strong impact on what is observed, how it is observed and the outcome of what is observed.

It appears that research is about discovering new knowledge of the unknown, and what steps the researcher is going to take to understand and uncover the unknown. Research concerns how we think the social world is constructed or what we think the world is (ontology), shaping the way we believe we can know the world. How we look at the world (epistemology), and the methods we use, shape what we can see. Doing research facilitates an understanding of the world we are living in; such understanding is also informed by how individuals view the world, what individuals interpret, and what individuals see as the purposes of our understanding. Because both the ontology and epistemology applicable to this study support the stance that the researcher remains objective and independent in nature from the research matter, quantitative methods and deductive reasoning were applied to verify the hypotheses (Antwi and Hamza, 2015; Yilmaz, 2013).

The research objectives, identified in Section 1.3, were as follows:

- to indicate which variable for (1) growth opportunities and (2) operational efficiency was the strongest predictor of firm performance;
- to indicate which of the financial sustainability elements of (1) growth opportunities, (2) operational efficiency or (3) innovation capability, contributed most on explaining firm performance;
- to indicate which of the non-financial sustainability elements of (1) environment, (2) social or (3) governance contributed most on explaining firm performance;

- to indicate which of financial or non-financial sustainability dimensions contributed most to firm performance respectively;
- to determine the effect of the interaction of the dimensions of financial and non-financial sustainability on firm performance; and
- to draw conclusions based on the findings of the study and make recommendations for future research.

The hypotheses, which postulated the relationships between financial and non-financial sustainability and firm performance, were presented in Section 5.5. These hypotheses provided testable propositions to achieve the research objectives. The empirical approach to the research objectives, as demonstrated by the hypotheses, indicated that the study was quantitative in nature.

The post-positivism paradigm was chosen for the study because the purpose of this study was to predict results and then to find the strength between variables.

The research strategy and research design adopted for this study, which are closely linked to the research approach and research paradigm, is explained in the following section.

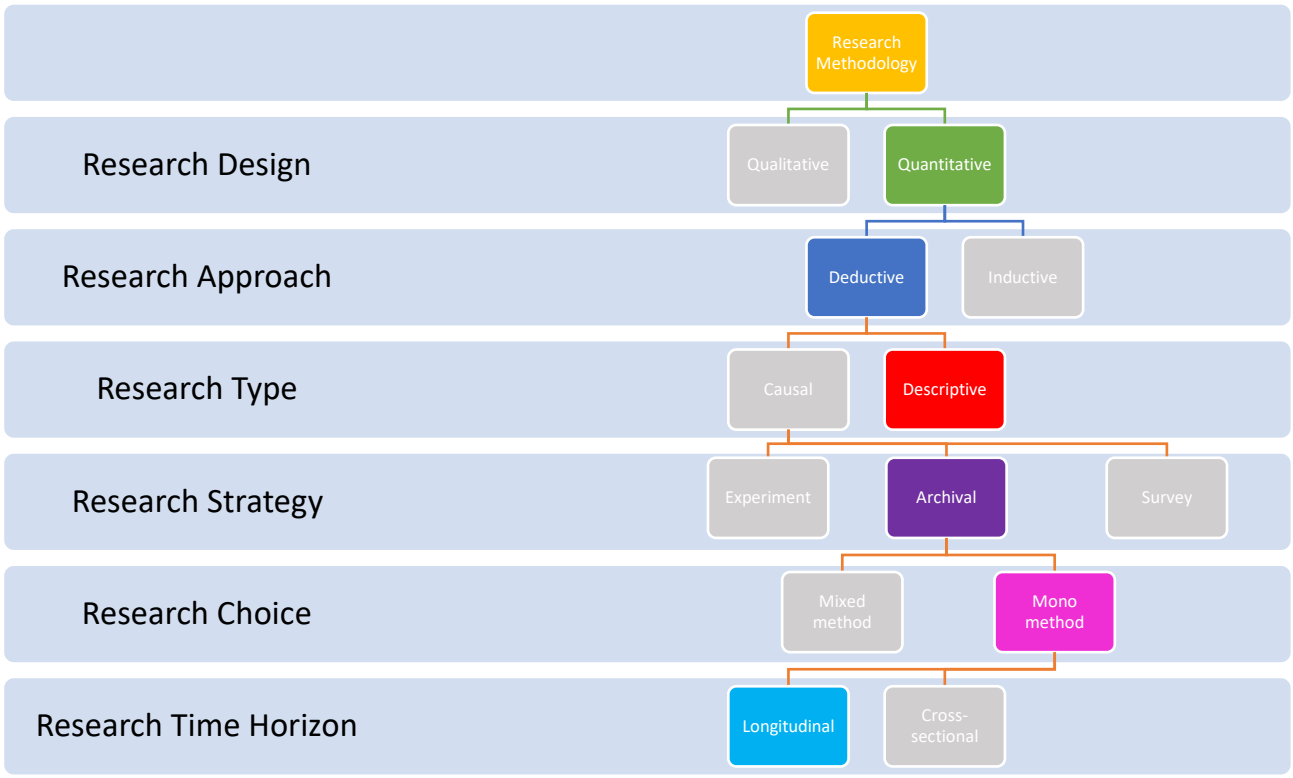
6.4 DESCRIPTION OF INQUIRY STRATEGY AND BROAD RESEARCH DESIGN

Saunders et al. (2009) state that the *research strategy* should be constructed grounded on the resources available while focusing on the leading research hypotheses but also keeping existing knowledge in mind.

The research conducted involved a structured, large sample measurement that was quantitative in nature, following a deductive form of reasoning. The study entailed an empirical research strategy, collecting and analysing secondary data. The study used a descriptive research type to show the effect on a firm's performance, caused by financial and non-financial sustainability performance, as well as the interactions between financial and non-financial sustainability performance. Quantitative research strategies included experiments, surveys and archival research (Creswell, 1994; Saunders, 2011).

Figure 6-1 visually shows the research design of the study, with each method explained in the subsections that follow.

Figure 6-1: Research design of the study



Source: Author's own.

As discussed in Section 6.2, this study was quantitative in nature and followed a deductive research approach. A descriptive research type was conducted, followed by an archival research strategy. All the research method choices indicated in Figure 6-1 are discussed separately in the subsections that follow.

6.4.1 Quantitative research design

Quantitative research can be defined as research that enlightens phenomena according to numerical data, which are investigated by means of mathematically based methods, particularly statistics (Yilmaz, 2013). According to Goertzen (2017), quantitative research involves collecting and analysing organised data, which can be numerically presented. From a broader perspective, it is a type of empirical research into a social phenomenon, testing a theory or theories, consisting of variables, which are measured with numerical data and

investigated with statistics to determine if the theory explains or predicts phenomena of interest (Airasian and Gay, 2003; Creswell, 1994). Furthermore, Van der Merwe (1996) states that it is a research approach aimed at the testing of theories, determining facts, demonstrating relationships between variables, and predicting outcomes. Quantitative research uses methods from the natural sciences, which are designed to ensure objectivity, generalisability and reliability. The techniques used in a quantitative research study include statistical methods used to test predetermined hypotheses regarding the relationship between specific variables. The researcher in quantitative research is considered to be external and results are expected to be replicable, no matter who conducts the research.

Table 6-1 sets out the main assumptions, purposes, approach and role of the researcher in a quantitative study.

Table 6-1: Characteristics of a quantitative study

Assumptions
• Reality is single, tangible and fragmentable. Social facts have an objective reality • Primacy of method • Researcher and data are independent, a dualism • Variables can be identified, and relationships measured • Inquiry is objective, free from value
Purposes
• Generalisability • Prediction • Descriptive explanations (see Section 5.2.3)
Approach
• Starts off with hypotheses and theories • Manipulates and controls • Uses formal, structured instruments • Is deductive (see Section 5.2.2) • Does component analysis • Seeks agreement, the norm

• Cuts down data to numerical indices
Researcher role
• Detachment and impartiality
• Objective portrayal (uninvolved observer)
• Etic (from an outsider's point of view)

Source: Adapted from Lincoln and Guba (1985); Yilmaz (2013)

A quantitative research design assumes that social facts have an objective reality, and the researcher does not identify with the researched phenomenon. The purpose of quantitative research is to predict, explain and generalise the outcomes of the research under study. The approach of quantitative research begins with hypotheses and theories as background, using formal instruments to conduct the research and finally, reduces data to numerical indices. The role of the quantitative researcher is that of a distant observer, meaning the researcher is detached from the research setting to ensure impartiality and objectivity.

A comprehensive list of the strengths and weaknesses of quantitative research was adapted from a well-known study by Johnson and Onwuegbuzie (2004) and set out in Table 6-2.

Table 6-2: Strengths and weaknesses of a quantitative study

Strengths
• Already constructed theories about how and why phenomena occur are tested and validated
• Hypotheses that have been constructed before data are collected, are tested. Generalising research findings when data are based on random samples of a sufficient size.
• Generalising research findings when it has been replicated on various populations.
• Useful for obtaining data that allow quantitative predictions to be made.
• Researcher may create a situation that removes the confounding influence of various variables, allowing to assess cause-and-effect relationships more reliably.
• Collecting data using a quantitative method are quick.
• Provides quantitative, precise, numerical data.
• Analysing the data collected is less time consuming (by using statistical software).
• Research results are independent from the researcher.
• May have higher credibility and reliability with people in power positions.

- Useful for studying large numbers.

Weaknesses

- Categories used by the researcher may not reflect local communities' understandings.
- Theories used by the researcher may not reflect local communities' understandings.
- Researchers focus on theory or hypothesis testing rather than theory or hypothesis generation (called confirmation bias) and therefore, the researcher may miss phenomena occurring.
- Knowledge produced from the study may be too abstract and/or general for the direct application to local situations, settings and individuals.

Source: Adapted from Johnson and Onwuegbuzie (2004)

6.4.2 Deductive research approach

According to Carl Klopper (in Zikmund et al. (2013): "Every genuine test of a theory is an attempt to falsify it, or to refine it". A deductive research approach is the logical process of deriving a conclusion about a specific instance based on a known general premise (known as a theory) or something known to be true. This study followed a deductive reasoning approach because it deduced hypotheses that were subject to empirical scrutiny.

6.4.3 Descriptive research type

According to Zikmund et al. (2013), the major purpose of descriptive research is to describe characteristics of firms and the environment. In other words, the results of descriptive research paint a picture of a given situation. Descriptive research is conducted after the researcher has gained a firm grasp of the situation being studied, by gathering previous literature and creating hypotheses; therefore, directing the study towards specific issues. One of the most important characteristics of descriptive research is accuracy. When research directs to a known problem but lacks knowledge of it, descriptive research is conducted. Descriptive research is typically focused on one or more specific research questions and can yield managerially actionable results. Results from this type of research can assist firms in making the right decisions. In this study, a descriptive research type was applied to deal with the main purpose of the study. The study identified all firms listed on the JSE Main Board to further understand the relationship between financial and non-financial

sustainability performances and firm performance. The data were described and analysed in more depth, after which conclusions were drawn.

6.4.4 Archival research strategy

Archival research refers to a type of primary research, which involves seeking out and extracting evidence from original archival records. An unobtrusive measure refers to any method of observation that directly removes the observer from the set of events being studied (Denzin, 2017). One of these measures is the study of archive materials such as historical records (Webb et al., 1966). This study looked at the archived financial and non-financial performances and financial statements of various firms. These records were held in custody of the firms, which originally generated them. The archival research strategy was followed in the current study. This research strategy was deemed to be appropriate because it answered questions about the past with variations over time. It then also created expectations with regard to the stated relationships in the future, leading to future research opportunities.

6.4.5 Mono-method research choice

A mono-method study is a study which conducts only one research methodology, either a quantitative research design or a qualitative research design (Johnson and Onwuegbuzie, 2004). This study followed a mono-method research design because only quantitative data were explored and tested, with no qualitative data collected and explored. Section 6.4.1 provides a comprehensive discussion of what a quantitative study entails.

6.4.6 Longitudinal research time horizon

A longitudinal study refers to a study that involves repeated observations of the same variables over extended periods of time. The purpose of longitudinal studies is to examine continuity of response and to observe changes that occur over time (Zikmund et al., 2013). This type of study analyses phenomena vertically and horizontally to establish interconnections between these levels over time (Pettigrew, 1990). It can provide insight into the time order of variables to make causal inferences. This study was a longitudinal, cohort

study because the same firms (all JSE-listed firms), all with financial and non-financial performance measures (therefore they shared a certain characteristic), were tested over a period (2011 to 2021).

Panel data are a subset of longitudinal data where observations are for the same subjects (the firms) each time. Therefore, this study explored panel data, which was multidimensional, involving measurements over time.

The research method applied to carry out the research strategy is discussed in the next section.

6.5 RESEARCH METHOD

A *research method* refers to the procedures followed to first collect, then analyse and lastly, interpret data used in the research study (Creswell, 1994; Leedy and Ormrod, 2005). When referring to a research method, it can take on the form of one of the following: quantitative, qualitative or mixed (both quantitative and qualitative) (Creswell, 1994). When choosing one or the other, it depends on whether the researcher intends to predetermine the data to be collected or accepts, through carefully setting out the research design, that the data will emerge from study participants as the research data collection progresses (Creswell, 1994). Predetermined data collection[9] supports quantitative studies, and therefore, the data collected in the current study was predetermined having hypotheses, supporting a quantitative research method rather than a qualitative or mixed research method.

When collecting data for quantitative research, it is typically numerical. When quantitative research methods are used, data may be collected based on an instrument or test, if these are appropriate when data collection is predetermined (Antwi and Hamza, 2015; Creswell, 1994). In the current study, it was decided to do statistical testing, because the data collected was numerical and predetermined based on hypotheses. Clearly, the collection of data can be linked with a quantitative research method.

[9] Pre-determined data collection refers to the process of gathering information in a structured and planned manner based on specific criteria or objectives established before the actual data collection begins. In other words, the parameters, variables, and methods for collecting data are predetermined or predefined in advance, often through careful planning and design of a research study or data collection initiative.

The results obtained from the statistical analysis are contingent on the type of data collected, as well as the analysis conducted. When a researcher follows a quantitative research method to collect and analyse data, then the interpretation of statistical results is required (Creswell, 1994). The results of the statistical tests, using a quantitative research method, can usually be generalised to a wider population, which is, in turn, represented by the sample of firms included in the research study (Antwi and Hamza, 2015).

In the current study, statistical tests were done on the data and interpretation thereof was required. This led to the results and findings of the study, which were deduced from the sample of firms listed on the JSE, to be generalised to the broader population of JSE-listed firms. The population and sample used to analyse data from and do statistical tests on are discussed in the next section.

6.6 POPULATION AND SAMPLING

Cohen et al. (2017) state that the quality of research does not only rely on the suitability of the research approach, research strategy and research method which were selected, but also on how appropriate the sampling strategy is applied to the study. The selection of firstly, the population, and secondly, the sample, serves as the subject of the study and must carefully be considered by the researcher.

6.6.1 Population

According to Zikmund et al. (2013), the term *population* is defined as any complete group of firms sharing a common set of characteristics. For the purposes of any research, the population is the entire group of firms that the researcher intends to do research on.

For the current study, it was intended to include all the firms listed on the JSE but firms from the Financials industry were excluded from the population because of the unique characteristics of this industry. Some of these characteristics are that they are known to have a minimal level of operational assets and are subject to strict regulatory requirements, which could potentially affect their financial information and market values, making it

common practice to exclude Financials industry firms from studies investigating financial information (André et al., 2018; Dahmash et al., 2009).

6.6.2 Sample

Leedy and Ormrod (2005) define the term *sample* as a subgroup of the population sharing a common set of characteristics. Therefore, the sample selected for this study was drawn from the original population selected. According to Barlett et al. (2001), an easy way to get a rough idea regarding an appropriate sample size is to use the sample size of other published studies with the same strategy and closely related topic.

This study included all the firms in South Africa listed on the JSE excluding firms from the Financials industry. The financial years 2011 to 2021 (11 years) were included in the study. The study is limited to data starting from 2011, as this marks the point when consistent and reliable non-financial sustainability performance measures became accessible through the Refinitiv Eikon database. Prior to this date, comprehensive non-financial sustainability data, particularly in the context of non-financial metrics, was not consistently available for inclusion in the analysis. The study having a quantitative research design, had a relatively large representative sample to generalise the findings from the sample, from where the logic and power of probability sampling derive its purpose, namely generalisation (Yilmaz, 2013).

The following nine industries on the JSE were considered in the sample (in alphabetical order): Basic Materials, Consumer Discretionary, Consumer Staples, Energy, Health Care, Industrials, Real Estate, Technology and Telecommunication.

The following tables set out the firms from the nine industries originally included in the sample, firms that were excluded and the final number of firms used in the study. Table 6-3 provides the sample of the financial sustainability firms, whereas Table 6-4 provides the sample of the non-financial sustainability firms. These two samples differed due to the fact that the financial and non-financial information were extracted from two different databases.

Table 6-3: Financial sustainability sample of firms

	Industry	Original number of firms	Firms excluded	Final number of firms
1	Basic Materials	41	6	35
2	Consumer Discretionary	43	16	27
3	Consumer Staples	24	8	16
4	Energy	14	7	7
5	Health Care	10	1	9
6	Industrials	51	6	45
7	Real Estate	53	28	25
8	Technology	19	5	14
9	Telecommunication	7	1	6
	Total	**262**	**78**	**184**

Firms with missing data for six or more of the 11 years were excluded from the sample. Firms with six years or more missing data will firstly implies that more than 50% of the data is missing across the 11-year period. The reason for missing data for six or more years was as follows: firms were only listed for five or less years; firms were listed and then again delisted during the 11-year period; and some firms had data for the financial sustainability variables but none for the dependent variables.

Table 6-4: Non-financial sustainability sample of firms

	Industry	Original number of firms	Firms excluded	Final number of firms
1	Basic Materials	41	18	23
2	Consumer Discretionary	43	29	14
3	Consumer Staples	24	12	12
4	Energy	14	12	2
5	Health Care	10	5	5
6	Industrials	51	31	20
7	Real Estate	53	38	15
8	Technology	19	14	5
9	Telecommunication	7	3	4
	Total	**262**	**162**	**100**

Firms with missing data for six or more of the 11 years were excluded from the sample. The reason for missing data for six or more years was as follows: firms were only listed for five or less years; firms were listed and then again delisted during the 11-year period; and some firms had data for the non-financial sustainability variables but none for the dependent variables. The reason for more firms excluded from the sample for non-financial sustainability was because the data were collected from an international database and for this reason, less South African data were available on this database, especially for the smaller listed firms.

The final number of firms included in the sample was exactly 100, based on the firms included in the limited sample for non-financial sustainability performance in terms of availability of data. For some firms included in the financial sustainability performance sample, no data were available for the non-financial sustainability performance indicators, due to the Refinitiv Eikon database adding new firms to its database every year, and therefore, complete statistical tests could not be conducted on these firms. For some firms, non-financial sustainability performance data were not available because they were not listed on the JSE during the period, with Refinitiv Eikon only reporting on data of JSE-listed firms.

6.7 DATA SOURCES AND VARIABLE CONSTRUCTION

Historical secondary data were used in this study (archival data). Rabianski (2003) defines *secondary data* as information obtained from secondary sources, which is not compiled specifically for the researcher. Therefore, secondary data are data that were collected in the past, for other purposes (Zikmund et al., 2013). Data for this study were drawn from electronic databases and annual reports of firms.

The data collected for this study for the dependent and independent variables were from reputable sources, being vital for this study because any inaccurate statistics would impact the outcome of the research results. Data relating to the dependent variables and the financial sustainability performance variables were primarily collected from the IRESS Research Domain and IRESS Expert databases. The IRESS databases are reputable sources of South African firms' financial data, known to provide valid and reliable data. Data

relating to the non-financial sustainability performance variables were collected from the Refinitiv Eikon database. The Refinitiv Eikon database provides both financial data and other firm fundamental data, not only for South Africa, but also for international countries. The Refinitiv Eikon database is known to be a well-established and trustworthy database. Data relating to the research and development independent variable was hand collected from the firms' annual reports.

Each of the dependent and independent variables is described in the following subsections.

6.7.1 Dependent variables of interest: Firm performance

Firm performance is the dependent variable of interest for researchers concerned with many areas of research (Richard et al., 2009). To determine whether financial and non-financial sustainability performance translate into firm performance, the following five measures were used separately to approximate firm performance with an explanation of the process:

- Tobin's Q;
- Total shareholder return (TSR);
- Weighted average cost of capital (WACC);
- Market value added (MVA); and
- Economic value added (EVA).

6.7.1.1 Tobin's Q

Tobin's Q is designed to reflect the valuation that the market places on the assets of a firm, relative to their book values (Lang and Maffett, 2011). The market-to-book value is often used as a proxy for the replacement cost of assets, because the replacement cost of the firm's assets is difficult to estimate (Richard et al., 2009). Tobin's Q helps to determine whether a firm is overpriced or underpriced (Aydogmus et al., 2022), making Tobin's Q an appropriate proxy for the study because the financial and non-financial performance of a firm are at a minimum reflected in the book value of assets (Barth et al., 2017). Hence, this study focused on whether financial and non-financial sustainability performance were associated with firm performance beyond what was already contained in the financial statements. The Tobin's Q variable was obtained from the IRESS Research Domain

database under financial models. Tobin's Q was calculated by IRESS Research Domain as the market value of all equity plus the book value of interest-bearing debt divided by the replacement cost of the firm's fixed assets. If the Tobin's Q ratio was larger than one, then it meant that the firm had successfully added value to its operations, whereas if Tobin's Q was less than one, then the firm had destroyed value. All values are the values as reflected at the end of each of the firm's financial year, expressed algebraically for firm *i* at time *t* as follows:

$$TQ_{it} = (MVe_{it} + BVd_{it}) / RCa_{it}$$

where, for firm *i* at time *t*:

TQ	= Tobin's Q
MVe	= Market value of equity
BVd	= Book value of debt
RCa	= Replacement cost of assets

6.7.1.2 Total shareholder return

Total shareholder return (TSR) is also known as *shareholder return* or *stock return.* TSR is the measure of the performance of a firm's stock/shares over time. More simply, it is defined as capital growth of shares plus dividends. Steyn (2015) claims that TSR is the most direct measure of shareholder wealth, supporting O'Neill and Iob (1999), who argue that TSR is the best indicator of firm performance because TSR combines capital growth and cash flow (Aaker and Jacobson, 2001; Mizik and Jacobson, 2003). TSR is a common performance indicator employed by financial analysts and is expressed as an annualised percentage of the sum total of capital gains and dividends returned to the investor. The TSR variable was obtained from the IRESS Research Domain database under financial models. The function calculates the return of a firm using the share price and dividend yield. The dividend yield is in effect transposed back into a dividend. The formula incorporates an averaging process for the inclusion of dividends where dividends are declared more than once per year. The following detailed function of how to calculate TSR was used: TSR = (Current year's share price – Previous year's share price) + Dividends / Previous year's share price – expressed as a percentage. This can be expressed algebraically for firm *i* at time *t* as follows:

$TSR_{it} = (SPe_{it} - SPb_{it}) + D_{it} / SPb_{it}$

where, for firm *i* at time *t*:

TSR	= Total shareholder return
SPe	= Share Price at end of year
SPb	= Share Price at beginning of year
D	= Dividends for year

6.7.1.3 Weighted average cost of capital

Weighted average cost of capital (WACC) refers to the cost that a firm incurs when acquiring debt and equity capital to fund its operations (Du Toit et al., 2014). WACC consists of all capital sources, namely ordinary shares, preferred shares, debentures and any other long-term debt. WACC is determined by considering the contribution (income minus all related variable costs) and the cost of each long-term capital component, taking into consideration that each source of capital has a different risk level. Broadly speaking, a firm's assets are financed by either debt or equity. WACC is the average of the costs of these two sources of financing, each of which is proportionately weighted by its respective use. The WACC variable was obtained from the IRESS Research Domain database under financial models. The WACC formula was calculated by using two components, namely the after-tax cost of debt and the cost of equity and then adding these together. This is expressed algebraically for firm *i* at time *t* as follows:

$WACC_{it} = (E_{it}/V_{it} \times Re_{it}) + (D_{it}/V_{it} \times Rd_{it} \times Tc_{it})$

where, for firm *i* at time *t*:

WACC	= Weighted average cost of capital
E	= Market value of firm's equity
D	= Market value of firm's debt
V	= E + D
E/V	= Percentage of financing that is equity
D/V	= Percentage of financing that is debt
Re	= Cost of equity (see below)
Rd	= Cost of debt (see below)
Tc	= Corporate tax rate

Cost of equity (Re):

From the IRESS Research Domain database, the cost of equity was estimated by employing the well-known capital asset pricing model (CAPM). The following formula was used for the cost of equity:

$$Re_{it} = Rf_{it} + Beta_{it} (Rm_{it} – Rf_{it})$$

where, for firm *i* at time *t*:

Re	= Cost of equity
Rf	= Risk-free rate of return
Beta	= Market risk factor
Rm	= Expected market return

The cost of equity is the risk-free rate of return plus the market risk premium adjusted by the relevant firm's market risk factor (Beta). In the IRESS Research Domain database, the beta is precalculated on a daily basis and stored in the database. The risk-free rate of return uses the All Share Index as a proxy for the market and a frequency of four weeks in calculating the firm and market return. The R186 risk-free rate of return was used, where the database considered previous risk-free rates applicable. The market risk premium was set on 6%, which was the average of the past few years.

Cost of debt (Rd):

From the IRESS Research Domain database, the after-tax cost of debt was calculated by taking into account the debt of the firm in terms of its published financial statements. From the published financial statements, the cost of debt was calculated by taking the interest paid during a given financial year and expressing this number as a percentage of the total interest-bearing long- and short-term debt. The cost of debt is an after-tax rate considering the applicable company tax rate for a specific year.

6.7.1.4 Market value added

Market value added (MVA) is determined by subtracting the equity and debt invested in the firm from the market value of the shares and long-term borrowings (De Wet, 2012; Hillman and Keim, 2001). To simplify, MVA is the difference between the cash that both debt and equity investors contributed to the firm and the value of the cash that they expected to get out of it. Therefore, MVA is affected by internal and external factors over which the firm has no control. The MVA variable was obtained from the IRESS Research Domain database under financial models. The following detailed function of how to calculate MVA was used: MVA = (Total market value of debt + Total market value of equity) – Total capital (provided by both lenders and shareholders). This can be expressed algebraically for firm *i* at time *t* as follows:

$$MVA_{it} = (MVe_{it} + MVd_{it}) - TC_{it}$$

where, for firm *i* at time *t*:

MVA	= Market value added
MVe	= Market value of equity
MVd	= Market value of debt
TC	= Total capital

6.7.1.5 Economic value added

Economic value added (EVA) is calculated similar to the well-known performance measurement, residual income. EVA covers all that managers can influence, namely all drivers of value. EVA can be seen as the capital investment multiplied by the difference between the actual return and the required return on assets (also known as the weighted average cost of capital (WACC)). Stern (2010) claims that EVA is the best measurement tool for creating shareholder value as it correlates better with stock prices than any other performance measure. EVA is an internal measure of performance that considers the full weighted average cost of a firm's capital (WACC). It yields a positive result if the firm earns after-tax operating returns that exceed cost of capital (De Wet, 2012). The EVA variable was obtained from the IRESS Research Domain database under financial models. The following detailed function of how to calculate EVA was used: EVA = Net Operating Profit After Tax –

(Invested Capital (both debt and equity) x Weighted Average Cost of Capital). This can be expressed algebraically for firm *i* at time *t* as follows:

$$EVA_{it} = NOPAT_{it} - (IC_{it} \times WACC_{it})$$

where, for firm *i* at time *t*:

EVA = Economic value added
NOPAT = Net operating profit after tax
IC = Invested capital
WACC = Weighted average cost of capital

6.7.2 Independent variables of interest: Financial sustainability

6.7.2.1 Separate variables

The first main independent variable of interest is the financial sustainability performance of a firm. Financial sustainability performance refers to the financial performance of a firm and is associated with firm performance. Financial sustainability is multidimensional, and this measure captures short-term and long-term profitability. Financial sustainability includes three elements with each having various variables, which are related to the financial performance of a firm (KPMG, 2013; Ng and Rezaee, 2015). The three elements are:

(a) Growth opportunities: Measured by using earnings per share, earnings yield ratio, dividend yield ratio and market-to-book value of equity.
(b) Operational efficiency: Measured by using return on assets, return on equity and sales.
(c) Innovation capabilities: Measured as the ratio of research and development expenditures disclosed under IAS 38 scaled by total assets of the firm.

The three elements of financial sustainability performance variable construction are discussed in more depth in the following sections:

(a) For *growth opportunities*, the following measures were used to predict firm performance: earnings per share, earnings yield ratio, dividend yield ratio and market-to-book value of equity.

For the earnings per share (EPS) variable, basic earnings per share, in terms of the International Accounting Standards (IAS), from IAS33, were used. According to IAS33, basic earnings per share are calculated by dividing the profit (or loss) attributable to ordinary shareholders (numerator) by the weighted average number of ordinary shares (denominator). The result is then given as a cent per share. The basic earnings are the profit (or loss) after tax that is left after taking into account the fixed portion of preference dividends, due to preference dividends belonging to preference shareholders and not to ordinary shareholders. Also, according to IAS33, the number of shares used is the weighted average number of ordinary shares in issue. The earnings per share variable was obtained from the IRESS Expert database. The following detailed function of how to calculate EPS was used: EPS = (Net Operating Profit After Tax – Preference Dividends) / Weighted Average of Ordinary Shares. This can be expressed algebraically for firm *i* at time *t* as follows:

$$EPS_{it} = (NOPAT_{it} - PD_{it}) / WAOS_{it})$$

where, for firm *i* at time *t*:

EPS = Earnings per share
NOPAT = Net operating profit after tax
PD = Preference Dividends
WAOS = Weighted average of ordinary shares

For the earnings yield ratio (EY) variable, the formula used was the earnings per share divided by the market price per share, both at financial year-end. The earnings yield ratio variable was obtained from the IRESS Expert database. The following detailed function of how to calculate EY was used: EY = Earnings per share / Share price. This can be expressed algebraically for firm *i* at time *t* as follows:

$$EY_{it} = (EPS_{it} / SPe_{it})$$

where, for firm *i* at time *t*:

EY = Earnings yield ratio
EPS = Earnings per share
SPe = Share price at end of year

For the dividend yield ratio (DY) variable, the formula used was the ordinary dividend per share divided by the market price per share, both at financial year-end. The dividend per share was calculated as the ordinary dividend divided by the number of ordinary shares in issue at year-end. The dividend yield ratio variable was obtained from the IRESS Expert database. The following detailed function of how to calculate DY was used: DY = Dividend per share / Share price. This can be expressed algebraically for firm *i* at time *t* as follows:

$$DY_{it} = (DPS_{it} / SPe_{it})$$

where, for firm *i* at time *t*:

DY = Dividend yield ratio
DPS = Dividend per share
SPe = Share price at end of year

For the market-to-book value for equity (MBVE) variable, the formula used was the market value of shares at year-end to the book value of equity at year-end. The book value of equity was calculated as the total equity in terms of the financial statements, which was also the net asset value (assets minus liabilities). The market-to-book value for equity variable was obtained from the IRESS Research Domain database. The following detailed function of how to calculate MVBV was used: MVBV = Market value of shares / Book value of equity. This can be expressed algebraically for firm *i* at time *t* as follows:

$$MBVE_{it} = (MVs_{it} / BVe_{it})$$

where, for firm *i* at time *t*:

MBVE = Market value to book value of equity
MVs = Market value of shares
BVe = Book value of equity

(b) For *operational efficiency,* the following measures were used to predict firm performance: return on assets, return on equity and sales.

For the return on assets (ROA) variable, the formula used was the net profit after tax divided by the total assets, both at year-end. The return on assets variable was obtained from the IRESS Expert database. The following detailed function of how to calculate ROA was used: ROA = Net profit after tax / Total assets. This can be expressed algebraically for firm *i* at time *t* as follows:

$$ROA_{it} = (NOPAT_{it} / TA_{it})$$

where, for firm *i* at time *t*:

ROA = Return on assets
NOPAT = Net operating profit after tax
TA = Total assets

For the return on equity (ROE) variable, the formula used was the net profit after tax divided by the total equity, both at year-end. The return on equity variable was obtained from the IRESS Expert database. The following detailed function of how to calculate ROE was used: ROE = Net profit after tax / Total equity. This can be expressed algebraically for firm *i* at time *t* as follows:

$$ROE_{it} = (NOPAT_{it} / TE_{it})$$

where, for firm *i* at time *t*:

ROE = Return on equity
NOPAT = Net operating profit after tax
TE = Total equity

For the sales variable, the variable used was the sales/revenue line item in the statement of profit or loss and other comprehensive income. The sales line item was obtained from the IRESS Expert database.

(c) For *research and development,* the following measures were used to predict firm performance: research and development in terms of IAS38.

For the research and development (R&D) variable, the variable used was the R&D line item in the statement of profit or loss and other comprehensive income. The R&D was obtained from the IRESS Expert database. Due to some missing values for R&D being an expense in the statement of profit or loss and other comprehensive income (where many firms account for their R&D not as an expense but rather as capitalised intangible assets), it was further investigated and decided that the R&D costs, which were capitalised under IAS38 as R&D, would be hand collected from annual reports. Only costs added to the capitalised IAS38 R&D in a specific year were included, showing the exact amount of innovation incurred in that specific year.

6.7.2.2 Combined variable

A combined financial sustainability variable was also used as part of the model specifications and regression equations under Section 5.8.1. The combined financial sustainability variable consisted of a combination of growth opportunities, operational efficiency and innovation capabilities. As can be seen from the results in Chapter 6, where the variables for both growth opportunities and operational efficiency were identified through analysis and testing, market-to-book value of equity and return on equity were identified as the strongest predictors of firm performance. Therefore, the three variables used in this study for finance were market-to-book value of equity (under growth opportunities), return on equity (under operational efficiency) and research and development (under innovation capabilities).

Because the three variables all had different units of measurements (market-to-book value of equity = ratio, return on equity = percentage/ratio and research and development = rand value), there was a need to convert these variables into a variable of the same unit of measurement by using standardisation. Therefore, the aim was to construct a summated index that was a measure of combined financial sustainability, which was one-dimensional.

To calculate the summated financial sustainability index, the steps and processes followed in IBM SPSS, v28 were:

(1) *Convert* the three different variables (market-to-book value of equity (MBVE), return on equity (ROE) and research and development (INNOVATE)) into a value between 0 and 1;
(2) Apply *principal component analysis* to identify the contribution of each of the variables to a single index score (this step also includes two substeps); and
(3) *Calculate* the combined financial sustainability variable.

Step 1 (standardisation): To make the three variables comparable, it is important to use standardised values. To standardise values means that the values for each of the three different variables must be converted to the same scale for a researcher to compare them. When standardisation is applied, it results in a variable with a mean of zero and a standard deviation of 1. For each of the three variables, namely MBVE, ROE and INNOVATE, the standardised observation values were calculated as Z-scores, as follows (Urdan, 2022):

$$Z_{it} = (x_{it} - \mu_{it}) / \sigma_{it}$$

where, for firm *i* at time *t*:

Z	= Z-score for the firm-year observation
x	= value of the firm-year observation for a specific variable
μ	= mean for the specific variable across the sample
σ	= standard deviation for the specific variable across the sample

Step 2 (principal component analysis): Exploratory factor analysis (EFA) and principal component analysis (PCA) are two similar techniques for transforming original variables into a smaller set of linear combinations, capturing most of the variability in the pattern of correlations (Field, 2013). Although both techniques produce similar results, index construction studies prefer PCA because the aim is only identifying linear combinations and not the identification of latent variables. PCA is also psychometrically sound, mathematically simpler and avoids some limitations associated with factor analysis (Stevens, 2012). By applying PCA to the three separate variables of financial sustainability (MBVE, ROE and INNOVATE), the original variables are transformed into a smaller set of linear combinations,

with all of the variance in the variables used (Field, 2013). The following two steps must be followed to apply PCA:

(a) Assessment of the suitability of the data for PCA

To determine if a particular dataset was suitable for PCA, the sample size and strength of the relationship among the variables had to be considered. Firstly, because the dataset used had 1 100 for each of the three variables, it was well above the 300 cases proposed (Tabachnick et al., 2013). Secondly, the strength of the intercorrelations among the variables was measured using Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. Bartlett's test should be significant ($p<0.05$) and the KMO index range should be more than 0.5 for a good PCA (George, 2011; Hair et al., 2013; Kline, 2014; Tabachnick et al., 2013). Table 6-5 presents the results of Bartlett's test and the KMO measure of sampling adequacy.

Table 6-5: Bartlett's test and KMO results

Kaiser-Meyer-Olkin measure of sampling adequacy.		0.522
Bartlett's test of sphericity	Approx. Chi-Square	416.732
	df	3
	Sig.	<0.001

The results of Bartlett's test and the KMO measure of sampling adequacy indicated that PCA could be applied because of the KMO being 0.522 (more than 0.5) and Bartlett's test showed statistical significance ($p<0.001$).

(b) PCA extraction

The extraction of the factors involves the determining of the smallest number of factors that can be used to best present the interrelationship among the set of variables (Field, 2013). Using Kaiser's criterion (also known as the eigenvalue rule), only factors with an eigenvalue of one or more are regarded as suitable for further investigation. The eigenvalue of a factor is the amount of the total variance explained by that factor. The analyses identified one component, based on the eigenvalue larger than one rule:

Table 6-6: Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.609	53.620	53.620	1.609	53.620	53.620
2	.938	31.272	84.892			
3	.453	15.108	100.000			
Extraction Method: Principal Component Analysis.						

Table 6-6 indicates that only Component 1 had an initial eigenvalue above one being 1.609, explaining a total of 53.620% of the variance.

Table 6-7 shows the component loadings and weights per variable. Normalisation of the loadings represents the weight of each variable, which sums up to 1 (Aggarwal et al., 2001). This weight will be allocated to each variable in a summated index.

Table 6-7: Component loadings and weights

Variable	Component 1 Loadings	Weight
MBVE	0.537	0.410
ROE	0.520	0.398
R&D	0.251	0.192
Extraction Method: Principal Component Analysis.		

Step 3 (calculate combined financial sustainability variable): By having the standardised values as calculated in *Step 1* and the final PCA and ratios as calculated in *Step 2*, the final combined financial sustainability variable (hereafter referred to as FINANCE) was calculated using the following formula:

$FINANCE_{it} = (ZMBVE_{it} \times 0.410) + (ZROE_{it} \times 0.398) + (ZR\&D_{it} \times 0.192)$

where, for firm *i* at time *t*:

FINANCE = A summated index measure of $GROWTH_{it}$, $OPERATE_{it}$ and $INNOVATE_{it}$ combined

ZMBVE = standardised value for MBVE

ZROE = standardised value for ROE

ZR&D = standardised value for R&D

6.7.3 Independent variables of interest: Non-financial sustainability

6.7.3.1 Separate variables

The second main independent variable of interest is the performance and initiatives (what strategies are in place to be in the lead or to have a competitive advantage) of non-financial sustainability of a firm. One approach to measuring firms' non-financial sustainability and initiatives is to trust the amount of ESG investments, which are disclosed in the annual reports of a firm. However, prior studies indicated concerns and doubts about the validity of disclosed ESG investments such as a lack of consensus on what should be included and excluded from the total ESG investment amount (Margolis and Walsh, 2003; Orlitzky et al., 2003; Tsoutsoura, 2004). It is also true that only a few firms have their ESG investments audited and validated by a third party (Luo and Bhattacharya, 2006). Evidently, firms may overreport (exaggerate what they give and spend) their ESG investments for impression management purposes, while other firms may underreport their ESG investments because they regard these investments as donations. Also, the nature and amount of ESG investments for the same firm can be different from one source to the other (Berner, 2005; Fombrun and Shanley, 1990; Margolis and Walsh, 2003). Therefore, this study relied on subjective measures of non-financial sustainability performance, which included ESG performance.

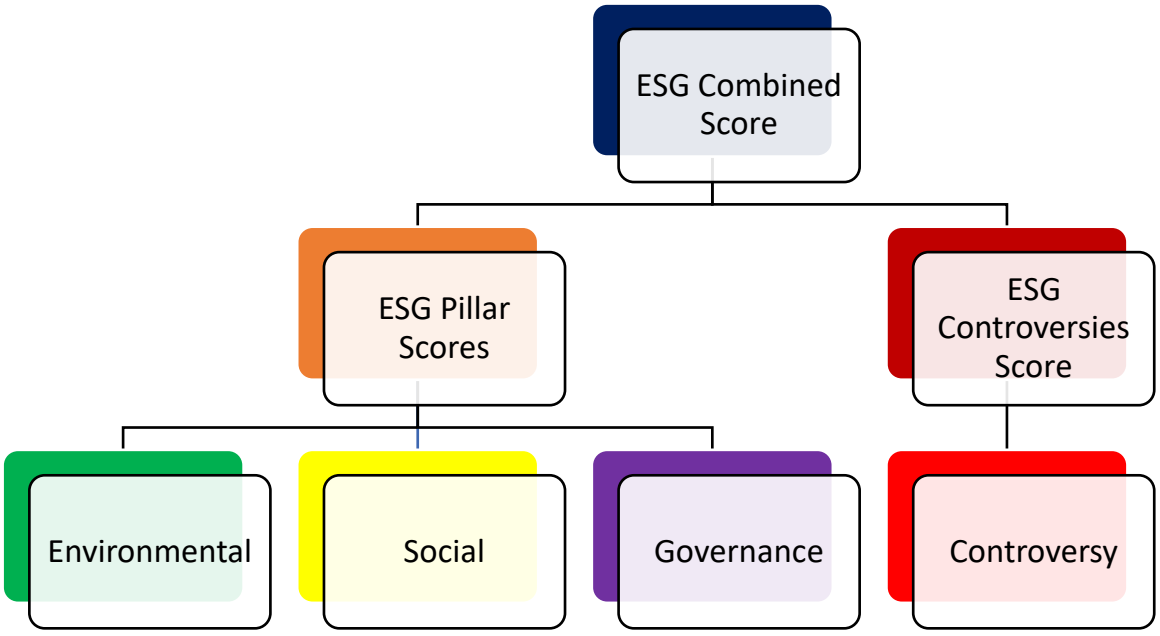
Non-financial sustainability performance is also multidimensional, which includes three pillars with each having a measure related to the non-financial performance of a firm (Aydogmus et al., 2022; Barth et al., 2017; Ng and Rezaee, 2015; Rezaee, 2017). Non-financial sustainability, namely the environmental, social and governance elements of a firm,

was measured using the different measurement scores from the specialist database from Refinitiv Eikon (formerly known as the Thomson Reuters database). Refinitiv Eikon operates one of the largest most comprehensive ESG content collection operations in the world, with data going back to 2002, and has been used by many studies (Aydogmus et al., 2022; Barth et al., 2017; Chairani and Siregar, 2021; Duque-Grisales and Aguilera-Caracuel, 2021; Giannopoulos et al., 2022; Naeem et al., 2021).

Refinitiv Eikon assesses ESG performance of firms across ten main themes within three pillars with more than 630 data points. Refinitiv Eikon gathers most of the data from public sources such as business websites, annual reports and other firm reports. Refinitiv Eikon also does research on and gathers data directly from the firm. For all data and sources acquired, it audits the data after which it then prepares the ESG scores (Aydogmus et al., 2022; Refinitiv, 2022). These scores are designed to transparently and objectively measure a firm's relative ESG performance, commitment and effectiveness (Refinitiv, 2022).

Refinitiv Eikon has two ESG scores available on its database. The first is the ESG scores in the three pillars, the second an overall ESG combined score, which is discounted for significant ESG controversies impacting the original ESG scores. Figure 6-2 explains the two different main scores visually, after which the scores are explained in more detail.

Figure 6-2: ESG score versus ESG controversies score



Source: Author's own

6.7.3.2 ESG combined score

The ESG combined score provides a rounded and comprehensive scoring of the overall ESG performance of a firm. This score is a combination of the reported information pertaining to the ESG pillar scores and a capturing of all controversies from global media sources. The main objective of using the ESG combined score was to discount the ESG performance of a firm based on any negative media events. When firms were involved in any ESG controversies, the ESG combined score was calculated as the weighted average of the ESG pillar scores and the ESG controversies score. When a firm was not involved in any ESG controversies, then the ESG combined scores were equal to the weighted average of the ESG pillar scores.

6.7.3.3 ESG pillar scores

The ESG pillar scores were grouped into ten categories that reformulated the three pillar scores, namely the reflection of the performance, commitment and effectiveness of a firm for non-financial sustainability, all based on publicly reported information and data. The ESG pillar scores are a relative score of the category weights, which vary per industry for the environmental and social categories, but for the governance category, the weights remain the same across all industries.

The three ESG pillars are:

(a) Environmental (ENV): Measured by using the environmental pillar score derived from the Refinitiv Eikon database.
(b) Social (SOC): Measured by using the social pillar score derived from the Refinitiv Eikon database.
(c) Governance (GOV): Measured by using the governance pillar score derived from the Refinitiv Eikon database.

(a) For *environmental*, the following three categories are included in the score: resource usage, emissions and innovation.
(b) For *social*, the following four categories are included in the score: human rights, workforce, product responsibility and community.
(c) For *governance*, the following three categories are included in the score: shareholders, management and corporate social responsibility strategy.

An example of the calculation of an ESG pillar score per firm is provided in Appendix 2.

6.7.3.4 ESG controversies score

When firms are involved in any ESG controversies, these controversies are captured to set the ESG controversies score. The ESG controversies score is calculated based on 23 ESG controversy topics. An example of an ESG controversy is when a firm is involved in a scandal leading to negative media coverage, which may lead to lawsuits, legislation disputes or fines. When this is the case, the firm may be penalised, which, in turn, affects the ESG controversies score, ultimately affecting the ESG combined score and grading. If a controversy progresses, all new media materials are captured in the ESG controversies scores. The default value of all firms with no controversies is 100, after which it decreases with each controversy of a firm, benchmarked against an industry group. Severity rates for controversies are applied in proportion to the size of the firm, because larger firms suffer more as they attract more media attention than smaller firms do. A firm with a market capitalisation of more than $10 billion is viewed as a large firm with a severity rate of 0.33. A firm with a market capitalisation of more than $2 billion up to $10 billion is viewed as a medium firm with a severity rate of 0.67, and firms with a market capitalisation of less than $2 billion are viewed as a small firm with a severity rate of 1 (Refinitiv, 2022).

Table 6-8 provides the Refinitiv Eikon ESG score range for all three of the above scores (ESG pillar scores, ESG controversies score and ESG combined score).

Table 6-8: Refinitiv Eikon ESG score range

Score Range	Description
From 0 to 25	Scores in this range imply poor relative ESG performance and insufficient degree of transparency in the public disclosure of relevant ESG data.
From 26 to 50	Scores in this range imply satisfactory relative ESG performance and moderate degree of transparency in the public disclosure of relevant ESG data.
From 51 to 75	Scores in this range imply good relative ESG performance and above-average degree of transparency in the public disclosure of relevant ESG data.
From 76 to 100	Scores in this range imply excellent relative ESG performance and high degree of transparency in the public disclosure of relevant ESG data.

Source: Adapted from Aydogmus et al. (2022) and Refinitiv (2022)

6.7.4 Control variables

The study adopted four control variables used in the literature controlling for the dependent variable, namely firm performance. Based on the literature, control variables were included in the regression as covariate[10] variables to control for other factors that could be correlated with the dependent variables for firm performance measures. The four variables are:

- Firm size;
- Financial leverage;
- Firm age; and
- Industry.

Each applicable control variable with its measurement is discussed below.

[10] Similar to an independent **variable**, a **covariate** is complementary to the dependent **variable**. A **variable** is a **covariate** if it is related to the dependent **variable.**

6.7.4.1 Firm size

A problem occurs in deciding whether to use absolute or relative measures for the measurement of growth: the use of absolute measures favours growth in larger firms, whereas the use of relative measures favours growth in smaller firms (Delmar, 2006). For example, if Firm A has started with one employee and after a year has five employees, its absolute growth is four employees, and its relative growth is 400%. At the same time, if Firm B has started with ten employees and after a year has 14 employees, its absolute growth is also four employees, but its relative growth is only 40%. Both firms will have the same absolute growth measure, but the smaller firm will have achieved a substantially higher relative growth measure (400% compared with the 40%). Consequently, regardless of the used measure of growth, it will depend on the size of the firm. To avoid this problem, the size of the firm should be controlled for.

The model controls for the influence of firm size (*Size*) (Atan et al., 2018; Aydogmus et al., 2022; Barth et al., 2017; Dhaliwal et al., 2014; Fu et al., 2016; Giannopoulos et al., 2022; Naeem et al., 2021; Ng and Rezaee, 2015; Qaim et al., 2021; Stock and Watson, 2015), because larger firms may have more financial resources and consequently, enjoy *economies of scale*[11], whereas smaller firms may have higher strategic flexibility[12] when looking for entrepreneurial rents[13] (Dutta et al., 1999; Rao et al., 2004). Cooper et al. (2008) found the relationship between asset growth and future share returns to vary somewhat with firm size and therefore, growth opportunities rates could also vary with firm size. To control for firm size, market capitalisation was employed as a proxy and the data were sourced from the Refinitiv Eikon database.

The firm size control variable refers to the total value of the firm's shares at a certain point in time. The formula used was the total number of ordinary shares issued multiplied by the share price at financial year-end. The market capitalisation control variable was obtained from the Refinitiv Eikon database. The following detailed function of how to calculate market

[11] **Economies of scale** refer to reduced costs per unit that arise from increased total output of a product.
[12] **Strategic flexibility** is the capability of an organisation to respond to major changes that take place in its external environment.
[13] **Entrepreneurial rent** (also called quasi-rent or Schumpeterian rent) can accrue due to entrepreneurial skills or managerial investments. A firm may invest in advertising, training of employees, and so forth. These investments can result in a higher price (brand) or lower costs (better technology).

capitalisation was used: MC = Number of ordinary shares issued x Share price at the end of the year. This can be expressed algebraically for firm *i* at time *t* as follows:

$$MC_{it} = (NOS_{it} \times SPe_{it})$$

where, for firm *i* at time *t*:

MC = Market capitalisation
NOS = Number of ordinary shares
SPe = Share price at end of year

6.7.4.2 Financial leverage

The model controls for the influence of financial leverage (*FL*) (Atan et al., 2018; Aydogmus et al., 2022; Barth et al., 2017; Dhaliwal et al., 2014; Fu et al., 2016; Giannopoulos et al., 2022; Naeem et al., 2021; Ng and Rezaee, 2015; Stock and Watson, 2015) to control for financial distress risk. Because firm performance deals with the sustainability of a firm and its continuing viability, debt holders will be particularly interested in this type of information that reveals the downside of risk (Dhaliwal et al., 2014).

The financial leverage control variable refers to the total debt of the firm divided by total assets at the end of the year (Aydogmus et al., 2022; Barth et al., 2017; Ng and Rezaee, 2015). The financial leverage control variable was obtained from the IRESS Expert database. The following detailed function of how to calculate financial leverage was used: FL = Total debt / Total assets. This can be expressed algebraically for firm *i* at time *t* as follows:

$$FL_{it} = (TD_{it} / TA_{it})$$

where, for firm *i* at time *t*:

FL = Financial leverage
TD = Total debt
TA = Total assets

6.7.4.3 Firm age

The model controls for the influence of firm age (*FA*) (Barth et al., 2017; Qaim et al., 2021) because of its possible effect on firm performance. There is no spurious correlation when it comes to firm age and firm performance, because the only interpretation of the correlation between firm age and firm performance is that firm age causes firm performance (Coad et al., 2018). Firm age was calculated as the difference between the reporting date and the first date that the firm was listed on the JSE.

6.7.4.4 Industry

The model controls for the influence of firm industry (Lassala et al., 2017) to control for the different characteristics of each industry. In the analysis of this study, each of the nine industries was defined using a dummy categoric variable taking the value of one if the firm belonged to the industry and a value of zero if the firm fell outside the industry. In some literature, the research focused on a specific industry, whereas others explored firms belonging to various industries. This could influence the results obtained because the impact of non-financial sustainability performance on firm performance may differ depending on the industry in which the firm operates. For this reason, this study explored all nine diverse industries and controlled for this factor.

6.8 INTERACTION EFFECTS

To deal with Hypothesis $H_{4,}$ which proposes that there are interaction effects between financial and non-financial sustainability performance on firm performance, interaction terms were introduced into the regression model. The concept of an interaction effect was first introduced in a study by Saunders (1956). In a multiple regression model with two continuous independent variables (X and Z) and a continuous dependent variable (Y), the additive model specification is commonly expressed as follows:

$$Y_{it} = \beta_1 X_{it} + \beta_2 Z_{it} + \varepsilon$$

where:

Y_t	= Refers to the five different measures of firm performance
X_{it}	= The coefficient of X
Z_{it}	= The coefficient of Z
ε	= The error term

In order to test for an interaction effect, an additional term was introduced to this model. This is commonly referred to as the interaction term and is created by multiplying X and Z. This new model, which includes the interaction terms, takes the following form:

$$Y_{it} = \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 XZ_{it} + \varepsilon$$

For interaction effects, X and Z have equal standing as independent variables and the effect of the interaction between these variables (XZ) implies that variable X influences variable Z and vice versa. Therefore, only interaction was tested, not moderation of one of the variables on another (Hall and Sammons, 2013). It is possible to test for an interaction effect despite empirically finding that a hypothesised relationship between the dependent and independent variables is weak or not statistically significant (Baron and Kenny, 1986; Frazier et al., 2004).

In a regression model with interaction terms, multicollinearity may arise from the interaction term as the product of at least two predictor variables (Aguinis et al., 2017; McClelland et al., 2017). Data are often standardised in order to minimise the issues arising from multicollinearity (Aguinis et al., 2017; Frazier et al., 2004). Therefore, in the current study, the data were standardised before the interaction terms were created.

For each of the independent variables, the standardised observation values were calculated as Z-scores, as follows (Urdan, 2022):

$$Z_{it} = (x_{it} - \mu_{it}) / \sigma_{it}$$

where, for firm *i* at time *t*:

Z	= Z-score for the firm-year observation for the specific variable
x	= value of the firm-year observation for the specific variable
μ	= mean for the specific variable across the sample
σ	= standard deviation for the specific variable across the sample

Each interaction term was tested within a separate regression model (see Subsection 6.9.1.4).

6.9 DATA ANALYSIS

This section presents the model specifications and the data analysis methods. Multiple linear regression was used to test for significant relationships between financial and non-financial sustainability performance respectively and combined on firm performance. The literature review in previous chapters served as the foundation for the hypotheses testing.

Empirical research is known as research done on data that has been directly or indirectly obtained by the researcher. This study was conducted taking the form of empirical research on secondary quantitative (numerical) data. This data were obtained from various sources as discussed in the previous chapters.

The study employed multiple linear regression analysis to test the extent (size and direction) of the relationship between the dependent variable of interest, namely firm performance, and the two independent variables of interest, namely financial and non-financial sustainability performance.

The data analysis was done by using the IBM SPSS, v28 and EViews, v13 software packages. The data analysis procedures are explained in this section, starting with the model specifications, then continuing with the treatment of outliers, panel data regression analysis and lastly, concluding with the estimation methods used in the study.

6.9.1 Model specifications

This section presents the research model, which was derived from the hypotheses set out at the end of Chapter 5 and the variables described in Section 6.7.

The variables used in the model specifications are summarised in Table 6-9.

Table 6-9: Summary of variables used in the model specifications

Variable	***Description***	***Definition/Calculation***
Dependent variables (Firm performance)		
TQ	Tobin's Q	(Market value of equity + Book value of debt) / Replacement cost of assets
TSR	Total shareholder return	(Share Price at end of year – Share Price at beginning of year) + Dividends / Share Price at beginning of year
WACC	Weighted average cost of capital	Weighted market value of firm's equity + Weighted market value of firm's debt after tax
MVA	Market value added	Market value of equity + Market value of debt – Total capital
EVA	Economic value added	Net operating profit after tax – (Invested capital x WACC)
Independent variables (Financial sustainability)		
GROWTH: (i) EPS (ii) EY (iii) DY (iv) MBVE	*Growth opportunities*[14] Earnings per share Earnings yield ratio Dividend yield ratio Market value to book value of equity	 (Net operating profit after tax – Preference dividends) / Weighted average of ordinary shares Earnings per share / Share price at end of year Dividend per share / Share price at end of year Market value of shares / Book value of equity
OPERATE: (i) ROA (ii) ROE	*Operational efficiency*[15] Return on assets Return on equity	 Net operating profit after tax / Total assets Net operating profit after tax / Total equity Total sales / Revenue

[14] Chapter 7 explores the four variables for growth opportunities through extensive statistical testing to identify the strongest variable as a predictor for firm performance.
[15] Chapter 7 explores the three variables for operational efficiency through extensive statistical testing to identify the strongest variable as a predictor of firm performance.

(iii) SALES	Sales revenue	
INNOVATE: R&D	Research and development	Research and development expense + Research and development additions capitalised under IAS38
FINANCE	Combined FINANCE	A summated index measure of *GROWTH*, *OPERATE* and *INNOVATE* combined
Independent variables (Non-financial sustainability)		
ENV	Environmental score	Environmental pillar score derived from Refinitiv Eikon database
SOC	Social score	Social pillar score derived from Refinitiv Eikon database
GOV	Governance score	Governance pillar score derived from Refinitiv Eikon database
NONFINANCE	ESG combined Score	Combination of ESG pillar scores and the ESG controversies score
Control variables		
FSIZE	Firm size (Market capitalisation)	Number of ordinary shares x Share price at end of year
FLEV	Financial leverage	Total debt / Total assets
FAGE	Firm age	Difference between the reporting date and the first date the firm was listed on the JSE
INDUS	Industry	Dummy categoric variable taking the value of one if the firm belongs to the industry and a value of zero if the firm falls outside the industry

The suggested regression models can be illustrated as shown in the next section.

The first regression model that was conducted was between financial sustainability and firm performance, without considering non-financial sustainability. Thereafter, the effects of non-financial sustainability on firm performance were tested where β_0 is the constant term, each β is a coefficient in the regression model and ε is the error term.

6.9.1.1 Effect of financial sustainability performance measures on firm performance

The regression model conducted examined the effect of financial sustainability on firm performance. The basic model to test the effect included different elements of financial sustainability (growth opportunities, operational efficiency and innovativeness capability) to estimate the differential effect of these elements on firm performance.

The first regression analysis equation is as follows for firm *i* at period *t*:

Model 1a

$$FP_{it} = \beta_0 + \beta_1 GROWTH_{it} + \beta_2 OPERATE_{it} + \beta_3 INNOVATE_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

Model 1b

$$FP_{it} = \beta_1 FINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

FP_t	Refers to the five different measures of firm performance
$GROWTH_{it}$	Financial dimension of sustainability performance – growth opportunities element
$OPERATE_{it}$	Financial dimension of sustainability performance – operational efficiency element
$INNOVATE_{it}$	Financial dimension of sustainability performance – innovativeness (research and development) element
$FINANCE_{it}$	Summated index measure of $GROWTH_{it}$, $OPERATE_{it}$ and $INNOVATE_{it}$ combined
ε_{it}	Error term

See results and discussion in Chapter 6 regarding the variable identified for each of the three elements for financial sustainability, being the strongest predictor of firm performance.

6.9.1.2 Effect of non-financial sustainability performance measures on firm performance

Next, the effect of non-financial sustainability on firm performance was examined. The study also examined the differential effect of the different elements contributing to non-financial sustainability performance on a firm.

The second regression analysis equation is as follows for firm *i* at period *t*:

Model 2a

$$FP_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

Model 2b

$$FP_{it} = \beta_1 NONFINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

ENV_{it} Non-financial dimension of sustainability performance – environmental element

SOC_{it} Non-financial dimension of sustainability performance – social element

GOV_{it} Non-financial dimension of sustainability performance – governance element

$NONFINANCE_{it}$ The combined score for ENV_{it}, SOC_{it} and GOV_{it} including ESG controversies

where all other variables were defined earlier.

6.9.1.3 Effect of financial and non-financial sustainability performance measures on firm performance

Next, the effect of the relationship between financial sustainability and non-financial sustainability on firm performance was explored.

The third regression analysis equation is as follows for firm *i* at period *t*:

Model 3a

$$FP_{it} = \beta_0 + \beta_1 GROWTH_{it} + \beta_2 OPERATE_{it} + \beta_3 INNOVATE_{it} + \beta_4 ENV_{it} + \beta_5 SOC_{it} + \beta_6 GOV_{it} + \beta_{7-x} Control\ variables_{it} + \varepsilon_{it}$$

Model 3b

$$FP_{it} = \beta_0 + \beta_1 FINANCE_{it} + \beta_2 NONFINANCE_{it} + \beta_{3-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$FINANCE_{it}$ Summated index measure of $GROWTH_{it}$, $OPERATE_{it}$ and $INNOVATE_{it}$ combined

$NONFINANCE_{it}$ Combined score for ENV_{it}, SOC_{it} and GOV_{it} including ESG controversies

and where all other variables were defined earlier.

6.9.1.4 Effect of introducing interaction terms between overall financial and non-financial sustainability performance measures on firm performance

Next, the effect of the interactions between overall financial and non-financial sustainability on firm performance was investigated. For the purposes of Model 4, the data for the two continuous variables were standardised in order to minimise the issues arising from multicollinearity before creating the interaction terms that were used to test the interaction effects.

Although multiple interaction terms can be introduced in a single regression model, the researcher refrained from this practice because where more than one interaction term was introduced, an additional effect was probable, namely if variable X interacted with variable W and variable X interacted with variable Z, then the possibility existed that W and Z could interact, in which case, additional terms (XWZ) needed to be added to such a model (Dawson, 2014).

The fourth regression analysis equation is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZFINANCE_{it} + \beta_2 ZNONFINANCE_{it} + \beta_3 INTZFINANCEZNONFINANCE_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZFINANCEZNONFINANCE_{it} = ZFINANCE_{it}$ x $ZNONFINANCE_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

6.9.1.5 Effect of introducing interaction terms between individual financial and non-financial sustainability performance measures on firm performance

The final set of regression analyses was conducted to see how various interactions between the individual financial and non-financial sustainability measures affected the various measures of firm performance. For the purposes of Model 5, the data for the three financial sustainability continuous variables and the three non-financial sustainability continuous

variables were standardised in order to minimise the issues arising from multicollinearity before creating the interaction terms that were used to test the interaction effects.

Each of the financial sustainability measures (ZMBVE, ZROE and ZR&D), together with each of the non-financial sustainability measures (ZENV, ZSOC and ZGOV), as well their interaction terms, was included in separate regression analyses as shown below.

The fifth set of regression analyses equations is as follows for firm *i* at period *t*:

Model 5a: Interaction between ZMBVE and ZENV

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZMBVEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZMBVEZENV_{it} = ZMBVE_{it}$ x $ZENV_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5b: Interaction between ZMBVE and ZSOC

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 SZOC_{it} + \beta_3 INTZMBVEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZMBVEZSOC_{it} = ZMBVE_{it}$ x $ZSOC_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5c: Interaction between ZMBVE and ZGOV

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZMBVEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZMBVEZGOV_{it} = ZMBVE_{it}$ x $ZGOV_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5d: Interaction between ZROE and ZENV

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZROEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZROEZENV_{it} = ZROE_{it}$ x $ZENV_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5e: Interaction between ZROE and ZSOC

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZROEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZROEZSOC_{it} = ZROE_{it}$ x $ZSOC_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5f: Interaction between ZROE and ZGOV

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZROEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZROEZGOV_{it} = ZROE_{it}$ x $ZGOV_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5g: Interaction between ZR&D and ZENV

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZENV_{it} + \beta_3 INTZR\&DZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZR\&DZENV_{it} = ZR\&D_{it}$ x $ZENV_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5h: Interaction between ZR&D and ZSOC

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZR\&DZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZR\&DZSOC_{it} = ZR\&D_{it}$ x $ZSOC_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

Model 5i: Interaction between ZR&D and ZGOV

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZR\&DZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

where:

$INTZR\&DZGOV_{it} = ZR\&D_{it}$ x $ZGOV_{it}$

and where all other variables were defined earlier with the *Z* indicating that the variable was standardised.

From the statistical model specifications, the regression models with its related research hypotheses for the relationships of financial and non-financial sustainability on firm performance are summarised in Table 6-10.

Table 6-10: Summarised statistical models and regression models with related research hypotheses

Statistical Models	***Regression Model****	***Related Research Hypothesis***
		H_1: Financial sustainability leads to enhanced firm performance.
Model 1a	$FP_{it} = \beta_0 + \beta_1 GROWTH_{it} + \beta_2 OPERATE_{it} + \beta_3 INNOVATE_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{1a}: Financial sustainability related to growth opportunities (GROWTH) leads to enhanced firm performance.* *H_{1b}: Financial sustainability related to operational efficiency (OPERATE) leads to enhanced firm performance.* *H_{1c}: Financial sustainability related to research and development (INNOVATE) leads to enhanced firm performance.*
Model 1b	$FP_{it} = \beta_1 FINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{1d}: Financial sustainability, as represented by a summated index, leads to enhanced firm performance.*
		H_2: Non-financial sustainability shows a relationship with firm performance.
Model 2a	$FP_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{2a}: Non-financial sustainability related to environmental (ENV) sustainability has a relationship with firm performance.* *H_{2b}: Non-financial sustainability related to social (SOC) sustainability has a relationship with firm performance.* *H_{2c}: Non-financial sustainability related to governance (GOV) sustainability has a relationship with firm performance.*
Model 2b	$FP_{it} = \beta_1 NONFINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{2d}: Non-financial sustainability, as represented by a combined score, shows a relationship with firm performance.*
		H_3: Financial sustainability and non-financial sustainability show a relationship with firm performance.
Model 3a	$FP_{it} = \beta_0 + \beta_1 GROWTH_{it} + \beta_2 OPERATE_{it} + \beta_3 INNOVATE_{it} + \beta_4 ENV_{it} + \beta_5 SOC_{it} + \beta_6 GOV_{it} + \beta_{7-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{3a}: Individual financial sustainability and individual non-financial sustainability elements show a relationship with firm performance.*
Model 3b	$FP_{it} = \beta_0 + \beta_1 FINANCE_{it} + \beta_2 NONFINANCE_{it} + \beta_{3-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{3b}: Combined financial sustainability and combined non-financial sustainability elements show a relationship with firm performance.*

		H_4: The interaction effect of financial and non-financial sustainability shows a relationship with firm performance.
Model 4	$FP_{it} = \beta_0 + \beta_1 ZFINANCE_{it} + \beta_2 ZNONFINANCE_{it} + \beta_3 INTZFINANCEZNONFINANCE_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4a}: The interaction effect of the combined financial and non-financial sustainability dimensions shows a relationship with firm performance.*
Model 5a	$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZMBVEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of growth opportunities and environmental sustainability elements shows a relationship with firm performance.*
Model 5b	$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 SZOC_{it} + \beta_3 INTZMBVEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of growth opportunities and social sustainability elements shows a relationship with firm performance.*
Model 5c	$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZMBVEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of growth opportunities and governance sustainability elements shows a relationship with firm performance.*
Model 5d	$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZROEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of operational efficiency and environmental sustainability elements shows a relationship with firm performance.*
Model 5e	$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZROEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of operational efficiency and social sustainability elements shows a relationship with firm performance.*
Model 5f	$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZROEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of operational efficiency and governance sustainability elements shows a relationship with firm performance.*
Model 5g	$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZENV_{it} + \beta_3 INTZR\&DZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of innovation capabilities and environmental sustainability elements shows a relationship with firm performance.*
Model 5h	$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZR\&DZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of innovation capabilities and social sustainability elements shows a relationship with firm performance.*
Model 5i	$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZR\&DZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$	*H_{4b}: The interaction effect of innovation capabilities and governance sustainability elements shows a relationship with firm performance.*
***** Take note that for each of the regression models, a regression was conducted for each of the five firm performance (FP) measures, namely TQ, TSR, WACC, MVA and EVA.		

Source: Author's own

6.9.2 Outliers

Multiple linear regression equations include the assumption that the relationship between the dependent and independent variables is linear (Saunders et al., 2009). This assumption may be violated if isolated cases of extreme values arise from variables collected. These so-called extreme values are often referred to as outliers (Saunders et al., 2009; Urdan, 2022). The effect of the outliers may influence the mean of the distribution, although outliers will not have an effect on the median (Urdan, 2022). Therefore, in financial data studies, it is not unusual to collect data for which the distribution thereof is highly skewed towards the tail. Therefore, there is often a problem with outlier values in the selected sample. Some of the financial data values can be very large, making the classical estimators very unstable because of their presence. Although regression methods such as robust regression offer the ability to include outliers if considered important to the analyses, i.e. influential, the distribution of outlying values of the measures considered was investigated. The skewness and kurtosis values, as well as explorative plots, indicated outlying values.

There are three ways to deal with identified outlier values. Firstly, they may be retained in the data distribution and therefore, treated as any other observation (Huck, 2012). Secondly, they may be removed from the data distribution (Huck, 2012; Lusk et al., 2011). Thirdly, they may be winsorised (Huck, 2012; Lusk et al., 2011). When retaining outlier values in a dataset, it may lead to a distortion of the test results. Similarly, caution should be taken when removing outliers from the dataset because these outliers may be valid observations, which are of a particular interest to the test results (Huck, 2012). As the focus of the regression modelling is to base the analyses on the majority of the observations, the decision was made to winsorise the data. Winsorisation is a method often used in studies exploring financial data to treat outliers. This method involves decreasing or increasing a value of one or more influential values to reduce their impact (Martinoz et al., 2015). Therefore, in the current study, the outlier values were neither retained nor totally removed, but rather winsorised.

During the course of data analysis in IBM SPSS, v28 and EViews, v13, the data were winsorised using the standard winsorisation method. This method follows a procedure for dealing with and eliminating extreme outliers in finite data sets. To winsorise data, it means to set extreme outliers equal to a specified percentile of the data. In this study, winsorisation

was followed by setting all observations greater than the 95th percentile equal to the value of the 95th percentile and all observations lower than the 5th percentile equal to the value of the 5th percentile. Winsorised data were used for the final conclusions and regression model choice, after assessing the application of robust regression analyses to the unwinsorised data.

6.9.3 Panel data regression analysis

This study used panel data regression analysis to investigate the relationship of financial and non-financial sustainability on firm performance of listed South African firms. Panel data combines data horizontally and vertically for a cross-section of firms with data over time. This study explored panel data because it examined time series data for an eleven-year period from 2011 to 2021 for a cross-section of firms. Making use of panel data has numerous advantages (Baltagi and Baltagi, 2008):

- Panel data suggests that entities, such as the firms used in this study, are heterogeneous. This is different from time series and cross-section data, which could lead to biased results if controls are not implemented to deal with heterogeneity.
- When panel data are used, effects that are not evident with the use of only time series or cross-section data can be identified and measured.
- Panel data enables the study and research of more complicated behavioural models.
- Panel data better enables the study of the dynamics of adjustments.

6.9.3.1 Missing data

To explore further, for panel data regression analysis, it is vital to consider whether the panels of data are balanced or unbalanced. When referring to a balanced panel, it means that the data include observations with respect to each variable (dependent and independent) for each panel member (firm) for every period under consideration (2011 to 2021) (Baltagi and Baltagi, 2008; Greene, 2003; Robson, 2002).

There are two approaches which a researcher can follow to deal with missing observations:

(a) The first approach is to replace the missing value with an inferred value, such as the mean or median of data which is available or an imputed value (Baltagi and Baltagi, 2008; Robson, 2002). Caution must be taken when following this

approach, for the researcher must not be too liberal when replacing missing observations as this may reduce the variability of the data and the frequency distribution may be distorted.

(b) The second approach is to exclude panel members (firms) with missing data when selecting the sample (Baltagi and Baltagi, 2008; Greene, 2003). This approach is only appropriate when data are not missing completely at random (MCAR) (Greene, 2003). When this approach is followed, namely excluding firms, the researcher should consider the impact this could have on the sample size to ensure that meaningful results may be drawn from the research.

The second approach was followed in this study, namely excluding firms with missing values. Firms with missing data of six or more of the eleven years were excluded from the sample. The reason for missing data of six or more years includes the following: firms were only listed for five or less years; firms were listed and then again delisted during the eleven-year period; and some firms had data for the financial sustainability variables but none for the dependent variables or vice versa.

When these firms were removed from the sample, further identification of missing values per variable was conducted. Missing data were considered for replacement because less than 6% of the data per variable were missing, which was less than the 10% threshold mentioned by Hair et al. (2013), indicating that any imputation method could be used. However, linear interpolation is considered better than mean replacement (Dong and Peng, 2013; Enders, 2003; Noor et al., 2015). It was then decided to replace these missing values using linear interpolation. Replacing the missing values resulted in a balanced panel.

6.9.3.2 Validation of multiple linear regression model assumptions

Whenever a multiple linear regression model is used, there is a set of tests and methods that needs to be conducted to evaluate the model assumptions and to investigate whether there are observations with large, undue influence on the analysis (Gujarati, 2022). This study did indeed use a multiple linear regression model (having two or more independent variables) and therefore, the following diagnostic tests and methods were conducted to

ensure that the validity of the models was fit and the assumptions were met (assumptions follow in alphabetical order):

a. Assumption 1: Autocorrelation

Autocorrelation (also called serial correlation) is common in panel regressions. Autocorrelation may be a problem when the ordinary least squares regression model is used. If the error term observations in a regression model are correlated, i.e following a pattern, then autocorrelation exists. When the presence of autocorrelation is ignored, it will lead to inefficient estimates of the regression coefficients and biased standard errors (Baltagi and Baltagi, 2008). The existence of autocorrelation is identified through the Durbin-Watson statistic. In this study, if the statistic was between 1.5 to 2.5., no or minimal autocorrelation existed and the results of the regression model could be used. If the value was outside this range, it could be a cause for concern and autocorrelation would be conducted. A Durbin-Watson statistic below 1.0 or more than 3.0 is a definite cause for concern (Field, 2013).

b. Assumption 2: Homoscedasticity

Homoscedasticity is an assumption of OLS regression modelling and refers to a condition in which the variance of the residual, or error term, in a regression model is constant, i.e. the variance of the residual is the same across time and firms. The likelihood ratio (LR) test for homoscedasticity, which determines whether homoscedasticity can be assumed, was used where feasible. If the null hypothesis of the test is rejected, i.e when heteroskedasticity exists, robust standard error estimates must be used to resolve the heteroskedasticity in the residual term. Where it was not feasible to conduct the test, potential heteroscedasticity was resolved by using robust standard error and covariance estimates.

c. Assumption 3: Multicollinearity

Multicollinearity ascertains whether the level of correlation that exists between the exogenous variables in the model is too high (larger than 0.8). A strong correlation between continuous independent variables indicates the existence of multicollinearity (Urdan, 2022). Furthermore, the variance inflation factor (VIF), which measures the level of multicollinearity

among the independent variables, was considered. If the VIF is greater than five, it is a clear indication that multicollinearity exists between the independent variables and needs to be resolved (Tibshirani et al., 2017). If multicollinearity exists between some of the independent variables, it causes large standard errors, which, in turn, impacts the test statistic and associated statistical significance (p value), and ultimately, results in difficulty to identify what the true relationship is between each of the independent variables and the dependent variables (Saunders, 2011).

d. Assumption 4: Normal distribution of residuals

This is a diagnostic test that ascertains whether the residuals follow a normal distribution when applying regression analysis. The Bera-Jarque test for testing a normal distribution cannot be used as in the panel data case, because the standard Bera-Jarque test cannot disentangle the departures of the individual and remainder components from non-normality (Alejo et al., 2015).

Skewness and *kurtosis* are terms used to describe how the data of the study is distributed (Urdan, 2022). On the one hand, residuals are not normally distributed if the bell curve shape of the data are gathered at one end of the curve, with some observations of data pulling a tail to the other end of the curve. When this happens, it is referred to as skewness of data and distorts the accuracy of the probabilities, because the data are not normally distributed. The acceptable range for skewness is between -3 and +3 (Hair et al., 2013). On the other hand, kurtosis refers to the height of the distribution, indicating the percentage of data observations near the mean. The acceptable range for kurtosis is between -7 and +7 (Hair et al., 2013). In this study, for kurtosis, it was necessary to deduct three from the kurtosis results provided by Eviews, v13 before comparing the kurtosis value with the acceptable range of values. However, a violation of the assumption of normally distributed residuals in regression analysis has no influence on bias and does not impact the regression results substantially in the presence of large sample sizes (where the number of observations per variable is larger than 10) (Schmidt and Finan, 2018).

6.9.3.3 Considerations in regression model

Whenever a multiple panel linear regression model is used, the researcher needs to consider the following: the fixed and random effects and endogeneity.

a. Consideration 1: Fixed and random effects

Both the fixed- and random effects models are commonly applied to regression analysis using panel data (Greene, 2003; Gujarati, 2022). The decision to apply either of these models depends on the specifics of each of the individual regressions. The two dominant approaches for dealing with heterogeneity are the fixed-effects and random effects panel data regression models (Clark and Linzer, 2015). A fixed model is usually applied when it is assumed that aspects related to an individual or company or country bias the predictor or outcome variable and these aspects need to be controlled for within the model, whereas with the random model, the variation across individual or company or country is assumed to be random and uncorrelated with the independent variables included in the model (Baltagi and Baltagi, 2008). The Hausman (1978) test can be used to determine which of the fixed-effects model or random effects model applies. Because this study consisted of a specific set of firms (JSE-listed firms), it seemed that the fixed-effects model would be suitable for the study. However, to be conservative, the Hausman test was done to determine the appropriateness of both the fixed-effects and random effects models.

b. Consideration 2: Endogeneity

Endogeneity occurs when an explanatory variable is correlated with the error term. However, in this study, it was assumed that the model was well specified in terms of explanatory and control variables and therefore, the conditional independence assumption (CIA) applied.

Consideration was given to the lagging effect of both the financial and non-financial sustainability variables. It was considered whether lagged variables (one and two years) should be added to the set of equations to resolve any endogeneity issues. When lagged variables are included in the equations, it allows for the application of dynamic panel generalised method of moments estimation method (Wintoki et al., 2012). After a close examination of scatter plots for both the dependent and independent variables, as well as

an investigation of both the inclusion and exclusion of lagged variables, the conclusion was made that no lagged variables should be included in the set of equations.

6.9.4 Conclusion of estimation method used

Firstly, the panel least squares estimation method, which applies ordinary least squares (OLS) to panel data, was not chosen for this study, owing to the violation of some of the underlying assumptions. In some cases, autocorrelation evidently exists for the Durbin-Watson statistic value. Another problem that occurred was heteroscedasticity. When some or all of the OLS assumptions are violated, then an EGLS method is favoured above the panel least squares estimation method (Wooldridge, 2010). First, the Hausman test was conducted to determine whether a fixed- or random effects model applied. The results were investigated upon which further estimation methods were considered, if applicable.

The EGLS estimation method was considered to be most appropriate for this study (except for the TSR dependent variable where panel least squares regression was used). Therefore, the EGLS estimation method, together with period SUR weightings and applying White (Diagonal) standard errors and covariance methods, was used.

The researcher also used variance contribution analysis to determine the relative strength of each independent variable for each of the regression models. Although standardised beta coefficients have been used in previous studies to indicate the relative strength of an independent variable in explaining the dependent variable, it was not used in this study (Statistics How To, 2023). Standardised beta coefficients, if required, can be computed for pooled data. However, in the case of panel data, the standardised beta is not provided because it has no single meaning in panel data. Therefore, the Eviews, v13 package does not provide standardised beta coefficients in the standard output. An example is fixed-effects regression, where within-panel effects are exclusively estimated. If the standard deviation of a variable in the entire sample is used for the standardisation, it would be an irrelevant "standard" at best, and in some situations, it would be dominated by the between-panel variation, which is explicitly excluded from consideration in fixed-effects models. Furthermore, it depends on whether the researcher wants to standardise within each panel separately, or wants to calculate a pooled standard deviation across the panels (Statalist, 2020).

6.10 QUALITY AND RIGOUR OF THE RESEARCH DESIGN

Certain sources of bias or error may have a negative impact on the quality and rigour of the research study. *Rigour* refers to how reliable, valid and accurate the results are.

When making use of secondary data sources, it may appear relevant at first glance but on closer examination, it may be found inappropriate to meet the research objectives and answer the research questions (Saunders et al., 2009). Therefore, the evaluation of the suitability of the secondary data is vital.

The validity and reliability of the data collected are imperative because these factors determine the extent to which the researcher can draw meaningful conclusions from the analysis of the data (Leedy and Ormrod, 2005).

Validity refers to how logical, robust, truthful, sound, meaningful and reasonable the data and results are (Quinlan et al., 2019). When developing the hypotheses, the information collected should provide accurate results that always tie back and support the problem statement of the underlying study. When a variable measures what it is intended to measure, it also refers to validity (Saunders et al., 2009).

In the literature and research design chapters, suitable measures for all the variables used in this study were identified. The use of these measures in other studies gave them credibility, leading to an increase in the validity of the data in this study. Secondary data were collected using a quantitative research design, which meant that the researcher applied an objective state of mind when the data were collected. During the data collection process, no manipulation of data took place. Owing to avoidance of bias, this also increased the validity of the data.

Reliability refers to the extent to which the data techniques or analysis procedures produce consistent findings (Saunders, 2011). *Reliability* refers to the dependability of the research, namely the degree to which the research can be repeated while obtaining consistent results, according to Quinlan et al. (2019).

In the current study, secondary financial and non-financial data were collected from the IRESS Research Domain, IRESS Expert and Refinitiv Eikon databases, which standardise the measurement of data for all firms. The following is an example:

- Data quoted in a currency other than South African rand is converted automatically by the IRESS databases.
- Data quoted for a period shorter (or longer) than a year is annualised to a full financial year.
- Standardised formulas are used to calculate variables, for example, ratios.

When data are collected from annual reports, these data are also standardised based on the JSE regulations and the International Financial Reporting Standards (IFRS). In minimal instances, hand-collected data (research and development) from annual reports was quoted in other currencies. When this occurred, the websites, www.x-rates.com and www.poundsterlinglive.com, were used for the conversion to South African rand.

For both validity and reliability of data, the source of secondary data is important, and is determined based on the reputation and authority of the data source (Saunders, 2011). When using data from large, well-known organisations, it is likely that these sources will be valid and reliable because the sustainability of these organisations depends on their credibility. The IRESS Research Domain, IRESS Expert and Refinitiv Eikon databases are known to be credible databases and are widely used in research studies.

Saunders et al. (2009) recommend the following steps for a researcher in evaluating secondary data sources, which also explain the data collection process in more depth:

Step 1: Assess overall suitability of data

To assess whether secondary data are suitable to meet the research objectives and answer the research questions, particular attention needs to be given to the measurement validity and coverage. Measurement validity relates to how logical, robust, truthful, sound, meaningful and reasonable the data and results are (Quinlan et al., 2019). When developing the hypotheses, the information collected should provide accurate results that always tie back and support the problem statement of the underlying study. If measurement validity is not achieved, the data will yield invalid results. Of equal importance is coverage. *Coverage* is the extent to which the dataset covers the target population, time frame and applicable

variables to meet the research objectives and answer research questions. In this study, all firms listed on the JSE for nine out of the ten industries were included over a period of 11 years, covering almost all the firms over a long period of time. Once Step 1 is satisfied, the next step is to evaluate the precise suitability of data needed for analysis to answer the research objectives and research questions.

Step 2: Evaluate precise suitability of data for analysis

To assess whether secondary data are precisely suitable to meet the research objectives and answer the research questions, particular attention needs to be given to reliability, validity and measurement bias. The reliability and validity ascribed to secondary data are functions of the method by and the source from which data were collected. The method by which data are collected needs to be inspected to assess if the data are reliable and valid. In this study, the collection of data method was reviewed by the supervisor. The source from where data are collected refers to assessing the authority and reputation of the source. Secondary data from large, well-known organisations or databases are likely to be trustworthy and reliable, because the existence of these organisations depends on the credibility of the data that they produce. Two well-known organisations and databases were used in this study. The IRESS (Research Domain and Expert) database is a South African-based database used extensively for South African financial data. The Refinitiv Eikon database is an internationally based database used extensively for financial and non-financial data.

When referring to measurement bias, one looks at how accurate the data were collected and the results were interpreted. Measurement bias occurs when there is a deliberate distortion of data (where data are purposely recorded inaccurately). For this study, there were no personal influences during the data collection and data interpretation processes. The data were collected in 2022, which meant that data up to and including the year 2021 was included. To summarise Step 2, the databases used to collect the data were found to be reliable, valid and with no measurement bias. Therefore, the dataset was precisely suitable to meet the research objectives and to answer the research questions. Once Step 2 is satisfied, the next step is to judge whether to use secondary data based on an assessment of costs and benefits in comparison with alternative sources.

Step 3: Judge whether to use secondary data based on costs versus benefits.
The researcher needs to judge how well the costs and benefits of using the secondary data compare with alternative sources. The data were available to the researcher at no cost. The costs were covered by the University of Pretoria. Therefore, the advantages outweighed the costs, as there were no costs. Therefore, the third requirement was achieved in evaluating the secondary data.

One last effort was made to make sure that the data collected was accurate and complete:

- A test sample of data collected from IRESS Research Domain and IRESS Expert was compared with the actual data in the annual reports to ensure accuracy; and
- where no values for a variable were available from the data source, this was confirmed by comparing it with the annual reports.

To conclude on Step 1 to 3, all three requirements were met, and therefore, the databases used, namely IRESS and Refinitiv Eikon, were found to be suitable for this study.

6.11 RESEARCH ETHICS CONSIDERATIONS

The term *ethics* refers to rules of conduct, which indicates what is considered acceptable behaviour. Research ethics should be embedded in the study and this study incorporated a moral and responsible approach from the moment of formulating the research topic, research design, data collection, processing and analysis of the data right up to the discussion of the research findings and the conclusion (Lavrakas, 2008).

This study was purely quantitative in nature. The secondary data used and analysed was at all times kept safe and confidential. The study relied on the analysis of publicly available data acquired from IRESS and Refinitiv Eikon, given that the researcher has a licence for accessing the data. The research in the study did not use interviews or incorporate people's opinions, beliefs, or sensitive personal information. The researcher monitored the use of information without permission from the owner of the information or acknowledgement of the said party.

All legal and ethical issues related to this study agreed with legal and ethical guidelines and were approved by the ethics committee of the Department of Financial Management at the University of Pretoria and ethical clearance was obtained from the Faculty of Economic and Management Sciences to collect the data and conduct the study. Once the data were collected, it would be kept safe without making any alterations to it. The researcher tested and made sure that all results of the study were without error. The study adhered to all ethical standards relating to academic research. Data were also not published in this study in a form that would specifically identify the firm to which it related.

6.12 CONCLUSION

This chapter focused on the research methodology, research design and data and variable construction that underpinned the study. The research methodology adopted considered the research approach, research paradigm, research strategy and research method. It also took into consideration the original population of firms and sample selection thereafter, data sources used, data collection, variable construction, data analysis and lastly, the research design. Also included in the chapter was the validity and reliability of the data collected as well as ethical matters considered.

This study adopted a quantitative research design, deductive research approach, descriptive research type, archival research strategy, mono-method research choice and longitudinal research time horizon. The sample was drawn from the population of firms listed on the JSE in 2021. The period of the study extended from 1 January 2011 to 31 December 2021 (a total of eleven years). The data of this study was purely secondary data, primarily collected from the IRESS Research Domain, IRESS Expert, Refinitiv Eikon databases and from the firms' annual reports. Data variables were collected for the dependent, independent and control variables, which included only financial data for firms included in the sample. Validity and reliability of data were also discussed.

Also included in this chapter was the representation of the research model specifications based on the hypotheses formulated at the end of Chapter 5, as well as the research paradigm, research design, research approach, research type, research strategy, research choice, research time horizon and variables selected. Data analysis included the treatment

of outliers. It also included the discussion of panel data used as well as the techniques applied to test for the assumptions of multiple linear regression models. These assumption tests included the test for autocorrelation, heteroscedasticity, multicollinearity and normal distribution of residuals. Attention was also given to the suitability of the use of the fixed-effects and random effects models. Ultimately, it was concluded that the EGLS method, together with the period SUR weightings and the use of White (diagonal) standard errors and covariance methods, was the best suited estimation method for the study. This method resolved some of the limitations of the panel least squares method.

The following chapters build on the methodological propositions made in this chapter by employing the data presentation and analysis approaches to analyse the quantitative data and finding results. Chapter 7 follows with data analysis and findings of the first set of results, which include the identification of the best suited variable for both growth opportunities and operational efficiency under the financial sustainability dimension.

CHAPTER 7
ANALYSIS AND RESULTS OF IDENTIFYING THE VARIABLES FOR FINANCIAL SUSTAINABILITY

7.1 INTRODUCTION

The preceding chapter highlighted the research methodology and design applied to the study to deal with the research hypotheses. It also set out how the dependent and independent variables were constructed providing detailed formulas of each. A discussion of the data analysis methods followed as well as the multiple linear regression assumptions, the chapter ending with a broad discussion of the validity and reliability of the secondary data used as well as the research ethics. This chapter presents the analysis and results of identifying the strongest predictors of firm performance for growth opportunities and operational efficiency, which represent the financial sustainability performance dimension.

7.2 MODEL SPECIFICATION

As discussed in the literature review in Chapter 3, financial sustainability consists of three elements, namely growth opportunities, operational efficiency and innovation capabilities. Various measures were identified under each of these elements from the literature. The variables set out in the literature review chapter and Section 6.7.2 in the research design and methods chapter are summarised as follows:

a) Growth opportunities: i) Earnings per share; ii) Earnings yield ratio; iii) Dividend yield ratio; and iv) Market-to-book value of equity.
b) Operational efficiency: i) Return on assets; ii) Return on equity; and iii) Sales.
c) Innovation capabilities: i) Research and development

The literature indicates that more than one variable has been used for growth opportunities and operational efficiency. Therefore, extensive statistical testing was done to identify which variable, within the sample context of this study, of each of the two elements was the strongest predictor across the dependent variables, namely firm performance, taking into account the effect of the other defined variables for a specific element. Innovation

capabilities only had one variable identified as the best measure of innovation, and therefore, no testing was done on this element.

The suggested regression models are illustrated below.

7.2.1 Growth opportunities and firm performance

The analyses examined the effect of growth opportunities on firm performance. The basic model used to analyse the effect included four variables of growth opportunities to estimate the differential effect of these variables on firm performance.

The first regression analysis equation is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 EPS_{it} + \beta_2 EY_{it} + \beta_3 DY_{it} + \beta_4 MBVE_{it} + \varepsilon_{it} \ldots\ldots\ldots 7.1$$

where:

FP_{it}	Refers to the five different measures of firm performance
EPS_{it}	Refers to the Earnings Per Share variable
EY_{it}	Refers to the Earnings Yield variable
DY_{it}	Refers to the Dividend Yield variable
$MBVE_{it}$	Refers to the Market-to-Book Value of total Equity variable
ε_{it}	Indicates the error/residual term

7.2.2 Operational efficiency and firm performance

The analyses examined the effect of operational efficiency on firm performance. The basic model used to analyse the effect included three variables of operational efficiency to estimate the differential effect of these variables on firm performance.

The second regression analysis equation is as follows:

$$FP_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 ROE_{it} + \beta_3 SALES_{it} + \varepsilon_{it} \ldots\ldots\ldots 7.2$$

where:

FP_{it}	Refers to the five different measures of firm performance
ROA_{it}	Refers to the Return on Assets variable
ROE_{it}	Refers to the Return on Equity variable
$SALES_{it}$	Refers to the Sales variable
ε_{it}	Indicates the error/residual term

7.3 DESCRIPTIVE STATISTICS

The sample applicable to the analysis of the regression models is presented in Table 7-1. The variables applicable to the analysis of the regression models are presented in Table 7-2, while Tables 7-3 and 7-4 present the descriptive statistics for the dependent and independent variables.

Table 7-1: Financial sustainability sample of firms

	Industry	Original number of firms	Firms excluded	Final number of firms
1	Basic Materials	41	6	35
2	Consumer Discretionary	43	16	27
3	Consumer Staples	24	8	16
4	Energy	14	7	7
5	Health Care	10	1	9
6	Industrials	51	6	45
7	Real Estate	53	28	25
8	Technology	19	5	14
9	Telecommunication	7	1	6
	Total	**262**	**78**	**184**

Table 7-2: Summary of variables used in the model specifications

Variable	***Description***	***Definition/Calculation***
Dependent variables (Firm performance)		
TQ	Tobin's Q	(Market value of equity + Book value of debt) / Replacement cost of assets
TSR	Total shareholder return	(Share Price at end of year – Share Price at beginning of year) + Dividends / Share Price at beginning of year
WACC	Weighted average cost of capital	Weighted market value of firm's equity + Weighted market value of firm's debt after tax
MVA	Market value added	Market value of equity + Market value of debt – Total capital
EVA	Economic value added	Net operating profit after tax – (Invested capital x WACC)
Independent variables (Financial sustainability)		
GROWTH: (i) EPS (ii) EY (iii) DY (iv) MBVE	*Growth opportunities*[16] Earnings per share Earnings yield ratio Dividend yield ratio Market value to book value of equity	 (Net operating profit after tax – Preference dividends) / Weighted average of ordinary shares Earnings per share / Share price at end of year Dividend per share / Share price at end of year Market value of shares / Book value of equity
OPERATE: (i) ROA (ii) ROE (iii) SALES	*Operational efficiency*[17] Return on assets Return on equity Sales revenue	 Net operating profit after tax / Total assets Net operating profit after tax / Total equity Total sales / Revenue

7.3.1 Outliers

The descriptive statistics in Tables 7-3 and 7-4 are reported for the full sample before the data were winsorised and after the data were winsorised respectively. A decision was made to winsorise the data owing to the extent of the skewness and excess kurtosis arising from the occurrence of extreme values. Robust regression analysis was considered; however,

[16] Chapter 7 explores the four variables for growth opportunities through extensive statistical testing to identify the strongest variable as a predictor for firm performance.
[17] Chapter 7 explores the three variables for operational efficiency through extensive statistical testing to identify the strongest variable as a predictor of firm performance.

not used, due to (i) the existence of non-random outliers, and (ii) potential model misspecification, both of which can result in biased estimates (Gassen and Veenman, 2022).

When a researcher intends to winsorise financial data, it must be done with great caution (Adams et al., 2019). Therefore, the percentiles used in the winsorisation process were determined based on the level of winsorisation required to mitigate the effect of outliers. All variables for the full sample were winsorised at the 5th and 95th percentiles. With the application of winsorisation, any value smaller than the 5th percentile value was increased to the 5th percentile value, whereas any value larger than the 95th percentile value was decreased to the 95th percentile value. With winsorisation, no outliers were discarded and the number of firm-year observations remained the same.

Table 7-3, for the full sample, shows that prior to winsorising, the data for the dependent variables, the skewness (kurtosis) values for TQ, TSR, WACC, MVA and EVA were 20.692 (471.636), 12.105 (274.176), 36.506 (1 511.228), 30.091 (1 052.989) and 15.470 (619.90) respectively. These skewness and kurtosis values gave a strong indication that the unwinsorised data for the dependent variables included outliers. After winsorisation was applied to the data for the dependent variables, the skewness (kurtosis) values for TQ, TSR, WACC, MVA and EVA were 1.533 (1.465), 0.489 (-0.269), 0.510 (-0.046), 1.598 (1.818) and -1.730 (3.707) respectively. Similarly, the spread for the independent variables for growth opportunities and operational efficiency showed that the effect of the outliers was mitigated.

7.3.2 Descriptive statistics of winsorised data

Table 7-4 (winsorised descriptive statistics), for the full sample, indicates that the means for the dependent variables TQ, TSR, WACC, MVA and EVA were 1.378, 4.718, 9.308, 1.543 and -264 619.228 respectively. TQ ranged in value from 0.290 to 4.450, TSR ranged in value from -55.550 to 88.600, WACC ranged in value from 3.100 to 17.060, MVA ranged in value from 0.370 to 4.850 and EVA ranged in value from -4 751 952.510 to 2 070 981.910. Note that the minimum values for TSR (-55.550) and EVA (-4 751 952.510) were preceded by negative signs, indicating that firm performance was destructed rather than created. However, the median of TSR confirmed that at least half of the observations were positive and equal to or larger than 0.650. The median of EVA, considering the large positive and

negative values, was relatively close to 0, with a value of -5 342.040. A comparison of the means and medians of TQ, WACC and MVA, namely 1.378 (0.970), 9.308 (8.755) and 1.542 (1.130), indicated a relatively symmetrical distribution of values because the values were fairly close to each other.

Table 7-3: Descriptive statistics for the full sample (unwinsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Observations*
Dependent variables:								
TQ	2.429	0.970	-0.170	370.93	14.715	20.692	471.636	2024
TSR	9.421	0.650	-99.000	1 928.57	72.963	12.105	274.176	2024
WACC	9.792	8.755	-189.041	1 331.577	31.960	36.506	1 511.228	2024
MVA	2.041	1.130	-119.130	560.490	15.085	30.091	1 052.989	2024
EVA	-229 545.660	-5 342.040	-238 357 947.910	533 661 276.890	16 365 330.570	15.470	619.90	2024
Independent variables – Growth opportunities:								
EPS	396.039	80.000	-14 745.000	34 424.317	1 836.906	10.808	172.148	2024
EY	-4.734	6.749	-2 822.916	124.550	110.146	-17.883	384.116	2024
DY	3.988	2.304	-0.287	313.427	12.768	14.050	258.506	2024
MBVE	2.585	1.180	-121.010	769.570	19.245	34.271	1 334.461	2024
Independent variables – Operational efficiency:								
ROA	-6.119	8.890	-5 958.879	1 039.457	190.068	-20.907	560.218	2024
ROE	-6.886	10.278	-11 064.865	1 217.143	331.523	-25.935	765.692	2024
SALES	32 878 262.36	3 323 288.00	0	3 108 262 742.940	185 673 708.310	13.03	182.560	2024

The table sets out the descriptive statistics for the full sample of 184 firms for all variables used in the model to identify the strongest predictors of firm performance for both growth opportunities and operational efficiency. The sample period was from 2011 to 2021 (11 years). TQ, TSR, WACC, MVA and EVA represent the firm performance dependent variables. TQ is the well-known external measure of firm performance called Tobin's Q, presented as a ratio. TSR is the total return that shareholders earned through capital gains and dividends over a specific period, presented as a ratio. WACC is the weighted cost for a firm to borrow money through debt and equity, presented as a %. MVA shows the difference between total firm value and the capital contributed by all investors, presented as a ratio. EVA is the value created in excess of the required return of the firm's shareholders, presented in R'000. EPS, EY, DY and MBVE represent the growth opportunities independent variables, whereas ROA, ROE and SALES represent the operational efficiency independent variables. EPS is the monetary value of earnings per outstanding share of a firm, presented in cents per share. EY is the ratio of ordinary earnings per share to the share price at year-end. DY is the ratio of ordinary dividends per share to the share price at year-end. MBVE is a ratio used to denote how much equity investors are willing to pay for each rand in net assets. ROA is the ratio of operating profit to total assets at year-end. ROE is the ratio of operating profit to total equity at year-end. SALES represents the rand value of total income from revenue for a financial year, presented in R'000. The data were not winsorised.

Table 7-4: Descriptive statistics for the full sample (winsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Observations*
Dependent variables:								
TQ	1.378	0.970	0.290	4.450	1.107	1.533	1.465	2024
TSR	4.718	0.650	-55.550	88.600	37.331	0.489	-0.269	2024
WACC	9.308	8.755	3.100	17.060	3.421	0.510	-0.046	2024
MVA	1.542	1.130	0.370	4.850	1.158	1.598	1.818	2024
EVA	-264 619.228	-5 342.040	-4 751 952.510	2 070 981.910	1 419 580.914	-1.730	3.707	2024
Independent variables – Growth opportunities:								
EPS	274.753	80.000	-330.180	1 687.000	493.899	1.617	1.887	2024
EY	4.092	6.749	-35.230	21.590	12.971	-1.699	2.805	2024
DY	2.857	2.304	0.000	10.490	3.077	0.984	0.094	2024
MBVE	1.862	1.180	0.140	7.300	1.843	1.714	2.247	2024
Independent variables – Operational efficiency:								
ROA	6.867	8.290	-33.320	30.670	14.441	-0.997	1.435	2024
ROE	8.141	10.278	-40.490	41.150	18.676	-0.814	0.931	2024
SALES	16 055 158.548	3 323 288.000	55.800	98 619 250.000	26 762 949.590	2.075	3.216	2024

The table sets out the descriptive statistics for the full sample of 184 firms for all variables used in the model to identify the strongest predictors of firm performance for both growth opportunities and operational efficiency. The sample period was from 2011 to 2021 (11 years). TQ, TSR, WACC, MVA and EVA represent the firm performance dependent variables. TQ is the well-known external measure of firm performance called Tobin's Q, presented as a ratio. TSR is the total return that shareholders earned through capital gains and dividends over a specific period, presented as a ratio. WACC is the weighted cost for a firm to borrow money through debt and equity, presented as a %. MVA shows the difference between total firm value and the capital contributed by all investors, presented as a ratio. EVA is the value created in excess of the required return of the firm's shareholders, presented in R'000. EPS, EY, DY and MBVE represent the growth opportunities independent variables, whereas ROA, ROE and SALES represent the operational efficiency independent variables. EPS is the monetary value of earnings per outstanding share of a firm, presented in cents per share. EY is the ratio of ordinary earnings per share to the share price at year-end. DY is the ratio of ordinary dividends per share to the share price at year-end. MBVE is a ratio used to denote how much equity investors are willing to pay for each rand in net assets. ROA is the ratio of operating profit to total assets at year-end. ROE is the ratio of operating profit to total equity at year-end. SALES represents the rand value of total income from revenue for a financial year, presented in R'000. The data for all variables were winsorised at the 5th and 95th percentile values.

Table 7-4 (winsorised descriptive statistics) indicates that, for the full sample, the means for the independent variables for growth opportunities EPS, EY, DY and MBVE were 274.753, 4.092, 2.857 and 1.862 respectively. EPS ranged in value from -330.180 to 1 687.00, EY ranged in value from -35.230 to 21.590, DY ranged in value from 0.000 to 10.490 and MBVE ranged in value from 0.140 and 7.300. Note that the minimum values for EPS (-330.180) and EY (-35.230) were preceded by negative signs, indicating that negative growth took place, where losses for a firm were higher than profits. The median for EPS and EY confirmed that at least half of the observations were positive and equal to or larger than 80.000 and 6.749 respectively. EY had a minimum value of 0.000, indicating that some firms did not declare any dividends during a financial year. This could be the case where firms did not make any profits, but rather a loss. A comparison of the means and medians of EY, DY and MBVE, namely 4.092 (6.749), 2.857 (2.304) and 1.862 (1.180), indicated a relatively symmetrical distribution of values because the values were fairly close to each other.

Lastly, Table 7-4 (winsorised descriptive statistics), for the full sample, indicates that the means for the independent variables for operational efficiency ROA, ROE and SALES were 6.867, 8.141 and 16 055 158.548 respectively. ROA ranged in value from -33.320 to 30.670, ROE ranged in value from -40.490 to 41.150 and SALES ranged in value from 55.800 to 98 619 250.000. Note that the minimum values for ROA (-33.320) and ROE (-40.490) were preceded by negative signs, indicating that negative operational efficiency took place, where losses for a firm were higher than profits. The median for ROA and ROE confirmed that at least half of the observations were positive and equal to or larger than 8.290 and 10.278 respectively. A comparison of the means and medians of ROA and ROE, namely 6.867 (8.290) and 8.141 (10.278), indicated a relatively symmetrical distribution of values because the values were fairly close to each other.

7.4 IDENTIFICATION OF STRONGEST PREDICTORS

Different methods were introduced to determine and validate the strongest predictor of each of the two elements under financial sustainability using winsorised data. The analyses involved, firstly, statistical significance testing, secondly, part and partial correlation analysis, and thirdly, percentage variance contribution analysis.

In the following sections, the three estimation methods of analyses are explained and results presented.

7.4.1 Method one: Statistical Significance Testing

7.4.1.1 Explanation of Method 1

Multiple linear regression modelling was conducted on panel data using the latest version of the statistical package EViews, v13. The steps followed were:

Step 1: Ordinary least squares testing

The first analysis conducted on the data, were a panel least squares regression, i.e. ordinary least squares (OLS) conducted on the panel data. Several statistics and tests were needed to determine if the assumptions for OLS estimation were met. Firstly, multicollinearity was assessed using the correlation matrix of the independent variables. Potential multicollinearity existed if the correlation coefficient exceeded a value of 0.8. Secondly, one of the key assumptions of OLS was no autocorrelation of the residual term because OLS estimates would be biased and inefficient in the presence of autocorrelation. The Durbin-Watson statistic was used to determine if autocorrelation was present in the model. If the statistic was between 1.5 to 2.5., no serious autocorrelation existed and results of the regression model could be used. If the value was outside this range, autocorrelation had to be resolved. A feasible option was to determine if a fixed- or random effects model applied to the data. This option is discussed in Step 3.

Step 2: Homoscedasticity testing

Another assumption of multiple linear regression, namely that the residuals were homoscedastic, were tested. Homoscedasticity is an assumption of equal or similar variances of the residual term across values of the predictor variables. If the results of the panel cross-section and period heteroskedasticity Laplace likelihood ratio (LR) tests indicated that the null hypothesis was rejected ($p<0.05$), the residuals were assumed to be heteroskedastic. Alternatively, if the null hypothesis was not rejected ($p>0.05$), the residuals were assumed to be homoscedastic.

Step 3: Random or fixed-effects modelling testing

The Hausman test was used to determine if a random or fixed-effects model applied to the data if autocorrelation and/or heteroskedasticity was observed. The null hypothesis would not be rejected if $p>0.05$, then a random effects model applied. If the null hypothesis was rejected ($p<0.05$), then a fixed-effects model applied. Subsequently, a fixed- or random effects model was conducted and the results studied. If autocorrelation remained problematic, the methods in Step 4 would be considered.

Step 4: Period SUR and White (diagonal) testing

Period seemingly unrelated regression (SUR) weightings, which correct for heteroskedasticity and general correlation of observations within a cross-section, were applied where necessary. The SUR specifications are an example of what is sometimes referred to as the Parks estimator. By default, EViews, v13 reports conventional estimates of coefficient standard errors and covariances; therefore, the White (diagonal) estimates were used, which are a robust standard error estimation method, ensuring that the significance values were not influenced by heteroskedasticity.

Step 5: Normal distribution of residuals testing

The skewness and kurtosis values were investigated to determine if they were within the acceptable thresholds, as discussed in Section 6.9.3.

7.4.1.2 Results of Method 1

The regression results of Step 1 (OLS) and Step 2 (homoscedasticity) are presented in Appendix 3. No multicollinearity was observed for both growth opportunities and operational efficiency variables because all correlation coefficient values ranged between 0.005 and 0.716.

The regression results of Step 3 (random or fixed-effects modelling) and Step 4 (Period SUR and White (diagonal)) are presented in Appendix 4. No serious violation for the assumption of autocorrelation was observed for the final regression models for both growth opportunities and operational efficiency variables because all Durbin-Watson statistics ranged between 1.530 and 1.945.

Lastly, the normal residual graph indicated that the assumption of normality was met (skewness and kurtosis were within the acceptable threshold of -2 and 2 for skewness and -7 to +7 for kurtosis). In four of the regression models conducted, the kurtosis values were outside the range. However, according to Schmidt and Finan (2018), a violation of the assumption of normally distributed residuals in regression analysis has no influence on bias and does not impact the regression results substantially in the presence of large sample sizes (where the number of observations per variable is larger than 10). Therefore, all results were considered as valid. The results are indicated in Table 7-5.

Table 7-5: Results of statistically significant relationships for Method 1

1: TQ and Growth Opportunities

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.645588	0.044805	14.40877	0.0000
EPS	0.000132	2.85E-05	4.639889	0.0000***
EY	-0.002012	0.000942	-2.136384	0.0328**
DY	-0.006288	0.003151	-1.995890	0.0461**
MBVE	0.350093	0.023192	15.09536	0.0000***

2: TQ and Operational Efficiency

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.115817	0.068752	16.22970	0.0000
ROA	0.001205	0.002311	0.521422	0.6021
ROE	0.004248	0.001320	3.217482	0.0013***
SALES	3.17E-09	1.71E-09	1.859230	0.0631*

3: TSR and Growth Opportunities

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.862827	1.453670	1.969379	0.0491
EPS	0.005576	0.001820	3.063160	0.0022***
EY	0.816486	0.070505	11.58057	0.0000***
DY	-2.642454	0.286804	-9.213443	0.0000***
MBVE	1.669575	0.472920	3.530354	0.0004***

4: TSR and Operational Efficiency

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.450282	1.048465	-0.429468	0.6676
ROA	0.703250	0.060686	11.58838	0.0000***
ROE	0.003317	0.002486	1.334299	0.1823
SALES	-4.86E-09	3.10E-08	-0.156866	0.8754

5: WACC and Growth Opportunities

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	9.250768	0.181851	50.87011	0.0000
EPS	0.000259	0.000191	1.360073	0.1740
EY	-0.008933	0.007967	-1.121223	0.2623
DY	-0.075707	0.024042	-3.148905	0.0017***
MBVE	-0.050454	0.068252	-0.739220	0.4599

6: WACC and Operational Efficiency

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.16638	0.207100	49.08929	0.0000
ROA	0.037700	0.009443	3.992537	0.0001***
ROE	-0.017534	0.006407	-2.736654	0.0063***
SALES	-6.06E-08	1.18E-08	-5.119453	0.0000***

7: MVA and Growth Opportunities

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.512233	0.032679	15.67487	0.0000
EPS	0.000137	2.59E-05	5.283037	0.0000***
EY	-0.001909	0.000988	-1.932773	0.0534*
DY	-0.000248	0.002393	-0.103472	0.9176
MBVE	0.527651	0.017483	30.18141	0.0000***

8: MVA and Operational Efficiency

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.213038	0.056750	21.37509	0.0000
ROA	0.004274	0.002919	1.464481	0.1432
ROE	0.004434	0.002271	1.951890	0.0511*
SALES	7.04E-09	1.75E-09	4.015235	0.0001***

9: EVA and Growth Opportunities

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1015444.	60111.93	-16.89255	0.0000
EPS	2187.760	79.87518	27.38973	0.0000***
EY	12443.58	2415.653	5.151230	0.0000***
DY	-28983.92	10251.65	-2.827244	0.0048***
MBVE	79359.11	21923.47	3.619824	0.0003***

10: EVA and Operational Efficiency

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-412954.8	48305.09	-8.548889	0.0000
ROA	18211.64	2965.037	6.142131	0.0000***
ROE	21478.12	2250.755	9.542629	0.0000***
SALES	-0.004712	0.002756	-1.709545	0.0875*

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

Based on the results, the statistically significant relationships are summarised in Table 7-6.

Table 7-6: Summary of results of statistically significant relationships for Method 1

	Equation	Lowest probability (significance)[18]	
1	TQ and Growth Opportunities	EPS	0.0000
		MBVE	0.0000
2	TQ and Operational Efficiency	ROE	0.0013
3	TSR and Growth Opportunities	EY	0.0000
		DY	0.0000
4	TSR and Operational Efficiency	ROA	0.0000
5	WACC and Growth Opportunities	DY	0.0017
6	WACC and Operational Efficiency	SALES	0.0000
7	MVA and Growth Opportunities	EPS	0.0000
		MBVE	0.0000
8	MVA and Operational Efficiency	SALES	0.0001
9	EVA and Growth Opportunities	EPS	0.0000
		EY	0.0000
10	EVA and Operational Efficiency	ROA	0.0000
		ROE	0.0000

For panel regressions, scaled (standardised) coefficients were not computed and statistical significance was considered. Table 7-6 indicates the following for growth opportunities: for the growth opportunities independent variables, in three cases, the earnings per share variable displayed the highest levels[19] of statistical significance, whereas the market-to-book value of equity, earnings yield and dividend yield variables, each did so in two cases. For operational efficiency independent variables, the return on assets and return on equity variables displayed the highest levels of statistical significance in two cases each, and the sales variable, in one case.

However, because estimation accuracy and sample size influence statistical significance, and do not necessarily indicate practical significance, i.e. to identify the strongest predictor, two additional methods were considered.

[18] The values of the probabilities were not exactly 0.0000, but rather a very small value rounded to four decimals. This was true for all the probabilities in this research with a value of 0.0000.
[19] The highest level of statistical significance refers to the 1% statistically significant level, with lower statistical significance at 5%, and the lowest statistical significance at 10%. This is true throughout the thesis.

7.4.2 Method 2: Part and Partial Correlation Analysis

7.4.2.1 Explanation of Method 2

The part and partial correlation analysis was conducted using the statistical package for social sciences IBM SPSS, v28. Partial correlation controls for the effect of the other independent variables in the regression on the dependent variable (outcome). Part correlation controls for the effects of the independent variables on the dependent variable (outcome) and among the independent variables themselves; therefore, part correlation represents the pure unique effect of the independent variable on the outcome (Zhang et al., 2021).

7.4.2.2 Results of Method 2

The detailed results are shown in Table 7-7.

Table 7-7: Results of part and partial correlations for Method 2

	Correlations	
1: TQ and Growth Opportunities	Partial	Part
Variable		
EPS	.077	.052
EY	-.149	-.102
DY	-.021	-.014
MBVE	.709	.676

	Correlations	
2: TQ and Operational Efficiency	Partial	Part
Variable		
ROA	-.004	-.004
ROE	.214	.209
SALES	.048	.046

	Correlations	
3: TSR and Growth Opportunities	Partial	Part
Variable		
EPS	.074	.070
EY	.269	.263
DY	-.217	-.209
MBVE	.085	.080

	Correlations	
4: TSR and Operational Efficiency	Partial	Part
Variable		
ROA	.104	.100
ROE	.100	.096
SALES	-.016	-.015

	Correlations	
5: WACC and Growth Opportunities	Partial	Part
Variable		
EPS	.028	.028
EY	-.023	-.0.23
DY	-.118	-.117
MBVE	-.018	-.018

	Correlations	
6: WACC and Operational Efficiency	Partial	Part
Variable		
ROA	.059	.059
ROE	-.099	-.099
SALES	-.045	-.045

	Correlations	
7: MVA and Growth Opportunities	Partial	Part
Variable		
EPS	.143	.059
EY	-.066	-.027
DY	.013	.005
MBVE	.899	.840

	Correlations	
8: MVA and Operational Efficiency	Partial	Part
Variable		
ROA	.105	.093
ROE	.227	.206
SALES	.191	.172

	Correlations	
9: EVA and Growth Opportunities	Partial	Part
Variable		
EPS	.250	.232
EY	.147	.134
DY	.023	.020
MBVE	.224	.206

	Correlations	
10: EVA and Operational Efficiency	Partial	Part
Variable		
ROA	.101	.088
ROE	.308	.280
SALES	-.194	-.171

Based on the results of estimation Method 2, the statistically significant relationships are summarised in

Table 7-8.

Table 7-8: Summary of results of part and partial correlations for Method 2

	Equation	Highest correlation coefficient value		
		Variable	Partial	Part
1	TQ and Growth Opportunities	MBVE	.709	.676
2	TQ and Operational Efficiency	ROE	.214	.209
3	TSR and Growth Opportunities	EY	.269	.263
4	TSR and Operational Efficiency	ROA	.104	.100
5	WACC and Growth Opportunities	DY	-.118	-.117
6	WACC and Operational Efficiency	ROE	-.099	-.099
7	MVA and Growth Opportunities	MBVE	.899	.840
8	MVA and Operational Efficiency	ROE	.227	.206
9	EVA and Growth Opportunities	EPS	.250	.232
10	EVA and Operational Efficiency	ROE	.308	.280

Table 7-8 indicates the following for growth opportunities: the independent variable *market-to-book value* displayed the highest part correlation in two cases, earnings per share variable, earnings yield variable and dividend yield variable only displayed the highest part correlation in one case each; therefore, the *market-to-book value* variable could be considered as having the largest unique effect across the five equations for growth opportunities.

Table 7-8 indicates the following for operational efficiency: the independent variable *return on equity* displayed the highest part correlation in four cases and return on assets variable displayed the highest part correlation in one case; therefore, the *return on equity* variable could be considered as having the largest unique effect across the five equations for operational efficiency.

7.4.3 Method 3: Percentage Variance Contribution analysis

7.4.3.1 Explanation of Method 3

As standardised beta coefficients could not be computed for panel data, the researcher used variance contribution analysis to determine the relative strength of each independent variable for each of the regression models (Statistics How To, 2023).

The variance contribution analysis was conducted using the latest version of the statistical package EViews, v13. Percentage variance contribution analysis was used to calculate the R-squared change in percentage for each of the ten equations. The R-squared is a statistical measure that represents the proportion of the *variance* for a dependent variable, which is explained by an independent variable. In this case, the linear relationship between the independent variables (either growth opportunities or operational efficiency) and five dependent variables (firm performance) was tested. The R-squared change was equal to the squared part correlation.

7.4.3.2 Results of Method 3

The detailed results are shown in Table 7-9.

Table 7-9: Results of adjusted R-squared differences for Method 3

	Equation	Variable excluded	Adjusted R-Squared	Adjusted R-Squared Difference
1	TQ and Growth Opportunities	Original (with all)	0.443303	
		Without EPS	0.442121	0.001182
		Without EY	0.443489	-0.000186
		Without DY	0.431798	0.011505
		Without MBVE	0.038598	0.404710 (40.47%)
2	TQ and Operational Efficiency	Original (with all)	0.032158	
		Without ROA	0.031474	0.000684
		Without ROE	0.024602	0.007556 (0.75%)
		Without SALES	0.029337	0.002821
3	TSR and Growth Opportunities	Original (with all)	0.115318	
		Without EPS	0.110483	0.004835
		Without EY	0.045309	0.070009 (7.00%)
		Without DY	0.069971	0.045347
		Without MBVE	0.108080	0.007238
4	TSR and Operational Efficiency	Original (with all)	0.071506	
		Without ROA	0.005041	0.066465 (6.65%)
		Without ROE	0.070625	0.000881
		Without SALES	0.079644	-0.008138
5		Original (with all)	0.007322	

	WACC and Growth Opportunities	Without EPS	0.006152	0.00117
		Without EY	0.004729	0.002593
		Without DY	0.003916	0.003406 (0.34%)
		Without MBVE	0.006238	0.001084
6	WACC and Operational Efficiency	Original (with all)	0.285635	
		Without ROA	0.279128	0.006507
		Without ROE	0.282578	0.003057
		Without SALES	0.274936	0.010699 (1.07%)
7	MVA and Growth Opportunities	Original (with all)	0.771425	
		Without EPS	0.770461	0.000964
		Without EY	0.762675	0.008750
		Without DY	0.763179	0.008246
		Without MBVE	0.047659	0.723770 (72.38%)
8	MVA and Operational Efficiency	Original (with all)	0.053706	
		Without ROA	0.053786	-0.00008
		Without ROE	0.043189	0.010517 (1.05%)
		Without SALES	0.043484	0.010222
9	EVA and Growth Opportunities	Original (with all)	0.648082	
		Without EPS	0.478519	0.169560 (16.96%)
		Without EY	0.640270	0.007812
		Without DY	0.631506	0.016576
		Without MBVE	0.647770	0.000312
10	EVA and Operational Efficiency	Original (with all)	0.222463	
		Without ROA	0.204260	0.018203
		Without ROE	0.162856	0.059607 (5.96%)
		Without SALES	0.221297	0.001166

Based on the results of Method 3, the highest adjusted R-squared differences are summarised in Table 7-10.

Table 7-10: Summary of results of R-squared variances for Method 3

	Equation	Variable	Highest Adjusted R-Squared Difference
1	TQ and Growth Opportunities	MBVE	0.404710 (40.47%)
2	TQ and Operational Efficiency	ROE	0.007556 (0.75%)
3	TSR and Growth Opportunities	EY	0.070009 (7.00%)
4	TSR and Operational Efficiency	ROA	0.066465 (6.65%)
5	WACC and Growth Opportunities	DY	0.003406 (0.34%)
6	WACC and Operational Efficiency	SALES	0.010699 (1.07%)
7	MVA and Growth Opportunities	MBVE	0.723770 (72.38%)
8	MVA and Operational Efficiency	ROE	0.010517 (1.05%)
9	EVA and Growth Opportunities	EPS	0.169560 (16.96%)
10	EVA and Operational Efficiency	ROE	0.059607 (5.96%)

Table 7-10 indicates the following for growth opportunities: for the growth opportunities independent variable, the market-to-book value variable displayed the highest adjusted R-squared difference (R^2 change) in two cases, earnings per share variable, earnings yield variable and dividend yield variable only displayed the highest adjusted R-squared difference in one case each; therefore, market-to-book value variable again could be considered the strongest predictor across the five equations for growth opportunities.

Table 7-10 indicates the following for operational efficiency: for the operational efficiency independent variable, the return on equity variable displayed the highest adjusted R-squared difference in three cases, return on assets variable and the sales variable displayed the highest adjusted R-squared difference in one case each; therefore, return on equity variable again could be considered the strongest predictor across the five equations for operational efficiency.

Therefore, it was expected that the results of Estimation Method 3 aligned and validated the results of Estimation Method 2. The results were the same in nine out of ten cases. The only difference was for equation six where the SALES variable was the strongest predictor of firm performance (WACC), and not the ROE variable in Estimation Method 2.

7.5 CONCLUSION

This chapter reported the investigations and findings of the strongest predictors of growth opportunities and operational efficiency, namely the financial sustainability dimension of firm performance. The descriptive statistics were reviewed to gain an understanding of the data and their distribution. This was done by investigating the assumptions of regression models such as the absence of autocorrelation, heteroscedasticity, and the normal distribution of the data. Three estimation methods were used to identify the strongest predictor of firm performance, namely statistical significance testing, part and partial correlation analysis and percentage variance contribution analysis. Due to the shortcomings of statistical significance testing in this regard, the results and summaries of Estimation Methods 2 and 3 were considered and these gave similar results, indicating that for growth opportunities, market-to-book value of equity was the strongest predictor of firm performance and for operational efficiency, return on equity was the strongest predictor of firm performance.

The next chapter presents the investigations and findings of the main regression models of the study (see Section 6.9.1), making use of the *market-to-book value of equity* variable for growth opportunities and *return on equity* variable for operational efficiency.

CHAPTER 8

ANALYSIS OF THE RELATIONSHIPS BETWEEN FINANCIAL AND NON-FINANCIAL SUSTAINABILITY PERFORMANCE AND FIRM PERFORMANCE

8.1 INTRODUCTION

This chapter presents the results of the testing of the relationships of financial and non-financial sustainability performance with firm performance. It starts with the descriptive statistics, then presents the evaluation of the correlations between variables, the testing of assumptions that could be pretested, setting out the suitable estimation method to empirically test the hypotheses, and lastly, the results and findings. The results and findings are split into three separate discussions. Section 8.5 presents the regression results of Models 1a, 1b, 2a, 2b, 3a and 3b and the percentage variance contribution for Models 1a, 2a, 3a and 3b. Lastly, in Section 8.6, the regression results of the interaction terms are presented for Model 4 and Models 5a to 5i.

8.2 MODEL SPECIFICATION

Regression modelling was conducted on the data for each of the five dependent variables (TQ, TSR, WACC, MVA and EVA) to test Hypotheses H_1 to H_4 as set out in Sections 5.5.1 to 5.5.4, which propose relationships of financial and non-financial sustainability performance with firm performance. The main hypotheses are provided below for quick reference:

H_1: *Financial sustainability leads to enhanced firm performance.*

H_2: *Non-financial sustainability shows a relationship with firm performance.*

H_3: *Financial sustainability and non-financial sustainability show a relationship with firm performance.*

H_4: *The interaction effect of financial and non-financial sustainability elements shows a relationship with firm performance.*

Based on the four hypotheses, the suggested regression models are summarised below. A more detailed discussion is set out in Section 6.9.1.

8.2.1 Effect of financial sustainability performance measures on firm performance

The first regression analysis equation is as follows for firm *i* at period *t*:

Model 1a

$$FP_{it} = \beta_0 + \beta_1 MBVE_{it} + \beta_2 ROE_{it} + \beta_3 R\&D_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \quad \text{.....8.1}$$

Model 1b

$$FP_{it} = \beta_1 FINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it} \quad \text{.....8.2}$$

8.2.2 Effect of non-financial sustainability performance measures on firm performance

The second regression analysis equation is as follows for firm *i* at period *t*:

Model 2a

$$FP_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \quad \text{.....8.3}$$

Model 2b

$$FP_{it} = \beta_1 NONFINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it} \quad \text{.....8.4}$$

8.2.3 Effect of financial and non-financial sustainability performance measures on firm performance

The third regression analysis equation is as follows for firm *i* at period *t*:

Model 3a

$$FP_{it} = \beta_0 + \beta_1 MBVE_{it} + \beta_2 ROE_{it} + \beta_3 R\&D_{it} + \beta_4 ENV_{it} + \beta_5 SOC_{it} + \beta_6 GOV_{it} + \beta_{7-x} Control\ variables_{it} + \varepsilon_{it} \quad \text{.....8.5}$$

Model 3b

$$FP_{it} = \beta_0 + \beta_1 FINANCE_{it} + \beta_2 NONFINANCE_{it} + \beta_{3-x} Control\ variables_{it} + \varepsilon_{it} \text{.....8.6}$$

8.2.4 Effect of introducing an interaction term between overall financial and non-financial sustainability performance measures on firm performance

The fourth regression analysis equation is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZFINANCE_{it} + \beta_2 ZNONFINANCE_{it} + \beta_3 INTZFINANCEZNONFINANCE_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \text{.....8.7}$$

8.2.5 Effect of introducing interaction terms between individual financial and non-financial sustainability performance measures on firm performance

The fifth set of regression analyses equations is as follows for firm *i* at period *t*:

Model 5a: Interaction between ZMBVE and ZENV

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZMBVEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \text{.....8.8}$$

Model 5b: Interaction between ZMBVE and ZSOC

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 SZOC_{it} + \beta_3 INTZMBVEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \text{.....8.9}$$

Model 5c: Interaction between ZMBVE and ZGOV

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZMBVEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \text{.....8.10}$$

Model 5d: Interaction between ZROE and ZENV

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZROEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \ldots\ldots\ldots 8.11$$

Model 5e: Interaction between ZROE and ZSOC

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZROEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \ldots\ldots\ldots 8.12$$

Model 5f: Interaction between ZROE and ZGOV

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZROEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \ldots\ldots\ldots 8.13$$

Model 5g: Interaction between ZR&D and ZENV

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZENV_{it} + \beta_3 INTZR\&DZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \ldots\ldots\ldots 8.14$$

Model 5h: Interaction between ZR&D and ZSOC

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZR\&DZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \ldots\ldots\ldots 8.15$$

Model 5i: Interaction between ZR&D and ZGOV

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZR\&DZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it} \ldots\ldots\ldots 8.16$$

8.3 DESCRIPTIVE STATISTICS

Table 8-1 presents the variables applicable to the main analyses of the relationships between financial and non-financial sustainability performance with firm performance, taking into account the results reported in Chapter 7, where the strongest predictor of firm performance was market-to-book value of equity for growth opportunities and the strongest predictor of firm performance was return on equity for operational efficiency. Tables 8-2 to 8-4 present the descriptive statistics for the dependent variables for unwinsorised, winsorised and winsorised with missing values replaced data. Tables 8-5 to 8-7 present the descriptive statistics for the independent variables for unwinsorised, winsorised and winsorised with missing values replaced data. Tables 8-8 to 8-9 present the descriptive statistics for the control variables for unwinsorised and winsorised data. There were no missing values for the control variables and therefore, missing values did not have to be replaced.

Table 8-1: Summary of variables used in the model specifications

Variable	***Description***	***Definition/Calculation***
Dependent variables (Firm performance)		
TQ	Tobin's Q	(Market value of equity + Book value of debt) / Replacement cost of assets
TSR	Total shareholder return	(Share price at end of year – Share price at beginning of year) + Dividends / Share price at beginning of year
WACC	Weighted average cost of capital	Weighted market value of firm's equity + Weighted market value of firm's debt after tax
MVA	Market value added	Market value of equity + Market value of debt – Total capital
EVA	Economic value added	Net operating profit after tax – (Invested capital x WACC)
Independent variables (Financial sustainability)		
GROWTH: MBVE	*Growth opportunities*[20] Market value to book value of equity	Market value of shares / Book value of equity
OPERATE:	*Operational efficiency*[21]	

[20] See Chapter 6 for an exploration of the four variables for growth opportunities through extensive statistical testing to identify the strongest variable as a predictor of firm performance.
[21] See Chapter 6 for an exploration of the three variables for operational efficiency through extensive statistical testing to identify the strongest variable as a predictor of firm performance.

ROE	Return on equity	Net operating profit after tax / Total equity
INNOVATE: R&D	Research and development	Research and development expense + Research and development additions capitalised under IAS38
FINANCE	Combined FINANCE	A summated index measure of *GROWTH*, *OPERATE* and *INNOVATE* combined
Independent variables (Non-financial sustainability)		
ENV	Environmental score	Environmental Pillar Score derived from Refinitiv Eikon database
SOC	Social score	Social Pillar Score derived from Refinitiv Eikon database
GOV	Governance score	Governance Pillar Score derived from Refinitiv Eikon database
NONFINANCE	ESG combined score	Combination of ESG pillar scores and the ESG controversies Score
Control variables		
FSIZE	Firm size (Market capitalisation)	Number of ordinary shares x Share price at end of year
FLEV	Financial leverage	Total debt / Total assets
FAGE	Firm age	Difference between the reporting date and the first date the firm was listed on the JSE
INDUS	Industry	Dummy categoric variable taking the value of one if the firm belongs to the industry and a value of zero if the firm falls outside the industry

8.3.1 Outliers

The descriptive statistics presented in Tables 8-2 to 8-9 are reported for the full sample of 100 firms, before the data were winsorised, after the data were winsorised and after missing values were replaced (Hair et al., 2013), for each of the variable groups, namely dependent variables, independent variables and control variables. A decision was made to winsorise the data owing to the extent of the skewness and kurtosis arising from the occurrence of extreme values. Robust regression analysis, which allows for the inclusion of outlier values if influential or necessary, was considered; however, but not used due to (i) the existence of non-random outliers, and (ii) potential model misspecification, which both can result in biased estimates (Gassen and Veenman, 2022).

When a researcher intends to winsorise financial data, it must be done with great caution (Adams et al., 2019). Therefore, the percentiles used in the winsorisation process were determined based on the level of winsorisation required to mitigate the effect of outliers. All variables for the full sample were winsorised at the 5th and 95th percentiles. With the application of winsorisation, any value smaller than the 5th percentile value was increased to the 5th percentile value, whereas any value larger than the 95th percentile value was decreased to the 95th percentile value. With winsorisation, no outliers were discarded and the number of firm-year observations remained the same. All variables were winsorised as winsorising only the independent variables biased coefficients away from zero, increasing the probability of a Type-I error.

The data in Table 8-2 for the five dependent variables, for the full sample, shows that prior to winsorising, the skewness (kurtosis) values for TQ, TSR, WACC, MVA and EVA were 2.722 (11.154), 15.341 (355.438), -0.305 (124.407), 4.070 (33.104) and 10.017 (296.413) respectively. These skewness and kurtosis values give a strong indication that the unwinsorised data for the dependent variables included outliers. In Table 8-3, after winsorisation was applied to the data and in Table 8-4, after all missing values were replaced for the dependent variables, the skewness (kurtosis) values for TQ, TSR, WACC, MVA and EVA were 1.416 (1.161), 0.393 (-0.416), 0.537 (-0.403), 1.505 (1.371) and -1.283 (3.004) respectively.

The data in Table 8-5 for the three independent variables for the financial sustainability dimension, for the full sample, shows that prior to winsorising, the skewness (kurtosis) values for MBVE, ROE and R&D were 24.607 (712.276), -4.230 (58.804) and 27.987 (851.714) respectively. These skewness and kurtosis values was a strong indication that the unwinsorised data for these three independent variables included outliers. In Table 8-6, after winsorisation for these three independent variables was applied to the data and in Table 8-7, after all missing values were replaced for the all independent variables (except for FINANCE, which had no missing values), the skewness (kurtosis) values for MBVE, ROE, R&D, FINANCE, ENV, SOC, GOV and NONFINANCE were 1.510 (1.333), -0.405 (0.473), 2.650 (6.078), 0.824 (0.601), 0.056 (-1.002), -0.191 (-0.598), -0.083 (-0.993) and -0.006 (-0.305) respectively.

Please note that the descriptive statistics in Chapter 8 differs from the descriptive statistics in Chapter 7 as a large number of the 184 companies on which the descriptive statistics was based on in Chapter 7, do not have/reported on non-financial sustainability measures. Therefore, the descriptive statistics reported on in Chapter 8 consist of only 100 firms.

Table 8-2: Descriptive statistics for dependent variables (unwinsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Dependent variables:									
TQ	1.494	1.035	-0.170	11.960	1.414	2.722	11.154	1044	56
TSR	9.347	0.970	-98.160	1 928.570	77.896	15.341	355.438	1067	33
WACC	9.241	8.768	-102.954	137.035	7.948	-0.305	124.407	1072	28
MVA	1.911	1.280	-0.350	27.260	1.937	4.070	33.104	1044	56
EVA	-795 877.38	36 943.50	-238 357 947.90	533 661 276.89	22 862 278.46	10.017	296.413	1072	28

The table sets out the descriptive statistics for the sample of 100 firms for all dependent variables used in the model. The data were *not winsorised*. The sample period was from 2011 to 2021 (11 years). TQ, TSR, WACC, MVA and EVA represent the firm performance dependent variables. TQ is the well-known external measure of firm performance called Tobin's Q, presented as a ratio. TSR is the total return that shareholders earned through capital gains and dividends over a specific period, presented as a ratio. WACC is the weighted cost for a firm to borrow money through debt and equity, presented as a %. MVA shows the difference between total firm value and the capital contributed by all investors, presented as a ratio. EVA is the value created in excess of the required return of the firm's shareholders, presented in R'000.

Table 8-3: Descriptive statistics for dependent variables (winsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Dependent variables:									
TQ	1.423	1.035	0.240	4.370	1.099	1.394	1.079	1044	56
TSR	4.907	0.970	-52.350	79.470	34.436	0.365	-0.429	1067	33
WACC	9.295	8.768	4.320	15.850	3.062	0.525	-0.411	1072	28
MVA	1.799	1.280	0.380	5.510	1.373	1.487	1.299	1044	56
EVA	-607 418.68	36 943.50	-11 755 727.90	6 515 953.17	3 568 576.78	-1.345	3.429	1072	28

The table sets out the descriptive statistics for the sample of 100 firms for all dependent variables used in the model. The data were *winsorised*.

Table 8-4: Descriptive statistics for dependent variables (winsorised data with missing values replaced)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Dependent variables:									
TQ	1.419	1.030	0.240	4.370	1.087	1.416	1.161	1100	0
TSR	4.006	0.105	-52.350	79.470	34.443	0.393	-0.416	1100	0
WACC	9.255	8.732	4.320	15.850	3.060	0.537	-0.403	1100	0
MVA	1.793	1.280	0.380	5.510	1.359	1.505	1.371	1100	0
EVA	-683 707.72	22 952.26	-11 755 727.17	6 515 953.17	3 629 359.31	-1.283	3.004	1100	0

The table sets out the descriptive statistics for the sample of 100 firms for all dependent variables used in the model. The data were *winsorised and the missing values replaced.*

Table 8-5: Descriptive statistics for independent variables (unwinsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Independent variables:									
MBVE	2.772	1.430	-6.920	239.990	8.093	24.607	712.276	1041	59
ROE	8.280	11.869	-483.654	441.516	43.751	-4.230	58.804	1074	26
R&D	866 542.753	24 555.300	0.000	295 993 237.000	9 552 187.506	27.987	851.714	1078	22
FINANCE	0.000	-0.160	-1.460	2.570	0.765	0.824	0.601	1100	0
ENV	45.187	46.180	0.000	95.710	24.735	0.037	-1.025	1056	44
SOC	52.559	53.500	1.210	94.550	20.801	-0.205	-0.606	1055	45
GOV	54.353	54.870	2.690	98.340	22.161	-0.107	-1.011	1056	44
NONFINANCE	48.831	48.245	1.360	91.390	17.400	-0.004	-0.362	1048	52

The table sets out the descriptive statistics for the sample of 100 firms for all independent variables for both financial and non-financial sustainability used in the model. The data were *not winsorised*. The sample period was from 2011 to 2021 (11 years). MBVE represents the growth opportunities independent variable, ROE represents the operational efficiency independent variable and R&D represents the innovation capabilities independent variable. MBVE is a ratio used to denote how much equity investors are willing to pay for each rand in net assets. ROE is the ratio of operating profit to total equity at year-end. R&D represents the rand value of research and development expenses and additions for a financial year, presented in R'000. FINANCE represents a summated index measure of MBVE, ROE and R&D combined. ENV, SOC and GOV represent the non-financial sustainability scores, presented as a numerical value between 0 and 100. NONFINANCE represents a combined score for ENV, SOC and GOV, presented as a numerical value between 0 and 100.

Table 8-6: Descriptive statistics for independent variables (winsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Independent variables:									
MBVE	2.360	1.430	0.140	8.67	2.316	1.525	1.393	1041	59
ROE	10.836	11.869	-32.050	44.480	17.496	-0.429	0.507	1074	26
R&D	229 027.219	24 555.300	0.000	1 921 412.050	477 498.962	2.662	6.136	1078	22

The table sets out the descriptive statistics for the sample of 100 firms for MBVE, ROE and R&D independent variables. The data were *winsorised*. The data for the other independent variables were not winsorised due to it falling between the acceptable thresholds of skewness and kurtosis (see discussion) before winsorisation.

Table 8-7: Descriptive statistics for independent variables (winsorised data with missing values replaced)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Independent variables:									
MBVE	2.362	1.430	0.140	8.670	2.312	1.510	1.333	1100	0
ROE	10.599	11.751	-32.050	44.480	17.444	-0.405	0.473	1100	0
R&D	228 859.086	23 464.500	0.000	1 921 412.050	477 082.443	2.650	6.078	1100	0
FINANCE	0.000	-0.160	-1.460	2.570	0.765	0.824	0.601	1100	0
ENV	44.824	45.475	0.000	95.710	24.590	0.056	-1.002	1100	0
SOC	52.344	53.105	1.210	94.550	20.696	-0.191	-0.598	1100	0
GOV	54.090	54.100	2.690	98.340	21.982	-0.083	-0.993	1100	0
NONFINANCE	48.728	48.245	1.360	91.390	17.138	-0.006	-0.305	1100	0

The table sets out the descriptive statistics for the sample of 100 firms for all independent variables for both financial and non-financial sustainability used in the model. The data were *winsorised and the missing values replaced.*

Table 8-8: Descriptive statistics for control variables (unwinsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Control variables:									
FSIZE	73 434 944 274.74	11 499 573 576.00	0.000	2 466 698 240 439.00	236 573 564 981.78	5.994	40.814	1100	0
FLEV	0.501	0.478	0.000	2.670	0.330	2.056	9.841	1100	0
FAGE	21.263	21.500	0.000	51.000	12.1268	0.307	-0.518	1100	0

The table sets out the descriptive statistics for the sample of 100 firms for three of the four control variables used in the model. Firm industry control variable was included in the models as a dummy categoric variable. The data were *not winsorised*. The sample period was from 2011 to 2021 (11 years). FSIZE, FLEV and FAGE represent the control variables. FSIZE is the well-known control variable used to measure firm size, presented in R'000. FLEV is total debt to total assets, presented as a ratio. FAGE is the difference between the reporting date and the first date the firm was listed on the JSE, presented as a numerical value, namely a total number of years.

Table 8-9: Descriptive statistics for control variables (winsorised data)

Variables	*Mean*	*Median*	*Minimum*	*Maximum*	*St. dev.*	*Skewness*	*Kurtosis*	*Valid Observations*	*Missing*
Control variables:									
FSIZE	41 510 540 025.3	11 499 573 576.0	658 390 083.9	2 804 478 600 814.3	70 629 235 221.6	2.485	5.257	1100	0
FLEV	0.480	0.480	0.010	0.950	0.253	0.029	-0.768	1100	0

The table sets out the descriptive statistics for the sample of 100 firms for two of the four control variables used in the model. Firm industry control variable is included in the models as a dummy categoric variable. FAGE was not winsorised due to it falling between the acceptable thresholds of skewness and kurtosis (see discussion) before winsorisation. The data were *winsorised*. Also note that there were no missing values that needed to be replaced.

The data in Table 8-8 for the three control variables, for the full sample, shows that prior to winsorising, the skewness (kurtosis) values for FSIZE, FLEV and FAGE were 5.994 (40.814), 2.056 (9.841) and 0.267 (-0.477) respectively. The skewness and kurtosis values for both FSIZE and FLEV strongly indicated that the unwinsorised data for these two independent variables included outliers. Table 8-9 indicates that after winsorisation for these two control variables was applied to the data, the skewness (kurtosis) values for FSIZE and FLEV were 2.485 (5.257) and 0.029 (-0.768) respectively.

8.3.2 Discussion of descriptive statistics results

Table 8-4 (winsorised and missing values replaced descriptive statistics), for the full sample, indicates that the means for the dependent variables TQ, TSR, WACC, MVA and EVA were 1.419, 4.066, 9.255, 1.793 and -683 707.72 respectively. TQ ranged in value from 0.240 to 4.370, TSR ranged in value from -52.350 to 79.470, WACC ranged in value from 4.320 to 15.850, MVA ranged in value from 0.380 to 5.510 and EVA ranged in value from -11 755 727.17 to 6 515 953.17. The minimum values for TSR (-52.350) and EVA (-11 755 727.17) were preceded by negative signs, indicating that firm performance was destructed rather than created. However, the median of TSR and EVA confirmed that at least half of the observations were positive and equal to or larger than 0.105 and 22.952.26 respectively. A comparison of the means and medians of TQ, WACC and MVA, namely 1.419 (1.030), 9.255 (8.732) and 1.793 (1.280), indicated a relatively symmetrical distribution of values because the values were fairly close to each other.

Also, Table 8-7 (winsorised and missing values replaced descriptive statistics), for the full sample, indicates that the means for the independent variables MBVE, ROE, R&D, FINANCE, ENV, SOC, GOV and NONFINANCE were 2.362, 10.599, 228 859.086, 0.000, 44.824, 52.344, 54.090 and 48.728 respectively. MBVE ranged in value from 0.140 to 8.670, ROE ranged in value from -32.050 to 44.480, R&D ranged in value from 0.000 to 1 921 412.050, FINANCE ranged in value from -1.460 to 2.570, ENV ranged in value from 0.000 to 95.710, SOC ranged in value from 1.210 to 94.550, GOV ranged in value from 2.690 to 98.340 and NONFINANCE ranged in value from 1.360 to 91.390. The minimum value for ROE (-32.050) was preceded by a negative sign, indicating negative financial sustainability in the sense of operational efficiency. However, the median of ROE confirmed

that at least half of the observations were positive and equal to or larger than 11.751 indicating positive financial sustainability. A comparison of the means and medians of ROE, FINANCE, ENV, SOC, GOV and NONFINANCE 10.599 (11.751), 0.000 (-0.160), 44.824 (45.475), 52.344 (53.105), 54.090 (54.100) and 48.728 (48.245) indicated a relatively symmetrical distribution of values because the values were fairly close to each other.

Also, Tables 8-8 and 8-9 (winsorised and missing values replaced descriptive statistics), for the full sample, indicate that the means for the control variables FSIZE, FLEV and FAGE were 41 510 540 025.3, 0.480 and 21.210 respectively. FSIZE ranged in value from 658 390 083.9 to 2 804 478 600 814.3, FLEV ranged in value from 0.010 to 0.950 and FAGE ranged in value from -5.000 to 51.000. A comparison of the means and medians of FLEV and FAGE, being 0.480 (0.480) and 21.210 (21.500), indicated a relatively symmetrical distribution of values because the values were fairly close to each other.

8.4 CORRELATIONS AND MULTICOLLINEARITY

Pearson correlation coefficients were examined to understand the size and direction of the relationship between each pair of the study variables. Only predictor independent variables that are directly associated with the dependent variable and are not taken into account by the other incorporated variables in the regression model should form part of the regression model (Gujarati, 2022). When a researcher includes variables in the regression model, which are not necessary, it may lead to an overfitted model resulting in multicollinearity issues and a reduction in the efficiency of the estimators, according to Gujarati (2022). Furthermore, Verbeek (2008) states that when there is an excessive correlation between two independent variables, unreliable regression estimates with high standard errors may occur. Therefore, multicollinearity may potentially lead to issues in multiple regression analysis because it may be problematic to detect the unique, most optimal relationship between each predictor independent variable and the dependent variable (Urdan, 2022). A positive or negative correlation coefficient of the association between two predictor independent variables exceeding 0.8 may be used as a guideline for indicating multicollinearity (Gujarati, 2022).

Pearson correlation coefficients were considered for the associations between the four financial sustainability independent variables (MBVE, ROE, R&D and FINANCE), the four non-financial sustainability independent variables (ENV, SOC, GOV and NONFINANCE) and the three control variables (FSIZE, FLEV and FAGE).

8.4.1 Financial and non-financial independent and control variables

Table 8-10 presents the Pearson correlation coefficients for the independent variables for both the financial and non-financial sustainability dimensions as well as the control variables for the full sample of firms from 2011 to 2021. None of the independent variables was strongly correlated with each other (exceeding a correlation coefficient of 0.8), except for the FINANCE and MBVE and ROE independent variables, where the correlation coefficients exceeded 0.8 and were statistically significant at the 1% level. However, this was expected as FINANCE consisted of a weighted combination of MBVE, ROE and R&D, and because these variables were not used simultaneously in the same regression, there was no possibility of multicollinearity.

Furthermore, across the regression analyses conducted, the VIF values ranged between 1.027 to 2.479, which was below the strict threshold of 5 for the eight independent variables used in the study, namely MBVE, ROE, R&D, FINANCE, ENV, SOC, GOV and NONFINANCE, as well as the three control variables, namely FSIZE, FLEV and FAGE; therefore, multicollinearity was not a concern for the regression analyses conducted (Tibshirani et al., 2017).

Table 8-10: Pearson correlations and VIF values: Independent and control variables

Variables	*MBVE*	*ROE*	*R&D*	*FINANCE*	*ENV*	*SOC*	*GOV*	*NONFINANCE*	*FSIZE*	*FLEV*	*FAGE*	*VIF*
Independent variables:												
MBVE	1.000											1.601
ROE	0.540***	1.000										1.457
R&D	0.185***	0.103***	1.000									2.216
FINANCE	0.864***	0.836***	0.404***	1.000								1.027
ENV	0.077**	-0.006	0.205***	0.090***	1.000							2.060
SOC	0.131***	0.094***	0.282***	0.190***	0.701***	1.000						2.449
GOV	0.071**	0.069**	0.127***	0.105***	0.379***	0.466***	1.000					1.331
NONFINANCE	0.138***	0.100***	0.141***	0.161***	0.684***	0.736***	0.564***	1.000				1.027
FSIZE	0.249***	0.195***	0.700***	0.411***	0.372***	0.440***	0.265***	0.308***	1.000			2.479
FLEV	0.285***	0.087***	0.241***	0.259***	-0.040	0.036	0.067**	0.030	0.059	1.000		1.216
FAGE	-0.080***	-0.054	-0.117***	-0.100***	0.164***	0.275***	0.229***	0.239***	-0.029	0.021	1.000	1.171

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

The table sets out the Pearson correlations and the VIF factor for the four independent variables for financial sustainability, four independent variables for non-financial sustainability and three control variables for the full sample of 100 firms used in the model. The sample period was from 2011 to 2021 (11 years). Correlation coefficients and the statistical significance of these are set out for associations between independent variables and control variables. MBVE represents the growth opportunities independent variable, ROE represents the operational efficiency independent variable and R&D represents the innovation capabilities independent variable. MBVE is a ratio used to denote how much equity investors are willing to pay for each rand in net assets. ROE is the ratio of operating profit to total equity at year-end. R&D represents the rand value of research and development expenses and additions for a financial year, presented in R'000. FINANCE represents a summated index measure of MBVE, ROE and R&D combined. ENV, SOC and GOV represent the non-financial sustainability scores, presented as a numerical value between 0 and 100. NONFINANCE represents a combined score for ENV, SOC and GOV, presented as a numerical value between 0 and 100. FSIZE, FLEV and FAGE represent the control variables. FSIZE is the well-known control variable used to measure firm size, presented in R'000. FLEV is total debt to total assets, presented as a ratio. FAGE is the difference between the reporting date and the first date the firm was listed on the JSE, presented as a numerical value, namely a total number of years.

8.5 REGRESSION ANALYSIS RESULTS OF MODELS 1 TO 3

The estimated generalised least squares (EGLS) method, which is also known as the feasible generalised least squares method, estimated with period seemingly unrelated regressions (SUR) as weighting method and using White (diagonal) standard errors and covariance methods, was used for this purpose for all dependent variables (except for the TSR dependent variable where panel least squares regression was used). See Section 6.9 for a detailed discussion of the model specifications, treatment of outliers and panel data regression analysis.

Regression analyses were conducted on the data for each of the five firm performance dependent variables (TQ, TSR, WACC, MVA and EVA) to test Hypotheses *H_1 to H_3*[22], which propose relationships of financial and non-financial sustainability performance with firm performance. The results of the regression analysis of the relationships of financial and non-financial sustainability performance with firm performance follow.

In addition to the regression analyses, the change in variance contribution of each independent variable was studied to determine the variable that explained the largest percentage of variation of the dependent variable in the regression models. The variance contribution method began with the full set of independent variables. Each independent variable was then removed from the regression model, and the analyses were conducted with the remaining independent variables. The results were then compared to see which independent variable resulted in the largest decrease in adjusted R-squared value by computing the difference between the original adjusted R-squared and the adjusted R-squared without a specific independent variable. A decrease in the adjusted R-squared value from the removal of an independent variable indicated how much the independent variable contributed to the explanatory power of the model.

The percentage variance contribution analysis was conducted using the statistical package EViews, v13. Percentage variance contribution analysis was used to calculate the R-

[22] Each hypothesis (H_1 to H_4) can be expressed as follows: a) firm performance in terms of TQ, b) firm performance in terms of TSR, c) firm performance in terms of WACC, d) firm performance in terms of MVA, and e) firm performance in terms of EVA.

squared change in percentage for Models 1a, 2a, 3a and 3b. In this case, the linear relationship between the independent variables (either MBVE, ROE, R&D, ENV, SOC or GOV) and the five dependent variables (TQ, TSR, WACC, MVA and EVA) was tested.

Regression analyses were conducted on the data for each of the five dependent variables (TQ, TSR, WACC, MVA and EVA) to test Hypotheses *H_1 to H_3*[23], which propose relationships of financial and non-financial sustainability performance with firm performance. The results of the regression analysis of the relationships of financial and non-financial sustainability performance with firm performance follow.

Note that for the WACC dependent variable, a *negative* coefficient indicated that the firm's weighted average cost of capital was decreasing, leading to *enhanced* firm performance. This could be due to increased investment opportunities, competitive advantages and improved financial flexibility. Lower financing costs (WACC) enabled the firm to take on more profitable projects and make strategic decisions driving growth and firm performance.

8.5.1 Model 1a

This section deals with the regression analyses for the financial sustainability independent variables, namely MBVE, ROE and R&D for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 1a is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 MBVE_{it} + \beta_2 ROE_{it} + \beta_3 R\&D_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 1a are reported in Table 8-11.

[23] Each hypothesis (H_1 to H_3) can be expressed as follows: a) firm performance in terms of TQ, b) firm performance in terms of TSR, c) firm performance in terms of WACC, d) firm performance in terms of MVA, and e) firm performance in terms of EVA.

Table 8-11: Model 1a: Regression results of the relationships between financial sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	0.5455***	-3.9571	11.5213***	1.0061***	263966.6000
MBVE	0.2251***	0.2328	0.0863	0.4009***	-23800.2300
ROE	0.0036***	0.5330***	-0.0174**	0.0065***	105472.5000***
R&D	7.12E-08**	-8.56E-06**	-5.94E-07***	-8.04E-08*	-0.0459
R^2	0.5757	0.0975	0.0684	0.7438	0.3639
Adjusted R^2	0.5702	0.0858	0.0564	0.7404	0.3556
Durbin-Watson	1.9423	1.8679	1.9878	1.8643	1.9828
F-statistic	105.1473	8.3684	5.6889	224.9197	44.3249
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The table presents the results of the EGLS regressions with period SUR weightings and using White (diagonal) standard errors and covariance estimation methods for the full sample (except for the TSR dependent variable where panel least squares regression was used) for the period 2011 to 2021.

The adjusted R^2 ranged between 0.0564 and 0.7404 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 74%, 57% and 36% for MVA, TQ and EVA respectively. The Durbin-Watson statistic ranged between 1.8643 and 1.9878 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

For the TQ dependent variable, both MBVE and ROE had a statistically significant positive relationship with TQ at the 1% level, whereas R&D had a statistically significant positive relationship with TQ at the 5% level. Consequently, Hypotheses H_{1a}, H_{1b} and H_{1c}, which propose that financial sustainability related to growth opportunities (MBVE), operational efficiency (ROE) and innovation (R&D) leads to enhanced firm performance, were supported.

For the TSR dependent variable, ROE had a statistically significant positive relationship with TSR at the 1% level, R&D had a statistically significant negative relationship with TSR at the 5% level and MBVE had no statistically significant relationship with TSR. Consequently, Hypothesis H_{1b}, which proposes that financial sustainability related to operational efficiency (ROE) leads to enhanced firm performance, was supported, while Hypotheses H_{1a} and $H_{1c,}$ which propose that financial sustainability related to growth opportunities (MBVE) and innovation (R&D) leads to enhanced firm performance, were not supported.

For the WACC dependent variable, both ROE and R&D had statistically significant negative relationships with WACC at the 5% and 1% level respectively, whereas MBVE had no statistically significant relationship with WACC. Consequently, Hypotheses H_{1b} and H_{1c}, which propose that financial sustainability related to operational efficiency (ROE) and innovation (R&D) leads to enhanced firm performance, were supported, while Hypothesis $H_{1a,}$ which proposes that financial sustainability related to growth opportunities (MBVE) leads to enhanced firm performance, was not supported.

For the MVA dependent variable, MBVE and ROE had a statistically significant positive relationship with MVA, at the 1% level, whereas R&D had a statistically significant negative relationship with MVA at the 10% level. Consequently, Hypotheses H_{1a} and H_{1b}, which propose that financial sustainability related to growth opportunities (MBVE) and operational efficiency (ROE) leads to enhanced firm performance, were supported, while Hypothesis $H_{1c,}$ which proposes that financial sustainability related to innovation (R&D) leads to enhanced firm performance, was not supported.

For the EVA dependent variable, only ROE had a statistically significant positive relationship with EVA at the 1% level. Consequently, Hypothesis H_{1b}, which proposes that financial sustainability related to operational efficiency (ROE) leads to enhanced firm performance, was supported, while Hypotheses H_{1a} and $H_{1c,}$ which propose that financial sustainability related to growth opportunities (MBVE) and innovation (R&D) leads to enhanced firm performance, were not supported.

The following studies support the view that the foremost objective of a firm is to focus on financial sustainability performance through the maximisation of profit, which is also evident from the results. According to Friedman (2016), profit making is the only social responsibility of a firm. Porter (1996) states that financial sustainability performance can be beneficial for firms in the long term due to the creation of positive returns. Studies show that financial sustainability performance can improve financial resources (Wang and Tuttle, 2014), lower costs (Orens et al., 2010), lead to improved total shareholder return and increased equity (Eccles et al., 2014) and also give firms a competitive advantage (Porter and Van der Linde, 1995).

The results of this study also support the studies by Ng and Rezaee (2015) and KPMG (2019), which found that financial sustainability performance led to improved firm performance. Qaim et al. (2021) also measured firm performance with a market-based measure related to stock price (similar to TQ) and found that financial sustainability performance had a significant positive effect on firm performance. Qaim et al. (2021) conclude that the financial sustainability performance of a firm has a positive impact on stock prices, which ultimately has an effect on the TSR, showing that long-term strategies of a firm do have a positive impact on the performance of a firm. The results indicating that financial sustainability performance does have a statistically significant positive impact on firm performance are also supported by other studies (Fama, 1990; Lamont, 1998; Purwaningsih, 2020). Ng and Rezaee (2015) state that the different elements of financial sustainability, namely growth opportunities, operational efficiency and innovation, have a statistically significant positive relationship with cost of equity capital, supporting the results of the WACC dependent variable.

Consequently, shareholders consider profit maximisation as a more tangible and immediate driver of firm performance, clearly indicating that if shareholders want to optimise their share returns, financial sustainability measures are better to use to monitor the performance of a firm. On the one hand, agency theory highlights that there is a misalignment between the objectives of shareholders and management, since shareholders want long-term financial returns, while management strives for short-term profit (Dawar, 2014; Rezaee, 2017). On the other hand, the shareholder wealth maximisation theory posits that the primary objective of firms is to maximise shareholder profit, without considering the needs of all stakeholders,

which is clear from the results indicating that financial sustainability performance leads to enhanced firm performance (Aydogmus et al., 2022).

8.5.1.1 *Variance Contribution*

The results of Model 1a are reported in Table 8-12.

Table 8-12: Model 1a: Results of Adjusted R-Squared Differences

	Equation	Variable excluded	Adjusted R-Squared	Adjusted R-Squared Difference
1	TQ and MBVE, ROE and R&D	Original (with all)	0.570210	
		Without MBVE	0.267896	0.302310 (30.23%)
		Without ROE	0.567379	0.002831
		Without R&D	0.570993	-0.000783
2	TSR and MBVE, ROE and R&D	Original (with all)	0.085810	
		Without MBVE	0.086528	-0.000718
		Without ROE	0.038166	0.047644 (4.76%)
		Without R&D	0.081319	0.004491
3	WACC and MBVE, ROE and R&D	Original (with all)	0.056365	
		Without MBVE	0.052393	0.003972
		Without ROE	0.047543	0.008822 (0.88%)
		Without R&D	0.051908	0.004457
4	MVA and MBVE, ROE and R&D	Original (with all)	0.740427	
		Without MBVE	0.264329	0.476100 (47.61%)
		Without ROE	0.737317	0.003108
		Without R&D	0.741634	-0.001207
5	EVA and MBVE, ROE and R&D	Original (with all)	0.355633	
		Without MBVE	0.354786	0.000847
		Without ROE	0.031148	0.324490 (32.45%)
		Without R&D	0.356286	-0.000653

For the TQ dependent variable, the highest adjusted R-squared difference occurred when MBVE was removed from Model 1a (adjusted R-squared difference of 0.302310). For the TSR dependent variable, the highest adjusted R-squared difference occurred when ROE

was removed from Model 1a (adjusted R-squared difference of 0.047644). For the WACC dependent variable, the highest adjusted R-squared difference occurred when ROE was removed from Model 1a (adjusted R-squared difference of 0.008822). For the MVA dependent variable, the highest adjusted R-squared difference occurred when MBVE was removed from Model 1a (adjusted R-squared difference of 0.476100). For the EVA dependent variable, the highest adjusted R-squared difference occurred when ROE was removed from Model 1a (adjusted R-squared difference of 0.324490).

Therefore, for TSR, WACC and EVA, ROE contributed the most to the explanatory power of the model, whereas MBVE contributed the most for TQ and MVA.

8.5.2 Model 1b

This section deals with the regressions for the combined financial sustainability independent variable, namely FINANCE for the period 2011 to 2021, with each of the five dependent variables, namely TQ, TSR, WACC, MVA and EVA. Model 1b is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_1 FINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 1b are reported in Table 8-13.

Table 8-13: Model 1b: Regression results of the relationships between combined financial sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	0.9218***	-1.1825	11.0235***	1.5452***	1531082.0000*
FINANCE	0.4953***	12.8574***	-0.3306*	0.9383***	2750565.0000***
R^2	0.4324	0.0695	0.0554	0.5536	0.2315
Adjusted R^2	0.4264	0.0592	0.0449	0.5486	0.2231
Durbin-Watson	1.7239	1.8481	1.9737	1.6516	1.9987
F-statistic	69.0828	6.7601	5.3145	112.3137	27.2952
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The table presents the results of the EGLS regressions with period SUR weightings and using White (diagonal) standard errors and covariance estimation methods for the full sample (except for the TSR dependent variable where panel least squares regression was used) for the period 2011 to 2021.

The adjusted R^2 ranged between 0.0449 and 0.5486 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 55%, 43% and 22% for MVA, TQ and EVA respectively. The Durbin-Watson statistic ranged between 1.6516 and 1.9737 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

FINANCE had a statistically significant positive relationship with the TQ, TSR, MVA and EVA dependent variables at the 1% level. For the WACC dependent variable, FINANCE had a statistically significant negative relationship with WACC at the 10% level.

Consequently, Hypothesis H_1, which proposes that financial sustainability leads to enhanced firm performance, was supported in the case of all five dependent variables.

8.5.3 Model 2a

This section deals with the regressions for the non-financial sustainability independent variables, namely ENV, SOC and GOV for the period 2011 to 2021, with each of the five dependent variables, namely TQ, TSR, WACC, MVA and EVA. Model 2a is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 2a are reported in Table 8-14.

Table 8-14: Model 2a: Regression results of the relationships between non-financial sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	0.8075**	4.0574	10.9968***	1.6294***	3076845.0000**
ENV	-0.0009	-0.0286	-0.0088	-0.0012	-6916.7960
SOC	0.0005	-0.0858	0.0084	0.0001	-1943.6600
GOV	-0.0003	-0.0005	-0.0061	-0.0004	7540.8240*
R^2	0.1988	0.0294	0.0532	0.1426	0.0358
Adjusted R^2	0.1885	0.0169	0.0409	0.1315	0.0234
Durbin-Watson	1.9422	1.8130	2.0030	1.9545	1.9940
F-statistic	19.2290	2.3492	4.3516	12.8902	2.8799
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The table presents the results of the EGLS regressions with period SUR weightings and using White (diagonal) standard errors and covariance estimation methods for the full sample (except for the TSR dependent variable where panel least squares regression was used) for the period 2011 to 2021.

The adjusted R^2 ranged between 0.0169 and 0.1885 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 19% and 13% for TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.8130 and 2.0030 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

For the TQ, TSR, WACC and MVA dependent variables, neither of ENV, SOC and GOV had a statistically significant relationship with each of the dependent variables. Consequently, Hypotheses H_{2a}, H_{2b} and H_{2c}, which propose that non-financial sustainability related to environmental (ENV), social (SOC) and governance (GOV) has a relationship with firm performance, were not supported.

For the EVA dependent variable, GOV had a statistically significant positive relationship with EVA at the 10% level, whereas ENV and SOC had no statistically significant relationship with EVA. Consequently, only Hypothesis H_{2c}, which proposes that non-financial sustainability related to governance (GOV) has a relationship with firm performance, was supported.

The literature on the relationship between non-financial elements of sustainability and firm performance is mixed, making this topic an ongoing disagreement under ESG performance researchers. Most studies examined ESG performance as a combined score, with fewer studies looking at the three different elements of non-financial sustainability individually.

Similar to the results of this study, Atan et al. (2018) also found no statistically significant relationship with any of the three elements of non-financial sustainability performance and firm performance. This shows that investors do not value the individual elements of non-financial sustainability (Miralles-Quirós et al., 2018). Therefore, specific stakeholder involvement, when focusing on the individual elements of non-financial sustainability performance, is less crucial than a holistic stakeholder involvement, when focusing on the combined non-financial sustainability performance.

The results of previous studies for the three separate elements of non-financial sustainability performance were as follows:

Environmental

Wang and Sarkis (2013) found that environmental performance was positively associated with firm performance, which is in contradiction with the results. A Korean study found that environmental performance had a negative relationship with performance, supporting the results of this study (Han et al., 2016). Saygili et al. (2022) also found that environmental performance had a negative relationship with firm performance. Aydogmus et al. (2022) found that environmental performance had a positive relationship with TQ, but it was not statistically significant. A Middle Eastern and North African study done by Al-Hiyari and Kolsi (2021) found that environmental performance did not have a significant impact on the performance of shares.

Some other studies investigated the association between the individual components of non-financial sustainability and cost of capital reporting, concluding that socially responsible firms, i.e. those having environmentally sustainable practices, tended to have significantly lower cost of capital (Borghesi et al., 2014; Crifo et al., 2015; Dhaliwal et al., 2011; El Ghoul et al., 2011; Mackey et al., 2007).

Social

A Korean study found that social performance had no significant relationship with firm performance (Han et al., 2016). Saygili et al. (2022) also found that social performance had a negative relationship with firm performance. The results of this study support both these studies. In contrast, three other studies found a significant positive relationship between social performance and firm performance (Al-Hiyari and Kolsi, 2021; Aydogmus et al., 2022; Wang and Sarkis, 2013).

Governance

Velte (2017) found that governance performance had a positive significant relationship with firm performance. A Korean study also found that governance performance had a positive relationship with firm performance (Han et al., 2016). Saygili et al. (2022) also found that governance performance had a positive relationship with firm performance. Aydogmus et al. (2022) and Al-Hiyari and Kolsi (2021) also found that governance performance had a significant positive relationship with firm performance. Therefore, the results of this study support the above studies in stating that only governance performance ultimately affects firm performance in a positive way.

8.5.3.1 *Variance Contribution*

The results of Model 2a are reported in Table 8-15.

Table 8-15: Model 2a: Results of Adjusted R-Squared Differences

	Equation	Variable excluded	Adjusted R-Squared	Adjusted R-Squared Difference
1	TQ and ENV, SOC and GOV	Original (with all)	0.188455	
		Without ENV	0.188122	0.000333
		Without SOC	0.187801	0.000654
		Without GOV	0.187194	0.001261 (0.13%)
2	TSR and ENV, SOC and GOV	Original (with all)	0.016897	
		Without ENV	0.017615	-0.000718
		Without SOC	0.016787	0.000110 (0.01%)
		Without GOV	0.017802	-0.000905
3	WACC and ENV, SOC and GOV	Original (with all)	0.040947	
		Without ENV	0.040785	0.000162
		Without SOC	0.041049	-0.000102
		Without GOV	0.039849	0.001098 (0.11%)
4	MVA and ENV, SOC and GOV	Original (with all)	0.131543	
		Without ENV	0.130962	0.000581 (0.06%)
		Without SOC	0.132372	-0.000829
		Without GOV	0.131327	0.000216
5	EVA and ENV, SOC and GOV	Original (with all)	0.023387	
		Without ENV	0.021965	0.001422 (0.14%)
		Without SOC	0.024352	-0.000965
		Without GOV	0.022117	0.001270

For the TQ dependent variable, the highest adjusted R-squared difference occurred when GOV was removed from Model 2a (adjusted R-squared difference of 0.001261). For the TSR dependent variable, the highest adjusted R-squared difference occurred when SOC was removed from Model 2a (adjusted R-squared difference of 0.000110). For the WACC dependent variable, the highest adjusted R-squared difference occurred when GOV was removed from Model 2a (adjusted R-squared difference of 0.001098). For the MVA

dependent variable, the highest adjusted R-squared difference occurred when ENV was removed from Model 2a (adjusted R-squared difference of 0.000581). For the EVA dependent variable, the highest adjusted R-squared difference occurred when ENV was removed from Model 2a (adjusted R-squared difference of 0.001422).

Therefore, for TQ and WACC, GOV contributed the most to the explanatory power of the model, whereas ENV contributed the most for MVA and EVA, and SOC contributed the most for TSR. However, the variance contribution differences were very small and similar. Therefore, these results should be considered as exploratory. Future research in a similar context could validate these findings.

8.5.4 Model 2b

This section deals with the regressions for the combined non-financial sustainability independent variable, namely NONFINANCE for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 2b is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_1 NONFINANCE_{it} + \beta_{2-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 2b are reported in Table 8-16.

Table 8-16: Model 2b: Regression results of the relationships between combined non-financial sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	0.8930***	0.3271	11.0024***	1.7397***	2956155.0000**
NONFINANCE	-0.0022***	0.0041	-0.0026	-0.0031**	-6975.7180
R^2	0.1963	0.0265	0.0509	0.1454	0.0304
Adjusted R^2	0.1874	0.0157	0.0404	0.1359	0.0197
Durbin-Watson	1.9536	1.8146	1.9985	1.9486	2.0001
F-statistic	22.1241	2.4605	4.8534	15.4112	2.8432
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The table presents the results of the EGLS regressions with period SUR weightings and using White (diagonal) standard errors and covariance estimation methods for the full sample (except for the TSR dependent variable where panel least squares regression was used) for the period 2011 to 2021.

The adjusted R^2 ranged between 0.0157 and 0.1874 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 19% and 14% for TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.8146 and 2.0001 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

For the TQ and MVA dependent variables, NONFINANCE had a statistically significant negative relationship with TQ and MVA at the 1% and 5% level respectively. Consequently, Hypothesis H_2, which proposes that non-financial sustainability shows a relationship with firm performance, was supported.

NONFINANCE had no statistically significant relationship with TSR, WACC and EVA. Consequently, Hypothesis H_2, which proposes that non-financial sustainability shows a relationship with firm performance, was not supported for these three dependent variables.

Most studies examined ESG performance as a combined score. Some studies found a statistically significant positive relationship between ESG performance and firm performance by measuring it using TQ (Aydogmus et al., 2022; Velte, 2017). Yoon et al. (2018) conclude that the ESG performance of a firm positively and significantly affects the market valuation of a firm. Many other studies also found that ESG performance led to enhanced firm performance (Bhaskaran et al., 2020; Chairani and Siregar, 2021; Dalal and Thaker, 2019; De Lucia et al., 2020; Fatemi et al., 2018; Naeem et al., 2021; Wang and Sarkis, 2013; Zhao et al., 2018). Similar emerging economies studies found that there was a significant positive relationship between ESG performance and the value of a firm's shares (Al-Hiyari and Kolsi, 2021; Miralles-Quirós et al., 2018). A recent study found mixed results with ESG performance having a negative relationship with the profitability of firms, but a positive relationship with firm performance measured using Tobin's Q (Giannopoulos et al., 2022).

Some studies state that ESG performance can harm a firm's ability to make profits (Bower and Paine, 2017). Other studies argue that by adopting non-financial sustainable strategies and practices, which are beneficial for all stakeholders and not only shareholders, firms would lose the ability to enhance financial performance (Brammer et al., 2006; Duque-Grisales and Aguilera-Caracuel, 2021; Folger-Laronde et al., 2022; Garcia and Orsato, 2020; Landi and Sciarelli, 2018). The results agree with the finding of the previous studies, namely that with no relationship between ESG and firm performance, the value added to financial sustainability performance would be destroyed. Brammer et al. (2006) found that firms with lower ESG performance performed better in the market. Two major multicountry studies also found a negative relationship between ESG performance and firm performance (Duque-Grisales and Aguilera-Caracuel, 2021; Garcia and Orsato, 2020).

8.5.5 Model 3a

This section deals with the regressions for the financial sustainability independent variables, namely MBVE, ROE and R&D together with the non-financial sustainability independent variables ENV, SOC and GOV, for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 3a is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 MBVE_{it} + \beta_2 ROE_{it} + \beta_3 R\&D_{it} + \beta_4 ENV_{it} + \beta_5 SOC_{it} + \beta_6 GOV_{it} + \beta_{7-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 3a are reported in Table 8-17.

Table 8-17: Model 3a: Regression results of the relationships between financial and non-financial sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	0.6223***	0.4225	11.5750***	1.0870***	279566.2000
MBVE	0.2256***	0.2139	0.0854	0.4006***	-15235.8400
ROE	0.0037***	0.5369***	-0.0176**	0.0065***	105059.1000***
R&D	7.39E-08**	-8.59E-06**	-6.03E-07***	-7.45E-08*	-0.0570
ENV	-0.0015*	0.0215	-0.0084	-0.0026**	-5152.3210
SOC	-0.0005	-0.1156	0.0093	-0.0005	4212.8330
GOV	0.0002	-0.0232	-0.0063	0.0001	-2973.5830
R^2	0.5786	0.1005	0.0707	0.7471	0.3614
Adjusted R^2	0.5720	0.0863	0.0561	0.7431	0.3514
Durbin-Watson	1.9352	1.8665	1.9929	1.8587	1.9784
F-statistic	87.3981	7.1095	4.8424	188.0389	36.0251
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The table presents the results of the EGLS regressions with period SUR weightings and using White (diagonal) standard errors and covariance estimation methods for the full sample (except for the TSR dependent variable where panel least squares regression was used) for the period 2011 to 2021.

The adjusted R^2 ranged between 0.0561 and 0.7431 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 74%, 57% and 35% for MVA, TQ and EVA respectively. The Durbin-Watson statistic ranged between 1.8587 and 1.9929 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

For the TQ dependent variable, from a FINANCE perspective, MBVE and ROE had a statistically significant positive relationship with TQ at the 1% level, whereas R&D had a

statistically significant positive relationship with TQ at the 5% level. From a NONFINANCE perspective, ENV had a statistically significant negative relationship with TQ at the 10% level, while SOC and GOV had no statistically significant relationship with TQ.

For the TSR dependent variable, from a FINANCE perspective, ROE had a statistically significant positive relationship with TSR at the 1% level, where R&D had a statistically significant negative relationship with TSR at the 5% level. From a NONFINANCE perspective, there was no statistically significant relationship for ENV, SOC and GOV with TSR.

For the WACC dependent variable, from a FINANCE perspective, ROE had a statistically significant negative relationship with WACC at the 5% level, where R&D had a statistically significant negative relationship with WACC at the 1% level. From a NONFINANCE perspective, there was no statistically significant relationship for ENV, SOC and GOV with WACC.

For the MVA dependent variable, from a FINANCE perspective, MBVE and ROE had a statistically significant positive relationship with MVA at the 1% level, where R&D had a statistically significant negative relationship with MVA at the 10% level. From a NONFINANCE perspective, ENV had a statistically significant negative relationship with MVA at the 5% level, while SOC and GOV had no statistically significant relationship with MVA.

For the EVA dependent variable, from a FINANCE perspective, ROE had a statistically significant positive relationship with EVA at the 1% level. From a NONFINANCE perspective, there was no statistically significant relationship for ENV, SOC and GOV with EVA.

Therefore, H_3 was not supported for all five dependent variables. Consequently, for the results of Hypotheses H_1 and H_2, in the presence of the financial sustainability measures, non-financial sustainability measures were weak or not statistically significant predictors of firm performance.

Section 8.5.1 (financial sustainability elements) and Section 8.5.2 (non-financial sustainability elements) discussed previous studies on the relationship between the individual financial sustainability elements and firm performance, as well as between the individual non-financial sustainability elements and firm performance, and their results, confirming the strong significant positive relationship between financial sustainability and firm performance, as well as the result that there was no relationship between non-financial sustainability and firm performance.

8.5.5.1 *Variance Contribution*

The results of Model 3a are reported in Table 8-18.

Table 8-18: Model 3a: Results of Adjusted R-Squared Differences

	Equation	Variable excluded	Adjusted R-Squared	Adjusted R-Squared Difference
1	TQ and MBVE, ROE, R&D, ENV, SOC and GOV	Original (with all)	0.572002	
		Without MBVE	0.270401	0.301600 (30.16%)
		Without ROE	0.567740	0.004262
		Without R&D	0.572090	-0.000088
		Without ENV	0.573423	-0.001422
		Without SOC	0.570914	0.001088
		Without GOV	0.572117	-0.000115
2	TSR and MBVE, ROE, R&D, ENV, SOC and GOV	Original (with all)	0.086345	
		Without MBVE	0.087084	-0.000739
		Without ROE	0.038348	0.047997 (4.80%)
		Without R&D	0.081812	0.004533
		Without ENV	0.087084	-0.000739
		Without SOC	0.085338	0.001007
		Without GOV	0.087033	-0.000688

3	WACC and MBVE, ROE, R&D, ENV, SOC and GOV	Original (with all)	0.056102	
		Without MBVE	0.052461	0.003641
		Without ROE	0.047150	0.008952 (0.90%)
		Without R&D	0.051317	0.004785
		Without ENV	0.056111	-0.000009
		Without SOC	0.056043	0.000001
		Without GOV	0.054666	0.001436
4	MVA and MBVE, ROE, R&D, ENV, SOC and GOV	Original (with all)	0.743144	
		Without MBVE	0.264857	0.478290 (47.83%)
		Without ROE	0.739942	0.003202
		Without R&D	0.744245	-0.001101
		Without ENV	0.743076	0.000043
		Without SOC	0.743351	-0.000207
		Without GOV	0.743217	-0.000073
5	EVA and MBVE, ROE, R&D, ENV, SOC and GOV	Original (with all)	0.351403	
		Without MBVE	0.350834	0.000569
		Without ROE	0.037570	0.313830 (31.38%)
		Without R&D	0.352110	-0.000707
		Without ENV	0.352532	-0.001129
		Without SOC	0.351679	-0.000276
		Without GOV	0.351746	-0.000343

For the TQ dependent variable, the highest adjusted R-squared difference occurred when MBVE was removed from Model 3a (adjusted R-squared difference of 0.301600). For the TSR dependent variable, the highest adjusted R-squared difference occurred when ROE was removed from Model 3a (adjusted R-squared difference of 0.047997). For the WACC dependent variable, the highest adjusted R-squared difference occurred when ROE was removed from Model 3a (adjusted R-squared difference of 0.008952). For the MVA dependent variable, the highest adjusted R-squared difference occurred when MBVE was removed from Model 2a (adjusted R-squared difference of 0.478290). For the EVA dependent variable, the highest adjusted R-squared difference occurred when ROE was removed from Model 3a (adjusted R-squared difference of 0.313830).

Therefore, for TSR, WACC and EVA, ROE contributed the most to the explanatory power of the model, whereas MBVE contributed the most for TQ and MVA.

8.5.6 Model 3b

This section deals with the regressions for the combined financial sustainability independent variable, namely FINANCE together with the combined non-financial sustainability independent variable, namely NONFINANCE for the period 2011 to 2021, with each of the five dependent variables TQ, TSR, WACC, MVA and EVA. Model 3b is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 FINANCE_{it} + \beta_2 NONFINANCE_{it} + \beta_{3-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 3b are reported in Table 8-19.

Table 8-19: Model 3b: Regression results of the relationships between combined financial sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	1.0310***	-0.7283	11.1308***	1.7074***	1652868.0000*
FINANCE	0.4959***	12.8718***	-0.3325*	0.9357***	2747706.0000***
NONFINANCE	-0.0027***	-0.0137	-0.0028	-0.0041***	-4036.5840
R^2	0.4404	0.0695	0.0554	0.5571	0.2323
Adjusted R^2	0.4337	0.0583	0.0441	0.5518	0.2331
Durbin-Watson	1.7153	1.8481	1.9734	1.6461	1.9943
F-statistic	65.7545	6.2379	4.8956	105.0952	25.2733
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The table presents the results of the EGLS regressions with period SUR weightings and using White (diagonal) standard errors and covariance estimation methods for the full sample (except for the TSR dependent variable where panel least squares regression was used) for the period 2011 to 2021.

The adjusted R^2 ranged between 0.0441 and 0.5518 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 55%, 43% and 23% for MVA, TQ and EVA respectively. The Durbin-Watson statistic ranged between 1.6461 and 1.9943 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

For the TQ and MVA dependent variables, FINANCE had a statistically significant positive relationship with TQ and MVA at the 1% level, whereas NONFINANCE had a statistically significant negative relationship with TQ and MVA at the 1% level. Consequently, Hypothesis H_3, which proposes that both financial and non-financial sustainability show a relationship with firm performance, was supported.

For the TSR dependent variable, only FINANCE had a statistically significant relationship with TSR at the 1% level. Consequently, Hypothesis H_3, which proposes that both financial and non-financial sustainability show a relationship with firm performance, was not supported.

For the WACC dependent variable, only FINANCE had a statistically significant negative relationship with WACC at the 10% level. Consequently, Hypothesis H_3, which proposes that both financial and non-financial sustainability show a relationship with firm performance, was not supported.

For the EVA dependent variable, only FINANCE had a statistically significant positive relationship with EVA at the 1% level. Consequently, Hypothesis H_3, which proposes that both financial and non-financial sustainability show a relationship with firm performance, was not supported.

Prior research shows that both financial and non-financial performance affect cost of capital, with this relationship driven by information asymmetry (one party has more knowledge of an economic transaction than the other) between management and investors.(Borghesi et al.,

2014; Botosan, 1997; Crifo et al., 2015; Dhaliwal et al., 2011; Easley and O'hara, 2004; Francis et al., 2004; Hughes et al., 2007; Lambert et al., 2007; 2011),

There may be possible reasons for the lack of significance between non-financial sustainability performance (NONFINANCE) and firm performance, when a significant financial sustainability performance measure (FINANCE) is introduced. The adoption rate[24] of non-financial sustainability practices and activities, which refers to how widespread the use of non-financial sustainability practices and activities are in a country, may influence the relationship between non-financial sustainability performance and firm performance.

Kaiser (2020) studied the relationship between non-financial sustainability performance and firm performance in two countries in the United States of America and Europe, and found mixed results, with one having a negative relationship and the other having a positive relationship between non-financial sustainability performance and firm performance. Kaiser (2020) concluded that the difference in relationships in the two countries could be attributed to the difference in adoption rates of non-financial sustainability practices and activities between the two countries. Therefore, it is clear that the national culture of a country has an impact on the execution of the non-financial sustainability practices and activities by a firm and its stakeholders (Shin et al., 2023). The results of this study indicated that financial sustainability performance had a significant positive relationship with firm performance, and that there was a lack of a significant positive relationship between non-financial sustainability performance and firm performance in South Africa. This result could be due to the unique culture of South African firms focusing on profit maximisation, with a lower adoption rate of non-financial sustainability practices and activities by firms and their stakeholders.

[24] The adoption rate for non-financial sustainability practices and activities refers to the pace at which the non-financial sustainability practices and activities are commenced and executed by firms.

8.5.6.1 *Variance Contribution*

The results of Model 3b are reported in Table 8-20.

Table 8-20: Model 3b: Results of Adjusted R-Squared Differences

	Equation	Variable excluded	Adjusted R-Squared	Adjusted R-Squared Difference
1	TQ and combined FINANCE and NONFINANCE	Original (with all)	0.433741	
		Without FINANCE	0.187424	0.246320 (24.63%)
		Without NONFINANCE	0.426407	0.007334
2	TSR and combined FINANCE and NONFINANCE	Original (with all)	0.058344	
		Without FINANCE	0.015697	0.042647 (4.27%)
		Without NONFINANCE	0.059173	-0.000829
3	WACC and combined FINANCE and NONFINANCE	Original (with all)	0.044051	
		Without FINANCE	0.040377	0.003674 (0.37%)
		Without NONFINANCE	0.044991	-0.00094
4	MVA and combined FINANCE and NONFINANCE	Original (with all)	0.551838	
		Without FINANCE	0.135962	0.415880 (41.59%)
		Without NONFINANCE	0.548622	0.003216
5	EVA and combined FINANCE and NONFINANCE	Original (with all)	0.223076	
		Without FINANCE	0.019729	0.203350 (20.34%)
		Without NONFINANCE	0.223070	0.000006

For the TQ dependent variable, the highest adjusted R-squared difference occurred when FINANCE was removed from Model 3b (adjusted R-squared difference of 0.24632). For the TSR dependent variable, the highest adjusted R-squared difference occurred when FINANCE was removed from Model 3b (adjusted R-squared difference of 0.042647). For the WACC dependent variable, the highest adjusted R-squared difference occurred when FINANCE was removed from Model 3b (adjusted R-squared difference of 0.003674). For

the MVA dependent variable, the highest adjusted R-squared difference occurred when FINANCE was removed from Model 3b (adjusted R-squared difference of 0.415880). For the EVA dependent variable, the highest adjusted R-squared difference occurred when FINANCE was removed from Model 3b (adjusted R-squared difference of 0.203350).

Therefore, for TQ, TSR, WACC, MVA and EVA, FINANCE contributed the most to the explanatory power of the model, whereas NONFINANCE contributed the least for all of the dependent variables.

Table 8-21 provides a summary of the regression results with its related research hypotheses for Models 1a, 1b, 2a, 2b, 3a and 3b.

Table 8-21: Summary of the regression results with supported or unsupported hypotheses

Regression Model	*Independent variable*	*TQ*	*TSR*	*WACC*	*MVA*	*EVA*
1a	MBVE	Hypothesis 1a supported ***	Hypothesis 1a not supported	Hypothesis 1a not supported	Hypothesis 1a supported ***	Hypothesis 1a not supported
	ROE	Hypothesis 1b supported ***	Hypothesis 1b supported ***	Hypothesis 1b supported **	Hypothesis 1b supported ***	Hypothesis 1b supported ***
	R&D	Hypothesis 1c supported **	Hypothesis 1c not supported **	Hypothesis 1c supported ***	Hypothesis 1c not supported *	Hypothesis 1c not supported
1b	FINANCE	Hypothesis 1 supported ***	Hypothesis 1 supported ***	Hypothesis 1 supported *	Hypothesis 1 supported ***	Hypothesis 1 supported ***
2a	ENV	Hypothesis 2a not supported	Hypothesis 2a not supported	Hypothesis 2a not supported	Hypothesis 2a not supported	Hypothesis 2a not supported
	SOC	Hypothesis 2b not supported	Hypothesis 2b not supported	Hypothesis 2b not supported	Hypothesis 2b not supported	Hypothesis 2b not supported
	GOV	Hypothesis 2c not supported	Hypothesis 2c not supported	Hypothesis 2c not supported	Hypothesis 2c not supported	Hypothesis 2c supported *
2b	NONFINANCE	Hypothesis 2 supported ***	Hypothesis 2 not supported	Hypothesis 2 not supported	Hypothesis 2 supported **	Hypothesis 2 not supported
3a	MBVE + ROE + R&D + ENV + SOC + GOV	Hypothesis 3a not supported	Hypothesis 3a not supported	Hypothesis 3a not supported	Hypothesis 3a not supported	Hypothesis 3a not supported
3b	FINANCE + NONFINANCE	Hypothesis 3b supported ***	Hypothesis 3b not supported ***	Hypothesis 3b not supported *	Hypothesis 3b supported ***	Hypothesis 3b not supported ***
*, **, *** denote significance at the 10%, 5% and 1% levels respectively.						

Source: *Author's own*

8.6 REGRESSION ANALYSIS RESULTS FOR MODELS 4 AND 5

This section presents the results of the tests for Hypothesis H_4. This hypothesis posits that the interaction effect of financial and non-financial sustainability elements shows a relationship with firm performance. The estimated generalised least squares (EGLS) method, which is also known as the feasible generalised least squares method, estimated with period seemingly unrelated regressions (SUR) as weighting method and using White (diagonal) standard errors and covariance methods, was used for this purpose for all dependent variables (except for the TSR dependent variable where panel least squares regression was used). See Section 6.9 for a detailed discussion of the model specifications, treatment of outliers and panel data regression analysis.

Interaction terms were introduced in Models 4 and 5 to examine the potential interaction effect of individual and combined financial and non-financial sustainability performance on firm performance. As discussed in Section 6.8, the continuous independent variables (MBVE, ROE, R&D, FINANCE, ENV, SOC, GOV and NONFINANCE) used in Models 4 and 5 were standardised, and multicollinearity arising from the creation of the interaction term was not of concern in moderated multiple regression. After standardising the continuous independent variables, these variables were denoted as ZMBVE, ZROE, ZR&D, ZFINANCE, ZENV, ZSOC, ZGOV and ZNONFINANCE. After standardisation, these variables had a mean of zero and a standard deviation of one.

Regression analyses were conducted on the data for each of the five dependent variables (TQ, TSR, WACC, MVA and EVA) to test Hypothesis H_4[25], which proposes interactive relationships of financial and non-financial sustainability performance with firm performance. The results of the regression analysis of the overall interactive relationships of financial and non-financial sustainability performance with firm performance follow in Model 4, after which the results of the regression analysis of the individual interactive relationships of financial and non-financial sustainability performance with firm performance, follow in Model 5.

[25] Each hypothesis (H_1 to H_4) can be expressed as follows: a) firm performance in terms of TQ, b) firm performance in terms of TSR, c) firm performance in terms of WACC, d) firm performance in terms of MVA, and e) firm performance in terms of EVA.

8.6.1 Model 4

This section deals with the regressions for the interactive relationship of the combined financial sustainability and non-financial sustainability independent variables, namely ZFINANCE and ZNONFINANCE for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 4 is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZFINANCE_{it} + \beta_2 ZNONFINANCE_{it} + \beta_3 INTZFINANCEZNONFINANCE_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 4 are reported in Table 8-22.

Table 8-22: Model 4: Regression results of the interactive relationship between overall financial and non-financial sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	0.8924***	-0.6441	11.0568***	1.5055***	133825.0000
ZFINANCE	0.4936***	13.0639***	-0.3059*	0.9352***	275577.0000***
ZNONFINANCE	-0.0467***	-0.2653	-0.0462	-0.0706***	-130042.0000
INTZFINANCE-ZNONFINANCE	0.0296*	-1.7216	-0.1149	0.0156	527612.0000***
R^2	0.4407	0.0709	0.0565	0.5574	0.2553
Adjusted R^2	0.4335	0.0588	0.0443	0.5517	0.2457
Durbin-Watson	1.7164	1.8552	1.9674	1.6484	1.9783
F-statistic	61.069	5.9034	4.6426	97.5873	26.5737
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.					

The adjusted R^2 ranged between 0.0443 and 0.5517 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 55%, 43% and 25% for MVA, TQ and EVA respectively. The Durbin-Watson statistic ranged between 1.6484 and 1.9783 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for

the regression models were all statistically significant (p<0.001), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZFINANCEZNONFINANCE) was not statistically significant for TSR, WACC and MVA. This indicates that combined financial and non-financial sustainability performance did not have a statistically significant interaction effect on firm performance. The interaction term (INTZFINANCEZNONFINANCE) had a positive relationship with TQ and EVA and was statistically significant at the 10% and 1% level respectively, confirming that there was an interaction effect between combined financial and non-financial sustainability performance on firm performance.

Hypothesis H_{4a} proposes that the interaction effect of the combined financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4a} was supported for both the TQ and EVA dependent variables, but not supported for the TSR, WACC and MVA dependent variables.

8.6.2 Model 5a

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables being ZMBVE and ZENV for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5a is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZMBVEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5a are reported in Table 8-23.

Table 8-23: Model 5a: Regression results of the interactive relationship between individual ZMBVE and ZENV sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	1.2414***	0.7431	10.9168***	2.0783***	2388447.0000**
ZMBVE	0.5464***	5.3624***	0.1865	1.0130***	503910.7000**
ZENV	-0.0225	-1.6059	-0.1486	-0.0820***	-284205.7000*
INTZMBVEZENV	-0.0764***	-1.3869	-0.2720**	-0.0428	195471.4000
R^2	0.5768	0.0438	0.0598	0.7490	0.0537
Adjusted R^2	0.5713	0.0315	0.0477	0.7458	0.0415
Durbin-Watson	1.9717	1.8319	1.9938	1.9363	1.9704
F-statistic	105.6199	3.5510	4.9284	231.2846	4.3989
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The adjusted R^2 ranged between 0.0315 and 0.7458 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 75% and 57% for MVA and TQ respectively. The Durbin-Watson statistic ranged between 1.8319 and 1.9938 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZMBVEZENV) was not statistically significant for TSR, MVA and EVA. This indicates that the interaction between MBVE (growth opportunities) and ENV (environment) did not have a statistically significant interaction effect on firm performance. The interaction term (INTZMBVEZENV) had a negative relationship with TQ and WACC and was statistically significant at the 1% and 5% level respectively, confirming that there was an interaction effect between MBVE financial sustainability performance and ENV non-financial sustainability performance on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was supported for both the TQ and WACC dependent variables, but not for the TSR, MVA and EVA dependent variables.

8.6.3 Model 5b

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZMBVE and ZSOC for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5b is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZMBVEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5b are reported in Table 8-24.

Table 8-24: Model 5b: Regression results of the interactive relationship between individual ZMBVE and ZSOC sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	1.1713***	2.6123	11.0932***	2.0879***	2436259.0000**
ZMBVE	0.5465***	5.9271***	0.1660	1.0091***	507163.3000**
ZSOC	-0.0166	-2.6509**	0.0060	-0.0504**	-164470.1000
INTZMBVEZSOC	-0.0081	-3.1641**	-0.1285	-0.0257	180182.2000*
R^2	0.5729	0.0489	0.0530	0.7484	0.0512
Adjusted R^2	0.5674	0.0367	0.0408	0.7451	0.0389
Durbin-Watson	1.9771	1.8318	1.9939	1.9371	1.9424
F-statistic	103.9627	3.9894	4.3390	230.4827	4.1787
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The adjusted R^2 ranged between 0.0367 and 0.7451 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 75% and 57% for MVA and TQ respectively. The Durbin-Watson statistic ranged between 1.8318 and 1.9939 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZMBVEZSOC) was not statistically significant for TQ, WACC and MVA. This indicates that the interaction between MBVE (growth opportunities) and SOC (social) did not have a statistically significant interaction effect on firm performance. The interaction term (INTZMBVEZSOC) had a negative relationship with TSR and was statistically significant at the 5% level. The interaction term (INTZMBVEZSOC) had a positive relationship with EVA and was statistically significant at the 10% level; confirming the interaction effect between MBVE financial sustainability performance and SOC non-financial sustainability performance on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was supported for both the TSR and EVA dependent variables, but not for the TQ, WACC and MVA dependent variables.

8.6.4 Model 5c

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZMBVE and ZGOV for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5c is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZMBVE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZMBVEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5c are reported in Table 8-25.

Table 8-25: Model 5c: Regression results of the interactive relationship between individual ZMBVE and ZGOV sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	1.1760***	1.3161	10.8266***	2.1056***	2400149.0000**
ZMBVE	0.5429***	5.2922***	0.1257	0.9952***	494018.5000*
ZGOV	-0.0029	-0.8389	-0.1302	-0.0153	-213643.3000**
INTZMBVEZGOV	0.0145	-0.1428	0.0195	0.0191	26076.1300
R^2	0.5713	0.0411	0.0564	0.7432	0.0459
Adjusted R^2	0.5658	0.0287	0.0442	0.7399	0.0336
Durbin-Watson	1.9909	1.8253	1.9928	1.9173	1.9646
F-statistic	103.2957	3.3206	4.6317	224.2710	3.7299
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.					

The adjusted R^2 ranged between 0.0287 and 0.7399 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 74% and 57% for MVA and TQ respectively. The Durbin-Watson statistic ranged between 1.8253 and 1.9928 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZMBVEZGOV) was not statistically significant for TQ, TSR, WACC, MVA and EVA. This indicates that the interaction between MBVE (growth opportunities) and GOV (governance) did not have a statistically significant interaction effect on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was not supported for the TQ, TSR, WACC, MVA and EVA dependent variables.

8.6.5 Model 5d

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZROE and ZENV for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5d is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZENV_{it} + \beta_3 INTZROEZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5d are reported in Table 8-26.

Table 8-26: Model 5d: Regression results of the interactive relationship between individual ZROE and ZENV sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	0.9415***	-3.7723	10.9351***	1.6669***	1572939.0000*
ZROE	0.0988***	9.9223***	-0.2332**	0.1831***	1870636.0000***
ZENV	-0.0442*	-1.0619	-0.1679	-0.0707**	-234490.7000**
INTZROEZENV	0.0289**	-1.2383	-0.1226	0.0375**	797103.4000***
R^2	0.2811	0.0938	0.0614	0.2712	0.4571
Adjusted R^2	0.2718	0.0821	0.0493	0.2618	0.4501
Durbin-Watson	1.5852	1.8835	1.9728	1.4875	1.9398
F-statistic	30.3045	8.0206	5.0668	28.8390	65.2634
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.					

The adjusted R^2 ranged between 0.0614 and 0.4501 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 45%, 27% and 26% for EVA, TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.4875 and 1.9398 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZROEZENV) was not statistically significant for TSR and WACC. This indicates that the interaction between ROE (operational efficiency) and ENV (environment) did not have a statistically significant interaction effect on firm performance. The interaction term (INTZROEZENV) had a positive relationship with TQ, MVA and EVA and was statistically significant at the 5% level for TQ and MVA, and at the 1% level for EVA, confirming that there was an interaction effect between ROE financial sustainability performance and ENV non-financial sustainability performance on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was supported for the TQ, MVA and EVA dependent variables, but not for the TSR and WACC dependent variables.

8.6.6 Model 5e

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZROE and ZSOC for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5e is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZROEZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5e are reported in Table 8-27.

Table 8-27: Model 5e: Regression results of the interactive relationship between individual ZROE and ZSOC sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	0.9189***	-3.3057	11.1075***	1.6296***	1248416.0000*
ZROE	0.1013***	10.0737***	-0.2472**	0.1871***	1931512.0000***
ZSOC	-0.0248	-2.5515**	0.0027	-0.0499	-118989.5000
INTZROEZSOC	0.0205*	-2.9908***	-0.0300	0.0400**	613684.7000***
R^2	0.2845	0.1011	0.0564	0.2726	0.4105
Adjusted R^2	0.2753	0.0895	0.0442	0.2632	0.4028
Durbin-Watson	1.6058	1.8963	1.9861	1.5179	1.9273
F-statistic	30.8209	8.7205	4.6326	29.0443	53.9563
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.					

The adjusted R^2 ranged between 0.0442 and 0.4028 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 40%, 28% and 26% for EVA, TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.5179 and 1.9861 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZROEZSOC) was not statistically significant for WACC. This indicates that the interaction between ROE (operational efficiency) and SOC (social) did not have a statistically significant interaction effect on firm performance. The interaction term (INTZROEZSOC) had a positive relationship with TQ, MVA and EVA and was statistically significant at the 10%, 5% and 1% level respectively. The interaction term (INTZROEZSOC) had a negative relationship with TSR and was statistically significant at the 1% level; confirming that there was an interaction effect between ROE financial sustainability performance and SOC non-financial sustainability performance on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was supported for the TQ, TSR, MVA and EVA dependent variables, but not for the WACC dependent variables.

8.6.7 Model 5f

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZROE and ZGOV for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5f is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZROE_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZROEZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5f are reported in Table 8-28.

Table 8-28: Model 5f: Regression results of the interactive relationship between individual ZROE and ZGOV sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	0.9560***	-3.6979	10.9121***	1.6744***	1401859.0000
ZROE	0.1025***	9.9090***	-0.2433**	0.1880***	1867541.0000***
ZGOV	-0.0032	-1.0302	-0.1299	-0.0100	-108251.4000
INTZROEZGOV	0.0262*	-0.4651	0.0403	0.0354	329695.0000***
R^2	0.2781	0.0928	0.0598	0.2677	0.3699
Adjusted R^2	0.2688	0.0811	0.0476	0.2582	0.3617
Durbin-Watson	1.6012	1.8787	1.9813	1.5083	1.9681
F-statistic	29.8594	7.9239	4.9255	28.3268	45.4891
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.					

The adjusted R^2 ranged between 0.0476 and 0.3617 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the

predictor variables of 36%, 27% and 26% for EVA, TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.5083 and 1.9813 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZROEZGOV) was not statistically significant for TSR, WACC and MVA. This indicates that the interaction between ROE (operational efficiency) and GOV (governance) did not have a statistically significant interaction effect on firm performance. The interaction term (INTZROEZGOV) had a positive relationship with TQ and EVA and was statistically significant at the 10% and 1% levels respectively, confirming that there was an interaction effect between ROE financial sustainability performance and GOV non-financial sustainability performance on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was supported for the TQ and EVA dependent variables, but not for the TSR, WACC and MVA dependent variables.

8.6.8 Model 5g

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZR&D and ZENV for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5g is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZENV_{it} + \beta_3 INTZR\&DZENV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5g are reported in Table 8-29.

Table 8-29: Model 5g: Regression results of the interactive relationship between individual ZR&D and ZENV sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	0.8259**	2.0732	11.0387***	1.6378***	2586285.0000**
ZR&D	-0.0023	-5.7811***	-0.24329**	-0.0900***	-161171.7000
ZENV	-0.0214	-1.8361	-0.1634	-0.0364	-224549.0000
INTZR&DZENV	-0.0011	-0.8487	-0.1241	-0.0487	16801.6100
R^2	0.2155	0.0410	0.0584	0.1839	0.0389
Adjusted R^2	0.2054	0.0286	0.0463	0.1734	0.0265
Durbin-Watson	1.8734	1.8197	1.9949	1.8455	1.9737
F-statistic	21.2860	3.3136	4.8082	17.4629	3.1385
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The adjusted R^2 ranged between 0.0265 and 0.2054 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 21% and 17% for TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.8197 and 1.9949 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZR&DZENV) was not statistically significant for TQ, TSR, WACC, MVA and EVA, indicating that the interaction between R&D (research and development) and ENV (environment) did not have a statistically significant interaction effect on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was not supported for the TQ, TSR, WACC, MVA and EVA dependent variables.

8.6.9 Model 5h

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZR&D and ZSOC for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5h is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZSOC_{it} + \beta_3 INTZR\&DZSOC_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5h are reported in Table 8-30.

Table 8-30: Model 5h: Regression results of the interactive relationship between individual ZR&D and ZSOC sustainability performance and firm performance

	TQ	***TSR***	***WACC***	***MVA***	***EVA***
Intercept	0.7739**	2.9432	11.1731***	1.6761***	2621680.0000**
ZR&D	-0.0063	-5.3120***	-0.2902***	-0.0940***	-119299.0000
ZSOC	-0.0073	-2.4191	0.0262	-0.0118	-168443.300
INTZR&DZSOC	0.0040	-1.5260	0.0157	-0.0225	-30450.9300
R^2	0.2068	0.0428	0.0557	0.1736	0.0358
Adjusted R^2	0.1966	0.0304	0.0435	0.1629	0.0233
Durbin-Watson	1.8877	1.8158	2.0017	1.7945	1.9756
F-statistic	20.2048	3.4641	4.5695	16.2756	2.8735
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The adjusted R^2 ranged between 0.0233 and 0.1966 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 20% and 16% for TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.7945 and 2.0017 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression

models were all statistically significant (p<0.001), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZR&DZSOC) was not statistically significant for TQ, TSR, WACC, MVA and EVA, indicating that the interaction between R&D (research and development) and SOC (social) did not have a statistically significant interaction effect on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis H_{4b} was not supported for the TQ, TSR, WACC, MVA and EVA dependent variables.

8.6.10 Model 5i

This section deals with the regressions for the interactive relationship of the individual financial sustainability and non-financial sustainability independent variables, namely ZR&D and ZGOV for the period 2011 to 2021, with each of the five dependent variables being TQ, TSR, WACC, MVA and EVA. Model 5i is as follows for firm *i* at period *t*:

$$FP_{it} = \beta_0 + \beta_1 ZR\&D_{it} + \beta_2 ZGOV_{it} + \beta_3 INTZR\&DZGOV_{it} + \beta_{4-x} Control\ variables_{it} + \varepsilon_{it}$$

The results of Model 5i are reported in Table 8-31.

Table 8-31: Model 5i: Regression results of the interactive relationship between individual ZR&D and ZGOV sustainability performance and firm performance

	TQ	*TSR*	*WACC*	*MVA*	*EVA*
Intercept	0.7868**	2.9909	10.9615***	1.6392***	2373444.0000*
ZR&D	-0.0022	-5.9905***	-0.2870***	-0.0947***	-142700.1000
ZGOV	-0.0142	-0.7306	-0.1387	-0.0246	-202738.2000**
INTZR&DZGOV	0.0079	-2.0806**	-0.0779	-0.0204	-111841.9000
R^2	0.2006	0.0431	0.0605	0.1714	0.0386
Adjusted R^2	0.1903	0.0307	0.0483	0.1607	0.0261
Durbin-Watson	1.9263	1.8197	1.9999	1.8579	1.9735
F-statistic	19.4436	3.4901	4.9868	16.0252	3.1074
Probability (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000

*, **, *** denote significance at the 10%, 5% and 1% levels respectively. β coefficients are shown in the table.

The adjusted R^2 ranged between 0.0261 and 0.1903 for the five dependent variables, indicating the highest explanation of the variances in the dependent variables by the predictor variables of 19% and 16% for TQ and MVA respectively. The Durbin-Watson statistic ranged between 1.8197 and 1.9999 for the five dependent variables, reflecting that there was no serious autocorrelation present in the data. The F-statistics for the regression models were all statistically significant ($p<0.001$), indicating that all β coefficients differed significantly from zero.

The interaction term (INTZR&DZGOV) was not statistically significant for TQ, WACC, MVA and EVA, indicating that the interaction between R&D (research and development) and GOV (governance) did not have a statistically significant interaction effect on firm performance. The interaction term (INTZR&DZGOV) had a negative relationship with TSR and was statistically significant at the 5% level, confirming that there was an interaction effect between R&D financial sustainability performance and GOV non-financial sustainability performance on firm performance.

Hypothesis H_{4b} proposes that the interaction effect of individual financial and non-financial sustainability elements shows a relationship with firm performance. Therefore, Hypothesis *H_{4b}* was supported for the TSR dependent variable, but not supported for the TQ, WACC, MVA and EVA dependent variables.

Table 8-32 provides a summary of the regression results with its related research hypotheses for Models 4, 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h and 5i.

Table 8-32: Summary of the regression results with supported or unsupported hypotheses

Model	***Interaction independent variable***	***TQ***	***TSR***	***WACC***	***MVA***	***EVA***
4	INTZFINANCEZNONFINANCE	Hypothesis 4a supported *	Hypothesis 4a not supported	Hypothesis 4a not supported	Hypothesis 4a not supported	Hypothesis 4a supported ***
5a	INTZMBVEZENV	Hypothesis 4b supported ***	Hypothesis 4b not supported	Hypothesis 4b supported **	Hypothesis 4b not supported	Hypothesis 4b not supported
5b	INTZMBVEZSOC	Hypothesis 4b not supported	Hypothesis 4b supported **	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b supported *
5c	INTZMBVEZGOV	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported
5d	INTZROEZENV	Hypothesis 4b supported **	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b supported **	Hypothesis 4b supported ***
5e	INTZROEZSOC	Hypothesis 4b supported *	Hypothesis 4b supported ***	Hypothesis 4b not supported	Hypothesis 4b supported **	Hypothesis 4b supported ***
5f	INTZROEZGOV	Hypothesis 4b supported *	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b supported ***
5g	INTZR&DZENV	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported
5h	INTZR&DZSOC	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported
5i	INTZR&DZGOV	Hypothesis 4b not supported	Hypothesis 4b supported **	Hypothesis 4b not supported	Hypothesis 4b not supported	Hypothesis 4b not supported
*, **, *** denote significance at the 10%, 5% and 1% levels respectively.						

Source: *Author's own*

8.7 CONCLUSION

This chapter provided the testing of Hypotheses H_1 to H_4, which propose relationships between financial and non-financial sustainability performance and firm performance. The results were analysed for the full sample for the period 2011 to 2021. Tables 8.21 and 8.32 served as the conclusion to the results of Chapter 8, setting out the supported and unsupported hypotheses.

The next chapter concludes the results and findings of this chapter, giving insight into the potential implications for firms and their stakeholders.

CHAPTER 9

CONCLUSION

9.1 INTRODUCTION

In the twenty-first century, firm sustainability has become a highly debated subject. A firm should consider sustainability from both a financial and non-financial context to ensure the firm remains viable into the future. The concept of *sustainability performance* suggests that a firm must extend its focus beyond maximising shareholder wealth alone by considering the long-term impact of its operations for the benefit of all stakeholders including the community, society and the environment.

This research studied the problem of firms often treating financial and non-financial sustainability as isolated dimensions, overlooking their interconnectedness and the optimal allocation of resources, in order to achieve sustainability benefits without disadvantaging any of the stakeholders.

The significance of the financial sustainability dimension, particularly to investors, is crucial for firm survival and shareholder value creation. Often, firms prioritise short-term financial gains over long-term wealth, missing the opportunity to unlock the creation of value. Fostering financial sustainability requires a balanced focus on both short-term profits and long-term sustainability endeavours across the three elements of financial sustainability performance, namely growth opportunities, operational efficiency and innovation capabilities.

The non-financial dimension greatly influences a firm's overall performance and involves satisfying diverse stakeholders beyond just shareholders. Non-financial sustainability entails aligning management strategies with societal expectations, resolving environmental impact, social responsibilities and governance practices. To enhance long-term value, reputation and sustainability, firms must uphold environmental, social and governance responsibilities, making non-financial sustainability essential for value creation and long-term viability of firms.

Therefore, the study acknowledged both dimensions of the sustainability of a firm, namely financial and non-financial sustainability, which were considered together to achieve firm performance. The underpinning theories of this view comprised shareholder wealth maximisation theory (financial sustainability), organisational legitimacy theory and resource dependence theory (non-financial sustainability), and stakeholder theory (the synergy between financial and non-financial sustainability).

Based on a review of the literature and aligned with the theoretical foundation of the study, the four primary hypotheses were formulated as follows:

- H_1: *Financial sustainability leads to enhanced firm performance.*
- H_2: *Non-financial sustainability shows a relationship with firm performance.*
- H_3: *Financial sustainability and non-financial sustainability show a relationship with firm performance.*
- H_4: *The interaction effect of financial and non-financial sustainability elements shows a relationship with firm performance.*

The financial sustainability dimension consisted of three elements, namely growth opportunities, operational efficiency and innovation capabilities. The non-financial sustainability dimension also consisted of three elements, namely environmental, social and governance.

The study first empirically identified the best predictor of firm performance for two of the three financial sustainability performance elements (Chapter 7). For the growth opportunities element, the market-to-book value of equity (MBVE) variable was identified as the strongest predictor of firm performance, whereas for the operational efficiency element, the return on equity (ROE) variable was identified as the strongest predictor of firm performance. For the third element, innovation capabilities, the only suitable variable was research and development, which was used in the study. For the non-financial sustainability dimension, the environmental, social and governance scores from the Refinitiv Eikon database were used.

After the identification of the best predictors of firm performance for the growth opportunities and operational efficiency elements of the financial sustainability dimension in Chapter 7,

the relationship of financial and non-financial sustainability on firm performance was investigated (Section 8.5) for a sample of 100 firms over the period 2011 to 2021 (see the list of firms in Appendix 1).

Because financial sustainability can be influenced by non-financial sustainability and vice versa, the relationship between financial and non-financial sustainability performance on firm performance was investigated by introducing interaction terms. Therefore, in addition to the main investigation in this study, the interactions between financial and non-financial sustainability performance on firm performance, individually and in combination, were studied (Section 8.6).

This chapter presents a summary of the main findings of the study, sets out the limitations of the study, outlines the contributions of the study, describes the practical implications of the study and provides recommendations for further research.

9.2 SUMMARY OF MAIN FINDINGS

The main findings are summarised with reference to each of the four hypotheses (see Table 8-20 at the end of Section 8.5 for a summary of the supported and unsupported hypotheses).

9.2.1 Hypothesis: Effect of financial sustainability on firm performance (H_1)

Hypothesis H_1 proposes that financial sustainability performance leads to enhanced firm performance. This main hypothesis was divided into four sub-hypotheses, proposing that the three elements of financial sustainability performance, namely growth opportunities (H_{1a}), operational efficiency (H_{1b}) and innovation capabilities (H_{1c}) lead to enhanced firm performance, as well as that combined financial sustainability represented by a summated index leads to enhanced firm performance (H_{1d}).

Growth opportunities

For the first element of financial sustainability performance, namely growth opportunities, H_{1a} was supported for two out of the five dependent variables, namely TQ and MVA, but not for TSR, WACC and EVA.

The substantial contribution of growth opportunities in explaining TQ and MVA, given all the explanatory and control variables, was 30.23% and 47.61% respectively. The statistically strong significant positive relationship between the growth opportunities element of financial sustainability performance and firm performance, as measured by TQ and MVA, has important implications for firms and their stakeholders.

The significant positive relationship between growth opportunities and firm performance has significance for firms, since for strategic decision-making purposes, firms which invest in positive return projects based on strategic decisions, create value and generate positive returns for their shareholders, leading to a higher TQ and MVA. Firms with strong growth opportunities are likely to be more attractive to potential investors. Therefore, management should focus on growth opportunities and strategies that can enhance a firm's overall performance. When firms have growth potential, it leads to investor interest and also possibly to more favourable terms when seeking external funding, which can ultimately lead to enhanced firm performance (in this instance proxied by TQ and MVA). If a firm establishes a significant positive relationship between growth opportunities and firm performance, it implies that the firm is positioning itself in the market and differentiating itself from competitors. Having a competitive advantage may translate into higher market share and remaining sustainable in the future.

The results also have significance for a firm's stakeholders. Current shareholders and potential investors can use the insights of TQ and MVA to make informed investment decisions. A positive relationship between growth opportunities and firm performance suggests that investing in the firm may yield positive return in the form of dividends and capital growth. Long-term investors are interested in firms that can remain sustainable and create value over time. The statistically significant positive relationship between growth opportunities and firm performance indicates that the firm's growth initiative is indeed in line

with value creation, which can ultimately enhance stakeholders' confidence in the firm's long-term prospects and sustainability.

Operational efficiency

For the second element of financial sustainability performance, namely operational efficiency, H_{1b} was supported for all five dependent variables, namely TQ, TSR, WACC, MVA and EVA.

H_{1b} therefore provides compelling evidence of a statistically significant positive relationship between operational efficiency and firm performance, underscoring the critical role of efficient operations in driving firm performance, shareholder value and for firms to remain sustainable in the foreseeable future. The substantial contribution of operational efficiency in explaining specifically EVA, given all the explanatory and control variables, was 32.45%. The statistically strong significant positive relationship between the operational efficiency element of financial sustainability performance and firm performance has important implications for firms and their stakeholders.

This has significance for firms since the findings support the notion that operational efficiency of the firm directly impacts various firm performance measures. Firms can use this insight to identify areas where operational improvements are needed to enhance competitiveness and performance, especially where they find that their operational efficiency measure leads to the diminishing of firm performance. Efficient operations often lead to cost savings and resource optimisation, resulting in enhanced firm performance. Therefore, firms can analyse the relationship between operational efficiency and firm performance to identify areas of improvement. For example, firms can analyse the relationship between operational efficiency and WACC to ensure they use their resources effectively and minimise their cost of capital. Firms with a streamlined operational system are therefore more likely to create sustainable value for shareholders over time.

The results also have significance for a firm's stakeholders. Firms with better operational efficiency are likely to demonstrate better firm performance through financial performance, which, in turn, offers a greater potential for attractive returns on investments, attracting potential investors. Firms with effective operational systems are also generally better

equipped to navigate challenges and economic downturns, which mitigate investment risks. Firms with a significant relationship between operational efficiency and firm performance also tend to deliver better long-term returns for shareholders, making them more appealing for investors seeking financial sustainability performance. Apart from shareholders and potential investors, the significant relationship also has important implications for employees and other internal stakeholders. Enhanced operational efficiency leads to increased productivity, which impacts employees' job security positively as well as the overall work environment. With the firm performing better, employees may experience job stability, leading to potential career advancement.

Innovation

The results of the third element of financial sustainability performance, namely innovation, indicated that H_{1c} was supported for two of the five dependent variables, namely TQ and WACC, but not for TSR, MVA and EVA.

The contribution of innovation capabilities in explaining TQ and WACC, given all the explanatory and control variables, although statistically significant, was very weak. However, the statistically significant results between the innovation capabilities element of financial sustainability performance and firm performance may have some implications for firms and their stakeholders.

This has significance for firms since the findings indicated that a significant relationship between R&D and TQ implied that investments in research and development could contribute to increasing the firm's market value relative to its assets. Firms can leverage these insights to make strategic decisions that prioritise long-term growth through innovation, because research and development investments can be seen as drivers of future sustainable market value. Furthermore, the significant relationship between R&D and WACC highlights that innovation efforts may reduce the cost of financing for the firm.

The results also have significance for a firm's stakeholders. Shareholders and investors with a focus on long-term growth and value creation may see firms with R&D initiatives as more attractive investment opportunities. The lack of a significant relationship with TSR, MVA and EVA indicated that R&D investments may not have an immediate effect on shareholder

value, because such investments could take time to materialise into tangible financial benefits. A firm's focus on R&D indicates its commitment to staying competitive and relevant in the market.

Combined FINANCE

The combined FINANCE variable represented an aggregated measure of the three elements of financial sustainability performance. H_{1d} was supported for all five dependent variables, namely TQ, TSR, WACC, MVA and EVA. This confirmed the overall results of the three individual financial sustainability performance elements.

The statistically strong significant positive relationship between the financial sustainability dimension and all five firm performance measures has important implications for firms and their stakeholders. On the one hand, this positive relationship indicated that when firms focused on financial sustainability by effectively managing their growth opportunities, operational efficiency and innovation capabilities, they tended to generate higher TQ, TSR, MVA, and EVA figures. This can result from increased revenue generation, enhanced profitability and effective resource allocation, contributing to overall improved financial performance. Stakeholders, including shareholders and potential investors, benefit from such positive financial outcomes through higher returns on investments, increased market capitalisation, and confidence in the firm's long-term growth potential.

On the other hand, the statistically significant negative relationship between the financial sustainability dimension and WACC indicated that as firms enhanced their financial sustainability performance, their cost of capital tended to decrease. This can be attributed to improved operational efficiency, reduced risks and effective capital structure management, which collectively would result in a lower cost of financing. Lowering WACC is advantageous for firms, as it leads to increased net present value of projects and higher valuation, making the firm more attractive to investors. Ultimately, stakeholders such as shareholders and potential investors benefit from reduced financing costs, as the lower cost indicates improved financial stability and efficient use of capital resources.

Overall, the positive relationships with TQ, TSR, MVA, and EVA, along with the negative relationship with WACC, highlighted the significance of financial sustainability in driving firm

performance and value creation. Stakeholders, including investors, employees and creditors, are poised to gain from these outcomes, solidifying the importance of strategic financial management in ensuring both short-term profitability and long-term sustainable growth.

9.2.2 Hypothesis: Effect of non-financial sustainability on firm performance (H_2)

Hypothesis H_2 proposes that non-financial sustainability performance shows a relationship with firm performance. This main hypothesis was also divided into four sub-hypotheses, proposing that the three elements of non-financial sustainability performance, namely environmental (H_{2a}), social (H_{2b}) and governance (H_{2c}) show a relationship with firm performance, as well as combined non-financial sustainability represented by a combined score, showing a relationship with firm performance (H_{2d}).

Environmental and Social

For the first and second element of non-financial sustainability performance, namely environmental and social, both H_{2a} and H_{2b} were not supported for all five of the dependent variables, namely TQ, TSR, WACC, MVA and EVA. The results revealed that there was no significant relationship between environmental as well as social performance with firm performance, suggesting that the firm's environmental and social performance efforts did not have a discernible impact on the performance of a firm. This was also illustrated by the negligible contribution (between 0.01% and 0.14%) of environmental and social performance in explaining TQ, TSR, WACC, MVA and EVA, given all the explanatory and control variables. The fact that there was no significant relationship between the environmental and social elements of non-financial sustainability performance with firm performance has important implications for firms and their stakeholders.

No relationship between environmental and social performance and firm performance has significance for firms since the lack of a significant relationship indicated that the current efforts of a firm's environmental and social performance might not directly influence the performance of the firm. However, this does not diminish the importance of environmental and social sustainability. Firms should rather be prompted to re-evaluate their environmental and social strategies and initiatives and explore more effective ways of integrating

environmental and social sustainability strategies into the overall firm strategy, because it is known that stakeholders do increasingly value environmentally and socially responsible practices of firms.

The results also have significance for a firm's stakeholders. The influence of environmental performance may not be evident in the short term, but potential investors with a long-term perspective may consider the potential benefits of firms adopting sustainable practices over time. Although firm performance is not linked to environmental and social performance, employees may still take pride in working for a firm that is committed to non-financial sustainable practices. For all stakeholders, this understanding of the results emphasises the broader value of environmental and social performance beyond immediate financial returns and firm performance.

Governance

The results indicated that for the third element of non-financial sustainability performance, namely governance, H_{2c} was supported for one out of the five dependent variables, namely EVA, but not for TQ, TSR, WACC and MVA.

These results revealed that there was a weak significant positive relationship between governance performance and firm performance, suggesting that the firm's governance performance efforts could play a role in economic value creation for firms, but not necessarily in immediate market valuation. The weak significant positive relationship between the governance element of non-financial sustainability performance and firm performance could have important implications for firms and their stakeholders.

The significant positive relationship between governance sustainability and firm performance has significance for firms since the findings indicated that a significant relationship between governance and EVA implied that the stronger the governance practices of the firm, the more enhanced the economic value creation of a firm would be over time. Firms can use this insight into the results to focus on improving their governance structures and accountability policies to drive their long-term value. Improving the governance performance of the firm can instil greater confidence in potential investors through accountability and reduced risk associated with the firm's management.

The results also have significance for a firm's stakeholders. The influence of governance performance may influence EVA, a measure of long-term value creation, which is more significant than immediate financial returns. Therefore, investors will evaluate investment opportunities by carefully considering governance performance by a firm. When firms have a strong governance performance, it indicates that the firm has the ability to manage risks and navigate challenging situations, attracting investors seeking resilient and sustainable investments. Governance performance by firms can contribute to a positive corporate culture, motivating employees in a valued working environment.

Combined NON-FINANCE

For the combined score of non-financial sustainability performance, H_{2d} was not supported for three of the five dependent variables, namely TSR, WACC and EVA, but H_{2d} was supported for TQ and MVA. The results revealed a significant negative relationship between NONFINANCE and both TQ and MVA, suggesting that an increase in a firm's overall non-financial sustainability performance efforts could have a marginal negative impact on the financial performance of a firm. A significant negative relationship between non-financial sustainability performance and firm performance has important implications for firms and their stakeholders.

A significant negative relationship between non-financial sustainability performance and firm performance has significance for firms since firms investing in non-financial sustainability practices and activities often face extremely high costs related to their non-financial sustainability performance efforts, leading to a decrease in the overall performance of the firm. This may impact short-term profitability negatively, although long-term benefits of improved non-financial sustainability performance may be significant.

The results also have significance for a firm's stakeholders because when there is a negative relationship between non-financial sustainability performance and firm performance, investors may become concerned about the financial impact of a firm's increased non-financial sustainability activities and efforts. A decline in a firm's TQ and MVA may raise questions about the effectiveness of the firm's non-financial sustainability performance initiatives in generating financial returns. However, long-term investors may recognise the

potential value of non-financial sustainability practices in enhancing the firm's resilience and reputation. For employees and customers, increased non-financial sustainability performance can make them feel proud about the firm's commitment towards non-financial sustainability practices, but it may impact job security and harm the ability to continue delivering sustainable products.

In summary, for both the individual elements and combined score of non-financial sustainability performance, firms and stakeholders need to recognise that the relationship between non-financial sustainability performance and firm performance remains complex. While a decrease in TQ and MVA, followed by increased non-financial sustainability performance, may raise short-term concerns and questions, there is a probability that the long-term view of non-financial sustainability performance may advocate sustainable practices.

9.2.3 Hypothesis: Effect of financial sustainability and non-financial sustainability on firm performance (H_3)

Hypothesis H_3 proposes that financial and non-financial sustainability elements together show a relationship with firm performance. This main hypothesis was also divided into two sub-hypotheses, proposing that, firstly, the three individual financial sustainability elements together with the three individual non-financial sustainability elements show a relationship with firm performance (H_{3a}), and secondly, the combined financial sustainability and combined non-financial sustainability dimensions show a relationship with firm performance (H_{3b}).

Individual elements of both dimensions

For the individual measures for both financial and non-financial sustainability, H_{3a} was not supported for all five of the dependent variables, namely TQ, TSR, WACC, MVA and EVA.

The results indicated that for none of the regression models, all the individual financial and non-financial sustainability measures were statistically significant. These results confirmed that hypotheses H_{2a}, H_{2b} and H_{2c}, which propose that non-financial sustainability related to environmental (ENV), social (SOC) and governance (GOV) should have a relationship with

firm performance, were not supported and had the same implications for firms and their stakeholders as discussed in Section 9.2.2.

Combined dimensions of both dimensions

For both financial and non-financial sustainability performances' combined measures, H_{3b} was supported for two out of the five dependent variables, namely TQ and MVA, but not for TSR, WACC and EVA. The results confirmed the findings of H_{1b} and $H_{2b.}$

Therefore, it is evident that an increase in non-financial sustainability performance measures do not result in enhanced firm performance. In contrast, financial sustainability performance measures exhibit a more pronounced association with firm performance. The stronger relationship between financial sustainability performance measures and firm performance demonstrates how management of firms prioritises profit maximisation over non-financial sustainability performance.

The strong significant positive relationship between combined financial sustainability performance, together with the weak significant negative relationship between combined non-financial sustainability performance, and firm performance as measured through TQ and MVA, has important implications for firms and their stakeholders.

The significant positive relationship between combined financial sustainability performance, together with the significant negative relationship between combined non-financial sustainability performance, on firm performance, have significance for firms since an increase in non-financial sustainability does not seem to enhance firm performance, indicating that firms should critically evaluate the effectiveness of their non-financial sustainability performance initiatives and efforts. Firms may need to rethink their approach towards non-financial sustainability, ensuring that their efforts are aligned with tangible value creation and not just symbolic gestures. While it seems as if profit maximisation is crucial for survival and growth, firms still need to recognise the growing importance of non-financial sustainability expectations in shaping long-term success. Firms excelling in financial sustainability performance may initially attract more investor attention due to their enhancement of firm performance. However, firms still need to commit themselves to non-financial sustainability to gain favour from stakeholders who prioritise long-term value and

ethical practices. Stakeholders, which include customers, employees and advocacy groups, can leverage their influence to encourage firms to adopt more balanced sustainability strategies.

9.2.4 Hypothesis: Effect of financial and non-financial sustainability interaction on firm performance (H_4)

Hypothesis H_4 proposes that the interaction effect of the financial sustainability performance dimension and the non-financial sustainability performance dimension shows a relationship with firm performance. This main hypothesis was also divided into two sub-hypotheses, proposing that the interaction effect of combined financial and non-financial sustainability dimensions shows a relationship with firm performance (H_{4a}), and the interaction effect of individual financial and non-financial sustainability performance elements shows a relationship with firm performance (H_{4b}).

Combined interaction

For the interaction between the combined financial and non-financial sustainability performances, H_{4a} was supported for two out of the five dependent variables, namely TQ and EVA, but not for TSR, WACC and MVA. The results revealed that there was a significant positive relationship between the interaction effect of overall financial and non-financial sustainability performance and TQ, as well as EVA, while no significant relationship was observed for TSR, WACC and MVA. The significant positive relationship between the interaction of financial and non-financial sustainability performance and firm performance as measured through TQ and EVA, could have important implications for firms and their stakeholders.

The significant positive relationship between the interaction of financial and non-financial sustainability performance and firm performance, has significance for firms since it indicated that when both financial and non-financial sustainability efforts aligned, complemented and influenced each other, only then firms could experience enhanced firm performance and value creation. This synergy underscores the potential benefits of pursuing a holistic sustainability strategy. Therefore, firms should strategically align financial and non-financial sustainability efforts to harness the significant positive relationship, resolving both aspects

cohesively. Firms that effectively manage both financial and non-financial sustainability can altogether improve their financial and non-financial sustainability, enhance their reputation, fulfil their social responsibility, and promote a corporate culture of integrity and competence.

The results also have significance for a firm's stakeholders, implying that investors and stakeholders may view firms with strong integration of financial and non-financial sustainability performance as more attractive investment opportunities, due to such firms perceived as well-managed and forward-thinkers, enhancing overall confidence.

Individual interactions

For the interaction between the individual financial and non-financial sustainability performance elements, H_{4b} was supported for various of the dependent variables. A discussion of each of the significant relationships follows.

Significant positive relationship

The following interactions had significant positive relationships with specific dependent variables, indicated in brackets:

- Growth opportunities and social performance (EVA)
- Operational efficiency and environmental performance (TQ, MVA and EVA)
- Operational efficiency and social performance (TQ, MVA and EVA)
- Operational efficiency and governance performance (TQ and EVA)

The interaction of growth opportunities and social performance leads to improved firm performance as measured by EVA. Additionally, when better operational efficiency of a firm interacts with enhanced environmental, social and governance performance, it contributes to exceptionally positive firm performance, as indicated by the dependent variables TQ, MVA, and EVA.

Significant negative relationship

The following interactions had significant negative relationships with specific dependent variables, indicated in brackets:

- Growth opportunities and environmental performance (WACC)
- Growth opportunities and environmental performance (TQ)
- Growth opportunities and social performance (TSR)
- Operational efficiency and social performance (TSR)
- Innovation capabilities and governance performance (TSR)

It is evident that an interaction between growth opportunities and environmental performance results in a reduction of a firm's weighted average cost of capital; therefore, indicating a desired outcome.

It is also evident that some interactions between financial and non-financial sustainability performance elements lead to the deterioration of firm performance, as in the case of growth opportunities and environmental and social performance; similarly, with the interaction between operational efficiency and social performance, as well as innovation capabilities and governance performance.

9.3 MAIN CONTRIBUTIONS OF THE STUDY

This study offers a multitude of significant contributions to the research literature field. Firstly, the current study constitutes a significant contribution to the body of knowledge concerning the impact of financial and non-financial sustainability performance on overall firm performance. Furthermore, it contributes by informing all stakeholders about the effect of financial and non-financial sustainability performance on firm performance, individually and in aggregate. Secondly, this study serves as an affirmation of the substantial role that financial sustainability metrics play in amplifying firm performance.

Thirdly, the study discerned the most robust predictor of financial sustainability performance in relation to projecting firm performance. This observation holds true across an array of five distinct firm performance metrics, namely TQ, TSR, WACC, MVA and EVA.

Fourthly, by recognising the bidirectional relationship between financial and non-financial sustainability performance measures, as evidenced by the inclusion of an interaction term in the regression models, this study posits that optimal outcomes in terms of enhanced firm performance and value generation are attainable only when concerted alignment, complementarity and mutual influence exist between efforts directed towards both financial and non-financial sustainability dimensions.

9.4 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study had some limitations and when the findings are interpreted, it should be done within these confines. One of the limitations was that only firms listed on the Johannesburg Stock Exchange (JSE) in South Africa were included. Therefore, care should be taken not to generalise the results beyond the population from which the sample was drawn.

Further research can be conducted to overcome this limitation. For example, firms not listed on the JSE or international firms can be examined. This could contribute to a more comprehensive understanding of what was studied in this research, not generalising the results for only South African-listed firms. In essence, this would broaden the scope of the study to include a more diverse set of firms.

Another recommendation is to test the mediation effect of financial sustainability performance measures on the relationship between non-financial sustainability performance measures and firm performance. Future research could investigate whether the positive impact of non-financial sustainability practices and efforts on firm performance could be explained or influenced by the firm's financial sustainability.

This study explored the two-way interaction terms between combined and individual financial and non-financial sustainability performance measures. However, there is room for further research to investigate more complex relationships in the form of three-way and four-way interaction terms. This can be defined by introducing the product of two or three non-financial/financial sustainability performance measures with one financial/non-financial sustainability performance measure. These analyses may provide a deeper understanding of how various sustainability metrics interact with each and ultimately, affect firm

performance. Adding to this, exploring the joint effect, specifically the dual causality, of each independent variable within the realms of financial and non-financial sustainability elements would constitute a novel contribution to the field.

The study investigated the actual performance of environmental, social and governance individual elements as well as the combined dimension of non-financial sustainability performance. Further research can be done by investigating the actual performance of a firm's environmental, social and governance sustainability, and comparing this performance with the disclosure of its environmental, social and governance initiatives and efforts, investigating impression management practices by firms.

9.5 CONCLUSION

This study investigated the relationship between financial and non-financial sustainability performance and its impact on firm performance. Hypothesis H_1 suggested that the three elements of financial sustainability performance, namely growth opportunities, operational efficiency and innovation capabilities led to enhanced firm performance. Growth opportunities were found to significantly impact TQ and MVA, emphasising the value of strategic investments. Operational efficiency showed a positive relationship with TQ, TSR, WACC, MVA and EVA, underlining the importance of efficient operations. Innovation capabilities affected TQ and WACC, promoting the role of innovation in market value and cost reduction. Hypothesis H_2 explored the impact of non-financial sustainability, indicating no significant relationship between environmental, social and governance elements with firm performance, except for a weak link between governance and EVA. Hypothesis H_3 evaluated the combined impact of both dimensions, revealing financial sustainability's stronger association with firm performance compared with non-financial sustainability. Hypothesis H_4 explored the interaction between the dimensions, individually between the various elements of both financial and non-financial sustainability, as well as in aggregate, highlighting the synergy between aligned financial and non-financial sustainability efforts, leading to enhanced firm performance. The combined interaction between financial and non-financial sustainability was found to significantly impact TQ and EVA, with various significant interactions between individual financial and non-financial sustainability elements. Overall, the study contributes valuable insights into the complex interplay between financial and non-

financial sustainability and their effect on firm performance, urging firms to strategically align these dimensions for optimally enhancing the overall performance of a firm from the view of five performance measures.

Future research avenues could resolve the study's limitations by examining firms not listed on the JSE or international firms, broadening the understanding beyond South African-listed firms. Additionally, investigating whether financial sustainability mediates the positive impact of non-financial sustainability on firm performance could provide deeper insights. Further exploration could involve more complex interactions like three-way and four-way interactions between financial and non-financial sustainability measures. Additionally, researching firms' actual sustainability performance compared with their disclosed initiatives could shed light on impression management practices.

In conclusion, this study underscores the paramount significance of financial sustainability as the cornerstone of overall firm performance, driving the attainment of enhanced shareholder wealth maximisation. However, this pursuit of financial prosperity does not unfold in isolation; rather, interacting with environmental, social and governance elements. The synergy achieved through the optimal interaction between financial and non-financial sustainability elements not only aligns with the views of stakeholder theory but also emerges as a foundation for fostering holistic firm performance. As firms navigate the complex landscape of modernity, it is imperative to recognise that true prosperity arises not from a unidimensional focus on financial sustainability, but from a holistic view, which includes economic, environmental, social and governance considerations. This interaction ultimately charts a course towards enduring success, where shareholder wealth maximisation prospers alongside a legacy of firms also being non-financial sustainable citizens.

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APPENDICES

APPENDIX 1: LIST OF FIRMS INCLUDED IN THE SAMPLE

	Firm name	JSE Ticker symbol	Industry
1	Adcock Ingram Hldgs Ltd	AIP	Health Care
2	Adcorp Holdings Ltd	ADR	Industrials
3	Advtech Ltd	ADH	Consumer Discretionary
4	Aeci Ltd	AFE	Basic Materials
5	African Rainbow Min Ltd	ARI	Basic Materials
6	Altron Ltd	AEL	Technology
7	Alviva Holdings Ltd	AVV	Technology
8	Anglo American Plat Ltd	AMS	Basic Materials
9	Anglo American Plc	AGL	Basic Materials
10	Anglogold Ashanti Ltd	ANG	Basic Materials
11	Anheuser-Busch Inbev Sa	ANH	Consumer Staples
12	Arcelormittal Sa Ltd	ACL	Basic Materials
13	Aspen Pharmacare Hldgs L	APN	Health Care
14	Astral Foods Ltd	ARL	Consumer Staples
15	Aveng Group Ltd	AEG	Industrials
16	Avi Ltd	AVI	Consumer Staples
17	Barloworld Ltd	BAW	Industrials
18	Bell Equipment Ltd	BEL	Industrials
19	Bidvest Ltd	BVT	Industrials
20	Blue Label Telecoms Ltd	BLU	Telecommunication
21	British American Tob Plc	BTI	Consumer Staples
22	Capital & Regional Plc	CRP	Real Estate
23	Capital&Counties Prop Pl	CCO	Real Estate
24	Cashbuild Ltd	CSB	Consumer Discretionary
25	City Lodge Hotels Ltd	CLH	Consumer Discretionary
26	Clicks Group Ltd	CLS	Consumer Staples
27	Datatec Ltd	DTC	Technology
28	Drd Gold Ltd	DRD	Basic Materials
29	Eastern Platinum Ltd	EPS	Basic Materials
30	Emira Property Fund Ltd	EMI	Real Estate
31	Eoh Holdings Ltd	EOH	Technology
32	Exxaro Resources Ltd	EXX	Energy
33	Famous Brands Ltd	FBR	Consumer Discretionary
34	Gemfields Group Ltd	GML	Basic Materials
35	Glencore Plc	GLN	Basic Materials
36	Globe Trade Centre S.A.	GTC	Real Estate

37	Gold Fields Ltd	GFI	Basic Materials
38	Grindrod Ltd	GND	Industrials
39	Growthpoint Prop Ltd	GRT	Real Estate
40	Hammerson Plc	HMN	Real Estate
41	Harmony Gm Co Ltd	HAR	Basic Materials
42	Hudaco Industries Ltd	HDC	Industrials
43	Hulamin Ltd	HLM	Basic Materials
44	Hyprop Inv Ltd	HYP	Real Estate
45	Impala Platinum Hlgs Ltd	IMP	Basic Materials
46	Investec Property Fund L	IPF	Real Estate
47	Invicta Holdings Ltd	IVT	Industrials
48	Kap Industrial Hldgs Ltd	KAP	Industrials
49	Kumba Iron Ore Ltd	KIO	Basic Materials
50	Lewis Group Ltd	LEW	Consumer Discretionary
51	Life Healthc Grp Hldgs L	LHC	Health Care
52	Massmart Holdings Ltd	MSM	Consumer Discretionary
53	Mc Mining Ltd	MCZ	Energy
54	Mediclinic Int Plc	MEI	Health Care
55	Merafe Resources Ltd	MRF	Basic Materials
56	Metair Investments Ltd	MTA	Consumer Discretionary
57	Mondi Plc	MNP	Industrials
58	Mpact Ltd	MPT	Industrials
59	Mr Price Group Ltd	MRP	Consumer Discretionary
60	Mtn Group Ltd	MTN	Telecommunication
61	Murray & Roberts Hldgs	MUR	Industrials
62	Nampak Ltd	NPK	Industrials
63	Naspers Ltd -N-	NPN	Technology
64	Nepi Rockcastle Plc	NRP	Real Estate
65	Netcare Ltd	NTC	Health Care
66	Northam Platinum Hldgs L	NPH	Basic Materials
67	Oceana Group Ltd	OCE	Consumer Staples
68	Octodec Invest Ltd	OCT	Real Estate
69	Omnia Holdings Ltd	OMN	Basic Materials
70	Pan African Resource Plc	PAN	Basic Materials
71	Pick N Pay Stores Ltd	PIK	Consumer Staples
72	Ppc Ltd	PPC	Industrials
73	Raubex Group Ltd	RBX	Industrials
74	Rcl Foods Ltd	RCL	Consumer Staples
75	Rebosis Property Fund Ltd	REB	Real Estate
76	Redefine Properties Ltd	RDF	Real Estate
77	Resilient Reit Ltd	RES	Real Estate
78	Reunert Ltd	RLO	Industrials

79	Royal Bafokeng Platinum	RBP	Basic Materials
80	Sa Corp Real Estate Ltd	SAC	Real Estate
81	Sappi Ltd	SAP	Basic Materials
82	Sasol Ltd	SOL	Basic Materials
83	Shoprite Holdings Ltd	SHP	Consumer Staples
84	Spur Corporation Ltd	SUR	Consumer Discretionary
85	Stefanutti Stck Hldgs Lt	SSK	Industrials
86	Steinhoff Int Hldgs N.V.	SNH	Consumer Discretionary
87	Sun International Ltd	SUI	Consumer Discretionary
88	Super Group Ltd	SPG	Industrials
89	Telkom Sa Soc Ltd	TKG	Telecommunication
90	The Foschini Group Ltd	TFG	Consumer Discretionary
91	The Spar Group Ltd	SPP	Consumer Staples
92	Tiger Brands Ltd	TBS	Consumer Staples
93	Tongaat Hulett Ltd	TON	Consumer Staples
94	Trencor Ltd	TRE	Industrials
95	Truworths Int Ltd	TRU	Consumer Discretionary
96	Vodacom Group Ltd	VOD	Telecommunication
97	Vukile Property Fund Ltd	VKE	Real Estate
98	Wesizwe Platinum Ltd	WEZ	Basic Materials
99	Wilson Bayly Hlm-Ovc Ltd	WBO	Industrials
100	Woolworths Holdings Ltd	WHL	Consumer Discretionary

APPENDIX 2: EXAMPLE OF CALCULATION OF ESG PILLAR SCORES

Pillar	Category	Category Scores (example)	Category weights	Sum of category weights	New category weights	Formula: Pillar Scores	= Pillar Scores
Environmental	Emissions	98	15	44	34 (15/44)	98 * 34	33.32
Environmental	Resource use	97	15		34 (15/44)	97 * 34	32.98
Environmental	Innovation	85	14		32 (14/44)	85 * 32	27.20
Total							93.50
Social	Community	89	9	31	29 (9/31)	89 * 29	25.81
Social	Human rights	95	5		16 (5/31)	95 * 16	15.20
Social	Product responsibility	92	4		13 (4/31)	92 * 13	11.96
Social	Workforce	98	13		42 (13/31)	98 * 42	41.16
Total							94.13
Governance	Shareholders	73	5	25	20 (5/25)	73 * 20	14.60
Governance	CSR strategy	34	3		12 (3/25)	34 * 12	4.08
Governance	Management	19	17		68 (17/25)	19 * 68	12.92
Total				100			31.60

APPENDIX 3: ORDINARY LEAST SQUARES AND HOMOSCEDASTICITY TESTING (STEP 1 AND 2) RESULTS:

	Equation	Step 1 (OLS)	Step 2 (Homoscedasticity)
1	TQ and Growth Opportunities	Durbin-Watson = 0.335807[26]	Cross-section (firm): p=0.0000[27] Period: p=1.0000
2	TQ and Operational Efficiency	Durbin-Watson = 0.247688[19]	Cross-section (firm): p=0.0000[20] Period: p=1.0000
3	TSR and Growth Opportunities	Durbin-Watson = 1.848262	Cross-section (firm): p=0.0000[20] Period: p=1.0000
4	TSR and Operational Efficiency	Durbin-Watson = 1.851033	Cross-section (firm): p=0.0000[20] Period: p=1.0000
5	WACC and Growth Opportunities	Durbin-Watson = 1.129535[19]	"Near singular matrix"[28]
6	WACC and Operational Efficiency	Durbin-Watson = 1.102549[19]	Cross-section (firm): p=0.0000[20] Period: p=1.0000
7	MVA and Growth Opportunities	Durbin-Watson = 0.632897[19]	"Near singular matrix"[27]
8	MVA and Operational Efficiency	Durbin-Watson = 0.431157[19]	Cross-section (firm): p=0.0000[20] Period: p=1.0000
9	EVA and Growth Opportunities	Durbin-Watson = 0.863162[19]	Cross-section (firm): p=0.0000[20] Period: p=1.0000
10	EVA and Operational Efficiency	Durbin-Watson = 0.885592[19]	Cross-section (firm): p=0.0000[20] Period: p=1.0000

[26] The results indicated the presence of autocorrelation (also called serial correlation in the data) as indicated by the Durbin-Watson statistic (not within the 1.5 to 2.5 range). Therefore, continue to Steps 3 and 4.
[27] Null hypothesis was rejected; therefore, the residuals were heteroskedastic for the cross-section (firm) dimension ($p<0.05$), but not for the period dimension ($p>0.05$).
[28] The error "near singular matrix" indicated high multicollinearity between some of the variables. Variables included in the regression cannot be exactly collinear or nearly collinear. The correlation matrix should be checked to identify which combinations of independent variables have a correlation value of above 0.8, which display potential multicollinearity.

APPENDIX 4: RANDOM AND FIXED-EFFECT MODELLING (STEP 3) AND PERIOD SUR AND WHITE (DIAGONAL) (STEP 4) RESULTS:

	Equation	Step 3 (Hausman Test)	Step 4 (Period SUR and White Diagonal)
1	TQ and Growth Opportunities	p<0.001 (fixed model applies); Durbin-Watson = 0.844008[29]	Durbin-Watson = 1.673977
2	TQ and Operational Efficiency	p<0.001 (fixed model applies); Durbin-Watson = 0.844618[21]	Durbin-Watson = 1.671611
3	TSR and Growth Opportunities	N/A[30]	N/A[29]
4	TSR and Operational Efficiency	N/A[29]	N/A[29]
5	WACC and Growth Opportunities	p>0.1 (random model applies); Durbin-Watson = 1.377361[31]	Durbin-Watson = 1.873782
6	WACC and Operational Efficiency	p<0.001 (fixed model applies); Durbin-Watson = 1.530262	N/A[29]
7	MVA and Growth Opportunities	p<0.001 (fixed model applies); Durbin-Watson = 0.980585[21]	Durbin-Watson = 1.834632
8	MVA and Operational Efficiency	p<0.001 (fixed model applies);	Durbin-Watson = 1.5725559

[29] Fixed model did not adequately resolve autocorrelation; therefore, still presence of autocorrelation) as indicated by the Durbin-Watson statistic (not within the 1.5 to 2.5 range).
[30] As Durbin-Watson is within the 1.5 to 2.5 range, there is no need to do additional tests for autocorrelation (Steps 3 and 4).
[31] Random model did not adequately resolve autocorrelation; therefore, still presence of autocorrelation) as indicated by the Durbin-Watson statistic (not within the 1.5 to 2.5 range).

		Durbin-Watson = 0.945075[21]	
9	EVA and Growth Opportunities	p<0.001 (fixed model applies); Durbin-Watson =1.713854	
10	EVA and Operational Efficiency	p<0.001 (fixed model applies); Durbin-Watson = 1.484164[21]	Durbin-Watson = 1.948735