

Corporate entrepreneurship and governance structures in South African listed companies

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*A research report submitted to the Faculty of Commerce, Law and Management,
University of the Witwatersrand, in partial fulfilment of the requirements for the degree of
Master of Management in Entrepreneurship and New Venture Creation*

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Date: 13/03/2021

ABSTRACT

Entrepreneurship scholars tend to agree that the governance structures of a company influence its corporate entrepreneurial efforts and activities. Empirical studies have certainly supported this but have limited application to Africa as few studies have been conducted under said context.

This study empirically investigated the relationship between corporate governance structures and the corporate entrepreneurial efforts of publicly listed companies in South Africa.

The study made use of secondary data sources including CIPC, IRESS and company annual reports. This was done to save time, costs and for ease of access to data. Multiple regression analysis was then used to test the hypotheses.

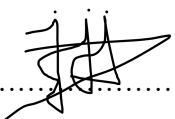
Following an investigation of 119 JSE listed firms, regression results revealed that a larger Board Size is positively associated with corporate entrepreneurship (CE) in South African (SA) registered firms as measured by research and development (R&D) expenditure. These results highlight the importance of a particular governance structure in relation to efforts to create sustainable long-term value and competitive advantages. Additionally, the findings provide key insights to scholars and policymakers where governance issues in an emerging market context serve as a catalyst for corporate entrepreneurial activities.

Key words – intrapreneurship; board structure; research and development; intellectual property rights, corporate entrepreneurship

DECLARATION

I, __Tadiwanshe Gaylord Zhanje____, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the Field of Entrepreneurship at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Tadiwanashe Gaylord Zhanje (1244066)

Signed at

On the....**31st**.. day of **March** 20**23**.

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CHAPTER 1: INTRODUCTION

Chapter 1 introduces the study. It explains the contextual basis, the theoretical foundation which underpins the research, the motivation for the study as well as the problem statement. It also explains the research purpose and aim of the study and gives a broad overview of the conceptual definition of terms. Finally, the chapter discusses the intended contributions, sets out its delimitations, outlines assumptions that were made and concludes with a roadmap of the report structure.

Recent studies have strongly indicated that the management of entrepreneurial efforts within large firms is much harder than otherwise expected (Choi, Lee & Williams 2011; Venter & Urban, 2015; Classen, Carree, Van Gils & Peters, 2014). Entrepreneurial efforts and activities at a firm/company level are positively associated with firm performance. Good corporate governance may significantly contribute to a company's ability to increase its efficiency and competitive advantage. Over the past few years, there has been an increase in both academic and industry interest in corporate governance standards, particularly among publicly traded corporations (Swartz, 2017). In South Africa, poor corporate governance practices were major factors to blame for the scandalous stories reported by the media of high-profile companies. These included the recent corporate failures of companies such as the VBS Mutual Bank, Steinhoff International corporate fraud, many of the Gupta owned companies, as well as several state-owned enterprises (Rossouw & Styan, 2019).

This research report investigates the relationship between corporate entrepreneurship and governance structures among South African registered listed firms. It analyses this by measuring the Intellectual Property (IP) output of the firms and the Research and Development (R&D) expenses incurred by companies as indicators of corporate entrepreneurship intensity. It answers the question about what form of relationship exists between certain corporate governance structures and corporate entrepreneurship intensity amongst the Johannesburg Stock Exchange (JSE) listed firms in South Africa (be it positive or negative, significant or insignificant).

Corporate entrepreneurship, the process of 'starting a business within an already established business' is necessitated by a company's drive to stay competitive within the market place and identify new avenues of revenue (Barreira, Botha, Oosthuizen, & Urban, 2016). Businesses focused on surviving the harsh socio-economic conditions present in emerging markets

necessitate flexibility in their conduct if they wish to effectively respond to the evident varied shifting stimuli. The harsh ever-changing conditions, and instinctive will to survive and thrive has pushed emerging market firms (EMFs) to adopt entrepreneurial tactics designed to promote firm performance (including growth, increasing internal innovations, ensuring survivability and increasing competitive advantage) (Hornsby et al., 2013; Morris, Kuratko & Covin, 2010). Some of those strategies entail top management leadership styles, specifically and most relevant to this study, corporate governance.

Thus, this study investigates the relationships between corporate governance structures and corporate entrepreneurship intensity (again as measured by Intellectual Property output and R&D expenditure) within the emerging markets context.

1.1 Context of the study

South Africa is in a unique position among Sub-Saharan African nations. It could be defined as a developed nation when one looks at its advanced infrastructure (Vihari & Rao, 2017), yet at the same time, the country has undeniable and prevalent socio-economic issues. The significant wealth gap is a favoured example of this. For much of the last decade, the country has faced increased unemployment levels, poor economic performance, questionable legal/regulatory frameworks, corruption at both micro and macro level, reduced investor confidence and flailing attempts by the government to intervene and save failing enterprises (mostly SOEs).

According to Thurnik (2009b), the "entrepreneurial economy" has risen significantly among emerging markets as a response to poor performance and low survivability levels amongst both new and established firms. The entrepreneurial economy has been defined as an economy where economic performance is related to distributed innovation, and the emergence and growth of innovative ventures (Kirchhoff, 1994; Audretsch & Thurik, 2000; Audretsch & Thurik, 2001). As such, entrepreneurial efforts within companies should be considered more seriously within the broader framework around survivability and growth prospects.

South Africa uses the King Report IV on Corporate Governance Codes (a principle-based system) which aims at improving governance amongst registered companies in the country. It is in this regard that this research seeks to understand the relationship between governance structures and corporate entrepreneurship.

Many scholars have concluded that entrepreneurship and firm performance are positively connected and interact with one another to assist an organisation to not only survive but thrive (Urban & Wood, 2015; Wales, 2015). The two acts in a complementary manner and the combination has been recognised as a pertinent component to organisational success and sustainability in the harsh socio-economic conditions that characterise most emerging markets (Dess & Lumpkin, 2005). As a result, there is a growing trend by top management and controlling stakeholders to adopt corporate entrepreneurial activity as a possible strategy to drive increased performance levels (Covin & Miller, 2013). Urban (2016), as well as James, Hayton and Cacciotti (2013) have suggested that in order to survive, firms should consider shifting from an employee culture to a more entrepreneurially minded one if sustained success is sought (Hagel, 2016). The boards of directors are the teams of persons bestowed with the fiduciary responsibilities of managing, guiding and directing a company (Abdullah, 2004).

Considering the fact that the board of directors has fiduciary duties in relation to the firm, the study argues that if the board executes its responsibilities effectively, the company's value and performance will likely increase. The shareholders, too (who elect the board), have a responsibility to act in the firm's best interest hence the argument is put forward that wise director allocations by the shareholders should also increase the company's performance by extension. South Africa thus presents an exceptional setting in which to investigate the aforementioned issues. As neither a Third World nor a First World country, South Africa contains many different characteristics from those in Anglo-Saxon nations or rapidly developing Asian countries where most of the studies in this topic have taken place.

1.2 Theoretical Foundation

This study integrates multiple theories. Firstly, Corporate Entrepreneurship (CE), as a theory, is briefly explained to establish how and why firms should explore and pursue new ideas (as a means of gaining/maintaining a competitive advantage).

Corporate entrepreneurship (CE) could be theorised as an internal vision directed companywide to embrace entrepreneurial behaviour that recognises and exploits opportunities to renew the company and extend the scope of operations (Ireland, Covin & Kuratko, 2009). Chen (2020), defined it as radical product innovation, risk-taking and proactiveness. It is a blend of human behaviour as well as individual, organisational and environmental elements producing specific outcomes (Antoncic & Hisrich, 2001; Moon et al., 2016). "Strategic renewal

involves strategy reformulation, reorganization and organisational change leading to new combinations of resources, often resulting in competitive advantage” (de Villers-Scheepers, 2012, p. 413). This, of course, may occur in already established businesses, though it is not always easy (Moon et al., 2016).

“Researchers have conceptualised CE as the presence of innovation plus the presence of the objective of rejuvenating or purposefully redefining companies, markets, or industries in order to create or sustain competitive superiority” (Urban, et al., 2015, p. 56) CE is important as it increases productivity amongst employees, makes more resources available, makes the company more sustainable thereby increasing chances of survival and offers an opportunity for the establishment of competitive advantages which can be a source of massive profits (de Villers-Scheepers, 2012). CE thus is the dependent variable in this study.

For the purposes of this research study, C.E. is defined as the innovativeness of the company as shown in the research and development efforts and intellectual property statistics. The presented definition is consistent with past academic investigations (Chen, 2020). It encompasses entrepreneurial behaviour within established (mid-sized and large) businesses within the South African context. The theory here is that if entrepreneurial competence (the ability to recognise and envision taking advantage of opportunities) is combined with entrepreneurial commitment (a dedication of time, resources, and energy necessary to bring the enterprise to initiation and fruition), the result will be effective entrepreneurial efforts with real-world results. The real world results that this study examines are in the form of research and development efforts (usually via budgetary commitments), patent applications and granted patents (in a particular year).

According to the agency theory, managers frequently embrace self-serving and individualistic behaviours that are detrimental to the interests of shareholders. (Brossard *et al.*, 2013; Wiseman *et al.*, 2012). They are believed to be risk averse while shareholders (often with diverse investment portfolios) have a much higher tolerance for risk, especially when healthy returns are a possibility hence there is evidently a difference in goals between the two groups which has the potential to result in agency costs when managers participate in said opportunistic behaviours at the expense of the shareholders’ goal of maximising wealth and long-term sustainability (Chen *et al.*, 2014b). Temporary growth is maximised in ways that reduce the managers’ risk to their position within the organisation, security, wealth and status (Brossard *et al.*, 2013).

It is acknowledged that such assumptions may not be valid in all contexts. Nations with high concentrations of ownership see a conflict of interests amongst the shareholders. Shareholders with the highest controlling power will disproportionately extract benefits from the corporate governance structure at the expense of corporate entrepreneurship (Young *et al.*, 2008). Contextually speaking, this thus possess a risk to CE as it could result in less resource allocation towards efforts that will maximise the firms' long-term growth and gain of competitive advantages. This naturally leads to tensions between the majority and minority shareholders. This could present itself as a majority shareholder appointing an incompetent family member to a managerial role within the company, which can lead to poor leadership within the firm inhibiting corporate entrepreneurship, ultimately resulting in less innovation and lower survivability chances. The majority shareholders and their appointees could end up engaging in trades that are self-interested, designed to maximise their personal or political goals at the expense of creating real financial value for the firm or other stakeholders (Chen *et al.*, 2014). This problem is especially prevalent in emerging countries where weak governance structures lack internal or external mechanisms to mitigate this potential conflict (Young *et al.*, 2008).

The agency theory thus reports that managers and shareholders are likely to adopt different strategies or attitudes towards CE because of the clashing goals. Shareholders are likely to view innovation, product development and expansion into different markets as vital strategies that will maximise growth in the long term. Managers, on the other hand, could view CE strategies as risky and the investment into such developments will likely reduce short term earnings hence adverse to their own goals (Zahra, 1996). Here, it becomes clear that the board of directors must make sure that the interests of all parties are appropriately managed. According to the agency theory, the board is the main steward of shareholders' wealth (Fama & Jensen, 1983). Companies backed by institutional investors and strong board independence have proven better equipped in monitoring and controlling management (Lie *et al.*, 2014) and this results in improved CE capabilities (more patents, more research and development effort) (Choi *et al.*, 2012). Agency theory thus postulates that the higher levels of ownership concentration and/or insider ownership can be effective tools in reducing the problems associated with agency. Shareholders are allowed to monitor management, ensure they pursue strategies that will maximise value over time, and afford the board of directors as guardians of the wealth (Fama & Jensen, 1983). It is thus the backing of the hypothesis that better governed firms can drive CE.

According to the resource dependence theory, a corporation operates in an open system and is heavily dependent on its surroundings (Chen, 2020). It suggests that the board of directors serves to extract resources from this external environment in order to manage the firm's dependency (Pfeffer & Salancik, 1978). The board members are expected to bring the resources and connections to which they have access to be used in the promotion of the firm's goals. Pfeffer and Salancik (1978b) believed that when a company designates an individual to its board of directors, the said individual is expected to support the company and its goals, completely take on the responsibility for the company's problems and must positively present it to potential investors.

The resource dependence theory also considers the actual board composition, focusing on the independence levels afforded it, ownership diversity, individual members' experience, skills as well as personal networks (Bertoni *et al.*, 2014; Tong *et al.*, 2013). In order to understand how the boards of directors and other types of investors may motivate corporate entrepreneurial endeavours within the South African setting, this research study blends the theories of corporate entrepreneurship, agency, and resource dependence. As mentioned earlier, such results are measured as the research and development efforts, patent applications and granted patents over a given year.

1.3 Motivation for the study

Globalisation has created intensified global competition and a rapid technological advancement drive (Urban & Venter, 2015). Companies need to adapt, and one of the strategies they can implement to survive and thrive is a return to their entrepreneurial roots. The entrepreneurial spirit within organisations seemingly diminishes over time, often through bureaucracy, complicated internal processes/procedures and too many hierarchical levels as a natural result of the organisation getting too large. Thirteen out of the top 20 New York Stock exchange companies were start-ups less than a decade ago (Funk, 2019). This shows most new innovations (and by extension, their value) come from new companies where the entrepreneurial spirit is still high. The need to develop and nurture entrepreneurial behaviours and attitudes within the organisational structures then becomes an imperative strategy in survival (Urban & Venter, 2015). In achieving this, sound leadership and governance must be in place that will stimulate the organisation, as a whole, towards the goal.

The problem South Africa faces is that poor corporate governance has resulted in it being less competitive in the new globalised world. According to the Department of Trade and Industry (2018), of the 40,131 patents registered between 2005 and 2015, less than 10% were by applicants with a South African address. This could point to South African companies not prioritising patenting or investment into such activities, which results in lost value from lack of investment in competitive advantage capabilities. This is a problem for less innovative firms are less competitive globally. South Africa is then at risk of losing relevancy within the global trade (within limits of course). With companies delisting from the JSE on near monthly basis, this problem is fast expanding (Buthelezi, 2022). Less trade and global competitiveness could further result in reduced Gross Domestic Product (GDP) for the country, which will further the economic stresses it is currently facing (Martinez & Serve, 2016). A root cause analysis of corporate entrepreneurship and governance structures could thus influence companies on optimal structures to employ in order to maintain high levels of innovation, thus maintaining or even growing more competitive within the global marketplace.

It is on this basis that the goal of this study, is to better investigate the relationship between corporate governance structures and corporate entrepreneurship (be they positive or negative) of companies listed on the JSE. Your title is Corporate entrepreneurship and governance structures in South African listed companies so be consistent and write it as such instead of changing it to corporate governance structures and corporate entrepreneurship intensity. While research into ownership and board structures (elements of corporate governance) has focused primarily on companies listed in developed economies like the United States (US) and Europe, this study examines the constructs from a South African perspective (specifically JSE listed firms) (Zeng & Lin, 2011; Abdullah, 2004, Azeez, 2015; Chen *et al.*, 2014). There has not been much research conducted within this context. Thus, the findings of this study will help improve our collective understanding of the relationship between corporate governance structures and corporate entrepreneurship amongst JSE listed firms.

1.4 Research objective and questions

The objective of this study is to investigate the relationship between Corporate Governance structures that potentially drive or inhibit Corporate Entrepreneurship in South African registered firms by adopting a multi-theoretical approach through application of the corporate entrepreneurship theory (Urban & Venter, 2015), agency

theory (Jensen & Meckling, 1976) and the resource dependence theory (Pfeffer & Salancik, 1978). The research questions this study looked to answer was:

- what relationship exists between CG structures and CE amongst JSE listed firms in South Africa?

In light of the discussion so far, and a prelude of that to follow, this research study proposed the following research questions:

1. What is the nature of the relationship between domestic non-state ownership of JSE listed firms and corporate entrepreneurship efforts?
2. What is the nature of the relationship between foreign ownership of JSE listed firms and corporate entrepreneurship efforts?
3. What is the nature of the relationship between managerial ownership of JSE listed firms and corporate entrepreneurship efforts?
4. What is the nature of the relationship between a larger board size amongst JSE listed firms and corporate entrepreneurship efforts?
5. What kind of connection exists between CE initiatives and the proportion of independent directors on the boards of directors of JSE-listed companies?

1.5 Conceptual definition of terms

- *Domestic non-state ownership* – shareholders that are not registered under a nominee, but instead with a South African address. For the purpose of this study, this includes nominees too. Nominees are beneficial shareholders of stock (usually not the purchasers but those who will derive benefit from owning said stock). It may include investors who are considered the corporate founders (individuals who established the company) and their next of kin and/or partners/associates, domestic firms, and institutional investors (Chen, 2020). Of vital concern here is ensuring the address of the owner is one found within the Republic of South Africa and that they are not a shareholder representing any organ of the state.
- *Foreign ownership* – In the form of Foreign Direct Investment (FDI) and as defined by the Organisation for Economic Co-operation and Development (OECD) (2019, p.36) as “...cross-border investment by a resident entity in one economy with the objective of obtaining a lasting interest in an enterprise resident in another economy”. In the context of this investigation, foreign ownership is attributed to an individual with at least

permanent residency in another country, or a firm formally registered in another country, who are significant shareholders in the company under study (formally registered as per South Africa's laws).

- *Managerial ownership* – This looks at companies where stock-based compensation schemes are available and practised (usually as a means of aligning the shareholders and managers' interests). Managerial ownership is the total shareholding (calculated as a percent) held by a company's top management (Chen *et al.*, 2014). As related to this study, this includes managers who accept a significant portion of their income through stock holdings in the firm (thereby making them shareholders in the firm and a manager simultaneously).
- *Board size* – Board size is the sum figure of directors on the board of directors (De Cleyn & Braet, 2012). For the purpose of this study, this means the actual number of board members (larger boards being assumed to have better access to critical resources needed for corporate entrepreneurial efforts).
 - Board size and managerial ownership are indeed distinct. Board size is number of individuals on a board. Managerial ownership is just the % of shares owned by the executive. Such shares were minimal and never had any controlling interest (often used as a tax prevention strategy or remuneration incentive, not to be confused with tax avoidance).
- *Independent ownership* – also known as independent director ratio, is the proportion of independent directors to the total number of directors on the Board (Chen, 2020). For the purposes of this study, the aforementioned definition is applied and examine the total number of independent directors on the company's board of directors (these parties often play a predominantly monitoring and consulting role).
- *Research and development intensity* – is a measure of corporate entrepreneurship presented by the ratio of the firm's annual R&D investments (ZAR) to its opening income (Zhang *et al.*, 2014; Dong & Gou, 2010). For the purposes of this study and stated more simply, this focuses on the research and development budget as a percentage of the company's annual budget of the year under study.
- *Patent applications* – as defined in the Intellectual Property Laws Amendment Act of 2013. "A patent is an exclusive right granted for an *invention*, which is a product or process that provides a new way of doing something, or offers a new technical solution to a problem" (Urban, et al., 2015).

- *Granted patents* – as defined in the Intellectual Property Laws Amendment Act of 2013. ‘When a patent is granted, a patentee is given the sole right to exclude all other parties/persons from making, using, exercising, disposing or importing the invention in question. This effectively allows them to enjoy the whole profit and advantage accrued as a result of the invention’ (Dean & Dyer, 2014). In relation to the current study, it will be the sum number of patents in favour of the firms under study (Chen X. , 2020).

1.6 Contribution of the study

This research study is motivated to fill the knowledge gap pertaining specifically to the lack of empirical investigation on corporate entrepreneurship and governance structures in South African listed companies. Most of the previous research has focused on developed economies at the expense of an emerging markets context (Burton *et al.*, 2007; Zeng & Lin, 2011; Abdullah, 2004; Azeez, 2015; Chen *et al.*, 2014).

Africa is worth focusing research efforts on as it carries several emerging economies such as Ghana, South Africa, Nigeria, Mauritius, Rwanda and Botswana (Hoskisson *et al.*, 2000). The focus on CG is especially relevant as companies in emerging economies have been shown to be poorly and inefficiently governed (Bloom *et al.*, 2012). This obviously has the damaging knock-on effect on firm performance which results in lower survivability and more unsatisfactory financial performance by such firms. The economy as a whole suffers, and this perpetuates the cycle of ever-increasing unemployment levels, low growth rates, less innovations coming out of Africa and further dependence on the developed world for aid.

Further, a critical analysis of the literature thus far (when examining entrepreneurial orientation within established firms) presents conflicting information. Some findings are in support that strong entrepreneurial efforts lead to high performance (Slater & Naver, 2000) and others have come to an opposite finding or no positive relationship between the two (Lee *et al.*, 2001). Most of the research has also almost always excluded African nations. An empirical investigation will be valuable to corporate scholars or practitioners within the African context. This is particularly valid when one considers the fact that the effective diffusion of organisational innovation can lead to economic output increase, higher production capacity and create employment opportunities (Kajalo *et al.*, 2016; Urban, 2016).

Finally, Luthy (p.132, 1998) believes that intellectual capital is "becoming the preeminent resource for creating economic wealth". The research report adds to the current body of

knowledge by testing relationships between CG and CE, and by offering potential explanations at the end as to why some firms have higher levels of CE than others. Previous investigations (Bena *et al.*, 2014; Dong & Gou, 2010; De Cleyn, 2012) have made it clear that CE is vital for firm performance, survivability and growth, deeper knowledge on what influences/encourages top management to promote CE levels within the organisation (or even what lowers it) is of great value to CE literature. This research could add to the CG literature by investigating the relationships between particular governance structures (e.g., Ownership structures and Board composition) and risk taking, proactiveness or innovation.

By investigating the influence of CG for CE in the South African context, the research may also contribute to South African small firm literature. Agency theory problems seem to not be as prevalent in small firms (due in part because the manager/agent is, more often than not, also the owner/principal). Sometimes though, opportunistic owners fall into a conflict of interest against minority shareholders. This investigation thus examines the applicability of the research on large firms (in terms of founders and managerial ownership) to the South African publicly listed firm context.

Finally, the research could have practical, academic as well as managerial implications since its findings could be used to assist scholars and/or practitioners in comprehension on which are the most important antecedents of CE or at least better grasp the level of emphasis that should ideally go into each, especially when the goal is increasing the organisational levels of CE, performance, sustainability and growth.

1.7 Delimitations of the study

Black Economic Empowerment (BEE) shareholding have been excluded from this study. This is because not all companies provide information regarding their BEE shareholders. Secondly, in order to assure a more accurate account of the percentage of shares held by the BEE shareholder, the BEE scorecards for each company would need to be obtained for the entire period under investigation which would be very difficult.

This study also did not include Pension or Private funds nor Institutional investors in its analysis of shareholders of given firms. This is mostly because the database used does not supply the addresses of these, so ascertaining which category they would fall under for the purposes of the study would be very difficult to verify.

In assessing entrepreneurial activity, the study excluded other popular measures such as the ENTRESALE instrument (Miller & Friesen, 1982), the intrapreneurial assessment instrument (IAI) developed by Kuratko (1990) and later changed to the corporate entrepreneurship assessment instrument (CEAI), nor the Entrepreneurial Performance Index as developed by Morris (1998). This is because this study made use of secondary data. Time, cost and efficiency limitations necessitate the use of this data source as it is readily available and can be collected in a highly structured way.

1.8 Assumptions

Assumptions applied:

- 1) An implicit assumption in comparative entrepreneurship has been that corporate entrepreneurship is a distinct phenomenon, apart from innovation.
- 2) If a firm is listed on the Johannesburg Stock Exchange, it is assumed that the firm is a South African firm.
- 3) The financial market of South Africa is well developed and highly liquid, allowing for easy movement of capital (allowing for investment commitments to be met hindrance free).

1.9 Report structure

The study is presented in logical progression as it builds up to addressing the research problem and objectives. It starts with a broad literature review based on the field of corporate entrepreneurship and corporate governance theories. Thereafter, the research methodology is explained in full detail, followed by the findings of the study as per the data analysis. After that, a discussion of the results is offered, and the study rounds up with conclusions and recommendations.

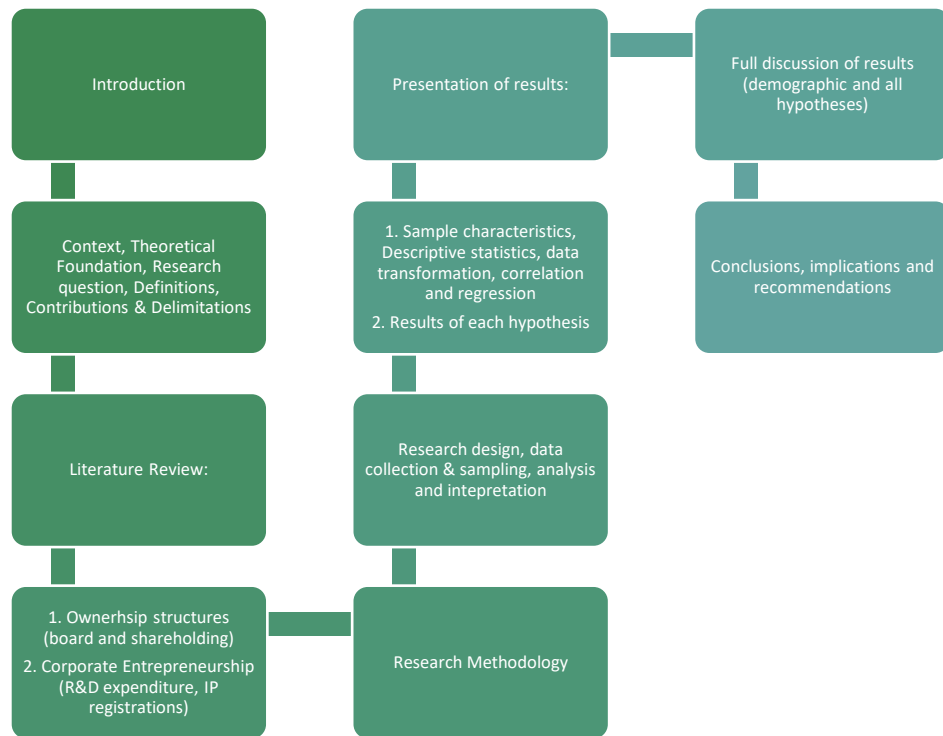


Figure 1: Report Structure

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The first section of this chapter gives a brief discussion of corporate governance's importance and significance in fostering corporate entrepreneurship as well as why this is good for a company. The next section dives into the actual corporate governance elements that this study focuses on, and details what prior studies have found and their significance. This then forms the basis for the hypotheses to be tested against the data analysis detailed in Chapter 4. The chapter ends with a conclusion of the literature review and introduces the research methodology to follow.

2.2 Background discussion

The relationship between corporate entrepreneurship and corporate governance has attracted a lot of attention from researchers, scholars and the wide-ranging civic community for many years now, with an intensified interest in the past few years following the failures of large corporate firms such as Enron, Satyam, Cadbury, Wal-Mart, Xerox and Steinhoff (Rossouw & Styan, 2018). Corporate Governance has been articulated as a form of supervision, wherein an organisation is monitored and controlled in a strict manner so as to prevent operational inefficiencies and maximise 'long term positive outcomes for all relevant stakeholders' (Ziyae, 2018). This of course is the duty and exclusive responsibility of the company's top leadership. This study investigates each in turn, namely, the shareholding structure and the company leaders.

Corporate entrepreneurship could be considered as a firm's innovation activities that encompass the usual tenets of any entrepreneurial activity including taking and managing risk, taking advantage of profitable market opportunities (often by leveraging underutilized internal and external resources) and diversification of market offerings (Ziyae, 2018). There are infinite opportunities available to leverage internal entrepreneurship in any organisation at all times, which are accrued in a pool of unexhausted assets. Directing investment and company efforts towards building internal knowledge and developing employee rewards for such behaviour is a common tactic employed to stimulate creativity within the company (Covin & Miller, 2014). Cullen *et al.* (2014) resolved that the corporate structure of a company can be used to relieve pressure associated with connecting entrepreneurial talent with large scale finance (necessary as development costs are high). They further stressed the importance of maintaining a high

sensitivity to market gaps and opportunities as the core factor in promoting entrepreneurial activities amongst the employees.

A number of current and past researchers propose an equally large array of advice around creating and maintaining entrepreneurial systems (Covin & Miller, 2014). This just shows that this field is still new and no clear consensus has yet been reached. The elements of innovation were investigated in a study by Krapez *et al.* (2012) including “organisational culture, values and reward system; law; taxes and social contributions; bureaucratic obstacles; human resources; and favourable bank loans, bank guarantees, investment and so on” (Ziyae, 2018, p. 348). Alvarez *et al.* (2013) believed that organisational flexibility, opportunity recognition and a business’s ability to start entrepreneurial activities is crucial to increase entrepreneurial behaviour. This study hinged on understanding what relationship particular corporate governance structures have in relation to corporate entrepreneurship.

As stated earlier, a firm’s vision and strategy are almost exclusively developed and given life (through an implementation plan) by the Board. ‘The shareholders, directors and executives are the three major forces that are responsible for determining corporate direction and action’ (Li, Terjesen, & Umans, 2018). ‘The main goal of corporate governance is to lessen or eliminate the agency issues brought on by the division of ownership and power, as well as deficiencies in monitoring’ (implicitly highlighting the importance of the Board) (Chen X. , 2020). A board of directors is usually ‘composed of both executive and non-executive directors, whose individual differences and unique backgrounds, experiences and skill may lead to diversity in perspectives’ (Cassim, Cassim, Jooste, Shev, & Yeats, 2018).

2.3 Corporate entrepreneurship

Corporate Entrepreneurship is also known as “intrapreneurship and corporate venturing” seek to use creativity, innovation and risk-taking in established medium to large organisations (Urban, et al., 2015). Examples of such innovations include ‘new products, services, administrative systems, plans or programs’ (Chen X. , 2020). It is believed that CE can be used strategically to improve firm performance by creating more sustainable competitive advantages (Tribbitt & Yang, 2017). CE has also been described as the ‘coordinated efforts towards entrepreneurship as an overarching strategic approach in an organisation’s daily activities’ (Kreiser P. , Kuratko, Covin, Ireland, & Hornsby, 2019). Finally, CE could also be considered as any and all ‘entrepreneurial efforts or new ventures pursued by an established firm in

fulfilment of its organisational plan and vision' (Abou-Moghli & Al-Abdallah, 2018). It is then clear that such activities are deliberate, architected and pursued with endorsement (including allocating time, resources and personnel so such activities). For the purposes of this research report, corporate entrepreneurship connoted innovativeness of the firm as reflected in its research and development expenditure and patent registration data.

An ever-increasing amount of literature, both theoretical and empirical, are emphasising the importance of expenditure on research and development in promoting sustainable economic growth (Adedoyin, Bekun & Alola, 2019). Freimane and Balina (2016) found that companies wishing to achieve increased levels of sustainability and competitive advantages over time tend to commit huge investments in R&D expenditure. As defined in the Frascati Manual (OECD, 2002, p.14), "Research and experimental Development (R&D) comprise creative work undertaken on a systemic basis in order to increase the stock of knowledge to devise new applications." This term includes all fields of sciences, engineering, social sciences and humanities. It covers three main activities: basic research, applied research and experimental development (Gaillard, 2010). Thus, investment in R&D expenditure could be considered a commitment towards technology, innovation and stock of knowledge to be leveraged for value creation (Adedoyin, Bekun & Alola, 2019). Countries that invest more in R&D expenditure are considered to have better economic performance and a robust value addition (Gumus & Celikay, 2015). It is on this basis that this study investigates a company's R&D commitment as it is an indicator of how seriously it considers innovation and long-term value creation/addition.

Intellectual property (almost always the result of successful R&D) is protected by patenting the innovative product. A patent is a statutory monopoly right for the protection of inventions (say, as a result of successful R&D) (Patents Act NO. 57 of 1978). Section 25 (1) of the Patent act provides; "a patent may be granted for any new invention which involves an inventive step and which is capable of being used or applied in trade of industry or agriculture". According to *Aerotel Ltd v Telco Holdings Ltd* (2006) EWCA Civ 1371; "a patent after all is to a legal monopoly over some commercial activity carried out by human beings such as making or dealing in goods or carrying out a process". This is a means of offering protection to a company or individual in possession of it against imitation by competitors (thereby increasing the company's profits as it has a market control of the product in question). Intellectual property rights are thus obviously important and this research study examined patent registrations of the

companies under study as it too indicates a company's interest in not only developing innovative products (through R&D) but in protecting them (patent registration) thereby ensuring it gains a competitive advantage reward for its investments.

2.4 Corporate governance structures

There are two governance structures that this study focused on; namely, ownership and Board structures. The ownership structures (domestic non-state, managerial and foreign) fit in the larger picture in that they examine the various levels of shareholding of a company. As discussed below, this shareholding dictates who is in control, what their intentions are for the company and the resultant actions of those intentions (for example, valuing or not valuing investment into R&D or prioritising patenting as a form of value creation/addition). The board structures related to size and ratio of non-executive directors as a means of accounting for such differences and their potential relationship with CE are later discussed.

2.4.1 Ownership structures and corporate entrepreneurship

Leadership has been proposed as a critical element in corporate venturing activities as they have the power and influence to 'encourage their employees to frequently adapt and expect environmental transformation through entrepreneurial activities' (Shafique & Kalyar, 2018). Such leaders understand that their employees are assets to the business beyond just the roles and responsibilities assigned to them and may offer value through novel and profitable ideas if and when given the opportunity (Chen, Tang, Jin, Xie, & Li, 2014). It is such leaders that possess and share their 'vision, stimulating their employees to go over and beyond the call of duty and increase innovative perspectives/production in the course of their work' (Shafique & Kalyar, 2018). Such innovations if fully utilized in a productive and profitable manner can assist a firm and its offering (product or service) stand out and offer a unique selling point. As such, these addresses become a more prominent player in the globalised market place and gaining a competitive advantage over other market participants.

Governance structures can be effective in facilitating or promoting corporate entrepreneurship which is vital if the organisation wishes to survive, maintain or increase profits, grow and increase its chances of long term or sustained survivability (Keasey & Wright, 1993). As such, there is a growing amount of academic research resources focused on CG structures and CE (Tribo et al., 2007; Minetti et al., 2012; Shapiro et al., 2015). These studies have investigated how various governance models affect CE in their specific contexts (Chen et al., 2012). Kidwell

et al. (2007) came to the conclusion that the governance structure of a company (a mixture of shareholders as well as directors' features) plays a significant part in the firm's ability to respond to outside influences and its performance.

Akbar (2015) studied the role of corporate governance mechanisms in improving the firm's performance and the results showed that CG positively and significantly plays a role in a firm's performance.

Based on the discussion above, this study therefore hypothesizes that particular governance structures are positively and significantly associated with CE (as measured by IP registrations and R&D expenditure). This includes the different shareholders (domestic non-state, managerial and foreign) as well as board size and ratio of independent non-executive directors on the said board. This hypothesis is broken down into three to enable the analysis and interpretation of each of the governance structures' variables which are IP registrations and R&D expenditure.

2.4.1.1 Domestic Non-State Ownership

These are investors such as corporate founders (including their families and friends), other domestic firms and institutional investors (Choi *et al.*, 2011). A firm could benefit from such investors' social networks in the domestic corporate space to acquire resources (Filatotchev *et al.*, 2010). There could be an argument that for black participants in the corporate space, such social networks are vital for resource accumulation as the institutional frameworks are still predominantly white, and a black player may find it hard to get assistance from the 'formal' structures. They can provide information that assists in innovation opportunity identification especially in the domestic market (Classens *et al.*, 2000). Another perspective to argue in favour of the fact that founders care about their business and thus want to achieve long term sustainability over short term returns. Following this, they could be more likely to invest in CE initiatives that will bring innovative products (Hess *et al.*, 2010).

Thus, the explanation above indicates that domestic non-state investors favour long-term CE investments with the aim of creating value in the future. As such, it is hypothesised that:

Hypothesis 1a: Domestic non-state ownership is positively related to CE in SA registered firms as measured by R&D expenditure.

Hypothesis 1b: Domestic non-state ownership is positively related to CE in SA registered firms as measured by patent registrations.

2.4.1.2 Foreign Ownership

As a foreign shareholder, the problem of information asymmetry (naturally because of language, time and remoteness differences) makes them more interested in monitoring manager actions (Chen *et al.*, 2014a). This could suggest that they are likely to require a lot more effort to reduce the asymmetries in information and take more interest in closely monitoring the strategic plans implemented by management. Any economy with ‘weak institutions (including but limited to: property rights, judicial systems, stringent regulations etc.) do not inspire any confidence of sound and protected governance practices and thus tend to lose support and trust from the international community’ (Chigudu, 2020). It is no secret that foreign investors favour nations with better governance and stable political systems as these are more secure markets in which to invest. In reference back to the resource dependence theory, foreign investors can offer the local firm much experience (send out very qualified managers to assist the local management team), advanced strategy, and are more than likely to be investing in such markets as a form of reaching out to new markets (hence are likely to push for CE efforts quite heavily). Thus, FDI can be leveraged to assist the firm to access the sufficient resources for CE activities. Additionally, they (Chen X. , 2020) provide their international social networks, which are a priceless assets, particularly in the technology sector (particularly technological development), and ultimately help the local business increase its dedication to and investment in CE efforts (Chen X. , 2020).

The research study thus hypothesises:

Hypothesis 2a: Foreign ownership is positively related to CE in SA registered firms as measured by R&D expenditure.

Hypothesis 2b: Foreign ownership is positively related to CE in SA registered firms as measured by patent registrations.

2.4.1.3 Managerial Ownership

Jensen and Meckling (1976) believe that stock-based compensation arrangements can be a very effective tool in reducing the problems identified by agency theory as they often unify management and shareholders’ interests. The idea stems from the theory that if a manager

receives a significant portion of their income from stock, they will make decisions more likely to maximise the shareholders' wealth (as a shareholder themselves) and thus are more motivated to make long term investments designed to make the business more sustainable. This will likely happen in the form of larger investment in CE initiatives which is likely to increase the firm's longer-term value through innovations.

Empirically, Zahra *et al.* (2000) found that higher manager ownership was, in almost all cases, positively associated with CE in an investigation of 239 manufacturing firms in the United States of America (USA) (though this study focused on the effects of job security on decision strategy). Agency assumptions are criticised here as they do not often consider social influences, relations or the complexity of human behaviour (Chen X. , 2020). Furthermore, Choi *et al.* (2011) and Zheng and Lin (2011) concluded that managerial ownership could actually lower research and development efforts (hence lower CE). It is therefore proposed that:

Hypothesis 3a: Managerial ownership is positively related with CE in SA registered firms as measured by R&D expenditure.

Hypothesis 3b: Managerial ownership is positively related with CE in SA registered firms as measured by patent registrations

2.5 Board structures and corporate entrepreneurship

As stated earlier, institutional differences between countries and organisational differences can lead to variations in each other's interior governance structures (James & McGuire, 2016; Anderson & Gupta, 2009, Chen, 2020). This then naturally lends itself as a worthy subject matter to investigate further.

2.5.1 Board size

Current empirical investigations have offered support to the agency view and have confirmed a negative relationship between board size and CE (Chen X. , 2020). As the board size increases, the increased heterogeneity among the members can make speedy and coherent decisions much harder and thus any entrepreneurial decisions can take much longer to reach. The different risk appetites also do not necessarily make the process any faster. Such investigations reason that these firms can be better equipped to monitor the management team (since it is harder for one CEO to overrule a large board). Larger boards also offer a more diverse skill set, experience base, and different management philosophies which could made any decision arrived at richer

in quality (De Cleyn & Braet, 2012; Mangena et al., 2012). This also includes the individual board members leveraging their networks to develop strategic partnerships for their firms. The resource dependence theory lends support for this.

Guest (2009) believes that there is not a best fit board size applicable to all cases (be it seven or 12 members). Smaller boards may be preferred in developed nations (Anglo-Saxon and most of Europe) in order to maintain board excellence because these nations are more likely to possess advanced and experienced balancing instruments. South Africa, which is at a developmental stage, may not benefit from this ideological view. The Companies Act dictates that a publicly listed company must have at least two board members (Adcock, Lekhuttle, & Gilfillan, 2007).

Zahra *et al.* (2000) believed that the size of the board positively and significantly affects the organisation's CE activities. This is in part because the size may indicate the members' ability to process information and make better or worse decisions on CE. Smaller boards may afford the directors an opportunity to participate more qualitatively and frequently with the firm's management team, and the better communication could help with monitoring efforts and prevent opportunistic behaviour by the managers (Azeez, 2015). The larger board size can also offer more diverse thinking, creativity and appetite for innovative solutions (Shapiro *et al.*, 2015). This is a very good environment for CE activities. Larger boards might offer more resources which will allow the organisation to take maximum advantage of opportunities that arise. A larger board size is thus one any board that is proportionally large with respect to its total employee number. It is under this understanding that the research report advocates that an increase in board size may be advantageous, particularly for businesses looking to boost CE hence:

Hypothesis 4a: A larger Board Size is positively associated with CE in SA registered firms as measured by R&D expenditure.

Hypothesis 4b: A larger Board Size is positively associated with CE in SA registered firms as measured by patents registrations.

2.5.2 Independent Directors

A company's CE investment decisions could be distorted by agency problems as a result of the significant level of risks associated with research and development efforts. Managers could be

less open to make such investments as these tend to only produce returns in the long term at the expense of short-term financial performance (Fama & Jensen, 1983). To mitigate this mechanism, monitoring managerial decisions need to be introduced which will in turn, deal with some of the problems associated with the agency theory (Kor, 2006). This suggested that independent directors may restrain too many resources going towards unproductive CE projects. Further, independent directors may promote accountability but also have adverse effects for CE in the organisation (possibly because individuals become intimidated to present and implement ideas). As stated before, very few studies have been conducted within an African setting and the resource dependence theory postulates that independent directors may provide access to vital resources (something many Africa firms desperately need) (Shapiro *et al.*, 2015). This is obviously necessary for CE initiatives. Thus, the next hypotheses read:

Hypothesis 5a: The proportion of independent non-executive directors on the board is positively associated with CE in SA registered firms as measured by R&D expenditure.

Hypothesis 5b: The proportion of independent non-executive directors on the board is positively associated with CE in SA registered firms as measured by patent registrations.

The following is a graphical presentation of the above key constructs' framework model. It is proposed that firm factors be used as control variables for the analysis to follow in Chapter 4. The corporate governance structures are then the independent variables and the CE factors, the dependent variables.

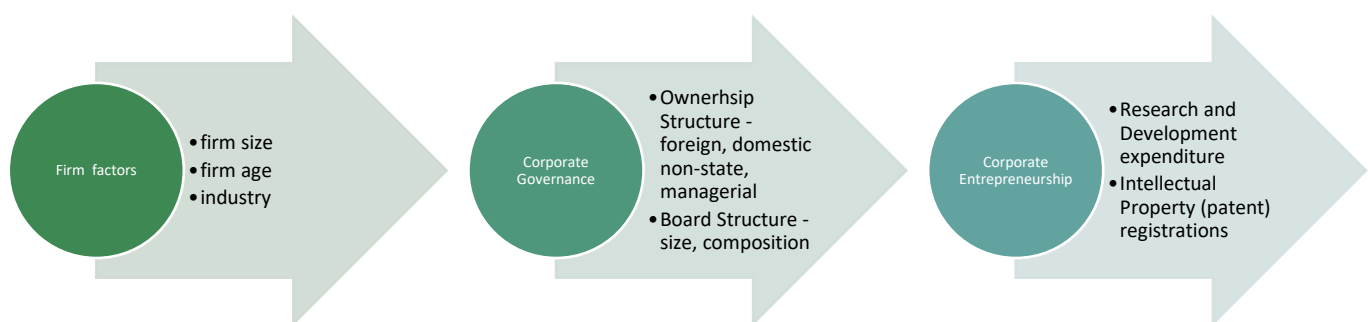


Figure 2: Key Concepts

Author's own construction

Figure 2. Graphical presentation of the control factors (firm factors), independent variables (corporate governance structures) and the dependent variables (corporate entrepreneurship efforts).

Table 1 is a summary of some of the most influential readings discussing the relationship between corporate governance and corporate entrepreneurship.

In the table, note that many studies including Musacchio and Lazzarini (2015), and Doug and Gou (2010), found in similar studies that in high state ownership (where government had a high ownership concentration in the companies), there was a statistically significant and positive relationship with R&D expenditure. Although this current study did not investigate state ownership, it is interesting to note that there is undoubtedly great potential for investigations into relationships between particular governance structures and investment into corporate entrepreneurial activities.

Table 1: Summary of corporate governance and its effects on corporate entrepreneurship

Author(s)	Corporate Governance phenomena	Locus of Corporate Entrepreneurship	Relationship between Corporate Governance and Corporate entrepreneurial behaviour
Minetti et al. (2012)	High ownership concentration.	Reduction of R&D expenditure/efforts	Corporate entrepreneurship negatively affected. Most high-technology firms could manage the balance better.
Chen et al. (2014)	Highly concentrated ownership.	Not specified	Little to no impact due to weak market influences and new policy dispersed ownership.
Zhou et al. (2017)	High government presence	Not specified	Easier access to policy, finance and resources positively affected CE.

Author(s)	Corporate Governance phenomena	Locus of Corporate Entrepreneurship	Relationship between Corporate Governance and Corporate entrepreneurial behaviour
Musacchio and Lazzarini (2015)	High government presence.	Varied and depended on industry.	Access to policy information, government support & scarce resources meant firm greatly increased CE activities.
Doug and Gou (2010)	State ownership	R&D investment.	Statistically positive and significant relationship.
Sakakibara and Cho (2002)	States in emerging economies often get direct aid from government if in targeted innovation areas.	Research activities and R&D spending.	Policies aimed at promoting CE activities resulted in increase in CE (including backed funding).
Guan et al. (2009)	High state ownership	Patent applications, product sales, firm's adoption of innovative technologies	Negative relationship between the two especially amongst SOE in emerging markets.
Ayyagari et al. (2011)	State ownership	Firm level innovation	Negative relationship as no obvious benefit observed.

Source: Adapted from Ireland, Covin and Kuratko (2009:22).

2.6 Conceptual framework

This study is underpinned by one theme: Corporate governance and corporate entrepreneurship. As stated in the previous chapter (Literature Review), earlier studies have had a tendency to investigate this independently, for example, the effect of corporate governance on corporate entrepreneurship (Shapiro *et al.*, 2015; Minetti *et al.*, 2012; Zahra, 1996).

Agency theory is based on the central assumption that “benefits are created by functional division of roles between capital holders and managers” (Munari, Oriani, & Sobrero, 2010, p. 1094). As such, “shareholders stand to benefit from the high-risk/high-return strategies associated with aggressive R&D investments as they can diversify risk through a portfolio of investments” (Munari, Oriani, & Sobrero, 2010, p. 1094). The resource dependence theory postulates that the conceptual framework of this research report postulates that “boards enable firms to minimize dependence or gain resources” in very simple terms (Amy, Michael, & Collins, 2009, p. 1408). As such this research report merges the two ideas and proposes that the two theories be combined and that there is scope to gain competitive advantages in the market place through strategically manipulating the board structure (as the ultimate influencer of the firm’s strategic plan) to acquire resources, mitigate against manager biases and promote the chances of corporate entrepreneurial activities. As such, certain CG structures or elements should lead to more CE. CE is vague and thus will be measured tangibly by accessing a firm’s R&D expenditure as well as its IP registrations. Please refer to Figure 3 for a visual representation of this.

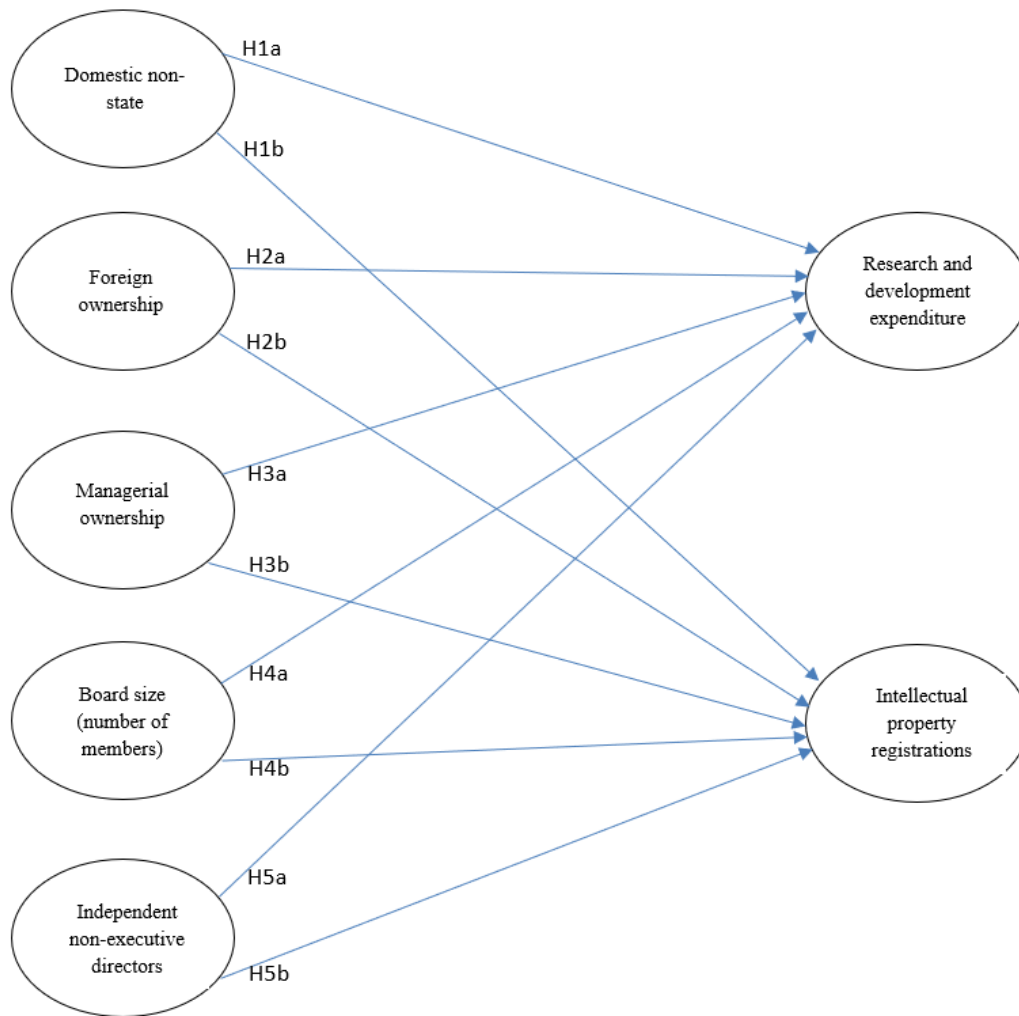


Figure 3: Conceptual framework (adapted by Saunders, 2013).

2.7 Chapter conclusion

This Chapter presented the hypotheses of the study that will undergo statistical data analysis in Chapter 4 and detailed all the theoretical underpinnings, as well as logical reasons behind each. A graphical presentation titled as Figure. 2 was also offered as a means of easily presenting the different constructs and how they are hypothesised, and relate to one another.

The next chapter fully explains the research methodology that was adopted for the purpose of this study which is then followed by the data analysis.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The aim of the study was to investigate corporate entrepreneurship and governance structures in South African listed companies. This chapter discusses the research methodology that was adopted by the study. It begins with a description of the methodology adopted and why this methodology was chosen. It then discusses the logic of inquiry, research setting, methods and procedure of data collection, and data analyses and ethical issues.

3.2 Research paradigm

A research paradigm is a fundamental set of beliefs or worldview that governs research action or enquiry (Kivunja & Kuyini, 2017). It is a philosophical framework that is meant to guide the implantation of scientific research (Collis & Hussey, 2013). The research paradigms can arguably be grouped into the following three classifications: “positivism, interpretative and critical paradigms” (Kivunja & Kuyini, 2017, p. 26). This research report will employ postivisim from the aforementioned perspectives. This report will detail the reasons for this below as well as offer a benchmark against interpretivism for perspectives’ sake.

Philosophical assumption	Interpretivism	Positivism
Axiological assumption (the role of values)	Researcher acknowledges that research is value-laden and biases are present.	Research is value-free and unbiased.
Epistemological (what constitutes valid knowledge)	Researcher interacts closely with the subject matter of the study.	Researcher is independent of that being researched.
Ontological assumption (the nature of reality)	Reality is subjective and multiple, as seen by participants.	Reality is objective and singular, separate from the researcher.
Rhetorical assumption (the language of research)	Researcher writes/records in a more informal manner and uses their own voice. They accept qualitative terms and have limited definitions.	Researchers writes/records in a more structured/formal manner and uses a passive voice. They accept quantitative terms and set definitions.
Methodological assumption (the process of research)	• Process is inductive. • Study of mutual simultaneous shaping factors with an emerging design (categories are identified during the process). • Research is context bound. • Findings are accurate and reliable through verification processes.	• Process is deductive. • Study of cause and effect with a static design (categories are isolated beforehand). • Research is context free. • Generalisations lead to prediction, explanation understanding (hypotheses and deduction) • Results are accurate and reliable through validity and reliability
Sampling requirements	Highly limited numbers chosen for very specific reasons.	Much larger numbers selected (often at random).

Table 2: Benchmark of interpretivism and positivism

3.2.1.1 Justification for implementation of the positivist paradigm

The research study drew on the foundation of a multiple theoretical approach in developing a conceptual framework in order to assist understanding, explaining and predicting the relationship between corporate governance and corporate entrepreneurship. Following the inspiration from previous research in the field, for example, on the relationship between CG and CE (Brossard *et al.*, 2013; Beyer *et al.*, 2012; De Cleyn & Braet, 2012; Choi *et al.*, 2011; Chen & Hsu, 2009), this research study adopted the positivist paradigm for the following reasons:

Ontological assumptions for the positivist paradigm objectivism are well suited to the assumptions that this study already has in relation to reality. Objectivism attempts to portray a situation in which social units exist in reality, external and independent of any social participants concerned with their existence (Saunders *et al.*, 2012). This research study assumed that a phenomenon (like compliance with specific CG codes and structures) is a peripheral reality that exists in a social world made up of various proposals, truths and regulations. This perspective emphasises the structural and formal features of a company's reaction to the contextual setting in which it operates, as opposed to emphasising its organisational beliefs, culture and values.

This stance allowed the study to test hypotheses based on existing theories that have been adopted (agency, resource dependence and corporate entrepreneurship theories) in addressing the

This research has adopted the positivism paradigm because it has “two crucial benefits, being that it is conducive for research to be conducted in considerably less time”, and it is easier to defend the positivism paradigm position on CG and CE as it is broadly acceptable (Chen X. , 2020, p. 153; Malik & Makhdoom, 2016). As indicated in Chapter 2, there is a hypothesis that CG can be effective in facilitating or promoting CE. This is a widely acceptable hypothesis, which has been extensively researched and acceptable to many. Consequently, it will be adopting the positivism paradigm to conduct further test of such hypothesis in understanding three relationships between CG and CE within the listed entities in South Africa. Furthermore, positivism as a paradigm has been successfully used on several occasions on similar subject matter, particularly CG and CE (Elhelaly, 2014).

3.3 Research approach

The research paradigm was identified meaning this study's methodology should be explained in such a way as to correspond to the theoretical assumptions adopted by the study (Collins & Hussey, 2013).

Quantitative research is primarily used as a synonym for any data collection technique or data analysis procedure that generates and/or uses numerical data.

As stated in the preceding sections, quantitative research is founded on the positivist paradigm. Quantitative research is also strongly associated to a deductive method in reasoning, in which the hypotheses based on the theories (such as this study's multi-theoretical approach) are tested and statistically analysed (Bryman, 2012). Quantitative research, as previously mentioned, places the researcher in the position of an objective person who does not engage in or have any direct or indirect effect over the subject matter under investigation. This was the basic underlying assumption of the methodology adopted in data collection and analysis employed by Lin (1998).

The current investigation could be classified as empirical. Empirical studies which among other objectives, may look into numerical correlations between variables (Ryan, Scapens & Theobald, 2002). These of course, can be positive, negative and/or statistically insignificant (Blumberg, Cooper & Schindler, 2014). These variables are categorised as dependent or independent, as is only natural. The variables measure the reaction to a change or modification of the independent variables, which are those that are being examined (in the current study this was corporate entrepreneurship as measured by research and development intensity and patent registrations) (Blumberg, Cooper & Schindler, 2014). The corporate governance structures were the independent variables for the purposes of this study.

As such, the study was based on the agency, resource dependence and corporate entrepreneurship theories (Chen X. , 2020).

As many of the experimental procedures utilised in empirical corporate entrepreneurship have a quasi-experimental quality, it is difficult to describe it as experimental (Ryan, Scapens & Theobald, 2002). As such, this study used a framework known as a Correlation Design. Under this design in its simple form, there is no implication of causality but rather, that the variables covary (Swartz, 2010). All the results will do is suggest that the variables under study covary.

Consequently, this has the additional drawback of raising the chance of erroneous correlations because both variables are connected with a third variable. Thus, a design that employs a regression technique could be employed to lessen this (Cooper & Schindler, 2001). Multiple regression approaches may be used if this is expanded to a relationship between a dependant variable and several independent factors, as was done in the study by Ryan, Scapens & Theobald (2002). A "common methodology in CG research and is typically associated with the deductive approach" is archival research (Saunders *et al.*, 2012, p. 62). Such a method is particularly useful in its capacity to study trends in large-scale data.

3.4 Population and sample

The population for this study is thus, JSE listed firms (not limited by industry) and the sample comprised of firms with enough data points to investigate (that being across R&D spend, patent applications and registrations) as well as the control variables (firm age as calculated from the date of registration and firm size as the number of employees in the firm). When one speaks of sampling in a very general sense, they refer to the process of selecting a few elements in a population, investigating them, then drawing a conclusion about the entire population (Blumberg, Cooper & Schindler, 2014). Thus, a population element is the subject on which the measurement is being taken, also known as the unit of study (Blumberg, Cooper & Schindler, 2014).

Conducting a census (collecting data point on every single firm) was not going to be a practical option for this study's purpose as it would be too expensive, take too long and not all firms disclose information pertaining to all data points. As such a sample was drawn.

Samples are more affordable, provide more accurate results, speed up data collection, and adequately account for population availability (Blumberg, Cooper & Schindler, 2014).

Therefore, a good sample accurately and precisely represents the characteristics of the population it purports to represent (Blumberg, Cooper & Schindler, 2014). This is very difficult to come by and as will be discussed later in the research report, limited the population to 119 firms.

A compromise between the necessity for a big enough sample size to guarantee that the results could be confidently relied upon as a reflection of the entire population of JSE listed companies and the need for manual data collection led to the selection of 119 companies as the sample

size. As the period of investigation spanned the 2018 and 2019 financial years, a number of features guided the choice of the final sample that was statistically analysed including:

1. The firm must have been included in the JSE, IRESS or CIPC databases ensuring all the study variables could be observed, compared and analysed.
2. All firms without complete data on CE (R&D expenditure and/or patent registrations) were excluded.
3. For the statistical analysis of the data to eliminate noise, the company's fiscal year had to end in December. This requirement was set by Smith and Pourciau (1988) for it showed that firms with a December fiscal year end and those without had statistically significant differences in financial characteristics (Chen X. , 2020).
4. Did not discriminate firms based on their industry.

3.5 Data collection

This section details the data collection methods. It includes sources of data used.

3.5.1 Secondary Data sources

The data sought after was available from two databases in South Africa, specifically the Johannesburg Stock/Securities Exchange (JSE) and the Intellectual Property Commission (CIPC) of South Africa. The various firm's annual reports and the IRESS database were also referenced occasionally during the data collection process. These two have also been used in several earlier research studies (Choi, 2011; Shapiro *et al.*, 2015; Zhang *et al.*, 2014; Chen, 2019). This study was restricted to publicly traded companies that are currently listed on the Johannesburg Stock/Securities Exchange due to the difficulty in obtaining sensitive data from private companies. The JSE database contains information on all listed companies in South Africa, including financial statements dating back decades. The data includes firm profiles, financial ratios (return on investment, return on assets etc.), ownership structures, top 10 shareholders, R&D investment expenditure, board structures and much more. All firms investigated in this research report met the requirement of having full financial statements available from the JSE for the two years under investigation (2018-2019).

The CIPC database was used for collection of patent registrations made by South African firms in South Africa. Patents have also been previously used in CE research studies to capture CE intensity (Shapiro *et al.*, 2015; Choi, 2011; Bena *et al.*, 2014; Chen, 2019). A representative of the CIPC was emailed and over the course of several communication exchanges, explained

how to access the data on their website, as although it is free and open for all to use, it is a complex to actually access (due to poor user interface design).

Company annual reports are widely accepted as the *de facto* communication device used by companies when disclosing all relevant information regarding the CG and CE practices of the firm. As used in this research study, the annual reports mainly provided missing data from the two primary databases, usually in relation to R&D expenditure disclosure. The study admits that there could potentially be sample selection issues as reporting of R&D expenditure is a voluntary act and not all JSE firms do so (International Financial Reporting Standards, 2016). Usually firms either disclose their R&D expenditure in the body of financial statements (found in the Annual Report), or at the bottom of the page (footnotes in the financial statements) (Wang & Fan, 2014). Access to the annual reports was gained by visiting each company's website and downloading it from their respective investors corners (where annual reports more often than not are found).

As such, corporate entrepreneurship was measured using the number of registered patents and R&D expenditure (in South African Rands), according to the records held by the Companies and Intellectual Property Commission (CIPC) of South Africa and Annual Reports published by the companies. Corporate governance data were collected as a reflection of the 2018 fiscal year while the corporate entrepreneurship efforts were collected for the 2019 fiscal year (to help account for resultant effects). The study used the IRESS database as well in a supplementary manner to account for data not readily accessible from the Annual Reports. As such, the study collected data from a sample of 119 companies (all of which were JSE listed companies) out of a total population of 400 listed companies. The industries from which these companies were drawn included mining, financial services, industrial production, agriculture, pharmaceutical, telecommunications, software, construction, defence and real estate. The IRESS database was also accessed by requesting access to their platforms over emails with a representative. This database was easier to navigate than the CIPC but didn't always have the requisite firm information so the two (IRESS and CIPC) filled each others gaps in a complementary manner.

3.6 Research Process

As a result of this positivist methodology, the study, in line with many other management studies based on the agency theory (Azeez, 2015; Chen, 2020), resource dependence theory

(Chen, 2011; Peng *et al.*, 2007) and corporate entrepreneurship theory (Urban, 2015). The research report utilised a panel approach to evaluate the proposed hypotheses with a substantial number of companies, hence enhancing the applicability of the report's conclusions (at least in relation to JSE listed firms). Other approaches (such as a case study or survey) would not have been viable or efficient due to time, expense, and access to sensitive/non-public data of listed businesses limits

Furthermore, it is a frequently used method for theory testing within the corporate entrepreneurship research field (Chen, 2011; Urban, 2015). Its primary purpose (archival research), includes description (large scale, secondary numerical data), as well as explanations (in this case, theory testing through examination of the nature of the relationship between CG structures and CE). Thus, the archival method was considered appropriate as it has the inherent ability to examine trends in large scale complex data. This naturally leads to research with particularly high external validity because the data were related to naturally occurring phenomena (Hageman, 2008). The data collected covered a 2-year period (2018-2019) and was deemed an appropriate method as it sufficiently encompassed the large data set. Research design

3.7 Variables under study

Table 3 is a concise summary of the variables under study, their definitions and the source of the data recorded. It is meant to be a quick reference guide whenever reference needs to be made as to what the different variables meant (definition) and where the study collected the data pertaining to these were.

Table 2: Definitions and sources of Variables

Variable	Definition	Source of data
Corporate Governance variables		
State ownership	Number of shares owned by the state (Munari et al., 2010).	Annual report/Sharedata.com
Domestic non-state ownership	Number of shares owned by any local non-state entity (Chen et al., 2014).	Annual report/Sharedata.com
Foreign ownership	Number of shares owned by foreign entities (Dong & Gou, 2010).	Annual report/Sharedata.com
Managerial ownership	Number of shares owned by firms' executives (Chen et al., 2014)	Annual report/Sharedata.com/JSE
Board size	Sum total of the firm's directors on the board (De Cleyn & Braet, 2012)	Annual report/Sharedata.com/JSE
Corporate entrepreneurship variables		
Research and development expenditure	Amount in South African Rands (ZAR) of the individual firm's annual investment into research and development.	Annual report/Financial Statements
Patent registrations	Number of patents registered by the firm.	CIPC Intellectual property board
Control variables		
Firm age	How many years the firm has been operational since the time of registration (included self-reported date of inception by firm)	Annual report
Firm size	A logarithm of total assets of firms (Munari et al., 2010). For the purposes of this study solely looked at the number of employees (as assets of the firm are difficult to ascertain in the South African context).	Annual report

Source: Adapted from Chen, 2020.

It should be noted that firm size will of course depend on what industry the firm is involved in and cannot be of value without this understanding of the nuance.

3.8 Data analysis

The Statistical Package for the Social Sciences (SPSS) was used for the analysis of the quantitative data collected. EFA and Cronbach's Alpha were not employed as the study did not use a multi-scale construct to assess if the constructs are valid and reliable. The objective of the data analysis was to ascertain the nature of the relationship between CG and CE.

3.8.1 Descriptive statistics

The mean and standard deviations were used in this report (Firer & Williams, 2003). Often, the mean is employed to measure central tendency (Isma'il, Yakubu, & Isa, 2021). The average of a group of numerical numbers is the group's mean (Juan, 2022). On the other hand, standard deviation reveals information on how data deviate from the mean (Andersen & Nielsen, 2020).

3.8.2 Correlation and regression analysis

Regression analysis makes use of simple and multiple predictions to predict Y from X values (Blumberg, Cooper & Schindler, 2014). As detailed earlier, multiple regression analysis was used to test the hypotheses of this study. This analytical tool is used when one is attempting to determine the unique correlation that each independent variable has with the dependent variable (Blumberg, Cooper & Schindler, 2014). In conducting a regression analysis, the study first checked for four assumptions (necessary when fitting a regression model). This was done by testing for normality, multicollinearity, homoscedasticity and outliers).

The regression analysis was conducted through SPSS. As a result, the report has two model summaries and co-efficients. For the purposes of this study, the model summary consisted of R , R^2 , adjusted R^2 and standard error of the estimate.

When a research study is said to have high internal validity, it means that the changes in the dependant variable were mostly accounted for by the nature of the change in the independent variable (Ryan, Scapens & Theobald, 2002). One of the primary statistical tests for this use is the correlation of determination (R^2).

The standard way to determine the coefficient of determination is to square the coefficient of correlation (Julyan & Nel, 2003). If R^2 is, for instance, 80%, then it should be recognized that 80% of the change in the dependant variable can be accounted for by the independent variables and that the remaining 20% of the change in the dependant variable is brought on by variables other than the independent variables used.

The t-test is the second. This test evaluates each regression coefficient's statistical significance, and it must be interpreted in light of degrees of significance (Blumberg, Cooper, & Schindler, 2014). A positive t-test indicates a positive association, whereas a negative t-test suggests a negative relationship hence the t-test can also reveal the nature of the connection between variables (Blumberg, Cooper & Schindler, 2014).

Every time a single observer provides the data, reliability is a worry since we lack a certain safeguard against the impact of that observer's subjectivity (Babbie, 2010). Wilson (2010) claims that reliability problems are frequently directly related to subjectivity, and if a researcher takes a subjective approach to the study, the level of dependability of the work will be jeopardised. As such, this research report has provided the data collected, analysed it and presented the findings in a succinct manner than can be accurately replicated by any party who wishes to do so.

As such and in relation to this study, the CG structures (domestic non-state ownership, foreign ownership, managerial ownership, board size and independent non-executive directors) were the independent variables and CE (R&D expenditure and registered patents) were the dependent variables. This, incorporated into the above discussion, produced the results reported in Chapter Four.

3.9 Limitations of the study

The findings of this study are subject to some limitations that could provide initiatives for future research. Firstly, future research could include specific provinces within the South African context. Gauteng was the focus in this study owing in part to time considerations and accessibility of data. Another limitation and point of contention among the results that the study predicted was the mixed results predicted to come from foreign and managerial ownership. The study believed that this could be because much of the benefit potentially derived from either is down to the individual's personal experience and resources they offer the company, and not necessarily that they are just foreigners or part owners.

This study aimed at investigating the relationship between corporate governance structures and the resultant Intellectual Property output as an indicator of corporate entrepreneurship through a single time period. Future academic investigations could use a similar set of basic hypotheses and regression construction, but differentiate themselves by approaching the study as a longitudinal examination as opposed to just a cross sectional design. This longitudinal investigation would need to mitigate fluctuations in data relative to time elements (such a legislation around corporate governance). The study was limited to South African listed firms and future studies could be extended to study countries with dissimilar corporate governance structure regulations to South Africa (such as China where the state is heavily involved in any and all innovation driven firms or any other Sub-Saharan country).

3.10 Ethical considerations

At all points in time, consideration and respect of privacy, confidentiality, safety, and honesty were maintained. Where necessary, the rights of privacy, prior consent, use of non-disclosure instruments and respect/limitation to the subject matter under investigation were sought and maintained. This was done by emailing the different data source managers/representatives and asking for permission to access the data. Annual reports were just downloaded as they are in the public domain.

The researcher recognised a responsibility to conduct the research in an ethical manner according to the Guidelines of the University of Witwatersrand, according to any laws and/or legal frameworks that applied, and according to the norms and expectations of the discipline. As such, no particulars of the companies were disclosed in this report. All data was anonymised to

Some of the data were preserved with respect to the nature of the original annual report's integrity (not that this can be changed by parties outside of the publishing organisation of course).

3.11 Conclusion

This chapter presented the research approach (ideological perspective), design, population and sample details, sampling method, a detailed description of the procedure for data collection, brief overview of the data analysis and interpretation as well as limitations of the study and ethical considerations.

In the next chapter (presentation of results), the results after statistical analysis of all the hypotheses are detailed and explained. Sample characteristics and accompanying graphs are also offered in explaining what the results have shown.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

Chapter 3 presented the research design, methodology and the rationale for undertaking the research using a quantitative approach. Chapter 4 explains the process of preparing the data, conducting the hypothesis testing and determines which ones could be accepted or rejected. As a result, the study presents the data analysis and results of the investigation on the CG structures of JSE listed firms in relation to R&D activities. In order to do this, the ownership and R&D activities data between 2018 and 2019 were analysed.

The first section presents the sample characteristics of the sample of 119 firms. Next, the descriptive statistics are presented in Table 4 and explained accordingly. The data collected varied quite significantly which would have made analysis both difficult and ineffective hence data transformation was necessary which is also explained in great detail. The correlation matrix and regression models (including regression assumptions and tests for normality, multicollinearity, homoscedastic and outliers) are included in this section. The regression results encompassing the model summary and ANOVA are presented in Tables 5 to 10. It is then that the results pertaining to the hypotheses are presented (including a table of the summary of all the hypotheses). The section ends in a brief conclusion.

4.2 Sample characteristics

The study's sample was made up of 119 JSE listed firms from various industries as summarised in Figure 3. The data collected indicates that the highest proportion of companies was from the Metals, Oil, Gas and Coal Mining (22%) followed by Banking, Insurance and Investment Services (17%) and Machinery, Equipment, Components and Industrial Goods (11%).

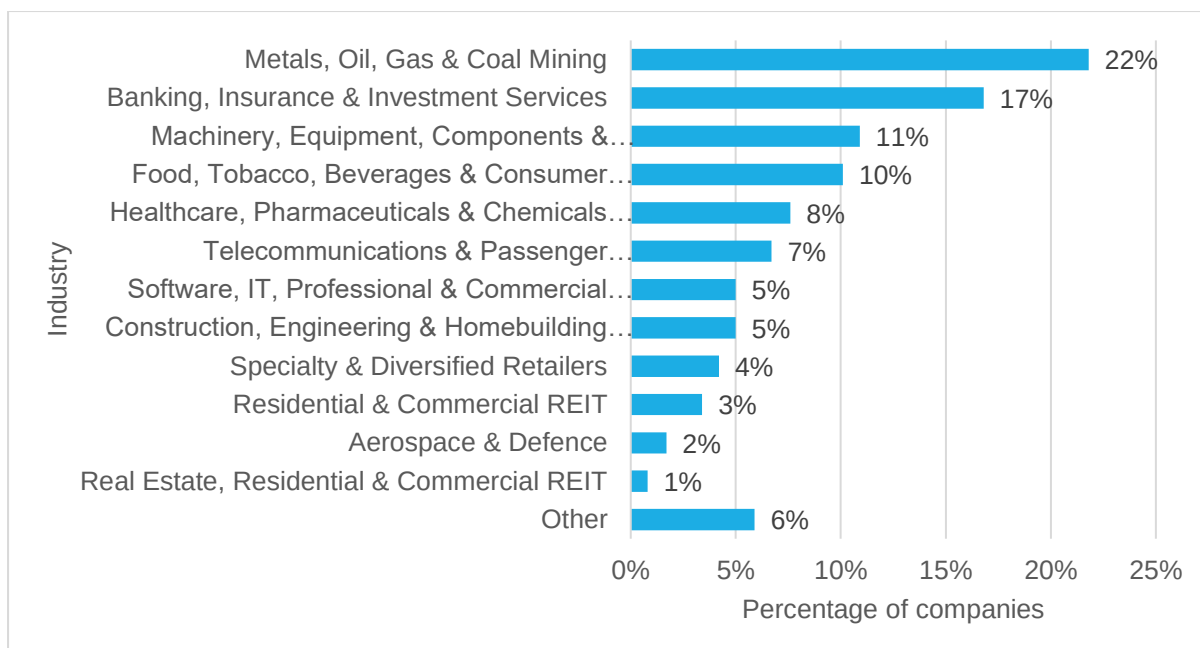


Figure 4: Industry

4.3 Descriptive statistics

The descriptive statistics of the companies in the sample are presented in Table 4. From the data collected, it should be noted that the companies in the sample had an average 19,402 employees with a range of (7,182 615). The data collected also showed that statistically speaking, a JSE listed company has, on average, been in business for about 42 years (from the date of incorporation). In terms of shareholding statistics, domestic non-state ownership was on average 87.7%, while amongst companies' foreign non-state ownership averaged 10.16%. The Director Ownership was on average 10.6%, with an average of 57.88% of a company board being composed of Independent Non-Executive Directors. The board size ranged from two to 20 with an average of 11 members (rounded up because a human being is one whole always). These findings are consistent with research conducted on firms in the United States and the United Kingdom where boards also had about 11 directors ((Conyon & Mallin, 1997); Main & Johnston, 1993).

The companies represented in the sample had, on average, registered 2.64 Intellectual property rights with the CIPC. These IP registrations ranged from no IP registration at all, to 139 IPs for one particular company. Expenditure on research and development ranged from R43 267 to R4,267 billion (as reported in the annual financial statements). Data transformation obviously needed to be done as this would otherwise have made comparison between the firms difficult and is discussed in more detail below.

Table 3: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Employees	94	7	182915	19402.36	31250.88
Firm Age (years)	119	1.00	129.00	42.87	30.40
Domestic Non-State Ownership (%)	117	0.00	100.00	87.70	16.28
Foreign Non- State Ownership (%)	112	0.00	79.40	10.16	12.87
Director Ownership (%)	107	0.0	85.4	10.6	17.9
Independent Non-Executive Directors (%)	119	0	86	57.88	18.583
Board Size (number of members)	119	2	20	10.80	3.346
Number of CIPC Registrations	119	0	139	2.64	13.559
Total Expenditure (ZAR)	75	43 267	145 144 800 000	4 267 792 989	18 158 325 850

4.4 Data transformation

The range of values was significant for most of the variables to the extent that it would be difficult for example to compare an expenditure of R43,000 to R4,267 billion, or seven employees to 182,915 employees as was shown in Table 5. To mitigate this and make analysis viable, all the variables were log transformed to reduce the variability of data. The log transformed data is presented in Table 4. There is reduced variability on the data. This is indicated by the narrow ranges which made comparison across the companies easier and more viable.

Table 4: Descriptive Statistics of Log transformed variables.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation

Log Employees	94	.85	5.26	3.65	1.019
Log Firm age	119	.00	2.11	1.51	.366
Domestic Non-State Ownership	116	-.08	2.00	1.93	.203
Log Foreign Non- State Ownership	103	-1.70	1.90	.58	.886
Log Director Ownership	104	-2.10	1.93	.10	1.151
Log Board Size	119	.30	1.30	1.01	.162
Log Independent Non-Executive Directors	115	1.00	1.93	1.76	.147
Log Total Expenditure (ZAR)	75	4.64	11.16	8.06	1.331
Log Number of CIPC Registrations	30	.00	2.14	.55	.560

4.5 Correlation

The correlation matrix is presented in Table 6. It shows that no significant issues were detected using multicollinearity as correlations amongst the independent variables were all insignificant (< 0.8). This of course, is limited to the degree of its use for the purpose of statistical analysis for this study.

Table 5: Correlation Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Log Employees	1								
2. Log Firm age	.092	1							
3. Domestic Non-State Ownership	-.111	-.066	1						
4. Log Foreign Non- State Ownership	.195	.005	-.048	1					
5. Log Director Ownership	-.374 **	-.273 **	.330 **	-.270 **	1				
6. Log Board Size	.671 **	.108	-.141	.280 **	-.313 **	1			
7. Log Independent Non-Executive Directors	.285 **	.200 *	-.135	.054	-.380 **	.233 *	1		

8. Log Total Expenditure (ZAR)	.676 **	.038	-.260 *	-.136	-.363 **	.546 **	.245 *	1	
9. Log Number of CIPC Registrations	.010	.033	.086	.217	-.064	.009	-.320	.076	1

4.6 Multiple Regression

As stated before, this study makes use of regression analysis in testing the aforementioned hypotheses. In testing the hypotheses, two regression models were fitted. The first model, Model one, had *Log Total Expenditure (ZAR)* as the dependent variable accompanied by *Log Domestic Non-State Ownership*, *Log Foreign Ownership*, *Log Director Ownership*, *Log Board Size*, and *Log Independent Non-Executive Directors* as the independent variables. *Log Employees*, and *Log Firm Age* were used as control variables in this study. The second model, Model 2, was fitted with the same independent and control variables but with *Log Number of IP/CIPC Registrations* as the dependent variable instead.

4.6.1 Testing Regression Assumptions

Certain assumptions need to be made when fitting a regression model. These assumptions, as explained below, were tested before interpreting the results to ensure compliance with the requirements for regression model fitting. They are as follows:

4.6.1.1 Test for Normality

The first assumption that needs to be met is normality. Regression residuals should ideally follow a normal distribution. For the purposes of this study, this assumption was tested by plotting a histogram on the regression standardised residuals as shown in Figure 2. It is worth noting that most of the bars on the histograms that follow, were below the superimposed normal curve. This indicates that the residuals are either normally distributed or approached the normal distribution as required for regression. Thus, the normality assumption was met for the purposes of the study.

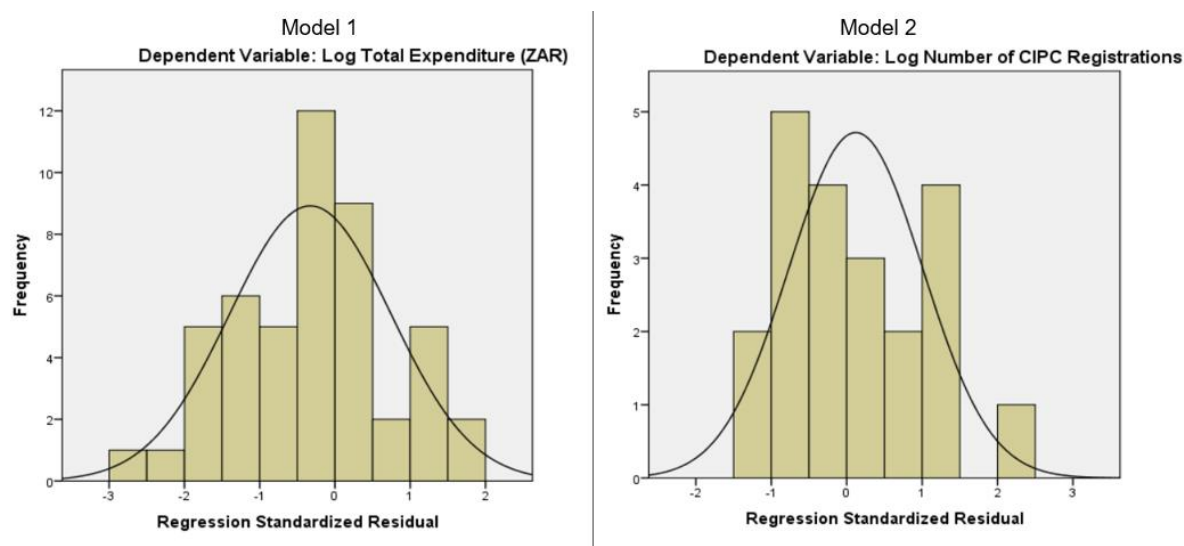


Figure 5: Histogram of regression standardised residual

4.6.1.2 Test for Multicollinearity

The second assumption that must be met is multicollinearity. As indicated by the table below, all the variance inflation factors (VIF) values were less than 10. The implication of this is that the ‘no-multicollinearity’ assumption was also met for the purposes of this study.

Table 6: Test for Outliers

	Collinearity Statistics	
	Tolerance	VIF
Log Employees	.510	1.960
Log Firm age	.906	1.103
Domestic Non-State Ownership	.883	1.133
Log Foreign Non-State Ownership	.870	1.150
Log Director Ownership	.639	1.565
Log Board Size	.520	1.924
Log Independent Non-Executive Directors	.816	1.225

4.6.1.3 Test for Homoscedasticity

The third assumption that should be met is homoscedasticity. Homoscedasticity implies that the error terms are assumed to be the same for all values of the independent variables. This assumption was tested by plotting scatter plots of the regression standardised residuals against the regression standardised predicted values for the two models (Model one and Model two)

as shown in Figure 3. As observable from the graphical presentations below, the scatter plot showed values randomly dotted around the zero line with no obvious pattern. This indicates that the homoscedasticity assumption was successfully met for the purposes of this study.

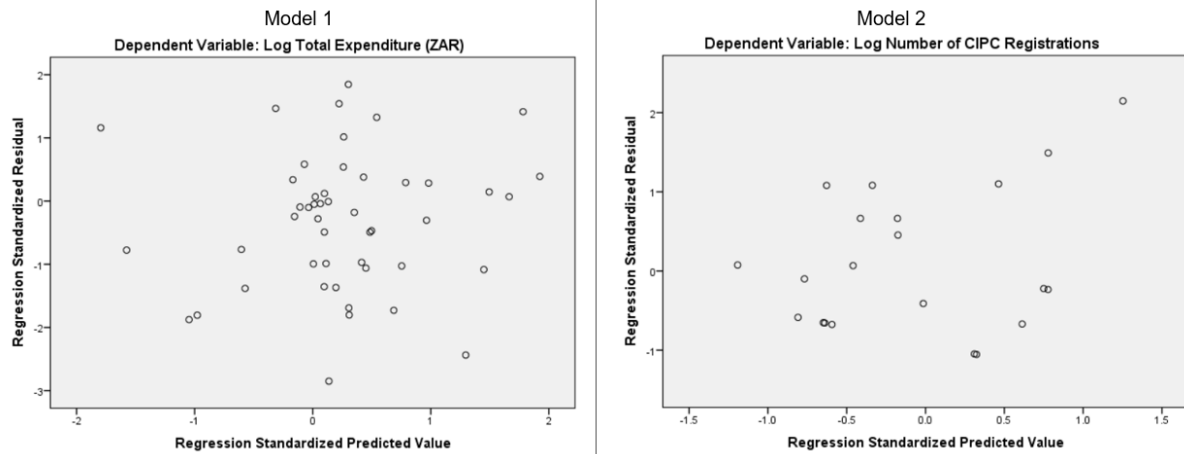


Figure 6: Scatter plot of outliers

4.6.1.4 Test for Outliers

The third assumption that must be met is the test for outliers. Here the assumption is that there are no extreme outliers that negatively impact on the quality of the model. This assumption was tested by charting a boxplot for all the variables in both models (Model one and Model two). Extreme outliers are usually to be indicated with an asterisk (*) outside the whiskers of a box plot. As observable below, the results in Figure 4 indicate that there were no extreme outliers, implying that the ‘no-extreme outliers’ assumption was met for the purposes of this study.

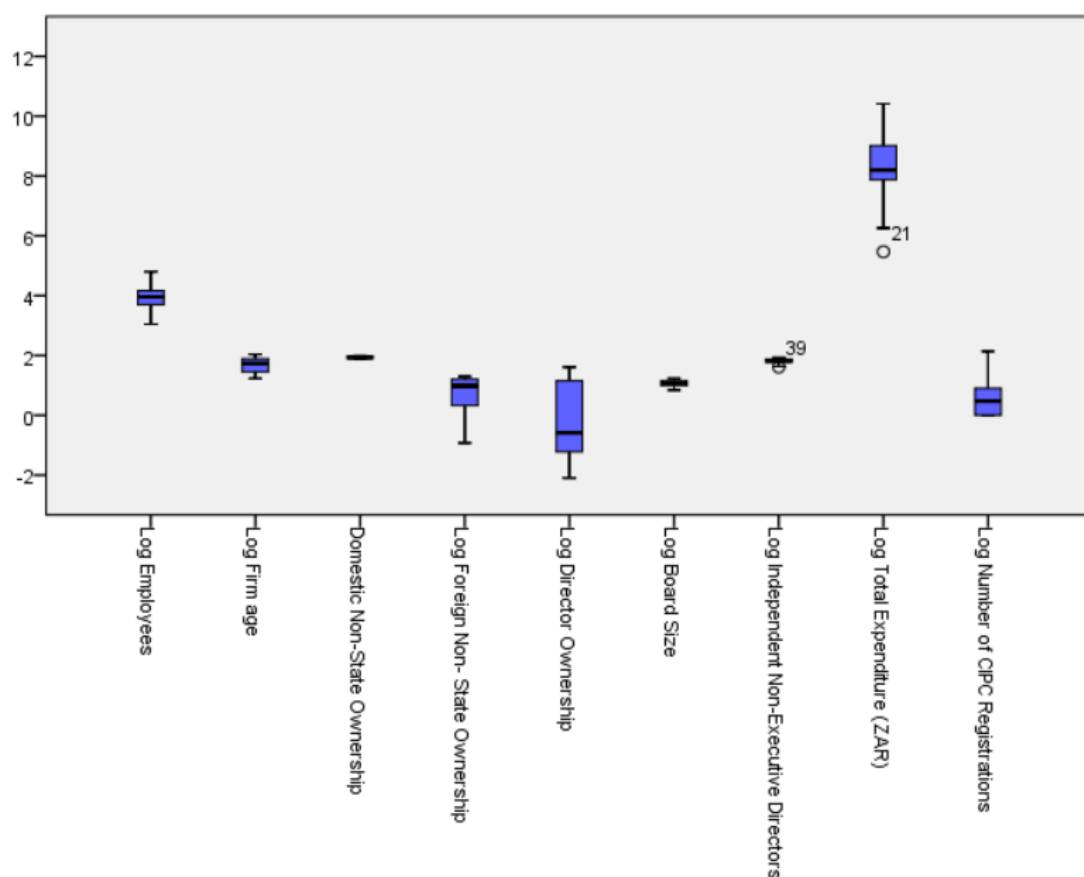


Figure 7: Box plot

As noted from the above three assumption tests, all the regression assumptions were successfully met. The regression results are thus presented below.

4.6.2 Multiple Regression results

The results shown in the summary table for Model one, which had firm age and number of employees, only explained 45.8% of variation in total expenditure on research and development (in ZAR). Furthermore, the addition of independent variables; namely, domestic non-state ownership, foreign non- state ownership, managerial ownership, independent non-executive directors and board size, resulted in an additional 16.2% in explaining the total of expenditure on research and development (in ZAR). What this means is that the final model that had all the independent variables, while controlling for firm age and number of employees, explained 62% of variation in the total expenditure on research and development. This of course, is excellent.

Table 7: Model Summary: Model Expenditure (ZAR) - Dependent variable

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df 1	df2	Sig. Change	
1	.677 ^a	.458	.440	.99571	.458	25.764	2	61	.000	
2	.787 ^b	.620	.572	.87028	.162	4.770	5	56	.001	1.859
a. Predictors: (Constant), Log Firm age, Log Employees										
b. Predictors: (Constant), Log Firm age, Log Employees, Domestic Non-State Ownership, Log Foreign Non- State Ownership, Log Independent Non-Executive Directors, Log Director Ownership, Log Board Size										
c. Dependent Variable: Log Total Expenditure in R&D (ZAR)										

The above model with firm age and number of employees were significant as shown by a p-value of 0.000. Moreover, the above model that had all the independent variables (domestic non-state ownership, foreign ownership, managerial ownership, independent non-executive directors and board size) while controlling with firm age and number of employees, was also clearly significant as shown in Table 9.

Table 8: ANOVA: Model Expenditure (ZAR) - Dependent variable

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.087	2	25.543	25.764	.000 ^b
	Residual	60.477	61	.991		
	Total	111.564	63			
2	Regression	69.151	7	9.879	13.043	.000 ^c
	Residual	42.413	56	.757		
	Total	111.564	63			
a. Dependent Variable: Log Total Expenditure in R&D (ZAR)						
b. Predictors: (Constant), Log Firm age, Log Employees						
c. Predictors: (Constant), Log Firm age, Log Employees, Domestic Non-State Ownership, Log Foreign Non- State Ownership, Log Independent Non-Executive Directors, Log Director Ownership, Log Board Size						

Table 10 shows the coefficients as analysed from the data. The coefficients shown in Table 7 indicate that only the number of employees ($\beta = 0.517$, p-value = 0.000), foreign non-state ownership ($\beta = -0.355$, p-value = 0.000), and board size ($\beta = 0.236$, p-value = 0.044) were significant in predicting Total Expenditure (ZAR). The rest of the results are interpreted below in relation to each hypothesis as presented.

Table 9: Coefficients: Model Expenditure (ZAR) - Dependent variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.961	.668		7.430	.000		
	Log Employees	.886	.124	.678	7.167	.000	.992	1.009
	Log Firm age	-.089	.345	-.024	-.257	.798	.992	1.009
2	(Constant)	6.228	1.936		3.217	.002		
	Log Employees	.675	.151	.517	4.480	.000	.510	1.960
	Log Firm age	-.321	.315	-.088	-1.020	.312	.906	1.103
	Domestic Non-State Ownership	-.884	.574	-.135	-1.541	.129	.883	1.133
	Log Foreign Non-State Ownership	-.533	.133	-.355	-4.017	.000	.870	1.150
	Log Director Ownership	-.200	.119	-.173	-1.678	.099	.639	1.565
	Log Board Size	1.941	.941	.236	2.063	.044	.520	1.924
	Log Independent Non-Executive Directors	-.038	.826	-.004	-.046	.963	.816	1.225
a. Dependent Variable: Log Total Expenditure (ZAR)								

The results presented in Table 11 indicate that Model one only explained 0.1% of the variation in the registered patents. The addition of the independent variables (much as done above), resulted in an additional 19.3% in the explanation of the number of employees. The final model that had all the independent variables while controlling for firm age and number of employees, explained 19.4% of variation in number of employees as shown by an R-square of 0.194.

Table 10: Model Summary: Model Number of CIPC Registrations - Dependent variable

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin - Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.034 ^a	.001	-.090	.58504	.001	.012	2	22	.988	
2	.440 ^b	.194	-.138	.59789	.193	.813	5	17	.557	2.181
a. Predictors: (Constant), Log Firm age, Log Employees										
b. Predictors: (Constant), Log Firm age, Log Employees, Domestic Non-State Ownership, Log Foreign Non- State Ownership, Log Independent Non-Executive Directors, Log Director Ownership, Log Board Size										
c. Dependent Variable: Log Number of CIPC Registrations										

The model with firm age and the number of employees as well as the model with all the independent variables while controlling for firm age and the number of employees, were insignificant as indicated by the P-values of 0.988 and 0.760 respectively. These are presented below in Table 12.

Table 11: ANOVA: Model Number of CIPC Registrations - Dependent variable

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.008	2	.004	.012	.988 ^b
	Residual	7.530	22	.342		
	Total	7.538	24			
2	Regression	1.461	7	.209	.584	.760 ^c
	Residual	6.077	17	.357		
	Total	7.538	24			
a. Dependent Variable: Log Number of CIPC Registrations						
b. Predictors: (Constant), Log Firm age, Log Employees						
c. Predictors: (Constant), Log Firm age, Log Employees, Domestic Non-State Ownership, Log Foreign Non- State Ownership, Log Independent Non-Executive Directors, Log Director Ownership, Log Board Size						

Furthermore, the coefficients shown in Table 12 indicate that none of the variables were significant in predicting the registered patents.

Table 12: Coefficients: Model Number of CIPC Registrations - Dependent variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.461	.635		.726	.475		
	Log Employees	.004	.118	.007	.034	.974	.992	1.009
	Log Firm age	.049	.328	.032	.150	.882	.992	1.009
2	(Constant)	2.486	2.155		1.154	.265		
	Log Employees	.027	.168	.050	.163	.872	.510	1.960
	Log Firm age	.110	.351	.072	.314	.757	.906	1.103
	Log Domestic Non-State Ownership	.283	.638	.103	.443	.663	.883	1.133
	Log Foreign Non-State Ownership	.124	.148	.197	.843	.411	.870	1.150

	Log Director Ownership	-.082	.133	-.169	-.622	.542	.639	1.565
	Log Board Size	-.112	1.047	-.032	-.107	.916	.520	1.924
	Log Independent Non-Executive Directors	-1.536	.919	-.403	-1.671	.113	.816	1.225
a. Dependent Variable: Log Number of CIPC Registrations								

4.7 Results pertaining to hypotheses

This section presents the results pertaining to all the hypotheses investigated in the study as follows:

4.7.1.1 Hypothesis 1a. Domestic non-state ownership is positively related to CE in SA registered firms as measured by R&D expenditure.

The results presented in Table 7 show that Domestic Non-State Ownership ($\beta = -0.088$, t-value = -1.541, p-value = 0.129) was not significant in predicting Total Expenditure on R&D. A standardised beta value of -0.135 indicates that for every 1% increase in Domestic Non-State Ownership, the Total Expenditure on R&D decreases by 0.135%. however, this result was not significant as the P-value was greater than 0.05. This indicates that the hypothesis was not supported as it postulated a positive relationship (while the data showed a negative relationship, though not significant).

4.7.1.2 Hypothesis 1b. Domestic non-state ownership is positively related to CE in SA registered firms as measured by patent registrations.

The results presented in Table 10 show that Domestic Non-State Ownership ($\beta = 0.103$, t-value = 0.443, P-value = 0.663) was positive but not significant in predicting Log Number of CIPC Registrations. A standardised beta value of 0.103 indicates that for every 1% increase in Domestic Non-State Ownership, the number of Patent Registrations increase by 0.103%. This result was however not significant as the P-value was greater than 0.05. This indicates that the hypothesis was supported but not significant.

4.7.2 Hypothesis 2a. Foreign ownership is positively related to CE in SA registered firms as measured by R&D expenditure.

The results presented in Table 7 show that Foreign Ownership ($\beta = -0.355$, t- value = -4.017, p-value = 0.000) was negative and significant in predicting Total Expenditure on R&D. A standardised beta value of -0.355 indicates that for every 1% increase in Foreign Ownership, the Total Expenditure on R&D decreases by 0.355%. This result was also insignificant since the p-value was less than 0.05. This indicates that the hypothesis was not supported as it postulated a positive relationship, yet the data showed a significant negative relationship.

4.7.2.1 Hypothesis 2b. Foreign ownership is positively related to CE in SA registered firms as measured by registered patents.

The results presented in Table 10 show that Foreign Ownership ($\beta = 0.197$, t- value = 0.411, P-value = 0.870) was positive but not significant in predicting the Number of Patent Registrations. A standardised beta value of 0.197 indicates that for every 1% increase in Foreign Ownership, the number of Patent Registrations increase by 0.197%. This result was however not significant as the P-value was greater than 0.05. This indicates that the hypothesis was supported but not significant.

4.7.3 Hypothesis 3a. Managerial ownership is positively related with CE in SA registered firms as measured by R&D expenditure and patent registrations.

It should be noted from Table 7, Director Ownership ($\beta = -0.173$, t- value = -1.678, P-value = 0.099) was not significant in predicting Total Expenditure on R&D. A standardised beta value of -0.173 indicates that for every 1% increase in Director Ownership, the Total Expenditure on R&D decreases by 0.173%. This result was however not significant as the P-value was greater than 0.05. This indicates that the hypothesis was not supported as it postulated a positive relationship, yet the data showed a negative relationship though not significant.

4.7.3.1 Hypothesis 3b. Managerial ownership is positively related with CE in SA registered firms as measured by patent registrations.

The results in Table 10 show that Director Ownership ($\beta = -0.169$, t- value = -0.622, P-value = 0.542) was not significant in predicting Patent Registrations. A standardised beta value of -0.169 indicates that for every 1% increase in Director Ownership, the number of Patent Registrations decreases by 0.169%. This result was however not significant as the P-value was greater than 0.05. This indicates that the hypothesis was not supported as it postulated a positive relationship, yet the data showed a negative relationship though not significant.

4.7.4 Hypothesis 4a. A larger Board Size is positively associated with CE in SA registered firms as measured by R&D expenditure.

The results presented in Table 7 show that Board Size ($\beta = 0.243$, t- value = 2.063, P-value = 0.044) was positive and significant in predicting Total Expenditure on R&D. A standardised beta value of 0.236 indicates that for every 1% increase in the Board Size, the Total Expenditure on R&D increases by 0.236%. This result was also significant since the P-value was less than 0.05. This indicates that the null hypothesis was rejected and it was concluded that a larger Board Size is positively associated with CE in SA registered firms as measured by R&D expenditure.

4.7.4.1 Hypothesis 4b. A larger Board Size is positively associated with CE in SA registered firms as measured by patents registrations.

The results in Table 10 show that Board Size ($\beta = -0.032$, t- value = -0.107, P-value = 0.916) was not significant in predicting Patent Registrations. A standardised beta value of -0.032

indicates that for every 1% increase in the Board Size, the number of Patent Registrations decreases by 0.032%. This result was however not significant as the P-value was greater than 0.05. This indicates that the hypothesis was not supported as it postulated a positive relationship, yet the data showed a negative relationship though not significant.

4.7.5 Hypothesis 5a. The proportion of independent non-executive directors on the board is positively associated with CE in SA registered firms as measured by R&D expenditure.

It should be noted from Table 7 that Independent Non-Executive Directors ($\beta = -0.004$, t- value = -0.046, P-value = 0.963) was not significant in predicting Total Expenditure on R&D. A standardised beta value of -0.004 indicates that for every 1% increase in Independent Non-Executive Directors, the Total Expenditure on R&D decreases by 0.004%. This result was however not significant as the P-value was greater than 0.05. This indicates that the hypothesis was not supported as it postulated a positive relationship, yet the data showed a negative relationship though not significant.

4.7.5.1 Hypothesis 5b. The proportion of independent non-executive directors on the board is positively associated with CE in SA registered firms as measured by registered patents.

The results in Table 10 show that Independent Non-Executive Directors ($\beta = -0.403$, t- value = -1.671, P-value = 0.113) was not significant in predicting Patent Registrations. A standardised beta value of -0.403 indicates that for every 1% increase in Independent Non-Executive Directors, the number of Patent Registrations decreases by 0.403%. This result was however not significant as the P-value was greater than 0.05. This indicates that the hypothesis was not supported as it postulated a positive relationship, yet the data showed a negative relationship though not significant.

4.8 Conclusion

This chapter presented the research results after data analysis. It gave commentary on the sample characteristics, descriptive statistics, data transformation and regression analysis results. It then examined each hypothesis and went into detail on each hypothesis as tested, as well as the results. Below is a table summarising the results obtained from the data analysis. From it, of note is that only Hypothesis 4a (managerial ownership is positively associated with CE in

SA registered firms as measured by R&D expenditure) was significantly supported. Hypothesis 2a (Foreign ownership is positively related to CE in SA registered firms as measured by R&D expenditure) was significantly not supported as well. All other hypotheses investigated in this study were not significantly supported and not supported.

In the next chapter (discussion of results), the results on all of the hypotheses are detailed and explained in relation to previous and similar studies.

Table 13: Summary of results

Hypothesis		Supported/ Not	Significant/ Not
H1a	Domestic non-state ownership is positively related to CE in SA registered firms as measured by R&D expenditure.	Not supported	Not Significant
H1b	Domestic non-state ownership is positively related to CE in SA registered firms as measured by patent registrations.	Supported	Not Significant
H2a	Foreign ownership is positively related to CE in SA registered firms as measured by R&D expenditure.	Not supported	Significant
H2b	Foreign ownership is positively related to CE in SA registered firms as measured by patent registrations.	Supported	Not Significant
H3a	Managerial ownership is positively related with CE in SA registered firms as measured by R&D expenditure.	Not supported	Not Significant
H3b	Managerial ownership is positively related with CE in SA registered firms as measured by patent registrations.	Not supported	Not Significant
H4a	A larger Board Size is positively associated with CE in SA registered firms as measured by R&D expenditure.	Supported	Significant
H4b	A larger Board Size is positively associated with CE in SA registered firms as measured by patents registrations.	Not supported	Not Significant
H5a	The proportion of independent non-executive directors on the board is positively associated with CE in SA registered firms as measured by R&D expenditure.	Not supported	Not Significant
H5b	The proportion of independent non-executive directors on the board is positively associated with CE in SA registered firms as measured by registered patents.	Not supported	Not Significant

CHAPTER 5: DISCUSSION OF RESULTS

5.1 Introduction

This chapter discusses the results as presented in Chapter 4, a summary of the chapter, as well as some concluding remarks.

5.2 Discussion pertaining to hypothesis 1 (Domestic non-state ownership)

Hypothesis 1(a) stated that domestic non-state ownership is positively related to CE in South African registered firms as measured by R&D expenditure. H1(b) stated that domestic non-state ownership is positively related to CE in South African registered firms as measured by patent registrations. Hypothesis 1(a) is not supported nor significant (as measured by R&D expenditure) and hypothesis 1(b) is supported but not significant (as measured by patent registrations).

Some previous findings indicate that domestic ownership ‘has a negative impact on performance compared to foreign institutional investors’ (Filatotchev & Wright, 2011). This could suggest that such investors are myopic and inert, thus limiting any real input to the firm in this respect. At the same time, Douma (2006) found a “positive and significant” relationship between domestic ownership and firm performance. As stated earlier, the results in relation to these variables are largely inconclusive.

In Europe during the late 80s and early 90s, “foreign investors accounted for over one-half of OECD privatization processed raised through public share offerings” (Munari, Oriani, & Sobrero, 2010). This rapid increase in Anglo-Saxon investors and their preference for pushing CE within the firms had a huge influence on decisions and strategies followed by French firms which in turn presented itself as significant investment in R&D (Munari, Oriani, & Sobrero, 2010). As related to this study, this is not likely the case as such investors (in the JSE) may simply be diversifying their assets and not actively engaged in the firm. It lends support that foreign investors, and not domestic ones, drive innovation.

Another potential explanation for this could tie back to agency theory as “literature shows that agency problems increase greatly with increased levels of diversification (Filatotchev & Wright, 2011). In reference to this research report, firms with overly diversified boards, even in instances where domestic non-state shareholders have significant shareholding, could still suffer from diversification and the associated agency problems. Another explanation could

simply be that the domestic non-state shareholder are simply not very interested in this information or the firm's performance as they may solely be interested in diversifying their individual investment portfolios. As such their interests are not in long term strategic moves towards gaining competitive edges (including corporate entrepreneurship) and will not allow significant investments into such activities (Filatotchev & Wright, 2011).

Filatotchey (2011) goes further to state that 'domestic ownership has a negative impact on firm innovation performance as opposed to foreign investors'. He posits it is because domestic owners are likely families but this is a rather poor view of domestic owners, especially considering the current study's sample was made up of publicly traded companies (JSE listed firms) where family with majority stakes in companies are extremely rare) (Filatotchev & Wright, 2011).

5.3 Discussion pertaining to hypothesis 2 (Foreign ownership)

Hypothesis 2 (a) stated that foreign ownership is positively related to CE in South African registered firms as measured by R&D expenditure. H2 (b) stated that foreign ownership is positively related to CE in South African registered firms as measured by patent registrations. As stated before, using a standardised beta value of -0.355 indicates that for every 1% increase in Foreign Non-State Ownership, the Total Expenditure (ZAR) on research and development decreases by 0.355%. Since the P-value was less than 0.05, this finding was statistically significant. This indicates that the hypothesis was not supported as it postulated a positive relationship, yet the data showed a significant negative relationship.

These results could be explained by the resource-based theory's perspective that 'although foreign shareholders may have excellent monitoring capabilities, their focus on the firm's financial position and liquidity status could result in more unwillingness to commit to long-term relationships/investments in the firm and less likely to engage in activities that will remedy poorer performance' (Douma, George, & Kabir, 2006). As such it naturally follows that less resources will be allocated towards corporate entrepreneurial activities. This research report's results thus are not abnormal but theoretically supported.

Firstly, Douma's (2006) study had similar findings to this and suggests a 'disaggregation of foreign ownership into foreign institutional and foreign corporate shareholding as the two segments should be examined separately'. It is convincible that dichotomously opposed

investment intentions (between the two sub-segments) need to be appreciated and separation could make understanding CG and CE at a more refined granularity of detail.

It should also be noted that the current study did not account for firms that are subsidiaries of international firms (which makes them dominantly foreign owned). Such distinction offers potential for future studies. One could theorize that subsidiaries will naturally have scope for more CE activities as they have access to the resources necessary, and are inherently and implicitly more entrepreneurially inclined (evidenced by the fact that the part company has created subsidiaries in other territories).

However, another study found such firms exhibited “lower opportunity exploitation” (Massis, Kimberly, & Paola, 2021). Again, the results are not conclusive but it could be tied back again to the investors intentions (particularly what they want out of the investment and how long they intend in being invested in a particular entity for).

Ziyae (2018) asserts that effective governance arrangements, especially those with foreign ownership, necessitate R&D initiatives driven by policies designed to foster "joint studies, joint development, international cooperation, and staff exchange." The present study could not examine such granularity of information as it is not public knowledge in many instances, particularly the South African one. It then becomes very difficult to explain the results in the study's case.

I posit that the negative and insignificant statistical results could stem from many factors including:

- Little interest by foreign investors to engage in risky behaviour (in the South African market at least);
- Offshoring their capital as a hedge to their home economies, thus are not actually investing but storing value away; and
- Limited context in the invested economy, thus they (foreign investors) do not know how to effectively encourage entrepreneurial behaviour.

5.4 Discussion pertaining to hypothesis 3 (Managerial ownership)

Hypothesis 3 (a) stated managerial ownership is positively related to CE in South African registered firms as measured by R&D expenditure. H3 (b) stated that managerial ownership is

positively related to CE in South African registered firms as measured by patent registrations. As stated previously, a director may simultaneously be a shareholder if they own shares in the company. The study found that Hypothesis 3 (a) and 3 (b) are neither supported nor significant.

The results actually indicated that for every 1% increase in Director Ownership, the number of CIPC Registrations decreases by 0.169% and a decrease of 0.173% in R&D expenditure (both negative but insignificant as the P-values were greater than 0.05).

This negative relationship could be explained by the stewardship theory wherein “equity ownership does not contribute to a higher degree of R&D intensity as managers are likely to spend less but produce high quality products” (Chen X. , 2020, p. 236). The logic here is that less incentive to long term real innovative products is mitigated with shorter term, efficiently produced product offerings that meet a certain market need.

“Among younger entrepreneurial firms, a dearth of top management industry experience is offset by the presence of outside directors with significant managerial industry experience, providing evidence of experience supplemented by outside directors” (Li, Terjesen, & Umans, Corporate governance in entrepreneurial firms: a systemic review and research agenda, 2018). As such, the current study’s results are not surprising at all, as the results do not support this view. This could simply be because firms listed on the JSE are often older and more established (with the sample’s average age since incorporation being 42 years). They are not young thus have different goals within the business’s lifecycle (that of potential sustainability and steady growth as opposed to younger firms just fighting to keep afloat and grow).

Zahra (1996) assert that from a Global perspective, US firms have declined in competitiveness, potentially as a result of managerial aversion to risk taking behaviours. Although an old study the current study’s results do support this view. Igor and Wright (2011) further asserted that managerial ownership can have a negative effect on “export-facilitating strategies” which was their measure of CE initiatives. They believed that this was again, as a result of risk aversion temperaments. When one refers to the agency theory it becomes obvious that the differing intentions around how resources should be allocated along with much shorter performance review timelines, managers will almost certainly not see it economically prudent to invest large amounts of resources into CE activities (at least of an R&D or IP registration nature).

Interestingly, Munari *et al* (2010) say they found varying results but did note it ultimately depends on the control exerted. This makes complete sense. It is logically conceivable that

managers in different firms will be allocated different levels of control over investment expenditure. Where they have more control, it is unlikely they'll direct resources to CE as measured in R&D or IP registration. Again, the study refers back to how managers are judged (performance wise) against the best longer-term interests of the business or firm as a whole.

Douma (2006) noted a “curvilinear relationship” between managerial ownership and innovation, going further to highlight that his results could not positively and significantly confirm the hypothesis. The study posits that this could be due to smaller shareholding by managers. Douma (2006) believes that much larger shareholding is needed to overcome ‘agency costs’, and as our sample proved, managerial ownership tends to be relatively small amongst South African listed firms. Industry standards in this market do not seem to promote having larger equity in firms as a best practice in compensation packages for the managers. So long as managers and investors goals are misaligned, increasing managerial ownership actually stands to prevent more entrepreneurial behaviour and initiatives amongst firms (at least South Africa publicly listed firms).

5.5 Discussion pertaining to hypothesis 4 (Board size)

Hypothesis 4 (a) stated that a larger board size is positively related to CE in South African registered firms as measured by R&D expenditure. H4b stated that a larger board size is positively related to CE in South African registered firms as measured by patent registrations. The results show that when CE is measured by R&D expenditure, Hypothesis 4 (a) is supported and significant. However, when CE is measured by patent registrations, hypothesis 4 (b) is not supported nor significant.

As stated earlier, a standardised beta value of 0.236 indicates that for every 1% increase in the size of the board, the Total Expenditure (ZAR) on research and development increases by 0.236%.

The findings of the present investigation actually showed a bad association; however, it was not statistically significant. A pertinent reason for this could be that new patent creation involves high risk investments. This could require a stronger commitment and unity among the board of directors (all of whom may have differing opinions and stances). The more members a board has the more difficult it is to reach consensus. “Given that the relationship between board size and its ability to process information effectively, CE will initially rise as the size of board increases, but then begin to fall at the point where adding more members becomes

dysfunctional” (Rigolini, 2013, p. 39). As expected, firms with larger boards tend to be positively correlated with CE activities, supporting the agency and resource dependence theories. As such, investors and the firm’s leadership should seriously consider applying these findings when reviewing their own board compositions (at least up until the critical mass point, before being so large they become dysfunctional).

Board size should have limitations and practitioners should be cognisant of the fact that a board size that is too large may in turn have negative effects, particularly weary of problems around ‘coordination and communication, board cohesiveness, free-riders (non-contributing members) and increased agency costs’ (Merendino & Melville, 2019). The combined effect of this could present itself as firms engaging in less CE activities. Extending this notion, patenting choices frequently call for a prompt response from the board to fresh and exceptional chances. A South African study found that a larger board size resulted in lower firm performance and CE activities (Scholtz & Kieviet, 2018). Of course, this could be related to their (cited study) particular measure of firm performance and CE activities, but it supports the idea that board sizes up to a certain size can have a positive effect on CE activities. Thus, although a larger board is potentially beneficial for R&D expenditure due to higher combined access to precious resources, skills and experience, it is not significantly advantageous for high-risk patent efforts. The resource dependence theory is thus partially supported.

5.6 Discussion pertaining to hypothesis 5 (Proportion of independent non-executive directors)

Hypothesis 5 (a) stated that the proportion of independent non-executive directors on the board is positively related to CE in South African registered firms as measured by R&D expenditure. H5b stated that the proportion of independent non-executive directors on the board is positively related to CE in South African registered firms as measured by patent registrations. The results of the data analysis did not support either of the posited hypotheses nor found any significance (as measured by R&D expenditure and patent registrations). These results are unexpectedly in opposition to the advanced theory that a higher proportion of independent non-executive directors should ensure better management oversight, prevent extremes of information asymmetry between managers and shareholders, and increase corporate value by facilitating CE activities through their expertise. Chen (2020) found a positive relationship but Zahra (1996) found a negative relationship between the proportion of independent board members and CE. Pucheta-Martinez & Gallego Alvarez (2020) found ‘board independence is positively

correlated with firm entrepreneurial initiatives and performance'. Another study found a positive correlation between firms with higher proportions of independent directors and firms' performance and entrepreneurial drive.

These findings are obviously not consistent with the current investigation's results but a few reasons could be posited including but not limited to:

- increased costs (as related to ensuring regulatory compliance¹ on independent board member composition, potentially leaving less for other investments such as R&D);
- the neutralizing tactics employed by the managerial team (C-suite executives) such as appointing inappropriately skilled independent directors, or at least directors sympathetic to the said executive's ambitions and plans (thus lessening the actual point in independence and negatively affecting strategic decisions around investments into CE activities). This of course crosses lines with agency theory; and
- considerations around time actually spent by these independent directors and their focus (or lack thereof). It is no secret that many independent directors are on several boards at any given moment as well as other career related interests outside of the firms. This more than likely dilutes their focus, lowering the quality of their decisions and advice, thus negatively affecting important strategic decisions (such as those around CE activities).

An extension of the above is the perspective that the core idea of independent directors is their 'potential to bring an objective perspective to the performance reviews of the board and management'. (Scholtz & Kieviet, 2018). The oversight role increases the quality of firm performance as one is held accountable for their actions, It could, conversely, be possible that in certain circumstances, such as those where the independent directors actually exercise independence of thought, have a positive effect on CE. The political landscape in South Africa has proved that many institutions that operate in the profit driven market place are not operated effectively (almost openly promote nepotism, cronyism and corruption). Further research on the field, particularly on much more clearly defining what actually constitutes as independent directors could be an area worth developing.

The difficulty in gaining insider knowledge for such directors may be another cause for this. They frequently just get financial data on the company (all other information being kept secret

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or not given in full for misconceived protection reasons). Due to this issue, some independent non-executive directors might advise management to engage in alternative types of entrepreneurial endeavours. An example could be to focus on new market entry through venturing rather than on new product innovation (Chen X. , 2020). Another potential reason could be that firms simply use independent non-executive directors from a legal compliance perspective (at the expense of actually enhancing the board's effectiveness). This naturally has the effect of dramatically reducing the independent non-executive directors' contribution to the company's commitment to innovation investment and patenting efforts (at least amongst JSE listed firms). The implementation of CE activities requires a deep understanding of the business and industry in which one is involved, and independent directors might not always have the knowledge or understanding thereof. Thus, as the results indicate amongst JSE listed firms, an outside presence is not associated with CE activities (R&D expenditure and patent registrations). As related to this variable, agency and resource dependence theories are not supported.

5.7 Conclusion

Generally speaking, 'CE is positively related to firm performance and empirically supported to enhance outcomes such as innovation, growth, learning and knowledge creation' (Kreiser P. M., Kuratko, Covin, Ireland, & Hornsby, 2021). However, the findings of this study allow for one to posit that in the given circumstances, there is an apparent lack of association between Corporate Governance structures and Research and Development activities/efforts of JSE listed firms in most of the Corporate Governance structures. This research study only statistically noted a positive and significant relationship between a larger board size (board of directors) and R&D expenditure. This evidence could suggest that JSE listed firms with more board members tends to result in a stronger commitment to direct resources towards backing Research and Development Expenditure (i.e., allocate more money towards it). The study's findings seem to indicate that neither the alternative CG structures nor the independent non-executive directors on this board have any discernible impact on R&D operations.

The outcomes of the hypothesis testing as recommended in Chapter 4 were covered in this chapter. These hypotheses considered the effects of CG structures on CE. The discussion included potential explanations of the results based on theory, prior literature and inference from common business practices in Southern Africa.

In the next chapter (Chapter 6), final conclusions are drawn, implications are inferred and recommendations are made for future study.

CHAPTER 6: CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

6.1 Introduction

This research study investigated the relationship between corporate entrepreneurship and governance structures amongst Johannesburg Stock Exchange listed companies in South Africa over the 2018 to 2019 period.

The relationship was evidenced by determining whether corporate governance structures are an important determinant in corporate entrepreneurship activities and efforts. Corporate entrepreneurship was examined using two dimensions; namely, the registration of intellectual property rights as measured by patent registrations; as well as research and development expenditure as measured by the total research and development investment (in Rand terms). In this chapter, conclusions are drawn, implications of the study are explored, limitations of the study are discussed, and suggestions are made for future research.

6.2 Conclusions of the study

Access to finance and limited resources, most notably natural resources, presents a significant problem for the majority of entrepreneurial enterprises without linkages to the government. In South Africa, commercial banks must adhere to strict regulations when making loans to start-up businesses (and it is no secret that Black owned firms have struggled the most in this respect despite the majority being politically in control of the country) (Bezuidenhout, Bitz & Preisendörfer, 2014). The pursuit of value adding CE activities requires considerable resources (Zhang *et al.*, 2014). Making significant resource commitments for the development of novel goods or services and unproven technologies for the domestic market is a necessary component of any innovation and risk-taking activity (with the goal of long-term value creation) (Shapiro *et al.*, 2015). In an ever-globalising world, achieving a competitive advantage through one's high-quality innovative products and services is key to success (Shapiro *et al.*, 2015). The previous studies from developed countries may not readily apply to the unique socio-political and economic environment of South Africa hence providing an excellent opportunity to add to the body of literature (Chen X. , 2020).

In investigating the nature of the relationships between the aforementioned variables, two models were used to examine the effects of CG structures on CE. The measurements of CG structures (domestic non-state ownership, foreign ownership, managerial ownership, board size

and proportion of independent non-executive directors) were developed from previous investigations (Chen X. , 2020). CE activities were measured using patent registrations and R&D expenditure (Chen X. , 2020).

The data analysis included descriptive statistics, data transformation, correlation check, regression analysis and the presentation of the results pertaining to the five hypotheses (all with two parts to them). The results of the empirical analysis (see Summary of all Hypotheses) showed that only a larger board size is positively related with CE in JSE listed firms as measured by R&D expenditure. All other CG structures were not significant (except foreign ownership which actually did not support the hypothesis and was significant). Similar to the Anglo-Saxon research, this involved controlling variables (firm age, size and industry).

6.3 Implications and recommendations

The study attempts to make two explicit contributions to the literature.

Firstly, the study contributes to the field of knowledge by demonstrating, dissimilar to research findings from developed nations, that only board size has a positive and significant relationship while foreign ownership has a negative and again, significant relationship.

Second, the study broadens the growing body of South African literature (Shapiro *et al.*, 2015; Bezuidenhout, Bitz & Preisendörfer, 2014), which has focused on the effects of ownership structures and barely considered board structures in depth. South Africa has different characteristics compared to the Anglo-Saxon and Asian countries where most studies in the field have been conducted. The study thus provides, rather unsurprisingly, empirical evidence that not all findings from developed countries apply to the Sub-Saharan African context.

Above and beyond the theoretical and empirical contributions, the study also offers a few policy and practical managerial implications.

The study could have implications for policy and law makers in the country (particularly on ownership laws). The study may suggest that policy should reflect a position that emphasises less on independent directors, and instead focuses on increasing board sizes if the country wishes to play a more prominent role in global competitiveness through innovation. It must be noted though, that the study does not indicate that agency and resource dependence problems are not applicable to South African firms. A stronger stewardship culture could help local firms

in that they have a resource provider role which has not been affected efficiently (Miller et al., 2008).

Furthermore, the theory provides empirical support for the need for firm management, CE policymakers, and investors of all stripes to fully disclose R&D spending in its current form. Aromatisation and poor descriptions in annual financial reports make it very difficult for one to track a listed company's R&D efforts. The reasons for this poor reporting are obvious (being better short-term financials) but they distort the picture of how, why and where companies are allocating resources (even to their own detriment as they may lose track instead of focussing on gaining future competitive advantages through innovation). This will have the added advantage of providing investors with the necessary information to make better informed decisions on the business CE capability and prospects of increased share value over time (Chen & Hsu, 2009).

6.4 Limitations of the study

Firstly, the sample could not include all JSE listed firms thus the study's findings obviously cannot be generalized as it had a limited sample and the lack of regulation around reporting R&D investment theoretically means many firms may or may not have also invested significantly in corporate entrepreneurship activities. (Chebbi, Yahiaoui, Sellami, Papasolomou, & Melanthiou, 2020).

Second, the study's findings are only applicable to JSE-listed companies that have accurate data on how to quantify R&D spending and patent filings (via the CIPC). Potential for future studies could stem from a replication of the study with non-South African listed firms (using any other African country).

Furthermore, the study definition was limited to R&D spend and patent registrations. These of course are not the full scope of what corporate entrepreneurial activities are. Other studies may use different and equally valid measures hence just because a firm did not invest R&D does not mean it is not entrepreneurial. The current study simply offers more light into the topic and more importantly, raises more questions that can be explored by future researchers (using their own definitions, contexts and datasets).

Finally, using employee size as a control variable is also limited. The companies under investigation came from a wide range of sectors. As such, different sectors will naturally have

different staffing requirements which will affect the number of employees (for example, more technologically advanced firms may require less but more advanced staff than less advanced firms in need of more human resources to do processes that cannot be easily automated). It must also be noted that this is a ‘cross-sectional study that has limitations as opposed to a longitudinal study’ (Shafique & Kalyar, 2018).

6.5 Suggestions for further research

- The effect of directors and top management traits in the context of South Africa are two additional criteria that could be investigated to determine CE (including but not limited to educational background, skills set, sex, colour) and how these could influence CE.
- The Business risk could be investigated in depth (considering the fact that CE can be very expensive, time consuming, resource intense and risky).
- A longer-term view with reference to the data collection could increase reliability (expanding the time span from just 2018-2019 to maybe 2000-2020). In any setting economic factors also affect strategic decisions companies make. As such, further research could factor in ‘economic conditions like recessions’ in the same subject matter (Zabri, Ahmad, & Wah, 2016).
- Consideration of all listed JSE firms with the use of more readily available measures of R&D activities as discussed above. By extension, the availability of a larger dataset within the publicly listed firm would also go a long way in exploring the research top at an advanced granularity. As noted earlier, not all firms report their R&D expenditure, so it can also be envisioned that in territories where such reporting is legislatively dictated, the said territories could also prove to be interesting areas to conduct further research.
- A direct comparative study between South African firms and the developed Anglo-Saxon countries (as an aggregated dataset potentially).
- Other similar studies have explored different variables including audit committee, ‘CEO and board tenure, CEO and board compensation, managerial or director ownership and board process (number of board meetings and number of decisions taken)’ (Ciftci, Ekrem , Geoffrey, Mehmet, & Selim, 2019).

- The study was a quantitative one, thus a qualitative investigation could be explored in order to better understand the ‘complex process between board directors and corporate innovation’ (Li M. , 2019).
- Future studies could also consider incorporating other theories in exploring, understanding and explaining the relationship between corporate governance structures and innovations such as the contingency and institutional theories, stewardship perspective and strategic management theories (Li, Terjesen, & Umans, 2020).
- Finally, further studies could also investigate measuring innovation investment by Return on assets or return on capital employed as well (Yameen, Farhan, & Tabash, 2019).

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Appendix A: Consistency matrix

Determining the impact of particular Governance Structures on Intellectual Property output s as a form of Corporate Entrepreneurship.					
Sub aim	Literature Review	Hypothesis	Research Question	Variables	Source
Determine the extent to which the proportion of non-state relates to the Intellectual Property output of a given firm.	Choi et al., (2011) Filatotchev et al., (2010) Claessens et al., (2000) Hess et al., (2010)	Domestic non-state ownership is positively related to Corporate Entrepreneurship in the form of IP output in South African registered firms.	What is the relationship between domestic non-state ownership and IP output?	IV: Domestic non-state ownership proportion DV: IP output	Second Bloom and C
Determine the extent to which proportion of foreign owners relates to the Intellectual Property output of a given.	Chen et al., (2014) Elsayed (2010)	Foreign ownership is positively related to Corporate Entrepreneurship in the form of IP output in South African registered firms.	What is the relationship between foreign ownership and IP output?	IV: Foreign ownership proportion DV: IP output	Second Bloom and C
Determine the extent to which the proportion of managerial owners relates to the Intellectual Property output of the firm.	Jensen and Meckling (1976) Zahra et al., (2000) Beyer et al., (2012) Miller et al., (2009) Choi et al., (2011) Zheng and Lin (2011)	Managerial ownership is positively related to Corporate Entrepreneurship in the form of IP output in South African registered firms.	What is the relationship between managerial ownership and IP output?	IV: Managerial ownership proportion DV: IP output	Second Bloom and C
Determine the extent to which board size relates to the Intellectual Property output (big vs small) of the firm.	Haniffa and Hudaib (2006) Azeez (2015) Guest (2009) Kiel and Nicholson (2003) De Cleyn and Braet (2012) Magen et al., (2012) Jackling and Juhl (2009) Van den Berghe and Levrau (2004) Zahra et al., (2000) Shapiro et al., (2015)	Board size is positively associated with Corporate Entrepreneurship in the form of IP output in South African registered firms.	What is the relationship between the board size and IP output?	IV: Board size DV: IP output	Second Bloom and C

Appendix B: Research Instrument

Secondary data research instrument guide1244066

Start of Block: Default Question Block

Introduction *Corporate entrepreneurship and governance structures in South African listed companies.*

Dear Participant

I am a MMENVC candidate in the School of CLM Faculty at the Wits Business School, student number 1244066. I am under the supervision of *Dr. Jabulile Galawe*. As part of my studies, I am conducting research on Corporate Entrepreneurship.

I am examining Corporate Entrepreneurship, particularly the Corporate Governance factors that drive or inhibit Corporate Entrepreneurship. I will like to understand more deeply if there is any relationship at all between specific corporate governance structures in a given firm and the resulting entrepreneurial endeavours pursued subsequently (as measured by Intellectual Property rights registered).

The information gathered will remain completely anonymous. No companies will be identified by name, and none of the information of any of the corporate governance structures identified will be shared. The utmost care will be taken to ensure and protect sensitive information. All information gathered will remain confidential and only be reported in summary format. My contact details are as follows: Email: 1244066@students.wits.ac.za Phone number: 0745661350 My supervisors' details are as follows: Email: jabulile.galawe@wits.ac.za

Kind regards Tadiwanashe Gaylord Zhanje

End of Block: Default Question Block

Start of Block: Demographics

D1 Is it a registered entity as per the CIPC regulations?

☐ Yes (1)

☐ No (2)

Skip To: End of Survey If Are you a registered entity as per the CIPC regulations? = No

D2 Which industry would best describe the entity's primary functions?

- ☐ Oil, gas, coal or related mining (1)
- ☐ Telecommunications (2)
- ☐ Infrastructure development (3)
- ☐ Financial and business services (4)
- ☐ Healthcare and pharmaceuticals (5)
- ☐ Industrial manufacturing (6)
- ☐ Other (7)

Skip To: End of Block If Which industry would best describe the entity's primary functions? = Oil, gas, coal or related mining

Skip To: End of Block If Which industry would best describe the entity's primary functions? = Telecommunications

Skip To: End of Block If Which industry would best describe the entity's primary functions? = Infrastructure development

Skip To: End of Block If Which industry would best describe the entity's primary functions? = Industrial manufacturing

Skip To: End of Block If Which industry would best describe the entity's primary functions? = Financial and business services

Skip To: End of Block If Which industry would best describe the entity's primary functions? = Healthcare and pharmaceuticals

Display This Question:

If Which industry would best describe the entity's primary functions? = Other



D3 If other please briefly specify.

End of Block: Demographics

Start of Block: Shareholding

This section will examine the shareholding composition of the entity. Complete the following questions using the scale provided (a percentage of the total corporate governance structure).

S1 Indicate the shareholding composition in the year 2017 as a percentage of the total issued shares.

	Percentage
	Answer 1 (1)
State ownership (1)	
Domestic non-state ownership (2)	
Foreign ownership (3)	
Managerial ownership (4)	
Board ownership (5)	
Independent Directors (6)	

End of Block: Shareholding

Start of Block: Intellectual Property efforts

I1 This section will investigate the entrepreneurial efforts of the entity as measured by Intellectual Property registrations. All answers are of a “ratio” nature

Avoid writing ‘look’. Your thesis is not a human being. It cannot ‘look’. Use examine, investigate, explore etc



I2 How many IP registrations were made by the entity in the year 2018?

I3 How many IP patent applications were made by the entity in the year 2018?

I4 How many IP patents were granted in favour of the entity in the year 2018?

End of Block: Intellectual Property efforts

Appendix C: Data collected

CustomerL	TickerNam	YearOfInce	FirmAge	CompanyA	En
ABSA Bank	ABG	1986	.35	7th Floor, J	
ANGLO AM	AGL	1998	.23	Anglo Ame	
AFRICAN C	AFX	1927	.94	Afrox HSE,	
AFRICAN R	ARI	1933	.88	ARM Hous	
BARLOWO	BAW	2000	.21	180 Kather	
GOLD FIEL	GFI	1968	.53	150 Helen	
HARMONY	HAR	1950	.71	Randfonte	
IMPALA PL	IMP	1957	.64	2 Fricker R	
SUN INTEF	SUI	1967	.54	6 Sandowr	

Appendix D: Ethics Waiver



HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

Registration number: REC-101114-044

SCHOOL OF GRADUATE SCHOOL OF BUSINESS ADMINISTRATION ETHICS COMMITTEE

Ethics clearance/waiver number: WWBS/BA1244066/985

25 November 2020

Re: Tadiwanashe Zhanje (1244066)

To whom it may concern,

Tadiwanashe Zhanje (1244066) is currently registered as MM (Entrepr & New Venture Creation) student at the School of Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. This letter is to confirm that, at the time of writing, the researcher does not need ethical clearance for the study entitled *'Drivers and inhibitors of Corporate Entrepreneurship from a corporate governance lens (a South African context)'*. This decision has been reached based upon a description of the project supplied by the researcher to the Graduate School Of Business Administration Ethics Committee, constituted as a subcommittee of the University Human Research Ethics Committee (Non-Medical), which has been evaluated by the subcommittee chair. This decision has then been ratified by the University Human Research Ethics Committee (Non-Medical). If, however, the researcher changes the methods of data collection and analysis for this project, this decision may no longer be valid. If such changes take place, this should be communicated to the Graduate School of Business Administration Ethics Committee.

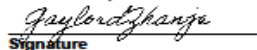
CHAIRPERSON (Dr MDJ Matshabaphala)

cc: Supervisor: Dr. Galawe

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am authorised to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.


Signature

Date 27 / 11 / 2020

Shaun Schoeman (Senior Administrative Officer)
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www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/

Appendix E: Acknowledgements

This report benefited from the support of many people. In particular the investor relations departments of many of the JSE's listed companies assisted us with information. A few invested hours of their time doing so and I am very grateful for their efforts. The Companies and Intellectual Property Commission administration office for providing information that greatly expedited this process. Dr. Jeanne Fredericks must also be acknowledged and thanked for her advice on navigating the research process. Honest Muchabaiwa's expertise and time is also appreciated.

Special thanks go to TZ and TS who provided important input to help us develop the conceptual approach to the task.

I must also acknowledge the funding and emotional support from Maude Ann Mabhena and Derek Zhanje which made this report possible. Without their contribution none of this would have ever been possible.

I would like to acknowledge Dr. Jabulile Msimango-Galawe for offering her guidance and support throughout the whole process. Your patience and trust in us to do what we thought best, gave us confidence to push through even during the most uncertain times.

Last but certainly not least we need to acknowledge "Sekuru" William Zhanje. The tree you planted years ago has borne fruit and now provides shade for generations you will never meet. The sacrifices you made throughout your whole life have not gone to waste.

The conclusions and opinions contained in this report are solely those of the author, as are any errors.