

**Title: Entrepreneurial Orientation and
Product Innovation of Private Health
Insurers in South Africa**

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**A research report submitted to the Faculty of Commerce, Law and Management,
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ABSTRACT

This research study analyses a conceptual model investigating the relationship between the level of health insurer product innovation and entrepreneurial orientation (EO); the relationship between the level of health insurer product innovation and external collaboration between health insurers and healthcare service providers. This study also analyses whether low presence of perceived strategic regulatory factors, necessary for encouraging health insurer product innovation in the private healthcare industry in South Africa, weakens the relationship between the level of new health insurer product innovation and EO, as well as the relationship between the level of new health insurer product innovation and external collaboration between health insurers and healthcare service providers.

The research study, focusing on major actors in both the demand and supply side structures of the private healthcare value chain, found that organisational-level EO is a very strong predictor of health insurer product innovation in the South African private healthcare industry. The research study also found that external collaboration between health insurers and healthcare service providers is a weak predictor of health insurer product innovation. An important finding of this study was that the low presence of strategic regulatory factors (which are necessary for encouraging health insurer product innovation in the South African private healthcare industry) means that the relationship between health insurer product innovation and EO is not moderated, and neither is the relationship between health insurer product innovation and external collaboration between health insurers and healthcare service providers.

These findings contribute to the South African private healthcare industry in terms of innovation, regulation, external collaboration and entrepreneurial orientation literature and studies.

DECLARATION

I, **Milton Alfred Streak**, 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 specialising in Entrepreneurship and New Venture Creation in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Milton Alfred Streak

Signed at

On the day of 2012

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This research study has added new insights to my understanding of the workings and the complex nature of the demand and supply side structures of the private healthcare industry in South Africa. It has also added to my own personal growth. I would like to thank the following people for their assistance and support throughout this rewarding, yet challenging process:

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CHAPTER 1: INTRODUCTION

1.1 Purpose of the study

The purpose of this research study is to investigate the relationship between the level of health insurer product innovation and entrepreneurial orientation (EO); the relationship between the level of health insurer product innovation and external collaboration between health insurers and healthcare service providers and; whether the low presence of perceived strategic regulatory factors, necessary for encouraging health insurer product innovation in the private healthcare industry in South Africa, weakens the relationship between the level of new health insurer product innovation and EO, as well as the relationship between the level of new health insurer innovation and external collaboration between health insurers and healthcare service providers.

1.2 Context of the study

The private healthcare industry in South Africa is complex and requires expertise and innovative solutions to ensure the financial sustainability of private health insurers and the industry as a whole. The private healthcare insurance market in South African is voluntary and covers a small percentage of the population due to cost, access and healthcare delivery challenges. The South African private healthcare insurance market will be used as a proxy to investigate the level of private health insurer product innovation. This is based on the performance versus cost ratio results of health systems in the world, as analysed by Monitor Group, L.P. (2008).

The private healthcare insurance market in South Africa is voluntary and accounts for 60% of total healthcare expenditure, but it only serves 16% of the South African population with higher incomes (Centre for Development and Enterprise 2011; Council for Medical Schemes 2010/11). There are approximately five-million formally employed uninsured people in South Africa (McLeod and Grobler 2008) and it is essential that they enter the private healthcare insurance market to ensure growth and future sustainability of the private healthcare industry.

The vehicles for private health insurance in South Africa are medical schemes (health insurers) and they are governed by the Medical Schemes Act 131 of 1998. According to the Centre for Development and Enterprise (2011) the Medical Schemes Act has been praised for good intentions and salutary effects in this regard, but has also been criticised for unintended consequences, resulting from what is included and what has been omitted. The Act exemplifies problems of over- and under-regulation; one key problem is community rating without mandatory participation of the formally employed uninsured population (Centre for Development and Enterprise 2011).

Medical Schemes are regulated by the Council for Medical Schemes, and the private healthcare industry has been subjected to increased regulatory intervention since 2000. Health insurers (medical schemes) in South Africa face many challenges to ensure they provide sustainable, quality and affordable healthcare cover to the populations they insure. According to the Centre for Development and Enterprise (2011), the average cost of belonging to a private health insurer has increased fivefold in real terms since 1980. According to the Centre for Development and Enterprise (2011), the relative number of dependents on medical insurance in South Africa has declined, especially in open health insurers and that this may be evidence of the impact of reduced affordability, especially since it occurred against the backdrop of overall GDP growth and an increasing population.

According to the Discovery Health Medical Scheme (2010), there are a number of key strategic issues facing the South African private healthcare industry:

1. Balancing the needs of all stakeholders in the healthcare value chain;
2. Managing the complexities of a heavily-regulated private healthcare funding system based on cross-subsidisation principles;
3. Finding sustainable ways of funding new medical technologies;
4. Managing health insurer cost drivers effectively;
5. The impact of the proposed National Health Insurance Plan on private health insurers;
6. The extension of private healthcare cover to a broader base of the formally employed population in order to grow the private healthcare market.

The challenges of managing a complex healthcare environment have led to significant industry consolidation, both in the number of health insurers and health insurer administrators operating in the private healthcare industry in South Africa. Over the past 10 years, 60 health insurers have closed or merged with other health insurers (Council for Medical Schemes 2010/11). Figure 1 indicates the reduction in the number of open medical schemes (open health insurers) during the last five years alone.

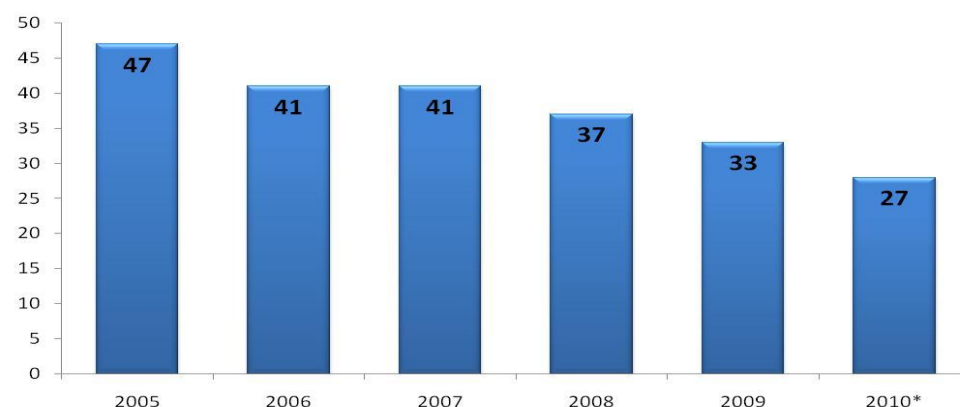


Figure 1 - Consolidation amongst open medical schemes (2005-2010), Source: Council for Medical Schemes (2010/11:156)

In addition, the cost pressures have led to continued financial underperformance of health insurers evidenced from a decreased industry solvency trend since 2005 (Council for Medical Schemes 2010/11). This trend of health insurer consolidation is still continuing and is predicted to continue for the foreseeable future. According to the Council for Medical Schemes (2010/11), in contrast to the decrease in the number of registered health insurers, the average number of benefit options in open health insurers increased from 5.0 in 2002 to 6.1 in 2010 and for restricted membership health insurers from 1.8 in 2002 to 2.1 in 2010. According to the Centre for Development and Enterprise (2011) incentives should be developed for the private sector to innovate more on the supply side of healthcare delivery. In addition, increased competition in private healthcare will put pressure on prices and encourage innovation in low-cost delivery structures.

This research study builds on the existing Domain Framework by Guth and Ginsberg (1990) which integrates corporate entrepreneurship into the strategic management of a company

(Morris, Kuratko and Covin 2008). Innovation in the entire healthcare value chain is required to drive sound healthcare reform ensuring sustainable, cost-effective quality healthcare delivery in the private healthcare industry. This research study focused on the demand (financing) and supply side (healthcare delivery) structures of the healthcare value chain, incorporating health insurers, health insurer administrators and healthcare service providers. According to Porter and Teisberg (2006), health insurer product innovation focusing on positive sum competition on results plays a critical role in aligning incentives between all stakeholders in the healthcare value chain. External collaboration between health insurers/health insurer administrators and healthcare service providers, focusing on innovation and building systems that both promote health and treat illness, are essential to create future sustainable healthcare delivery systems (Mintzberg 2011).

The objective of the research study was to investigate the relationship between the level of health insurer product innovation and entrepreneurial orientation (EO); the relationship between the level of health insurer product innovation and external collaboration between health insurers and healthcare service providers and; whether low presence of perceived strategic regulatory factors, necessary for encouraging health insurer product innovation in the private healthcare industry of South Africa, weakens the relationship between the level of new health insurer product innovation and EO as well as the relationship between the level of new health insurer innovation an external collaboration between health insurers and healthcare service providers.

1.3 Problem statement

1.3.1 *Main problem*

In the context of healthcare inequalities and a struggling and underfunded public healthcare system in South Africa, the South African private healthcare industry is viewed as a national asset. However, the South African private health insurance industry is a complex and heavily-regulated industry, with minimal growth in total lives covered, spiralling healthcare costs and coverage of only 16% of the South African population. There are approximately five-million formally employed uninsured people in South Africa and in order to grow and sustain the private healthcare industry, and lighten the population load of formally employed

uninsured people on public healthcare delivery systems, the private healthcare industry needs new, attractive/innovative health insurer products/plans. This could align the incentives of stakeholders (demand and supply side structures) in the private healthcare value chain, and thus could create the necessary access to private healthcare cover for the uninsured.

1.3.2 Research Questions and Hypotheses

As entrepreneurial orientation (EO) (innovativeness, proactiveness and risk taking) is a traditional determinant of product innovation, it is important to investigate whether there is a relationship between the level of product innovation of health insurers and firm-level EO. For health insurer product innovation to occur, the level of external collaboration between health insurers and healthcare service providers is needed to foster supply side innovation in the healthcare value chain. The private healthcare industry is heavily regulated and it is important to investigate whether low presence of strategic regulatory factors, necessary for encouraging health insurer product innovation in the private healthcare industry in South Africa, weakens the relationship between the level of new health insurer product innovation and EO, and weakens the relationship between the level of new health insurer product innovation and external collaboration between health insurers and healthcare service providers.

The following research questions have been designed to test the respective relational hypotheses, which were developed on the basis of extensive theory and literature reviews as set out in chapter 2 of this report.

Research question 1:

Does firm entrepreneurial orientation (EO) promote new product innovation by health insurers?

Research Hypothesis 1: A positive correlation exists between the level of new product innovation by health insurers and entrepreneurial orientation (EO).

Research question 2:

Does external collaboration between health insurers and healthcare service providers promote new product innovation by health insurers?

Research Hypothesis 2: A positive correlation exists between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers.

Research question 3:

Does the South African private healthcare regulatory environment impede new product innovation by health insurers?

Research Hypothesis 3: The relationship between the level of new product innovation by health insurers and entrepreneurial orientation (EO) is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that the relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.

Research Hypothesis 4: The relationship between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that this relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.

Conceptual Research Model

This research study builds on the existing Domain Framework by Guth and Ginsberg (1990) which integrates corporate entrepreneurship into the strategic management of a company (Morris et al. 2008). In this model they argue that the domain of corporate entrepreneurship encompasses two types of processes; internal innovation, or venturing through the creation of new businesses within existing organisations, and strategic renewal, or the design of corporate initiatives that transform organisations (Morris et al. 2008).

Fitting Corporate Entrepreneurship Into Strategic Management

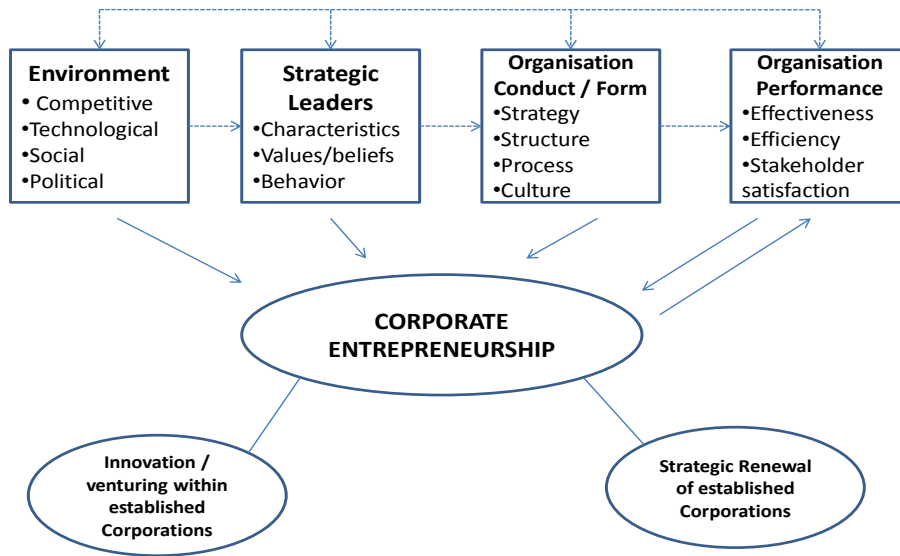


Figure 2 - Fitting Corporate Entrepreneurship into Strategic Management, Source: Morris et al. (2008:47)

This research study aimed to build on the innovation process of the Domain Framework by Guth and Ginsberg (1990).

A conceptual model for this research study, highlighting the independent variables (EO, external collaboration and regulation) and the dependent variable (health insurer product innovation) is shown in figure 3.

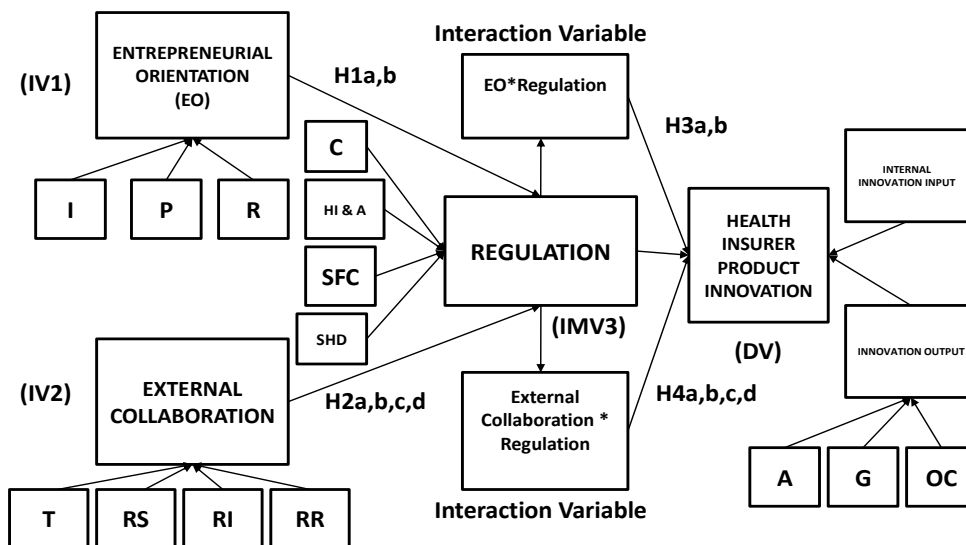


Figure 3 – Conceptual Research Model, Source: (Own source)

The constructs that will be measured under each of the independent variables and dependent variable have been obtained through a review of existing academic literature. The regression equation of the model is:

$$\text{Level of Health Insurer Product innovation} = \alpha + \beta_1(\text{EO}) + \beta_2(\text{External Collaboration}) + \beta_3(\text{Regulation}) + \beta_4(\text{EO*Regulation}) + \beta_5(\text{External Collaboration*Regulation})$$

Independent variable 1: Entrepreneurial Orientation (EO) – measurement constructs: innovativeness (I), proactiveness (P), and risk-taking (R). The EO instrument was based on the original Covin and Slevin (1989) scale, as modified by Kreiser, Marino and Weaver (2002).

Independent variable 2: External Collaboration – measurement constructs: trustworthiness (T), role specification (RS), relationship initiation (RI) and relationship restructure (RR). The external collaboration measurement instrument was based on the instrument used by Zillich, Douchette, Carter and Kreiter (2005) to measure physical pharmacist collaboration (PPCI) from a physician perspective. This instrument was

adapted to measure health insurer/health insurer administrator and healthcare service provider collaboration from both health insurer/health insurer administrator and healthcare service provider perspectives. This instrument was further adapted to add another construct to measure the extent to which the health insurer and healthcare service provider relationship need to be restructured to facilitate the increase of positive sum competition in the healthcare value chain as per Porter and Teisberg (2006).

Independent variable 3: Regulation – measurement constructs: increased competition (C), increased health insurance and access (HI & A), standards for coverage (SFC) and, structure of health care delivery (SHD). These measurement constructs are important from a strategic perspective in light of healthcare innovation and reform. This section is not based on a previous instrument and the construction of the measurement instrument followed guidelines in terms of strategic regulatory factors encouraging healthcare innovation by Porter and Teisberg (2006) and Christensen, Grossman and Hwang (2009). The instrument was designed to measure the following items which are perceived to influence healthcare innovation from a strategic perspective:

- Create competition in healthcare to reduce prices;
- Health insurance improvement and access to private healthcare cover;
- Standards for coverage;
- Structure of health care delivery.

Dependent variable: Health insurer product innovation – measurement constructs: Internal innovation input and innovation output. Internal innovation input is measured by establishing the research and development intensity of organisations and innovation output is measured by the number of “new to the organisation” and “new to the healthcare industry” products introduced in the last three years. This section included measurement constructs for innovation output, which contextualised both innovation adoption (A) and innovation generation (G), as well as organisational competitiveness (OC). This section of the questionnaire was adapted from previous measurement instruments used by Perez-Luno, Wiklund and Cabrera (2011) and Rosenbusch, Brinkman and Bausch (2011) for internal innovation input and innovation output as well as the GEM Global report (2010) (Kelly, Bosma and Amoros 2010).

1.4 Significance of the study

This research study fills a gap in that it aims to investigate why the private healthcare insurance market in South Africa is only covering 16% of the population (Council for Medical Schemes 2010/11) and is not growing, although the relative performance of the private healthcare system in South Africa is comparing favourably to international benchmarks (Monitor Group, L.P. 2008). There are approximately five-million people (McLeod and Grobler 2008) in formal employment who are not covered by the private healthcare system in South Africa and it is imperative that this uncovered group access private healthcare insurance in order to ensure future sustainability of the private healthcare system. This research study aims to investigate firm-level entrepreneurial orientation of health insurers/health insurer administrators and healthcare service providers in South Africa and its relationship to health insurer product innovation. The research study also aims to investigate to what extent health insurers and healthcare service providers collaborate in designing and implementing new innovative health insurer products. Furthermore, the study intends investigating the moderating effect of the presence of perceived strategic regulatory factors necessary for encouraging health insurer product innovation in the private healthcare industry in South Africa.

This research study has both theoretical and practical implications for actors in the South African private healthcare value chain and aims to add to entrepreneurship research in South Africa. It will provide guidance to health insurers, health insurer administrators, healthcare service providers and regulatory authorities on aspects which could influence and drive both healthcare product innovation and supply side innovation in the private healthcare industry in South Africa.

1.5 Delimitations of the study

The research study will only focus on health insurers, health insurer administrators and healthcare service providers as major actors in the South African private healthcare value chain, as well as the regulatory environment of health insurers. The private healthcare market for the purpose of this study is defined as:

Demand side financing structures

- Health Insurers – Registered health insurers in South Africa – health insurers include both restricted membership and open health insurers.
- Health Insurer Administrators – Accredited private health insurer administrators in South Africa.

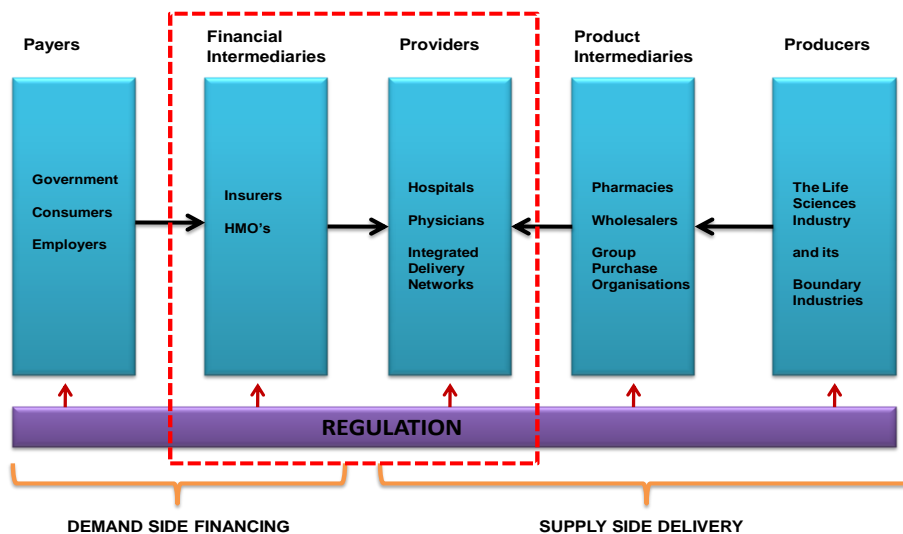
Supply side delivery structures

- Healthcare service providers, including major private hospital groups and physician societies representing the majority of medical specialists and general practitioners in South Africa.

Regulatory environment

The regulatory focus will include the existing regulatory environment of healthcare insurers.

The focus of the research study is presented in terms of the healthcare value chain, adapted from Stremersch (2008), as shown in figure 4. The red block indicates the section of the healthcare value chain which was the focus of the research study.



Source : The Healthcare Value Chain (adapted from Stremersch ,2008)

Figure 4 - The healthcare value chain, Source: Adapted from Stremersch (2008); Stremersch and Van Dyck (2008); adapted from Burns (2005)

1.6 Definition of terms

- HMOs – Health Maintenance Organisations
- Closed health insurers/restricted membership health insurers - a medical scheme, the rules of which restrict the eligibility for membership by reference to:
 - (a) employment or former employment or both employment or former employment in a profession, trade, industry or calling;
 - (b) employment or former employment or both employment or former employment by a particular employer, or by an employer included in a particular class of employers;
 - (c) membership or former membership or both membership or former membership of a particular profession, professional association or union; or
 - (d) any other prescribed matter (Medical Schemes Act 131 of 1998).

- Open health insurers – membership is open to any person or employer.
- The Life Science Industry – the life science industry is composed of the pharmaceutical, biotechnology, and (therapeutic) medical devices industries (Stremersch 2008).
- Boundary Industries – food (e.g. nutraceuticals), high tech (e.g. medical imaging) and cosmetics industries (e.g. cosmeceuticals) (Stremersch 2008).

1.7 Assumptions

The following assumptions are based on the research study.

- All respondents are deemed to be aware of an entrepreneurial environment within their organisations.
- Knowledge of respondents - It is assumed that the respondents have enough knowledge of the healthcare value chain and the private healthcare industry to contextualise and articulate the answers to the research questions and minimise response bias.
- Industry representation – this study aimed to have industry representation in terms of the organisations (sample populations) that have been surveyed for the research study.
- Respondent perceptions of the research topic – the perceptions of the respondents are important and the purpose of the research was stressed in order to allay any fears from industry competitors that the results (or data collection process) will be used for competitive purposes. This might have had a negative impact on respondents' attitudes to respond.
- Research instrument – the research instrument has been operationalised as an online questionnaire to facilitate responses from the respective respondents and it is assumed that the data collected using this technique adequately reflects reality.
- Relationship with respondents – it is assumed that the respondents have an interest in the results of the survey and that the existing relationship between the researcher and major healthcare organisations and provider groups would have facilitated response rates.

- Regulatory environment - it is assumed that the respondents have sufficient knowledge of the existing health insurer regulatory provisions.
- Time and costs – it is assumed that there would be time and cost constraints to finalise the research study in the required time lines.
- Definition of healthcare product innovation - It is assumed that the sample populations know or have been informed of the definition of healthcare product innovation. The definition used for the purpose of the study is: ‘a product innovation is the introduction of a good or service that is new or significantly improved regarding its characteristics or intended uses’.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

Conceptualising Entrepreneurship

According to Morris et al. (2008) entrepreneurship is the process of creating value by bringing together a unique combination of resources to exploit an opportunity. This definition of entrepreneurship has four key elements: 1) entrepreneurship involves a process; 2) entrepreneurs create value where there was none before; 3) entrepreneurs put resources together in a unique way and; 4) entrepreneurship is an opportunity-driven behaviour (Morris et al. 2008). The ability to recognise new opportunities, evaluate these opportunities and then translate these opportunities into viable business concepts lie at the heart of the entrepreneurial process (Morris et al. 2008).

Conceptualising corporate entrepreneurship

According to Morris et al. (2008), corporate entrepreneurship is a term used to describe entrepreneurial behaviour inside established mid-sized and large organisations. Other terms for corporate entrepreneurship include intrapreneurship, corporate venturing and organisational entrepreneurship (Morris et al. 2008). Guth and Ginsberg (1990) and Morris et al. (2008) argue that corporate entrepreneurship includes two major processes, innovation and new venture creation within existing organisations and the transformation of organisations through strategic renewal.

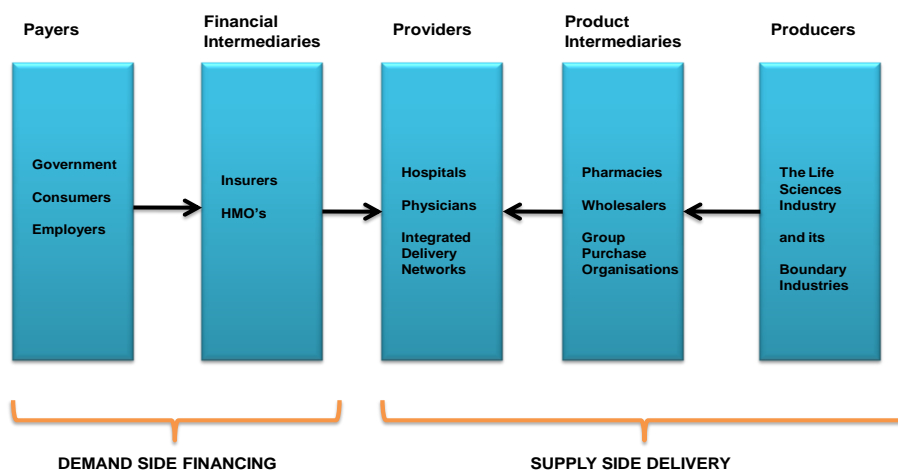
Innovation is concerned with introducing something new to the market place; corporate venturing is concerned with entrepreneurial efforts that lead to the creation of new business organisations within corporate organisations and; strategic renewal is concerned with organisational revitalisation involving major strategic and/or structural changes (Morris et al. 2008).

According to Ireland, Covin and Kuratko (2009) entrepreneurial strategy is a core construct within the corporate entrepreneurship literature and a specific manifestation of firm-level entrepreneurship. According to Ireland et al. (2009) the organisational-level outcomes of

corporate entrepreneurship strategy is competitive capability and strategic repositioning. According to Ireland et al. (2009), research suggests that exploiting entrepreneurial opportunities enables organisations to both strengthen existing competitive capabilities and build new competitive capabilities (Covin, Ireland and Kuratko 2003; Ireland et al. 2009). Competitive capability as per Ireland et al. (2009) is the capacity of firms to create and sustain economically viable industry positions (Nelson 1991; Teece, Pisano and Shuen 1997; Ireland et al. 2009). According to Ireland et al. (2009) strategic repositioning can alter relationships among competitors in an industry by strategically locating the organisation within a newly defined competitive space (Stopford and Baden-Fuller 1990; Ireland et al. 2009).

Conceptualising the Healthcare Value Chain

The scope of the research study can be best understood by the perspective of the healthcare value chain (Stremersch 2008; Stremersch and Van Dyck 2008, adapted from, Burns 2005).



Source : The Healthcare Value Chain (adapted from Stremersch ,2008)

Figure 5 - The health care value chain, Source: Adapted from Stremersch (2008); Stremersch and Van Dyck (2008), adapted from Burns (2005)

The healthcare value chain (Figure 5) consists of a healthcare delivery chain (supply side chain) and a healthcare payment (financing) chain (demand side chain). The healthcare delivery starts with therapy producers, who are commonly referred to as the life science industry (Stremersch 2008; Stremersch and Van Dyck 2008). At its core, the life science industry is composed of the pharmaceutical, biotechnology, and (therapeutic) medical devices industries (Stremersch 2008). At its boundaries are the food (e.g nutraceuticals), high tech (e.g medical imaging) and cosmetics industries (e.g cosmeceuticals) (Stremersch 2008). Product intermediaries are typically referred to as the “channel” in marketing literature (Stremersch 2008). Healthcare providers are central in the healthcare value chain. The care provided in the chain is paid for by employers, government, and/or consumers (who, if afflicted with a disease, are referred to as patients by the medical profession) (Stremersch 2008). According to Stremersch (2008) there is often co-payment by several of these actors, where each pays a certain share. Especially in systems where the government is not the main payer, there is a substantial financial intermediary industry composed of Health Maintenance Organisations (HMOs) and health insurance companies (Stremersch 2008). The scope of this research study will address health insurers, health insurer administrators and healthcare service providers as major actors in the healthcare value chain.

The Private Healthcare Industry in South Africa

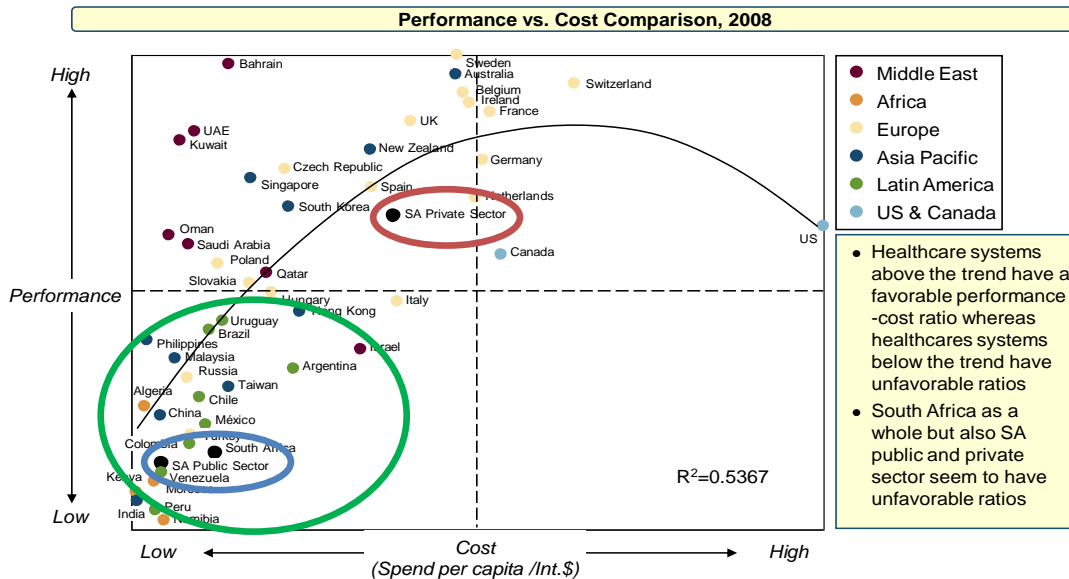
According to Ruff, Mzimba, Hendrie and Broomberg (2011) South Africa currently faces a divided healthcare system with ever-increasing distinctions between the private and public healthcare sectors in terms of access and quality. The performance and cost rankings of emerging market health systems (South Africa is classified as an emerging market economy) are poor compared to developed economies (Monitor Group, L.P. 2008). Figure 6 is a comparison of performance versus cost rankings of various healthcare systems in the world (Monitor Group, L.P. 2008). It is clear from the comparison that emerging market health systems (green oval indicator) find themselves in various stages of maturity and therefore have low performance and cost rankings compared to developed countries (Monitor Group, L.P. 2008). According to Bloom, Standing and Lloyd (2008), since the early 1980s economic and structural crises have exposed the weak institutional capacity of the public sector in many countries. In health as in other sectors, growing demands and

structural reform policies have left the state overworked and underfunded (Bloom et al. 2008). The private health care insurance market in South Africa covers only 16% of the population (Centre for Development and Enterprise 2011; Council for Medical Schemes 2010/11) and accounts for 60% of total healthcare expenditure (McLeod and Grobler 2008).

According to Monitor Group, L.P. (2008), the South African private healthcare system (red oval indicator) is ranked high on the performance versus cost rankings and compares more favourably with health systems in developed economies. Conversely, the public healthcare system in South Africa (blue oval indicator) is ranked low in terms of performance versus cost. The cost ranking of the South African private healthcare system compared to performance is however out of line and it is therefore imperative that costs and access are managed more aggressively through innovation in the healthcare value chain. According to the Centre for Development and Enterprise (2011), the average cost of belonging to a private health insurer has increased fivefold in real terms since 1980. There are approximately five-million people (McLeod and Grobler 2008) in formal employment who are not covered by the private healthcare system in South Africa and it is imperative that this uncovered group access private healthcare insurance in order to ensure future sustainability of the private healthcare system. Innovation is critical if health insurers want to win subscribers and stay ahead of the competition (Porter and Teisberg 2006).

Performance vs. Cost Analysis Comparison of Cost and Performance Rankings

Countries sitting above the trend line are producing relatively better performance for the cost per capita inputs that they are investing



Note: Trend line is a polynomial; South African private sector variables do not include WHO rankings as these refer to the general healthcare system
Source: Pool Stream Database, Monitor Analysis

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Figure 6 – Performance vs. cost rankings of global health systems, Source: Monitor Group, L.P. (2008)

It is therefore imperative to investigate if health insurers, health insurer administrators and healthcare service providers are able to act entrepreneurially in terms of product innovation by measuring the firm-level EO of health insurers/health insurer administrators and healthcare service providers in the South African private healthcare industry. External collaboration between health insurers/health insurer administrators and healthcare service providers are viewed as a major driving factor of product innovation by health insurers and healthcare efficiencies (Porter and Teisberg 2006) in the healthcare system. This research study investigates the relationship between external collaboration between health insurers/health insurer administrators and healthcare service providers and health insurer product innovation in South Africa. The private health insurance industry is heavily regulated and the moderating effect of the presence of perceived strategic regulatory factors necessary for encouraging health insurer product innovation in the South African private healthcare industry will be investigated.

2.2. Entrepreneurial Orientation (EO)

According to Dess and Lumpkin (2005) entrepreneurial orientation (EO) refers to: the strategy-making practices that organisations use to identify and launch corporate ventures and; a frame of mind and perspective about entrepreneurship reflected in a firm's ongoing processes and corporate culture. According to Urban and Barreira (2010) entrepreneurship in organisations has been labelled in various different ways, including "intrapreneurship" (Kuratko 2002; Antoncic and Hisrich 2001; Urban and Barreira 2010), "innovation entrepreneurship" (Schumpeter 1934; Urban and Barreira 2010), "innovation management" (Drucker 1979; Urban and Barreira 2010), "venture entrepreneurship" (Tang and Koveos 2004; Urban and Barreira 2010), "corporate entrepreneurship" (Dess, Ireland, Zahra, Floyd, Janney and Lane 2003; Urban and Barreira 2010), "strategic entrepreneurial posture" (Covin and Slevin 1989; Urban and Barreira 2010), "internal corporate venturing" (Hornsby, Kuratko and Zahra 2002; Urban and Barreira 2010).

According to Li, Huang and Tsai (2009) in order for organisations to respond to the dynamic and competitive environment they need to consistently transfer EO into feasible strategic activities to fulfil the organisations' objectives and achieve superior performance. EO reflects how a firm operates rather than what it does (Lumpkin and Dess 1996; Li et al. 2009). According to Urban and Barreira (2010) the concept of EO incorporates organisational-level processes, practices and decision-making styles of innovative organisations (Lumpkin and Dess 1996; Urban and Barreira 2010). The strength of an organisation's EO can have a strong positive effect on performance (Zahra and Covin 1995; Morris and Sexton 1996; Wiklund and Shepherd 2005; Green, Covin and Slevin 2008). EO is also an important predictor of firm growth: firms that nurture structures and values conducive to intrapreneurial activities are more likely to grow than firms lacking in such characteristics (Antoncic and Hisrich 2001; Dess et al. 2003; Urban 2008).

The literature and extensive research confirms that there are three dimensions that characterises an entrepreneurial organisation, innovativeness, risk taking and proactiveness (Morris et al. 2008; Urban and Barreira 2010).

Innovative behaviours are born from a tendency to enter into experimentation, support new ideas and depart from established practices (Lumpkin and Dess 2001; Hansen, Deitz,

Tokman, Marino and Weaver 2011). According to Urban and Barreira (2010) innovativeness is the fundamental posture of an entrepreneurial organisation in terms of developing and creating new products and processes. According to Dess and Lumpkin (2005), innovations come in many different forms, such as technological innovativeness, product-market innovativeness and administrative innovativeness. They define technological innovativeness as consisting primarily of research and engineering efforts aimed at developing new products and processes. Product market innovativeness includes market research, product design and innovations in advertising and promotion (Dess and Lumpkin 2005). Administrative innovativeness refers to novelty in management systems, control techniques and organisational structure (Dess and Lumpkin 2005). Innovation is critical if organisations want to win customers and stay ahead of their competition; innovativeness is one of the fundamental instruments of growth strategies to enter new markets, to increase an organisation's existing market share and to provide the organisation with a competitive advantage (Gunday, Ulusoy, Kilic and Alpkın 2011).

Proactiveness refers to an organisation's efforts to seize new opportunities (Dess and Lumpkin 2005). According to Lumpkin and Dess (2001) and Hansen et al. (2011), proactive behaviours reflect a propensity to act aggressively towards competitor organisations in the pursuit of favourable business opportunity. Proactiveness is also an indicator that initiatives are implemented and is also concerned with adaptability and tolerance of failure (Lumpkin and Dess 1996; Urban and Barreira 2010; Hansen et al. 2011). According to Wiklund (1999) and Soininen, Martikainen, Puumalainen and Kylaheiko (2011), proactiveness gives organisations the capacity to present new products or services to the market before their competitors which also gives them a competitive advantage. According to Dess and Lumpkin (2005), first movers have several advantages. They indicate that first movers often capture unusually high profits because there are no competitors to drive prices down and first movers that establish brand recognition are usually able to retain their image and hold onto market share gains. Dess and Lumpkin (2005) also indicate that there are two other methods that organisations use to act proactively, such as:

- Introducing new products or technological capabilities ahead of the competition;
- Continuously seeking out new product or service offerings.

Risk-taking refers to an organisation's willingness to seize a venture opportunity even though it does not know whether the venture will be successful and to act boldly without knowing the consequences (Dess and Lumpkin 2005:152). According to Rauch, Wiklund, Lumpkin and Frese (2009) and Soininen et al. (2011) risk taking describes the nature of easily venturing into the unknown, borrowing heavily, and/or committing remarkable resources to ventures in uncertain environments. Risk taking behaviours also result from a willingness to invest in projects that have uncertain outcomes or unusually high profits and losses and to take calculated business risks when identifying business opportunities (Lumpkin and Dess 1996; Urban and Barreira 2010; Hansen et al. 2011). According to Dess and Lumpkin (2005), organisations could use the following two methods to strengthen their competitive position through risk-taking:

- Researching and assessing risk factors to minimise uncertainty;
- Using tried-and-true practices and techniques that have worked in other domains.

According to Dess and Lumpkin (2005) prior research has explored the direct relationship between EO and performance (Rauch, Wiklund, Lumpkin and Freeze 2004) as well as the sustainability of the EO-performance relationship (Wiklund 1999). Dess and Lumpkin (2005) also indicate that other work has found that the EO-performance relationship is dependent on the fit between EO and such factors as environment, structure and strategy (Dess, Lumpkin and Covin 1997). Wiklund and Shepherd (2003) have suggested that EO acted as a moderator and found that the relationship between knowledge-based resources and performance was stronger among organisations with higher levels of EO (Dess and Lumpkin 2005). Dess and Lumpkin (2005) also indicate that exploring relationships among the individual dimensions of EO and performance is superior to considering EO as a unidimensional construct and that the individual dimensions of EO were more robust predictors of organisational growth than a summated unidimensional EO construct. A study by Kreiser, Marino and Weaver (2002), found that EO dimensions tended to vary independently with each other and have different associations with environmental hostility (Dess and Lumpkin 2005). A study by Richard, Barnett, Dwyer and Chadwick (2004) focusing on cultural diversity and firm performance, found that innovativeness and risk-taking had different relationships with organisational performance and that innovativeness positively moderated and risk-taking negatively moderated nonlinear relationship patterns for both racial and gender heterogeneity (Dess and Lumpkin 2005). According to Lumpkin

and Dess (1996) (Urban and Barreira 2010), all the EO dimensions are central to understanding the entrepreneurial process, although these dimensions may occur in different combinations, depending on the type of entrepreneurial opportunity the organisation pursues. According to Urban and Barreira (2010) firms can be labelled entrepreneurial only if they are simultaneously risk-taking, innovative and proactive. The extent to which each of these dimensions is useful for predicting business success may be contingent on the specific industry environment, and the norms for EO could also vary among industries (Urban and Barreira 2010.) For the individual organisation that adopts innovation, the change in knowledge may be incremental in magnitude, but it may also radically expand its current knowledge base (Perez-Luno, Wiklund, and Cabrera 2011). According to Urban and Barreira (2010) the EO concept is best understood as a complex mix of personal and situational factors, and in addition to individual and organisational differences, forces operating within other, larger cultural contexts also determine levels of EO (Aloulou and Foyolle 2005; Urban and Barreira 2010). Organisations with EO, therefore, typically out-perform other similar organisational types in volatile times (Knight 1997; Urban and Barreira 2010).

According to Li et al. (2009), the resource advantage theory stipulates that innovative competencies may be a source of competitive advantage because they are deeply rooted in the context of the organisation and cannot be explicitly articulated and imitated (Barney 1991; Nonaka 1994; Hunt and Morgan 1996; Hunt and Arnett 2006). They further indicate that by increasing commitment to innovative products and processes, organisations can renew their operations in marketplace and improve their profitability (Miller 1983; Lumpkin and Dess 1996; Zahra and Garvis 2000; Li et al. 2009).

According to Li, Liu and Zhao (2006), there is a strong link between EO and new product development improvement (Drucker 1985; Lumpkin and Dess 1996; Li et al. 2006). Their study focused on building a systemic conceptual model to describe the relationship among organisational orientation, internal control systems and new product development. Their study focusing on the Chinese transitional economy found that EO is significantly and positively related to new product development improvement.

Based on the extensive literature on the relationships between EO and performance and EO and innovation the following hypothesis is set out:

H1: A positive correlation exists between the level of new product innovation by health insurers and entrepreneurial orientation (EO).

2.3. External Collaboration between Health Insurers and Healthcare Service Providers

According to Adler, Heckscher and Prusak (2011) a growing number of organisations are reaping the rewards of collaborative communities in the form of higher margins on knowledge intensive work. According to Adler et al. (2011) collaborative communities encourage people to continually apply their unique talents to group projects and to become motivated by a collective mission, not just personal gain or the intrinsic pleasures of autonomous creativity. Adler et al. (2011) argues that by marrying a sense of common purpose to a supportive structure, these organisations are mobilising knowledge workers' talents and expertise in flexible, highly manageable group efforts. This approach fosters not only innovation and agility but also efficiency and scalability (Adler et al. 2011).

According to Adler et al. (2011) this approach requires four new organisational efforts:

- Defining and building a shared purpose;
- Cultivating an ethic of contribution;
- Developing processes that enable people to work together in flexible but disciplined projects;
- Creating infrastructure where collaboration is valued and rewarded

Zillich et al. (2005) define collaboration among healthcare professionals as a joint communication and decision-making process with the goal of satisfying the patient's wellness and illness needs while respecting the unique qualities and abilities of each professional. This definition is also applicable in terms of the collaboration between healthcare service providers and health insurers/health insurer administrators in developing and implementing new innovative health insurer products. Discussions around healthcare reform rarely focus on health outcomes. Instead the discussion emphasises cost, cost-shifting and access (Teisberg and Wallace 2009). In healthcare, patient outcomes define quality and quality can be enhanced by preventing errors, reducing waste and improving coordination (Teisberg and Wallace 2009). Each of these changes creates better

experiences for patients and also brings down costs (Teisberg and Wallace 2009). According to Teisberg and Wallace (2009) the focus of healthcare reform should therefore be on creating value-based care delivery on improving results rather than cost reduction as a solution. Competing to improve value for patients means competing to provide better medical care, enable better health and restore professional satisfaction for clinicians (Teisberg and Wallace 2009). When improving value is the goal, the interests of all parties in the healthcare value chain are aligned (Teisberg and Wallace 2009).

According to Porter and Teisberg (2006) health insurers have a unique and essential role in value-based competition and innovation in healthcare. They emphasise that health insurers must rethink and reorient their whole approach around value-based competition. Health insurers must become health organisations, not just insurance organisations and they must be participants in health, and not just payers (Porter and Teisberg 2006). Health insurers must become health organisations dedicated to patient and physician information, support and service, not just organisations for administrative, auditing and financial services (Porter and Teisberg 2006). Health insurers therefore must move from being adversaries to true partners in value creation for patients (Porter and Teisberg 2006).

Healthcare service providers, including hospitals, clinics, physician groups and individual physicians are the central actors in the healthcare system and the place where most value is actually delivered (Porter and Teisberg 2006). Health insurers can therefore reinforce or detract from this value through their specific roles and choices. Moving towards a positive sum competition on results offers the only real way to address the long-standing weaknesses in healthcare delivery, while also encouraging the entire healthcare system to innovate (Porter and Teisberg 2006).

It is critical to restructure the health insurer–healthcare service provider relationship so the adversarial mindset between health insurers and healthcare service providers makes way for a spirit of collaboration in terms of creating value for patients (Porter and Teisberg 2006). When health insurers and healthcare service providers collaborate around value and health results, efficiency will improve exponentially and administrative costs will fall (Porter and Teisberg 2006). According to Porter and Teisberg (2006) restructuring the relationship between health insurers and health care providers involves the following key areas of innovation for health insurers and healthcare service providers:

- **Shift the nature of information sharing with providers** – health insurers can assist patients and their doctors to gather information, understand their treatment options, seek the best provider to address their circumstances, and ensure that providers involved in care have up-to-date patient information. Health insurers should also give ongoing feedback to healthcare providers about the results achieved by their referrals in terms of patient outcomes
- **Reward provider excellence and value-enhancing innovation for patients** – current health insurer contracting and payment practices are not tied to value and providers are not rewarded for excellence. There is also a lack of gain sharing in the healthcare system in terms of healthcare service providers achieving better results and for healthcare service providers who improve results over time. Health insurers should reward the best healthcare service providers in terms of their medical work with patients rather than focusing on raising all healthcare service providers to an acceptable level.
- **Move to single bills for episodes and cycles of care, and single prices** – health insurers should aim to minimise administrative complexity for healthcare service providers and move towards creating a system involving single process for service bundles, episodes of care, and ultimately full care cycles.
- **Simplify, standardise, and eliminate paperwork and transactions** – Health insurers and healthcare service providers should aim to minimise administrative complexity and focus on reducing costs that do not contribute directly to patient value. Health insurers would therefore aim to drastically streamline their administrative processes.

The new role for health insurers involve a radical transformation not only in their relationship with healthcare service providers and members but also in their internal culture which means that they need to create a culture of patient health (Porter and Teisberg 2006). According to Zillich et al. (2005) and Liu, Doucette and Farris (2010) a theoretical framework for physician-pharmacist collaboration was developed, indicating that collaborative relationships are developed through five progressive stages:

- Stage 0 – professional awareness – exchange is minimal

- Stage 1 – professional recognition – exchange is mostly unilateral and driven by one party
- Stage 2 – exploration and trial – the exchanges becomes bilateral
- Stage 3 - professional relationship expansion – as the relationship progresses, the exchange becomes bilateral in which both parties are active
- Stage 4 – commitment to the collaborative working relationship – this stage represents a committed and sustained relationship characterised by bilateral communication and mutual trust.

This physician-pharmacist theoretical framework was used to develop a measurement instrument (PPCI instrument) to capture the nature and scope of social exchange which drives a professional relationship (Zillich et al. 2005). This measurement instrument was crafted around seven professional themes surrounding a professional relationship: collaborative care, commitment, dependence symmetry, bidirectional communication, trust, initiating behaviour and conflict resolution (Baggs 1994; Zillich et al. 2005). According to Zillich et al. (2005) this framework measures the following factors which influence collaborative relationships:

- Trustworthiness (T)
- Role specification (RS)
- Relationship initiation (RI)

According to Mintzberg (2011) healthcare actors need to build systems that both promote health and treat illness and to do that, more cooperation between healthcare actors is required, not more competition. Mintzberg (2011) further adds that in healthcare, ‘competition’ mostly amounts to individualisation – with every person, profession and institution looking out for number one (Mintzberg 2011).

Christensen et al. (2009) presents a model from their research on innovation which is called the “Tools of Cooperation” presented in figure 7. The essence of this model, as a start, is having the right vision for where an organisation needs to go. According to Christensen et al. (2009), once the organisation’s future direction is in place, the organisation needs to convince all the other people and resources and energies that are required to succeed in that journey to cooperatively work together to get there. Christensen et al. (2009) explains

that the effectiveness of the various tools that might be wielded to elicit this cooperation depends upon the extent of pre-existing agreements along two dimensions: the first is the extent to which the people involved agreed on what they want, the results they seek, what their priorities are, and which trade-offs they are willing to make to achieve those results (Christensen et al. 2009). The second is the extent to which they agree with each other on which actions will yield the desired result (Christensen et al. 2009). The key to this model is recognising the extent of agreement and then selecting the tools of cooperation that will work most effectively in that situation (Christensen et al. 2009). Christensen et al. (2009) believes that this model applies to units of small families, to business units and corporations, to school districts, and even to nations.

Figure 7 maps the two dimensions of agreements in the matrix, and describes the tools managers can utilise in different situations in order to elicit cooperation among the stakeholders to work in concert in achieving the required change. The boundaries delineating the domains in which the various tools can be applied are not rigid, but the broad labels can give leaders a sense of which tools are likely to be more or less effective in various situations (Christensen et al. 2009). A short discussion of the different tools follow.

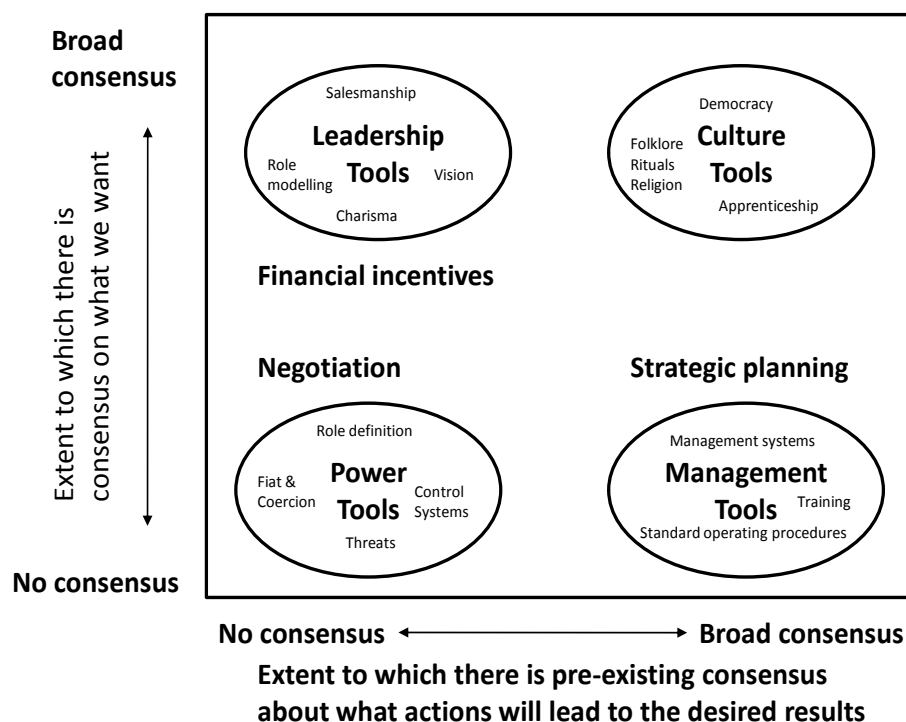


Figure 7 – Four types of cooperation tools, source: Christensen et al. (2009:403)

Power tools

According to Christensen et al. (2009) where there are sharp disagreements among the concerned parties about what they want and how to get it, the only tools that will elicit cooperation in pursuit of a new course are “power tools”, such as fiat, force, coercion and threats.

Tools such as negotiation, strategic planning and financial incentives do not work well in situations of minimal agreement and as shown in figure 7, these tools only work when there is a modicum of agreement on both dimensions of the matrix (Christensen et al. 2009). Only power tools are reliably effective in low agreement situations and the key is to have the authority to use them (Christensen et al. 2009). In democracies, many of these mechanisms are not effective and are outlawed (Christensen et al. 2009).

Management tools

According to Christensen et al. (2009) the management tools in the matrix are cooperative and process-oriented in nature, and they include training, standard operating procedures and measurement systems. For management tools to work, group members need not agree on what they want from their participation in the organisation, but they must agree on cause and effect (Christensen et al. 2009).

Leadership tools

In the upper left region of figure 7, results-oriented tools, as opposed to process-oriented tools, are more effective because there is high consensus about what employees want from their participation in the organisation (Christensen et al. 2009). Charismatic leaders, who command respect, do not often address how to get things done; instead they focus on motivating people to just do what needs to be done (Christensen et al. 2009).

Culture tools

According to Christensen et al. (2009) people located in the upper-right region will cooperate almost automatically to continue in the same direction and this is indicative of a strong culture – their common view of what they want and how the world works means that little debate is required about where to go and how to get there. This very strength can make such organisations highly resistant to change and facilitate cooperation only to preserve the status quo (Christensen et al. 2009). When executives in this circumstance see big changes in the future and realise that the organisation's momentum is propelling it in the wrong direction, the culture often fires the manager (Christensen et al. 2009).

Healthcare systems in the agreement matrix

According to Christensen et al. (2009) for the most part, healthcare systems are positioned in the lower-left corner of the matrix – patients, healthcare service providers, regulators, IT professionals, health insurers, executives in pharmaceutical and medical device companies and politicians all have divergent priorities and disagree strongly about how to achieve them. The fact that healthcare is in the lower-left world of disagreement helps explain why certain remedies that reformers tried to introduce in the past have not worked. There are also instances in which disagreement among parties that need to cooperate is so

fundamental that it is simply impossible to reach consensus on a course of action (Christensen et al. 2009). According to Christensen et al. (2009), when all other tools have failed, a “separation” strategy needs to be followed – dividing the conflicted parties into separate groups so they can reach agreement with others inside their own group, yet don’t need to agree with those in other groups. The separation tool is used where organisations create separate business units to pursue disruptive opportunities with a unique business model, separate from the parent company, placing it in competition with the parent company (Christensen et al. 2009).

Based on a study by Wu (2011), two perspectives have been identified which are useful in understanding the effects of strategic alliances on firm product innovation. The first perspective emphasises cooperative behaviours in strategic alliances and suggests that collaborative behaviours in strategic alliances can enhance organisations’ learning capability (Hagedoorn and Schakenraad 1994; Powell et al. 1996; Wu 2011), increase the likelihood of successful innovation activities (Uzzi 1997; Ahuja 2000; Wu 2011), develop and strengthen internal competencies (Mitchell and Singh 1996; Ahuja 2000; Wu 2011), reduce risks and costs of the innovation process (Tyler and Steensma 1995; Das and Teng 2000; Wu 2011), shorten innovation cycles (Pisano 1990; Wu 2011), obtain efficiency gains such as economies of scope and scale (Ahuja 2000; Wu 2011), and access to new markets (Mowery, Oxley and Silverman 1998; Wu 2011).

According to Wu (2011) the second perspective emphasises the competitive aspect of strategic alliances and suggests that intense competition stimulates firms to position themselves for competitive behaviours in strategic alliances (Das and Teng 2000; Wu 2011). According to Wu (2011) if organisations do not institute proper monitoring mechanisms or invest sufficient resources in critical activities, such as trust building, their partners might indulge in opportunistic behaviour which could lead to failed collaboration (Hamel 1991; Larsson, Bengtsson, Hendrisson and Sparks 1998; Wu 2011).

According to Rosenbusch et al. (2011), entrepreneurs and small business owners face the dilemma of deciding whether they should pursue and focus on innovation development projects as firm-internal projects or with strategic alliances (external partners). They indicate that prior research mainly advocates external collaborations and networking for new and small organisations. Their study findings show that internal innovation projects lead to

greater firm performance than innovation projects with external partners. They further stress that their meta-analytical results indicate that the innovation projects that focus on external collaboration do not increase the performance of small and medium enterprises (SMEs).

According to Vanvactor (2011), external collaboration and cooperation is critical in today's business environment. As related by Kouzes and Posner (2007) and Vanvactor (2011) collaboration is so critical to success that every significant relationship should be treated as if it is a lifelong endeavour. The face of healthcare management is an evolutionary process and the relationships established between multifaceted partners can produce dynamic effects on an organisation's environment (Vanvactor 2011).

Based on the above literature review, where the research point to an expected relationship between innovation and external collaboration, the following research hypothesis will be tested:

H2. A positive correlation exists between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers.

2.4. Regulation

According to Dassler (2006), traditionally, two theories of regulations have emerged, firstly the concept of 'regulatory intervention' or, in different terms, the way regulators conduct market intervention. A review of the issues relevant in this respect has been provided by Trebing (1987) and (Dassler 2006), who distinguish between market-driven and non-market-driven approaches (Dassler 2006). Secondly, in the context of 'regulatory governance', Majone (1996) identifies a substantive and a proceduralist model (Dassler 2006). This research study will however focus only on one of the two theories, namely regulatory intervention as this aspect has a direct impact on the development/generation and adoption of innovative healthcare products and services in terms of external collaboration between healthcare service providers and healthcare insurers.

According to Dassler (2006) the aspect of regulation that has probably received the most attention, in both theoretical and political contexts, is the way in which dedicated regulatory

authorities intervene in their markets or, in other words, intend to promote durable competition and consumer benefits. To achieve these objectives, two schools of thought have emerged over time on the role of the regulatory authority (Trebing 1987; Dassler 2006). These are market-driven and non-market-driven approaches to regulatory intervention.

Market-driven approach

This school of thought, according to Dassler (2006) argues that competition is the most powerful means to achieve a Pareto-optimal economic outcome and therefore, market intervention other than to tackle market failure until durable competition arrives, is undesirable. The market-driven approach to regulation recognises, however, that there may be a dominant supplier and a Pareto-optimal economic outcome may not be achieved. Hence, the emphasis in the regulation is to remove legal barriers to entry and to encourage competition by setting performance targets in the form of price or profit regulation (Dassler 2006). In addition, it is argued that regulating the dominant supplier's prices or profits may be appropriate to create a level playing field for all the competitors (Dassler 2006). Performance-based regulation should, however, reduce as competition matures (Littlechild 1983; Burton, 1997; Parker 2002; Dassler 2006). Specific regulatory methods used under this approach commonly include price cap regulation (Littlechild 1983; Dassler 2006) or benchmarking, originally proposed by Shleifer (1985) (Dassler (2006).

Non-market-driven approach

According to Dassler (2006) proponents of this school of thought argue that the markets are inherently flawed and lead to an inefficient distribution of outcome including disadvantages for consumers. This is primarily in the context of economies of scale, scope and positive network externalities. According to Dassler (2006), the purpose of regulation is to tackle market flaws on a permanent basis. He further emphasises that in contrast to the market driven approach, a non-market driven approach does not focus simply on bringing barriers of entry down and regulating prices or profits in the short term. Instead, regulation should concentrate more widely on the public interest or social values, such as benefiting all classes of consumers. To achieve these intentions, a set of policy recommendations is proposed, such as setting quality guidelines for services, implementing health and safety

requirements for suppliers, and entrusting one or more operators with the provision of services that might be discontinued when regarded as non-profitable (Kolstad, Ulen and Johnson 1990; Dassler 2006).

It is proposed in the non-market-driven school of thought to conduct regular market reviews to identify, for example, areas of inadequate service, potential competition or least-cost supply options (Dassler 2006). It is important to stress that market-driven and non-market-driven approaches to regulation have their shortcomings and it has been argued that in practice no clear line can be drawn between them. Baldwin and Cave (1999) (Dassler 2006) have argued that the Pareto-optimum may not be achieved without referring to wider social and economic interests and hence, a regulator may need to pursue a mix of objectives for regulation (Baldwin and Cave 1999; Dassler 2006). It may, therefore, be the case that a regulatory authority places emphasis on pursuing a non-market-driven approach, but still promotes competition. Alternatively, a regulator may pursue a market-driven approach and administer price caps as the main method of regulation, while at the same time, taking into account wider economic and social interests (Dassler 2006).

Healthcare regulation

In the healthcare sector, regulatory bodies play a pivotal role in balancing cooperation and competition by means of reforms introduced through legislation (Provan 1984; Mur-Veeman, Eijkelberg and Spreeuwenberg 2001; Baretta 2008). According to Baretta (2008), within the healthcare sector regulatory bodies can influence the level of competition, for example, by: (a) increasing the number of healthcare service providers authorised to provide healthcare services (b) choosing a competitive financing model for healthcare service providers, (c) establishing the same spheres of activity for many (or all) healthcare service providers and (d) adopting mechanisms for evaluating performance based on the pursuit of individual goals. Baretta (2008) argues that the regulatory bodies can also impact on the level of cooperation among providers of healthcare services through many decisions, such as: (a) the implementation of a financing model for healthcare service providers that induces collaboration/cooperation among them; (b) the establishment of different spheres of activity for each category of healthcare service provider and; (c) the adoption of mechanisms for evaluating performance based on the pursuit of collective objectives. Therefore, a regulatory body in the healthcare sector is potentially able to act as a

coordinator system through its own power to balance competition and cooperation (Baretta 2008).

According to Porter and Teisberg (2006) there are three broad areas of healthcare policy from a strategic perspective that drive healthcare innovation, as shown in figure 8.

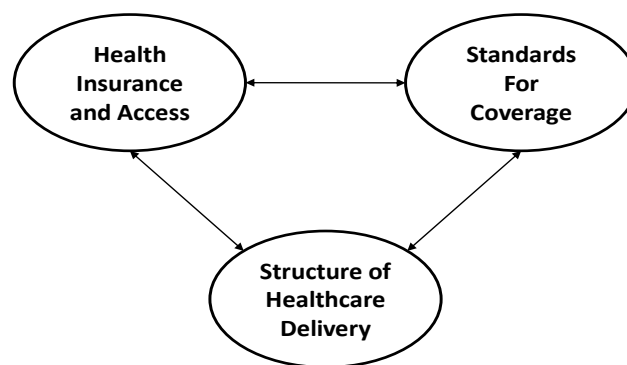


Figure 8 - Issues in healthcare reform, Source: Porter and Teisberg (2006:327)

According to Porter and Teisberg (2006) the **first** set of policies address healthcare insurance and access to insurance, such as who has health insurance, how health plans operate, and how insurance is paid for. As health insurance become more and more expensive, individuals are being requested to pay more towards their healthcare coverage and as the number of uninsured grows, the debate about access to cover and the structure of insurance have become urgent and crucial (Porter and Teisberg 2006). According to the Centre for Development and Enterprise (2011), one aspect of under-regulation of health insurers in South Africa is the key problem of community rating without mandatory participation. Under community rating health insurance, premiums cannot be differentiated on actuarial risk factors like age (Centre for Development and Enterprise 2011). Community rating increases equity because the young and healthy subsidise the old and sick, but it also acts as a disincentive for young potential members to join health insurers (Centre for

Development and Enterprise 2011). Healthcare reformers therefore argue that community rating must accompany compulsory membership of health insurers for those in formal employment and thus create larger risk pools in terms of industry sustainability (Centre for Development and Enterprise 2011).

According to Porter and Teisberg (2006) the **second** broad strategic issue in healthcare policy is coverage: what services insurers and society should be responsible for covering and what services individuals should pay for themselves. This includes difficult issues including and surrounding the extent of treatment justified in terms of its health value, the types of care that should be discretionary, and the responsibilities of patients in participating in their health and their healthcare (Porter and Teisberg 2006). What is covered by health insurance is a major determinant of the cost of private and public health plans and many issues of coverage have not been addressed adequately (Porter and Teisberg 2006). Instead of explicit policy attention, the area of coverage has tended to be left to policies, individual negotiations between members and health plans, and the courts (Porter and Teisberg 2006). According to Porter and Teisberg (2006), some experts assert that the only way to reduce the rate of growth in healthcare costs is to make tough rationing choices about what is covered.

The **third** broad strategic issue in healthcare policy is the structure of healthcare delivery itself (Porter and Teisberg 2006). The delivery of healthcare creates the value for patients and this area has not received much attention until recently when it was realised that more and more private and public money is poured into healthcare without the necessary attention to the value delivered (Porter and Teisberg 2006). Policy attention directed at healthcare delivery has been dominated by how to reduce costs and more recently, attention has been focused on the importance of information technology and pay for performance initiatives to reduce errors and improve quality (Porter and Teisberg 2006). These measures have still largely focused on attempting to control the supply of care and bargain down prices, instead of enabling competition in terms of value (Porter and Teisberg 2006). According to Christensen et al. (2009), when care of a disorder has moved into the realm of empirical medicine, emphasis of regulation needs to focus less on the qualifications of providers and more on how they do their work – on the process being

followed. Following best-practice processes is the key to getting the best outcomes most consistently, when medical practice is empirical (Christensen et al. 2009).

All three strategic areas – health insurance and access, coverage, and the structure of healthcare delivery are important, however, Porter and Teisberg (2006) believe that the structure of healthcare delivery is the most fundamental and that delivering value for patients (in terms of health outcomes per Dollar spend) is the central purpose of the healthcare system in the first place. The value delivered will determine the cost of insurance and what can be covered. Improving the value delivered must be the central focus of health policy instead of an afterthought; it is not just about shifting costs (Porter and Teisberg 2006).

According to Porter and Teisberg (2006) healthcare policy has been both a reflection and a contributor to the zero-sum competition that plagues the healthcare system. Government policies have contributed to the cost shifting and flawed incentives in the healthcare system (Porter and Teisberg 2006). They believe that the central policy goal of healthcare reform must be to enable value-based competition on results. Harnessing the power of competition will enable major improvements in value. Porter and Teisberg (2006) argue that if every actor in the healthcare system has to measure and report results and compete for every member/subscriber or patient, value will increase and innovation will flourish.

According to Christensen et al. (2009) the lack of business model innovation in the healthcare industry is a result of regulators not permitting it and the pattern of regulation in healthcare matches that of many other industries in which the public interest may not be addressed through normal market mechanisms. Regulation in these industries typically goes through three stages (Christensen et al. 2009):

1. **Foster.** Subsidise the creation of the industry.
2. **Stabilise and assure.** Strengthen the participants; ensure that all who should have access in fact do; and make sure that the products are safe and effective.
3. **Afford.** Encourage competition that will reduce prices.

According to Christensen et al. (2009) it has been disruptive competition that has reduced costs dramatically in most historical instance because regulators have sought to reduce

prices. Regulations which try to intensify sustaining competition in an industry normally results in higher prices (Christensen et al. 2009). A key reason why regulatory change persistently lags behind the process of medical science is that those who would be disrupted by a shift in regulatory focus have a lot to lose, and for the good of the healthcare provider they preserve regulations that initially had been adopted for the good of the patient (Christensen et al. 2009). Regulations are toppled only when disruptive innovators find applications or markets beyond the reach of regulators (Christensen et al. 2009).

According to Christensen et al. (2009), the transformation force that has brought affordability and accessibility to industries is disruptive innovation – disruption solves the more fundamental question: How to make healthcare affordable?. Christensen et al. (2009) indicates that most disruptions have three enablers: a simplified technology, a business model innovation, and a disruptive value network. The technological enabler transforms a technological problem from something that requires deep training, intuition, and iteration to resolve, into a problem that can be addressed in a predictable, rules-based way. Diagnostic abilities are the technological enablers of disruption in healthcare (Christensen et al. 2009). Christensen et al. (2009) comment that business model innovation has stalled in the last three decades in healthcare and that regulations and reimbursement systems currently trap in high cost venues where much of the care could be provided in lower-cost, more convenient business models. One of the key lessons from the history of disruptive innovation is that business model innovations are almost always forged by new entrants to the industry. Regulators must therefore be aware of attempts by leading institutions to outlaw business model innovation (Christensen et al. 2009).

Christensen et al. (2009) also indicate that other disruptions fail because they lack new value networks that combine business models into coherent ecosystems that allow them to disrupt their predecessors. Christensen et al. (2009) also emphasises that disruption rarely happens piecemeal where stand-alone disruptions are plugged into the existing value network of an industry – rather entirely new value networks are created, disrupting the old. Regulators should therefore realise that disruptive business models such as value-adding process clinics, retail clinics and facilitated networks must be married with disruptive innovations in insurance and reimbursement to maximise the full impact in cost and accessibility of healthcare (Christensen et al. 2009). Christensen et al. (2009) warns that

knitting all these pieces together will require a much higher degree of integration than has been the norm in the health care industry to date. The authors also warn that employers will need to play a more proactive role in orchestrating the emergence of these new value networks compared to the reactive posture they have taken in the past.

When stability and quality have become assured, governments often shift their focus to regulations that improve the affordability and convenience of the products and services in question. This can be achieved by deregulation, or the unwinding of restrictions on price-cutting and entry that had been put in place when stabilisation and assurance were of paramount concern (Christensen et al. 2009). Economists and economist-turned deregulators have employed a simple formula for cost reduction (Christensen et al. 2009):

↑ Increased competition = ↓ reduced prices

If competition is intensified it will drive prices down. It is disruptive competition that yields dramatic reduction in price and improved accessibility; the implication is that deregulators need to focus not simply on enabling competition, but on facilitating disruptive competition to reduce prices and increase efficiency (Christensen et al. 2009).

Based on the above literature review it is expected that a low presence of strategic regulatory factors in healthcare regulation, necessary for encouraging product innovation, would impact innovation activities of organisations in the supply and demand side structures of the healthcare value chain. For this reason, the following research hypotheses will be tested:

H3: The relationship between the level of new product innovation by health insurers and entrepreneurial orientation (EO) is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that the relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.

H4: The relationship between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers is moderated by perceived strategic regulatory factors necessary for encouraging health

insurer product innovation, such that this relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.

2.5. Health Insurer Product Innovation

Innovation is broadly seen as an essential component of competitiveness, embedded in the organisational structures, processes, products and services within a firm (Gunday et al. 2011). Motivated by the increasing competition in global markets, companies have started to grasp the importance of innovation, since rapidly changing technologies and severe global competition rapidly erode the value-add of existing products and services (Gunday et al. 2011). According to Gunday et al. (2011) innovations constitute an indispensable component of the corporate strategies for several reasons such as to apply more productive manufacturing processes, to perform better in the market, to seek positive reputation in customer's perception and as a result to gain sustainable competitive advantage. According to Morris et al. (2008) the new product or service development process does not evolve in a neat, orderly way. There are some key steps that must be accomplished to produce a commercially viable new product, service or process. These steps are outlined in Figure 9.

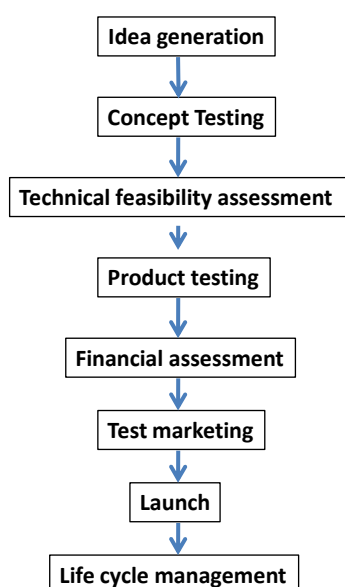


Figure 9 – Innovation as a linear process, Source: Morris et al. (2008:338)

In the OECD Oslo Manual (2005) (Bloch 2007; Gunday et al. 2011) four different innovation types are introduced: product innovation, process innovation, marketing innovation and organisational innovation. This research study only focuses on product innovation.

A product innovation is the introduction of a good or service that is new or significantly improved regarding its characteristics or intended uses, including significant improvements in technical specification, components and materials, incorporated software, user-friendliness or other functional characteristics (OECD Oslo Manual 2005; Gunday et al. 2011). Product innovations can utilise new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies (Gunday et al. 2011). The term 'product' covers both goods and services. 'Product' innovation is a difficult process driven by advancing technologies, changing customer needs, shortening product life cycles and increasing global competition (Gunday et al. 2011). For product innovation success, it must involve strong interaction within the organisation and further between the organisation and its customers and suppliers (Akova, Ulusoy, Payzin and Kaylan 1998; Gunday et al. 2011).

The 'newness' concept is the central element of innovation definitions, but the scope of newness has been conceptualised inconsistently in the literature (Pérez-Luño et al. 2011). Whether the innovation is new to an individual adopter or organization or 'new to the world' reflects substantially different scopes or newness. Pérez-Luño et al. (2011) argues that the literature has been unclear as to whether newness refer to one or several of these dimensions, or has assumed that newness to the organization is equivalent with 'new to the world'.

Damanpour and Wischnevsky (2006) and Pérez-Luño et al. (2011) suggested a way to address the different scopes of newness in the innovation literature. They differentiate between the generation and the adoption of innovations and as the terminology indicates, the generation of innovation refers to situations where a firm internally generates a product, process or technology that was previously unknown to the market in which the firm operate. If a firm adopts innovation, on the other hand, it assimilates knowledge and technologies that have been developed elsewhere and that are new to the organization only (Pérez-Luño et al. 2011).

According to Rosenbusch et al. (2011) the product development process is considered to be a path dependent idiosyncratic dynamic capability and it leads to competitive advantage via enhancement, recombination or creation of resources and their deployment in value-creating strategies (Grant 1996; Teece et al. 1997; Eisenhardt and Martin 2000; Branzei and Vertinsky 2006; Rosenbusch et al. 2011). Rosenbusch et al. (2011) argue that there are a number of ways to assess innovation. They classify innovation measures into input-related and output-related indicators; innovation input has been associated with research and development expenditure and research and development experience of organisations.

Innovation output has been associated with organisational performance (Rosenbusch et al. 2011). According to Wiklund (1999) and Soininen et al. (2011) innovation keeps organisations ahead of their competitors, gaining competitive advantage and leading to improved financial results. According to Goedhuys and Veugelers (2011) product innovation translates into superior sales and growth rates and product innovation is a more complex process with multiple inputs requiring more advanced knowledge inputs and absorptive capacity. Pérez-Luño et al. (2011) classify innovation output as the proportion of total innovation output (number or amount of innovations organisations produce) that falls within each of the two categories of innovation generation and innovation adoption.

The Global Entrepreneurship Monitor (GEM) Global Report (2010) (Kelly, Bosma and Amoros 2010) indicates that GEM assesses innovation in entrepreneurial businesses by asking entrepreneurs to rate the newness of their current services and products and the level of newness this represents for their clients. In addition, GEM asks each entrepreneur to rate industry newness, in terms of the degree of competition the business faces, focusing on whether they perceive there are “many”, “few” or “no other businesses” offering similar products or services.

2.6. Conclusion of Literature Review

Private healthcare insurance in South Africa covers only 16% of the population due to cost, access and healthcare delivery challenges (Council for Medical Schemes 2010/11). In South Africa approximately five-million formally employed people are not covered by private healthcare insurance (McLeod and Grobler 2008) and this is a grave concern. In order for

the industry to grow it needs new attractive/innovative insurance products/plans offered by health insurers.

The conceptual research model builds on the existing Domain Framework by Guth and Ginsberg (1990) for integrating corporate entrepreneurship into the strategic management of a company (Morris et al. 2008). This research study focuses on the innovation process of corporations and includes three independent variables: entrepreneurial orientation (EO), external collaboration and regulation. Predicting health insurer product innovation is the dependent variable. The literature review focused on these four variables.

According to Dess and Lumpkin (2005) entrepreneurial orientation (EO) refers to the strategy-making practices that organisations use to identify and launch corporate ventures and it represents a frame of mind and a perspective about entrepreneurship that are reflected in a firm's ongoing processes and corporate culture. Entrepreneurial orientation (EO) has been positively associated with firm performance. The literature indicates that the three dimensions of EO, innovativeness, risk taking and proactiveness are determinants of firm performance. According to Urban and Barreira (2008), innovativeness is the fundamental posture of an entrepreneurial organisation in terms of developing and creating new products and processes. The literature also indicates that innovation is broadly seen as an essential component of competitiveness embedded in the organisational structures, processes, products and services. According to Lumpkin and Dess (2001) and Hansen et al. (2011), proactive behaviours reflect a propensity to act aggressively towards competitor organisations in the pursuit of favourable business opportunity. Risk taking behaviours result from a willingness to invest in projects that have uncertain outcomes or unusually high profits and losses and to take calculated business risks when identifying business opportunities (Lumpkin and Dess 1996; Urban and Barreira 2010; Hansen et al. 2011).

It is therefore important to investigate the dimensions of entrepreneurial orientation in actors identified for this research study, within the healthcare value chain. These identified actors are health insurers, health insurer administrators and healthcare service providers as major contributors in the healthcare value chain.

External collaboration between health insurers/health insurer administrators and healthcare service providers has been recognised as a necessary condition for the development and

implementation of innovative health insurer products/plans. Value-based healthcare delivery is recognised as the next frontier of healthcare innovation and it focuses on competition based on health outcome or health results – positive sum competition. Porter and Teisberg (2006) argue that moving towards positive sum competition on results offers the only real way to address the long-standing weaknesses in healthcare delivery while also encouraging the entire healthcare system to innovate. Aligning the incentives of all stakeholders in the healthcare value chain will enhance quality, health outcomes and efficiencies in the healthcare system. According to Mintzberg (2011) healthcare actors need to build systems that both promote health and treat illness and to do that more cooperation between healthcare actors are required, not more competition. According to Kouzes and Posner (2007) and Vanvactor (2011), external collaboration and cooperation is critical in today's business environment and collaboration is so critical to success that every significant relationship should be treated as if it a lifelong endeavour.

Regulatory authorities play an important role in the healthcare system in terms of balancing cooperation and competition by means of reforms introduced through legislation. Regulatory authorities and regulations can support or hamper innovation in the healthcare system. A lack of business model innovation in the healthcare system has been attributed to the regulatory environment (Christensen et al. 2009). According to Christensen et al. (2009) it has been disruptive competition that has reduced costs dramatically in literally every historically instance in which regulators have sought to reduce prices. According to Porter and Teisberg (2006) there are three broad areas of healthcare policy, from a strategic perspective, that drive healthcare innovation: health insurance and access; standards for coverage and; structures of healthcare delivery. It is therefore important to investigate whether the presence of strategic regulatory factors, necessary for encouraging healthcare innovation, moderates the relationship between EO and health insurer product innovation and moderates the relationship between external collaboration and health insurer product innovation.

Motivated by the increasing competition in global markets, companies have started to gasp the importance of innovation, since rapidly changing technologies and severe global competition rapidly erode the value add of existing products and services (Gunday et al. 2011). A product innovation is the introduction of a good or service that is new or

significantly improved in terms of its characteristics or intended uses, including significant improvements in technical specification, components and materials, incorporated software, user-friendliness or other functional characteristics (OECD Oslo Manual 2005; Gunday et al. 2011). Product innovations can utilise new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies (Gunday et al. 2011). The 'newness' of product concepts is the central element defining innovation, but the scope of newness has been conceptualised inconsistently in the literature (Pérez-Luño et al. 2011). Damanpour and Wischnevsky (2006) and Pérez-Luño et al. (2011) suggested a way to address the different scopes of newness in the innovation literature. They differentiate between the generation and the adoption of innovations. Rosenbusch et al. (2011) argue that there are a number of ways to assess innovation. They classify innovation measures into input-related and output-related indicators. Innovation input has been associated with research and development expenditure and research and development experience of organisations; innovation output has been associated with organisational performance (Rosenbusch et al. 2011). According to Rosenbusch et al. (2011), entrepreneurs and small business owners face the dilemma of deciding whether they should pursue and focus on innovation development projects as firm-internal projects or with strategic alliances (external partners). They indicate that prior research mainly advocates external collaborations and networking for new and small organisations. They also find that internal innovation projects lead to greater firm performance than innovation projects with external partners. They further stress that their meta-analytical results indicate that the innovation projects that focus on external collaboration do not increase the performance of small and medium SMEs.

The research study aims to predict the relationship between health insurer product innovation and EO and the relationship between health insurer product innovation and external collaboration between health insurers and healthcare service providers. The study also aims to investigate whether the level of presence of perceived strategic regulatory factors, necessary for encouraging health insurer product innovation in the private healthcare industry of South Africa, weakens the relationship between the level of new health insurer product innovation and EO and weakens the relationship between the level of new health insurer innovation and external collaboration between health insurers and healthcare service providers.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology that has been followed for the selection of the sample population and sample size, the development of the research instrument, the data gathering procedure and the statistical methods used to test the research hypotheses and answer the research questions of the research study. The research paradigm that has been used for this research study is based on positivist social science (PSS). Positivist social science is an organised method for combining deductive logic with precise empirical observations of individual behaviour in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity (Neuman 2011).

The focus of this research study is explanatory research and the objective is to test certain relational hypotheses. This research study followed a quantitative cross-sectional research approach. Cross-sectional research examines information on many cases at one point in time (Neuman 2011). The proposed research model comprises scales of entrepreneurial orientation (EO), external collaboration, regulation and health insurer product innovation.

The following methodological steps were adopted (Suhr 2006):

Step 1 – The development of a conceptual framework for testing the model;

Step 2 - The development of a questionnaire to measure the constructs of the model;

Step 3 – The determination of measurement scales for all the measurement items;

Step 4 – Pilot testing and revision of the measurement instrument;

Step 5 – Data collection through an online questionnaire, administered by an independent business research organisation;

Step 6 – Investigation of the measurement aspects of the model through assessing the reliability and validity and normality assumptions of the measurement scales relative to theoretical expectations. Exploratory factor analysis (EFA) and Confirmatory factor analysis (CFA) are used for empirical testing of hypotheses that relationships exist between the observed variables and their underlying latent constructs;

Step 7– Multiple regression analysis to test the structure of the model via tests of relational hypotheses.

3.2 Research Design

The research study is based on explanatory research and followed a quantitative approach. The methodological approach that was adopted is an online survey that was administered by an independent business research organisation in order to ensure data confidentiality of participants. The questionnaire was delivered via the internet in the form of an online questionnaire and elicited perceptions of respondents at managerial levels. Management perceptions are the preferred measure of corporate entrepreneurship (Antoncic and Hisrich 2004).

The research questionnaire followed guidelines extracted from the academic literature and some of the measurement items were amended based on the nature of the South African healthcare industry and the sample populations selected for this study. Additional measurement items were added to existing instruments based on recent academic literature. The following advantages of a research questionnaire have been identified, based on the research study (Cooper and Schindler 2011).

- It allows direct contact with specific participants
- It is a low cost option and can be administered nationally without additional cost
- It allows participants time to think about the questions
- It is perceived as more anonymous
- It allows for rapid data collection

The following disadvantages have been identified based on the research study (Cooper and Schindler 2011):

- Low response rates are a real risk
- No interviewer is available for probing, clarification or explanation
- The questionnaire should not be too long and complex
- Accurate e-mail lists are required to ensure participants are reached
- Anxiety among some participants
- Computer security

Ethical consideration has been taken into account in terms of the research design. The study purpose and benefits to the sample population as well as the participant's rights and protections had been explained previously. The study design was fully disclosed to participants. The study also adhered to participant confidentiality and participants were fully debriefed following the data collection process. Participants' rights to privacy were also protected during the data collection process.

3.3 Population and Sample

3.3.1 Population

The sampling frame of participants in the supply and demand side structures of the healthcare value chain was determined by using the Council for Medical Schemes Annual Report (2010/11). This report provided the sampling frame for health insurers and health insurer administrators and was also used to identify the sampling frame for healthcare service provider disciplines responsible for the majority of annual healthcare benefits paid in the industry. The focus of the sample populations were CEOs and senior executives of health insurers, health insurer administrators and healthcare service providers, representing demand and supply side structures as indicated in the private healthcare value chain, adapted from Stremersch (2008). The sample population was determined as follows in order to ensure proper representation:

1. **Health Insurers** (open and restricted health insurers)
The target population was CEOs (Principal Officers) of all the registered health insurers in South Africa. A list of all the registered health insurers is provided in Appendix D.
2. **Health Insurer Administrators** – The target population was CEOs and senior executives of all the accredited health insurer administrators in South Africa. A list of the accredited health insurer administrators is provided in Appendix E.
3. **Health care service providers** – The target population was CEOs and senior executives of the four largest hospitals groups in South Africa, as well as the CEO of the representative body of the independent hospitals, representing the majority of hospital beds in the country (89% of total private hospital beds) (HASA 2012) – a list

of the hospital groups is provided in Appendix F. CEOs and regional executives of general practitioner and specialist associations/societies, representing the majority of general practitioners/specialists and specialist disciplines in South Africa. A list of the general practitioner and specialist representative organisations/societies is provided in Appendix G. The healthcare service provider population (hospitals, specialists and general practitioners) identified for this research study is responsible for sixty one percent (61%) of total healthcare benefits paid by health insurers on an annual basis (Council for Medical Schemes 2010/11).

3.3.2 Sample and sampling method

The sample of respondents is assumed to be representative of private health insurers, health insurer administrators and major healthcare service providers in the private healthcare industry in South Africa. The ultimate objective was to build a sample size of n=150, after allowing for lack of response from the sample populations.

A non-probability judgmental sampling method was used for the private hospital sample. According to Cooper and Schindler (2011) judgement sampling occurs when a researcher selects sample members to conform to some criterion. The researcher chose judgment sampling for the hospital groups based on the selection of Funder Relations Executives as sample members due to their specific business interaction roles with health insurers and health insurer administrators on product innovation and hospital contracting principles. The four major private hospital groups were included in the hospital provider sample as well the independent hospitals' representative body. As mentioned previously, Funder Relations Executives were identified as participants due to their business interaction with health insurers and health insurer administrators. The five Funder Relations Executives of the hospital groups received an electronic link to the online questionnaire via e-mail.

A non-probability judgmental sampling method was used for the general practitioner and specialist representative associations/societies sample. As mentioned before a judgmental sampling method was used due to the fact that specialist and general practitioner provider associations/societies are responsible for representing specialists and general practitioners in healthcare service provider negotiations and product innovation with health insurers and

health insurer administrators in South Africa. The major specialist and general practitioner professional associations/societies were included in the general practitioner and specialist sample. For this reason, the views of the CEOs and executives of these healthcare service provider associations/societies are assumed to be representative of the specialist and general practitioners' views of product innovation in the private healthcare industry in South Africa. CEOs and Executives of nine provider representative organisations/societies were identified and the CEOs received the electronic link to the online questionnaire via e-mail for distribution to their respective executives for completion.

All one hundred (n=100) registered health insurers in South Africa was included in the health insurer sample. A non-probability purposive saturation sampling method was adopted. All CEOs (Principal Officers) received the online survey link via e-mail. According to Guest, Bunce and Johnson (2006) in terms of instrument content, the more widely distributed a particular experience or domain of knowledge, the fewer the number of participants required to provide an understanding of the phenomenon of interest. They emphasise that it really depends on how a researcher wants to use the data and what the researcher wants to achieve from the analysis. They indicated that Johnson (1998:153) stipulated that it is crucial that the connection between theory, design (including sampling), and data analysis are established from the beginning and Johnson (1998) highlights that how the data were collected, both in terms of measurement and sampling, is directly related to how it can be analysed. They further emphasise that if the goal is to describe a shared perception, belief, or behavior among a relatively homogeneous group, then a sample of twelve will likely be sufficient. If a researcher wishes to determine how two or more groups differ along a given dimension, then the researcher would likely use a quota sample and might purposively select twelve participants per group of interest (Guest et al. 2006).

Guest et al. (2006) also indicates that the more similar participants in a sample are in terms of their experiences with respect to the research domain, the sooner sample saturation will be reached.

All twenty four (n=24) accredited health insurer administrators in South Africa were included in the health insurer administrator sample yielding a saturation sample. The sample size of the accredited health insurer administrators totalled n=24. The CEOs of all the accredited

health insurer administrators were sent an e-mail containing the electronic survey link. The CEOs were also requested to identify senior executives in their respective organisations to complete the survey. A non-probability judgement sampling method was used for this sample population.

All respondents were based nationally and represent the two major demand and supply side structures of the health care value chain, adapted from Stremersch (2008).

Table 1: Profile of respondents

RESPONDENT TYPE
1. CEOs of all the registered health insurers in South Africa (n=100 health insurers)
2. CEOs and senior executives of all the health insurer administrators in South Africa (n=24 health insurer administrators)
3. Funder Relations Executives of the five largest hospital groups in South Africa (n=5 hospital groups)
4. CEOs and regional executives of the largest general practitioner representative associations/societies in South Africa (n=3 general practitioner associations)
5. CEOs and regional executives of the largest specialist representative associations/societies in South Africa (n=6 specialist representative organisations)

An independent research organisation, Greenfields Institute of Business (Pty) Ltd was contracted to collect the data using Qualtrics research software (www.qualtrics.com). This was done with the objective of enhancing the confidentiality of respondents. All CEOs of health insurers, CEOs of Health insurer administrators, CEOs of healthcare service provider associations/societies and the Funder Relationships Executives of the five hospital groups received a personalised e-mail from the researcher positioning the research, objectives of the research and the value of the research to the South African private healthcare industry. The e-mails were followed up with telephone calls.

A total of 154 respondents completed the online survey. Fifteen (15) respondents did not fully complete the survey and their responses were deleted from the data set, leaving the

total number of respondents at 139. The health insurer response rate achieved was 34%, a total of 34 responses. Fourteen open health insurers responded (51.8% of all registered open health insurers) and 20 closed health insurers (27.3% of all registered closed health insurers). Fifty percent (50%) of the number of large open health insurers (>30,000 beneficiaries) as defined in the Council for Medical Schemes' annual report, responded (Council for Medical Schemes 2010/11). Sixty percent (60%) of the number of large closed health insurers (>30,000 beneficiaries), as defined in the Council for Medical Schemes' annual report, responded (Council for Medical Schemes 2010/2011). The number of private healthcare lives covered by the 34 health insurers that responded totalled 68% of all the private healthcare lives in the South African private healthcare industry.

The health insurer administrator responses totalled 83. The responses from the general practitioner representative organisations totalled 11 and 7 responses were received from the specialist representative organisations. Four out of the five private hospital groups responded, with 4 responses received.

Based on the sampling method and response rates, the researcher considers all samples as adequate representations of their respective populations.

3.3.3 External validity of the study

According to Cooper and Schindler (2011), external validity is largely a matter of generalisation, which is an inductive process of extrapolating beyond the data collected. The ability to generalise the research findings across the population for this study was controlled by carefully selecting the sample population for this research. The sample population was selected based on their in-depth knowledge of the healthcare industry, and included all major health insurers, health insurer administrators, private hospital groups and healthcare service provider representative organisations, representing demand and supply side structures of the private healthcare value chain in South Africa.

Additional measures to control non-response bias were implemented in order to generalise the study's findings across the sample population. E-mail reminders were sent out weekly to the sample population for four weeks to maximise response rates.

According to Cooper and Schindler (2011), external validity is also concerned with the interaction of the experimental treatment with other factors and the resulting impact on the ability to generalise to (and across) times, settings, or persons. However, none of these are threats to the external validity of the results of the present study in view of its non-experimental nature and thus absence of treatment effects.

3.4 The Research Instrument

The research instrument was designed to answer the three research questions and to provide the data for testing the four relational hypotheses. The questionnaire was a closed online questionnaire consisting of five parts/sections and a total of 74 closed ended questions. The survey was conducted online and results captured through a remote online system, Qualtrics (www.qualtrics.com).

3.4.1 Structure of the research instrument

The questionnaire is presented in Appendix A. It consisted of the following parts:

Section A - This section focuses on biographical data (control variables for the study, i.e. firm size, firm age, industry sector, geographical area). This section also included questions derived from the literature on organisational competitive capability described by Ireland et al. (2009), and used a seven point Likert scale. The range of the seven point Likert scale is from 1 - strongly disagree through to 7 – strongly agree with the midpoint 4 – neither agree nor disagree. The levels are: 1 – strongly disagree, 2 – disagree, 3 – somewhat disagree, 4 – neither agree nor disagree, 5 – somewhat agree, 6 agree and 7 – strongly agree.

Section B – This section focuses on entrepreneurial orientation (EO) as one of the independent variables. This section aimed to answer Research Question 1 and test research hypotheses 1a and 1b, The EO instrument was based on the original Covin and Slevin (1998) scale as modified by Kreiser et al. (2002). All items were measured using a seven point Likert scale. The range of the seven point Likert scale is from 1 - strongly disagree through to 7 – strongly agree with the midpoint 4 – neither agree nor disagree. The levels are: 1 – strongly disagree, 2 – disagree, 3 – somewhat disagree, 4 – neither agree nor disagree, 5 – somewhat agree, 6 agree and 7 – strongly agree.

The following EO constructs were measured in this section: innovativeness, proactiveness and risk taking.

Section C - This section focuses on external collaboration between health insurers and health care service providers and provided the data to measure this independent variable. This section aimed to answer Research Question 2 and test research hypotheses 2a-d. The collaboration measurement instrument was based on the instrument used by Zillich et al. (2005) to measure physician-pharmacist collaboration (PPCI) from a physician perspective. This instrument was adapted to measure health insurer/health insurer administrator and healthcare service provider collaboration from both health insurer/health insurer administrator and healthcare service provider perspectives. This instrument was further adapted to include items on a seven point Likert scale designed to measure the extent to which the healthcare insurer and healthcare service provider relationship needs to be restructured, as per Porter and Teisberg (2006) to facilitate value-based competition/innovation in healthcare. The range of the seven point Likert scale is from 1 - strongly disagree through to 7 – strongly agree with the midpoint 4 – neither agree nor disagree. The levels are: 1 – strongly disagree, 2 – disagree, 3 – somewhat disagree, 4 – neither agree nor disagree, 5 – somewhat agree, 6 agree and 7 – strongly agree.

This section of the questionnaire was designed to measure the constructs of trustworthiness (T), role specification (RS), relationship initiation (RI) and health insurer and healthcare service provider relationship restructure (RR).

Section D – This section focuses on regulation as the independent moderator variable of the researcher's model, impacting product innovation by health insurers. This section aimed to answer Research Question 3 and test research hypotheses 3a and b and 4a-d. This section was not based on a previous instrument and the construction of the instrument followed guidelines in terms of strategic regulatory factors present in healthcare regulation, encouraging health insurer product innovation and value-based health care delivery by Porter and Teisberg (2006) and Christensen et al. (2009). The instrument was designed to measure the following constructs:

- Encourage competition in healthcare to reduce prices

- Improve health insurance and access to private healthcare
- Standards for coverage
- Structure of health care delivery

All items were measured using a seven point Likert scale. The range of the seven point Likert scale is from 1 - strongly disagree through to 7 – strongly agree with the midpoint 4 – neither agree nor disagree. The levels are: 1 – strongly disagree, 2 – disagree, 3 – somewhat disagree, 4 – neither agree nor disagree, 5 – somewhat agree, 6 agree and 7 – strongly agree.

Section E - This section focused on measuring the dependent variable, health insurer product innovation. The questionnaire was designed to measure two aspects of this construct, internal innovation input; and innovation output. Internal innovation input was measured by questioning the research and development intensity of organisations. This section of the questionnaire used forced choice items in terms of response options as well as a seven point Likert scale for certain items. The range of the seven point Likert scale is from 1 - strongly disagree through to 7 – strongly agree with the midpoint 4 – neither agree nor disagree. Innovation output was measured through items on the following constructs: innovation adoption, innovation generation and organisational competitiveness. This section of the questionnaire was based on combining and adapting previous measurement instruments used by Pérez-Luño et al. (2011), Rosenbusch et al. (2011) and the GEM Global report (2010) (Kelly et al. 2010) for internal innovation input and innovation output. Items were measured using a seven point Likert scale and forced choice items in terms of response options. The range of the seven point Likert scale is from 1 - strongly disagree through to 7 – strongly agree with the midpoint 4 – neither agree nor disagree. The levels are: 1 – strongly disagree, 2 – disagree, 3 – somewhat disagree, 4 – neither agree nor disagree, 5 – somewhat agree, 6 agree and 7 – strongly agree.

3.4.2 Control for Common Method Bias

Response bias refers to tendencies of respondents to respond systematically to questionnaire items on some basis other than the specific item content (Baumgartner and Steenkamp 2001), (Tellis and Chandrasekaran 2010). According to Tellis and

Chandrasekaran (2010), there is not much clarity on how, and if at all, response biases distort survey results.

According to Podsakoff, Mackenzie, Lee and Podsakoff (2003), most researchers agree that common method variance (CMV), which is the variance that is attributable to the measurement method rather than to the constructs the measures represent, is a potential problem in behavioural research. According to Siemsen, Roth and Oliveira (2010) many researchers agree that CMV exists in some form and they indicate that the literature remains inconclusive on whether and when CMV inflates observed relationships among variables. Indeed, in spite of the general recognition of the possibility of correlations being distorted due to the influence of general bias, some authors are less concerned about the effects of common method bias. According to Bidderman, Nguyen, Cunningham and Ghorbani (2011), there have been few reported instances of changes in correlations after removal of the influence of bias.

According to Podsakoff et al. (2003), common method biases arise from having a common rater, a common measurement context, a common item context, or from characteristics of the items themselves, and in any given study it is possible for several of these factors to be present. It is therefore important to evaluate the conditions under which the data are obtained carefully to assess the extent to which method biases may be a problem (Podsakoff et al. 2003). Podsakoff et al. (2003) indicates that method biases are likely to be particularly powerful in studies in which the data for both the predictor and criterion variable are obtained from the same person in the same measurement context using the same item context and similar item characteristics.

As the same respondents responded to all the questionnaire scales and the seven-point Likert-type scale was the dominant measurement scale used, the researcher was careful to control for common method biases in the responses using both design and statistical controls. These are two primary ways to control for method biases (Podsakoff et al. 2003). According to Podsakoff et al. (2003) procedural remedies include the following:

- Obtain measure of predictor and criterion variables from different sources
- Methodological separation of measurement
- Protecting respondent anonymity and reducing evaluation apprehension

- Counter balance question order
- Improving scale items

Following these recommendations, the researcher applied procedural controls through obtaining measures of the criterion variable from other sources by introducing an independent scale of organisational competitive capability (Ireland et al. 2009) as a check and correlate of the criterion variable. Furthermore, the respondents clustered on measures of innovation input were compared on the dependent variable measures of innovation adoption, innovation generation and organisational competitiveness as a validity check of the dependent variable measures. In addition, the researcher respected respondent anonymity.

Furthermore, the researcher applied confirmatory factor analysis (CFA) to the empirical data of the scales of each construct to check whether a single factor could account for most of the variance in the data as would occur if there was strong method bias in the responses (Podsakoff et al. 2003). The CFA method is a more recent and more sophisticated test of common method bias than other tests such as the Harman single-factor test that uses Exploratory factor analysis (EFA) to examine the unrotated factor solution for the dimensionality in the data (Podsakoff et al. 2003). The basic assumption of these tests is that if a substantial amount of common method variance is present, either a single factor will emerge from the factor analysis or one general factor will account for the majority of the covariance among the measures (Podsakoff et al. 2003).

3.5 Procedure for Data Collection

The data was collected through an online survey. The online survey link was e-mailed to a selected sample population as per Table 1 of the report.

The results were captured through a remote online system provided by Qualtrics (www.qualtrics.com) and administered by Greenfields Institute of Business (Pty) Ltd, an independent business research organisation. The instrument was tested by conducting pilot testing before it was used for the main study. Pilot testing was conducted by selecting 15 senior managers from Discovery Health (Pty) Ltd with sufficient knowledge of the demand

and supply side structures of the health care value chain as presented by Stremersch (2008). The pilot test showed that the questionnaire's instructions were clear and that the items were unambiguous.

3.6 Analysis of the model: Structural Equation Modelling (SEM)

The model comprised the relationships among the constructs of entrepreneurial orientation (EO), external collaboration, regulation and health insurer product innovation, and specified their respective measurement scales. According to Kline (2011), these are the model's a priori specifications that the researcher tests to see whether they are supported by the empirical data gathered. Kline (2011) explains that models may be tested in three contexts: a strictly confirmatory context in which the researcher's model is accepted or rejected based on the fit of the data; a less restrictive context of multiple alternative models in which some of the models may be retained and others rejected; and finally, a context of model generation in which the researcher's model is modified if the empirical data does not fit (Kline 2011:8).

The aim of the researcher in the present study is best characterised in the context of model generation as the researcher applied EFA to determine the dimensionality of the constructs of the model and then used CFA to test and compare both the empirically and the theoretically derived factor structures. Model generation occurred when the CFA results showed the empirically derived factor structure as superior to the theoretically derived structure.

Although Structural equation modelling (SEM) was proposed to evaluate the model, the sample size realised did not allow the application of this statistical procedure. According to Kline (2011), an ideal sample size-to-parameters ratio would be 20:1, a "typical" sample size being about 200 cases in studies where SEM is used. Instead, the researcher tested **the structure of the model** by applying regression analysis to each of the hypotheses of the model separately and ignoring the psychometrics properties of scale reliability and validity. SEM would have tested the overall model at once, simultaneously taking into account the reliability and validity of the scales.

3.7 Descriptive statistics

Descriptive data was gathered for respondents and the organisations they represented.

3.7.1 *Organisational characteristics*

Frequency tables and their corresponding stacked bar graphs were used to describe the data distributions of industry sector, provider organisation, health insurer organisation and geographical location, firm age and firm size of the organisations represented by the respondents.

The organisational competitive capability measures were used as an additional validity check for the dependent variable, organisational competitiveness using a correlation analysis.

3.7.2 *Innovation input*

As there were several measures of innovation input in the measurement scale, the multivariate technique of cluster analysis was used to analyse these variables simultaneously by grouping similar responses in terms of the innovation input variables of the number of research and development (R&D) staff employed, whether the organisation has an approved R&D budget or not and if the organisation's R&D budget encourages innovation. These groupings were also compared on the dependent variable measures of innovation adoption, innovation generation and organisational competitiveness as a validity check of the dependent variable measures.

3.8 Evaluation of the Model: Measurement characteristics of scales

According to Kline (2011) it is critical to select measures with strong psychometric characteristics and report these characteristics in written summaries. If the scores of the measures that are analysed do not have good psychometric properties, then the results can be meaningless (Kline 2011).

The researcher assessed the **measurement** adequacy of the scales of each of the model's constructs separately using first reliability measures, then exploratory factor analysis (EFA) and then confirmatory factor analysis (CFA), of empirically based and theoretically based models.

3.8.1 Reliability of scales

Score reliability is the degree to which scores in a particular sample are free from random measurement error, and is estimated as one minus the proportion of total observed variance due to random error (Kline 2011). A measure is reliable to a degree that it supplies consistent results, and thus reliability is a necessary contributor to validity although not a sufficient condition for validity (Cooper and Schindler 2011). Internal consistency assesses the degree to which items in the scale are measuring consistently (Hair, Black, Babin and Anderson 2010). Although internal consistency does not assess construct validity, the rationale for internal consistency is that the individual items or indicators of the scale should be measuring the same construct and thus be highly intercorrelated (Hair et al. 2010). Cronbach's alpha coefficient is used to measure internal consistency reliability, the degree to which responses are consistent across the items within a measure (Kline 2011). Generally reliability coefficients around 0.9 are considered excellent, values around 0.8 are very good and values around 0.7 are adequate (Kline 2011). According to Hair et al. (2010) the generally agreed upon lower limit for Cronbach's alpha is 0.70, although it may decrease to 0.60 in exploratory research. According to Kline (2011), values less than 0.5 indicate that most of the score variance is due to random error, an unacceptable amount of imprecision in most research. According to Kline (2011), low score reliability has many detrimental effects in manifest variable analysis – poor reliability reduces the power of statistical tests and it also generally attenuates effect sizes below their true (population) values as unreliability in the scores of variables attenuates their observed correlations (Kline 2011).

The researcher used two measures of internal consistency reliability – Cronbach alpha and the average inter item correlations to assess the reliability of the scales of the three independent variables (EO, external collaboration and regulation) and the dependent variable (health insurer product innovation), as well as their underlying subscales. The average inter item correlations were considered as the value of Cronbach alpha increases

with the number of items in the scale. As the number of items differed across scales, the average inter-item correlations allowed fairer comparisons of the internal consistency reliabilities of these scales. The inter item correlations is the descriptive information about the correlation of each item with the sum of all the remaining items and Hair et al. (2010) recommends that the average inter-item correlations should exceed 0.30. The Standardised Alpha coefficient of internal consistency was not used as all the questionnaire items were scaled on the same Likert-type scale. Standardised Alpha should be used when all scale items have been standardised, as would be appropriate for example when the individual scale items are not scaled the same – variance and covariance are taken into account for computation (Yu 2001).

3.8.2 Validity of the scales of the model

According to Kline (2011), score validity concerns the soundness of the inferences based on the scores, and information about score validity conveys to the researcher whether applying a test is capable of achieving certain objectives. All forms of score validity are absorbed under the broader concept of construct validity (Kline 2011). According to Kline (2011) there is no single, definite test of construct validity and measurement related research usually concerns a particular facet of construct validity.

Criterion-related validity concerns whether scores (X) relate to an external criterion (Y) against which the scores can be evaluated (Kline 2011). In view of the importance of investigating the construct validity of the dependent variable, an independent measure of organisational competitiveness, a key dimension of the dependent variable, was introduced in the form of a scale of organisational competitive capacity. Correlating these two measures served as external criterion-related validity of the dependent variable, lending further evidence to the construct validity of the dependent variable scale. Regrettably, space constraints did not allow for the inclusion of other independent measures of the other scales of the questionnaire for the purpose of investigating their construct validity through criterion-related validity.

Convergent validity and discriminant validity are measures of construct validity and involve the evaluation of measures against each other instead of against an external context (Kline

2011). The researcher studied the construct validity of the scales using the statistical techniques of CFA and EFA, CFA allows the researcher to test the hypothesis that a relationship between the observed variables and their underlying latent construct(s) exists. The researcher uses knowledge of theory, empirical research, or both, postulates the relationship pattern a priori and then tests the hypothesis statistically (Suhr 2006). The assumption of factor analysis that sufficient correlations exist among the variables of the analysis was tested using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) and Bartlett's Test of Sphericity before proceeding with exploratory factor analysis. According to Hair et al. (2010) Bartlett's Test of Sphericity is used to determine the appropriateness of factor analysis and it provides the statistical significance that the correlation matrix has significant correlations among at least some of the correlations. Hair et al (2010) notes that increasing the sample size causes the Bartlett Test to become more sensitive in detecting correlations among variables. According to Hair et al. (2010) the measure of sampling adequacy (MSA) is also used to quantify the degree of intercorrelations among variables and the appropriateness of factor analysis. According to Hair et al. (2010) the MSA index ranges from 0 to 1, reaching 1 when each variable is perfectly predicted without error by the other variables. According to Hair et al. (2010) the measure can be interpreted with the following guidelines: 0.80 or above, meritorious; 0.70 or above, middling; 0.60 or above, mediocre; 0.50 or above, miserable; and below 0.50, unacceptable. The MSA also increases as the sample size increases (Hair et al. 2010).

Exploratory factor analysis (EFA) is used to identify the number of constructs and the underlying factor structure (Suhr 2006). It is used to explore the possible underlying factor structure of a set of measured variables without imposing any preconceived structure on the outcome (Child 1990; Suhr 2006).

In the present research, confirmatory factor analysis (CFA) was used as a statistical tool for testing hypotheses about convergent and discriminant validity (Kline 2011). Analysis of the results of exploratory factor analysis (EFA) was also considered in evaluating construct validity, particularly when the CFA results were weak.

As the sample size achieved in the research did not allow for factor analysis of all 74 items simultaneously, CFA and EFA were performed in turn on all the items of the scales and subscales designed to measure each of the constructs of the model. Thus separate factor

analyses were computed on the items of the subscales of the independent variables of the model (EO, external collaboration and regulation) and on the items of the subscales of the dependent variable, health insurer product innovation (health insurer product innovation adoption, health insurer product innovation generation and organisational competitiveness). Thereafter, a higher order CFA was used on the subscale scores (rather than the item scores) to test the model for a second-order factor structure (Hair et al., 2010). Thus second order CFA was performed on the subscale scores of EO, external collaboration, regulation and health insurer product innovation to establish construct validity at the subscale level. This second order CFA aimed to assess whether the subscales that purported to reflect the same construct were more highly intercorrelated than subscales purported to reflect different constructs.

As a factor loading is the correlation of the variable and the factor, a squared loading is the amount of the variable's total variance accounted for by the factor (Hair et al. 2010). Thus a loading value of 0.3 translates to approximately 10% explained variance, a 0.5 loading indicates 25% of the variance is accounted for by the factor; and the loading must exceed 0.7 for the factor to account for 50% of the variance of a variable (Hair et al. 2010). Factor loadings in the range of ± 0.3 to ± 0.4 are considered to meet the minimal level for interpretation of structure; factor loadings of ± 0.5 or greater are considered practically significant and loadings exceeding 0.70 are considered indicative of well-defined structure (Hair et al. 2010).

3.8.3 Testing factor structure via CFA

Rather than assessing all aspects of the model simultaneously as in SEM, the researcher constructed a standard confirmatory factor analysis model for each construct of the model separately in which the number of factors and their correspondence with the measurement scales were specified (Kline 2011) – as an example, see Appendix C for an explanation of the standard CFA model for entrepreneurial orientation (EO). The structural equation diagram was used for each of the model constructs, confirming the construct validity of each of the constructs. As mentioned in section 3.6 structural equation modelling (SEM) was proposed to evaluate the structure of the model but the sample size realised did not allow the application of this statistical procedure and regression analysis will be used to

analyse the path model, using a path diagram (Figure 3). A path model is a structural model for observed variables and a structural model represents hypotheses about effect priority (Kline 2011).

According to Hair et al. (2010) absolute fit indices are a direct measure of how well the model specified by the researcher reproduces the observed data. The following absolute fit indices were used in the data analysis:

- Chi- square statistic
- Non-centrality-based goodness-of-fit (GOF) indices
 - Population non-centrality parameter
 - Steiger-Lind root mean square error of approximation (RMSEA)
 - Population gamma index
 - Adjusted population gamma index
- Single sample goodness-of-fit indices
 - Joreskog GFI
 - Joreskog AGFI
- Standardised root mean residual (SRMR)
- Discrepancy function

Chi-square statistic

According to Hair et al. (2010), the most fundamental absolute fit index is the chi-square statistic. It is the only statistically-based SEM fit measure and is essentially the same as the chi-square statistic used in cross-classification analysis between two non-metric measures - the only distinction is that when used as a goodness of fit (GOF) measure the researcher is looking for no differences between the matrices to support the model as representative of the data (Hair et al. 2010). In SEM a relatively small chi-square value and corresponding large p-value are indicators that there is no statistical difference between the two matrices, to support the idea that a proposed theory fits reality (Hair et al. 2010). As this statistic may prove to be significant in large samples based on small differences and

thus small effect size, other criteria are used to complement it. The main measures are now described.

Population non-centrality parameter

This index directly estimates the population noncentrality parameter. This estimation is a measure of "badness of fit" and is computed with a 90% confidence interval (StatSoft Inc. 2011).

Steiger-Lind RMSEA index

According to Hair et al. (2010), RMSEA better represents how well a model fits a population, not just a sample used for estimation. It corrects for both model complexity and sample size by including each in its computation and lower RMSEA values indicate better fit (Hair et al. 2010). Values of the RMSEA index below 0.5 indicate good fit and values below 0.1 indicate outstanding fit (StatSoft Inc. 2011).

Population gamma index

According to StatSoft Inc. (2011) the population gamma index is an estimate of the population GFI, the value of the GFI that would be obtained if we could analyse the population covariance matrix σ . For this index good fit is indicated by values above 0.9 or 0.95 (Hair et al. 2010).

Adjusted population gamma index

The adjusted population gamma index is an estimate of the population GFI, corrected for model parsimony and good fit is indicated by values above 0.95 (StatSoft Inc. 2011).

Joreskog GFI

This index is a negatively based estimate of the population GFI, and it tends to produce a slightly pessimistic view of the quality of the population fit, and values above 0.95 indicate good fit (StatSoft Inc. 2011).

Joreskog AGFI

This index is also a negatively based estimate of the population equivalent and values above 0.95 indicate good fit (StatSoft Inc. 2011).

Standardised root mean residual (SRMR)

According to Hair et al. (2010) the standardised value of route mean square residual (RMR) is useful for comparing fit across models. According to Hair et al. (2010) lower SRMR values represent better fit and higher values represent worse fit. According to Hair et al. (2010) a rule of thumb is that an SRMR value of over 0.1 suggests a problem with fit.

Discrepancy function

The discrepancy function is a numerical value that expresses how badly a structural model reproduces the observed data (StatSoft Inc. 2011). The larger the value of the discrepancy function, the worse the fit of model to data and the discrepancy function value is zero only if fit is perfect (StatSoft Inc. 2011).

The remainder of the methodology to be described in this chapter refers to the testing of the structure of the relationships in the model posited by the researcher.

3.8.4 Tests of measurement variables

To describe the distributions of the scores of all the measurement variables, the variable means and medians were used as measures of central tendency, and the standard deviations were used as the measure of variability.

Tests of assumptions of score distributions

Score distributions were examined for normality using the measures of skewness and kurtosis to indicate the distribution shape in terms of symmetry and peakedness respectively. While positive skew indicates that most of the scores are below the mean and negative skew indicates that most of the scores are above the mean (Kline 2011). Furthermore, the skew index (SI) and kurtosis index (KI) are standardised measures of these characteristics (Kline 2011). Variables with absolute values of $SI > 3$ are described as extremely skewed and those with absolute values for KI of about 8 to over 20 indicate extreme kurtosis (Kline 2011). These criteria were used by the researcher in deciding whether to apply transformations to normalise the score distributions using mathematical operations to convert the original scores to new ones that may be more normally distributed (Kline 2011). The researcher used the cube transformation function for transforming the

highly negatively skewed empirical distribution of relationship restructure (RR) scores reflecting the construct of external collaboration.

3.8.5 Comparison of the subgroups on the measurement variables

As the sample of respondents of the research comprised three underlying subgroups (health insurers, health insurer administrators and healthcare service providers as major actors in the healthcare value chain), the researcher needed to ascertain whether the model could be tested on the full sample of respondents, or on any of the subgroups separately.

The comparisons of the subgroups were based firstly on the means of the scales and subscales using independent t-tests to check for differences between the health insurer and the health insurer administrator subgroups. When no significant differences were discerned between these subgroups, they were combined and their means similarly tested against those of the healthcare service providers. In the case of significant t-test comparisons, the effect sizes of the subgroup differences were computed to establish the practical significance or meaningfulness of the differences. The effect size is expressed as the differences in group means divided by their standard deviation (Hair et al. 2010). The magnitude of the effect size has a direct impact on the power of the statistical test. An effect size (d) of 0.2 is deemed small, 0.5 medium and 0.8 large (Cohen 1992).

The comparability of the subgroups was assessed further by comparing the subgroups in terms of the structure of the relationships among their scales. Comparisons were based on the Pearson product moment correlations among the variables for each of the three subgroups considered separately. The respective correlations of the independent subgroups were then compared pair wise using a normal curve test through the Fisher z transformation of the correlation coefficient (Cohen 1992).

3.9 Evaluation of the Model: Structural aspects of the model

As previously stated, ideally the researcher would have used SEM to test simultaneously the measurement and structural aspects of the model. In addition to the efficiency and methodological elegance of SEM, the advantage of this method is

that the unreliability of the measures is taken into account when testing the structure of the model. By contrast, linear regression assumes that the scores of the predictors are perfectly reliable (Kline 2011) and consequently, poor regression results may in part be due to unreliability in measurement scales rather than the correlations between variables.

For ease of reference and context, the model that was tested in the research study is presented in figure 10.

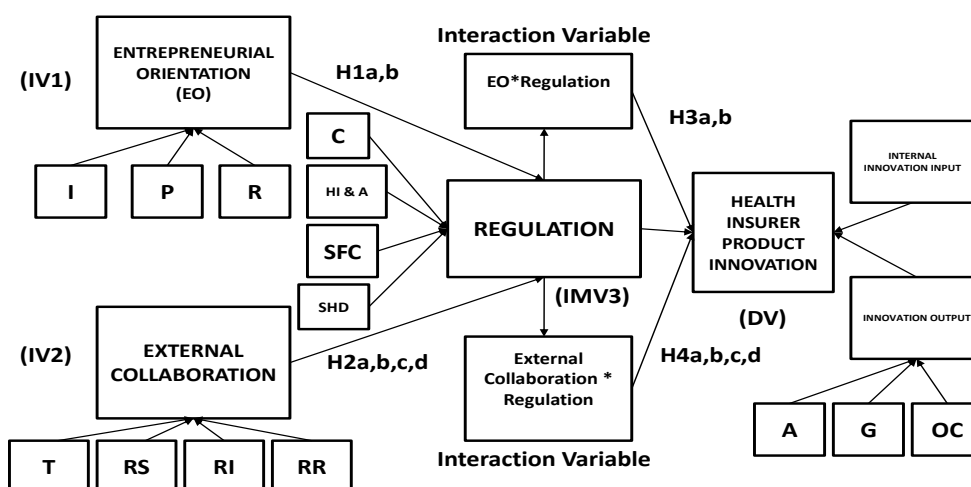


Figure 10 - Conceptual Research Model, Source: (Own source)

3.9.1 Regression analysis

The regression equation of the model that was tested via the empirical data is:

$$\text{Level of Health Insurer Product innovation} = \alpha + \beta_1 (\text{EO}) + \beta_2 (\text{External Collaboration}) + \beta_3 (\text{Regulation}) + \beta_4 (\text{EO} * \text{Regulation}) + \beta_5 (\text{External Collaboration} * \text{Regulation})$$

According to Kline (2011), the assumptions of multiple regression are stringent and are summarised as follows:

- Regression weights reflect linear relationships only;
- Statistical tests in multiple regression assume that the residuals are normally distributed and have uniform variances across all levels of the predictors;

- Multiple linear regression assumed that the scores of the predictors are perfectly reliable.

Multiple regression analysis has been performed to test the model as per the revised regression equation. The model predicts health insurer product innovation which includes the following constructs:

- Innovation adoption
- Innovation generation
- Organisational competitiveness

In order to alleviate collinearity problems in moderated multiple regression models, some authors (Aiken and West, 1991, Irwin and McClelland, 2001) suggest mean centering of the independent variables and interaction terms (Echambadi and Hess 2007). However, evidence by Echambadi and Hess (2007) have proved analytically that mean-centering neither changes the computational precision of parameters, the sampling accuracy of main effects, simple effects, interaction effects, nor the R^2 . Gaticon and Vosgerau (2005) also established that mean centering does not reduce multicollinearity at all, even if the bivariate correlation between x_1 and x_1x_2 is decreased.

Mean centering has therefore not been used in preparing the independent variables and interaction terms for the regression analysis.

Regression coefficients are indicators of the relative impact and importance of the independent variables in their relationship with the dependent variable (Hair et al. 2010). In order to use the regression coefficients for explanatory purposes, it must be ensured that all the independent variables are on comparable scales (Hair et al. 2010). Standardisation of the regression coefficient is required to achieve this objective. The beta coefficient is used for this purpose (Hair et al. 2010).

When comparing regression models, the most common standard used is overall predictive fit, and R^2 provides this information (Hair et al. 2010). As more variables are included in the model, R^2 will always increase. In order to compare between models with different numbers of independent variables, the adjusted R^2 was used (Hair et al. 2010). The adjusted R^2 is also helpful in comparing models between different data sets, because it will compensate

for the different sample sizes (Hair et al. 2010). In the present study, adjusted R² was useful when comparing the model based on different subgroups.

Based on the comparison between the difference in means of the subgroups and the difference in inter correlations among variables of the subgroups, the regression analysis has included or excluded certain subgroups in order to control for underestimation of the results.

3.9.2 Regression models tested

Tests of the following regression models were performed:

1. The test of EO vs. Health Insurer product innovation

Tests of hypotheses 1a, b and 3a, b

2. The tests of External Collaboration (T,RS,RI) and External Collaboration (RR) vs. Health insurer product innovation

Tests of hypotheses 2a-d and 4a-d

3. Jointly specified hypothesis to test for specification error – Hypotheses 5 and 6.

Specification error refers to a problem of omitted predictors that account for some unique proportion of total criterion variance, but are not included in the analysis (Kline 2011). According to Kline (2011), overestimation due to the omission of a predictor occurs more often than underestimation and to avoid serious specification error is to reduce the potential number of left-out variables.

Hypotheses 5a,b - Test of EO * Regulation (moderator variable) vs. health insurer product innovation - inclusive of all main variables

Hypotheses 6a-d - Test of External Collaboration (T,RS,RI) * Regulation vs. Health insurer product innovation (inclusive of all main variables) and

3.10 Chapter Conclusion

This chapter focused on the research methodology that has been followed for the selection of the sample population and the sample size, the development of the research instrument, the data gathering procedure and the statistical methods used to test the research hypotheses and answer the research questions of the research study. As indicated previously the focus of this research study is explanatory research and the objective is to test certain relational research hypotheses. This research study followed a quantitative cross-sectional research approach and the proposed research model comprises scales of entrepreneurial orientation (EO), external collaboration, regulation and health insurer product innovation. This research study has several limitations which could provide opportunities for future research. The following limitations have been identified:

- The sample that was selected is assumed to be representative of the population. This may not be so.
- The research study only focused on health insurers, health insurer administrators and healthcare providers and did not take any significant contribution to product innovation into account from other actors in the healthcare value chain such as employers, corporate and individual pharmacies and pharmaceutical manufacturers.
- The sample population excluded respondents from regulatory authorities.
- The study assumed that all innovation is not equal. The focus of this study is to measure health insurer product innovation with an emphasis on health insurer innovation output. Innovation input measures would be used to validate innovation output measures.
- The design of the measurement instrument did not adequately control for response bias as there were no negatively phrased items that controlled for response set, for example acquiescence response set.

- The design of the measurement instrument did not adequately control for common method bias as the same seven-point Likert type scale was used throughout. Thus statistical methods had to be used to estimate the presence of this potential bias.
- The measurement scales for innovation adoption need to be refined due to low reliability and validity.
- The CFA analysis showed that the measurement scales overall need to be improved.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

The results of the data analysis of the study are reported in this chapter in accordance with the research methodology chapter, Chapter 3, of this report. At the outset, the organisational characteristics are described (4.2); thereafter the results of the empirical testing of the researcher's model are reported. As outlined in the previous chapter, the approach adopted is to evaluate the measurement aspects of the model first (3.8), followed by the evaluation of the structural relationships of the model (3.9). Finally, conclusions are drawn based on the results of the tests of the hypotheses (4.6).

There were several stages to evaluating the model. In view of the complexity of the structure of the results on the model evaluation, the underlying logic of the results on the model is once again outlined in this introductory section.

4.1.1 Reliability

In Section 4.3, measures of reliability were computed for the theoretically derived measurement scales as reliability is a necessary condition (although not a sufficient condition) for validity.

4.1.2 Validity

As outlined in the previous chapter, the sample size achieved in the research did not allow for factor analysis of all 74 items simultaneously. Thus in Section 4.4, three sets of factor analyses (EFA and CFA) were performed in turn on all the items of the scales and subscales designed to measure each of the constructs of the model (EO, external collaboration and regulation), followed by a fourth set of factor analyses on the items of the subscales of the dependent variable, health insurer product innovation (health insurer product innovation adoption, health insurer product innovation generation and organisational competitiveness). Thereafter, a higher order CFA was used on the subscale

scores (rather than the item scores) to test the model for a second-order factor structure in order to establish construct validity at the subscale level.

Each of the factor analyses began as exploratory, with EFA performed separately on the items of each construct to assess whether the theoretically derived combinations of items designed to reflect the various constructs did indeed load highly on the factors as expected, and not highly on other factors. This was the first stage of assessing construct validity. In situations where unexpected combinations of items emerged based on the factor loadings, new measurement scales were formed as potential substitute measurement scales for the theoretically derived scales. These were referred to as the empirically derived scales.

Secondly, confirmatory factor analyses (CFAs) were computed on both the theoretically derived measures of the constructs as well as the empirically derived measures, and the CFA results compared using model fit indices. The objective of the CFAs was to see whether the theoretically derived scales of the constructs of the model were validated, and if not, whether the empirically derived scales showed improved construct validity.

Finally, in Section 4.4.7, an independent measure of a key aspect of the dependent variable of the model was introduced in the form of a scale of organisational competitive capability. Significant correlations with moderate effect size between this scale and the scale of the dependent variable was considered as supporting the construct validity of the measures through criterion related validity. Furthermore, variables expected to correlate with the dependent variable of product innovation were introduced in the form of innovation input measures. These measures, considered jointly via cluster analysis, were correlated against the dependent measures in a further validation exercise.

While analysis of the scales' psychometric properties of reliability and validity constituted the first steps in preparing the data in terms of the items comprising for model analysis, evaluation of the score distributions of these scales was the next step of data preparation.

4.1.3 Normality Assumptions

In Section 4.4.10, the score distributions of the theoretically derived and empirically derived scales were examined in terms of their descriptive statistics to see whether they met the required assumptions for statistical testing. This information informed the researcher on the necessary adjustments to make to the measurement scales in terms transformations to normality.

4.1.4 Group comparability

As previously described, there were three main groups or sectors of the healthcare industry that comprised the sample respondents. Although the researcher's model was developed to apply to both the demand and supply sides of the industry, the possibility existed that the relationships specified in the model could be different in the three sectors, rendering an analysis of the combined sample as problematic. Thus in Section 4.4.11, the intercorrelations of the variables were compared across the subgroups to assess whether the structure of the relationships were the same for health insurers (HIs), health insurer administrators (HIAs) and healthcare service providers. Differences in the structure of the intercorrelations were noted and the structural model was later tested on both the entire sample as well as on the total sample excluding the subgroup of healthcare service providers (for whom differences were found on some of the intercorrelations).

4.1.5 Regression analysis for hypothesis testing

Finally, in Section 4.5, the hypotheses of the model were tested by a series of hierarchical regression analyses computed on the theoretically derived scales substituted, where necessary, by the empirically derived scales. In view of the number of hypotheses framed, the hypotheses were framed as research hypotheses, rather than as statistical null and alternative hypotheses. Thus significant regression results, i.e., when the statistical null hypothesis would be rejected, were interpreted as indicating support for the corresponding research hypothesis. The tests of the research hypotheses jointly served as the empirical evaluation of the researcher's model.

4.2 Sample description

4.2.1 Organisational characteristics: industry sector, firm age and size

Descriptive information on the industry sector represented by the respondents is presented in Table 2. The majority of respondents (60%) represent health insurance administrators (HIAs), 25% of respondents represent health insurers (HIs), and almost 16% represent healthcare service providers. The sub-industry categories for providers are included in an additional pie graph in Figure 2.

Table 2: Distribution of Industry sector of respondents (n=139)

Industry sector	Count	Percent (%)
Provider organisation	22	15.8
Health insurer administrator organisation	83	59.7
Health insurer organisation	34	24.5
Total	139	100

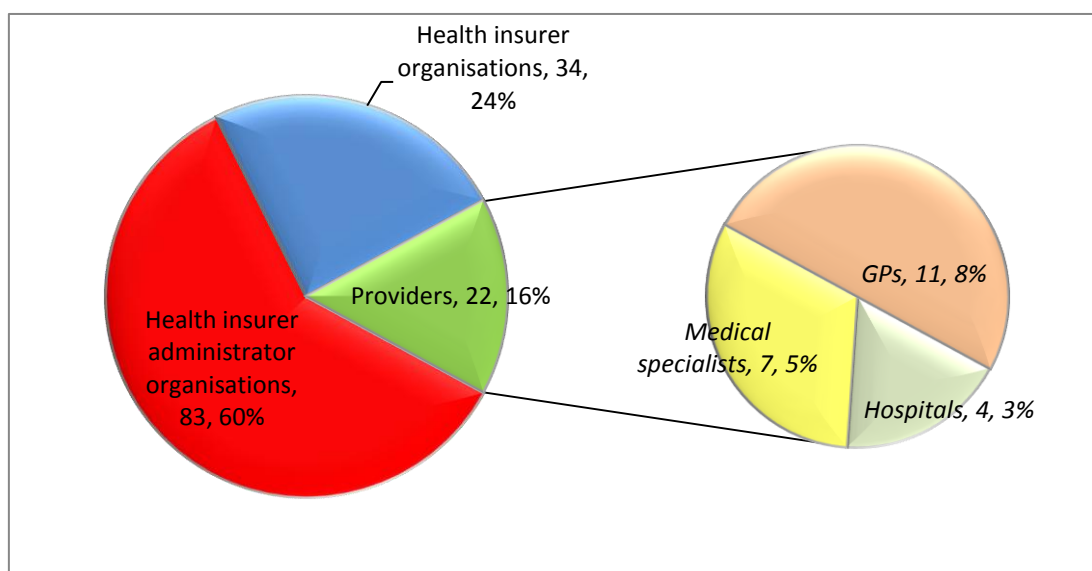


Figure 11–Distribution of respondents by industry sector and subsector (n=139)

Respondents reported the following information:

Of the 34 health insurers who responded, 20 (59%) represented closed health insurers and 14 (41%) represented open health insurers.

The majority (88%) of respondents worked in organisations that operated nationally; of the other respondents, half worked in organisations that operated primarily in Gauteng and the others operated primarily in KZN, Limpopo, Western Cape, North West and Eastern Cape.

Other characteristics of the organisations represented by the respondents are firm age and firm size in terms of number of permanent employees and membership/patient base. As these characteristics differ across the industry sectors, they are reported separately in Table 3 and the respective percentages are reflected in stacked bar graphs in Figures 12-14.

These results show that:

- Most healthcare service providers (73%) had been in operation for more than 20 years and almost two-thirds had a staff complement of 10 or fewer. Their membership/patient base ranged between under 5,000 to over 100,000.
- Most health insurer administrator organisations (59%) had been in operation for 11-20 years. Almost all the organisations (98%) employed more than 200 staff. Furthermore almost all (83%) had a membership/patient base of more than 100,000 for the current financial year.
- A third of the health insurers had been on operation for 11-20 years and 56% for longer. Almost half (47%) employed 10 or fewer staff members, while 26% employed more than 200 staff. Almost half (47%) had a membership/patient base for the current financial year of over 100,000.

Table 3: Organisational characteristics by industry sector

Organisational characteristics		Industry sector		
		Providers	HIA	HI
Years in operation	0-10 years	18%	22%	12%
	11-20 years	9%	59%	32%
	>20 years	73%	19%	56%
Staff employed	10 or fewer	64%	0%	47%
	11-50	5%	0%	21%
	51-200	9%	2%	6%
	>200	23%	98%	26%
Membership/patient base for the current financial year	up to 5000	32%	0%	3%
	5,001-30,000	36%	0%	29%
	30,001-100,000	0%	17%	21%
	>100,000	32%	83%	47%

The distribution of the Industry sector of respondents is summarised based on the forced-choice item that provided the response options displayed in Table 3.

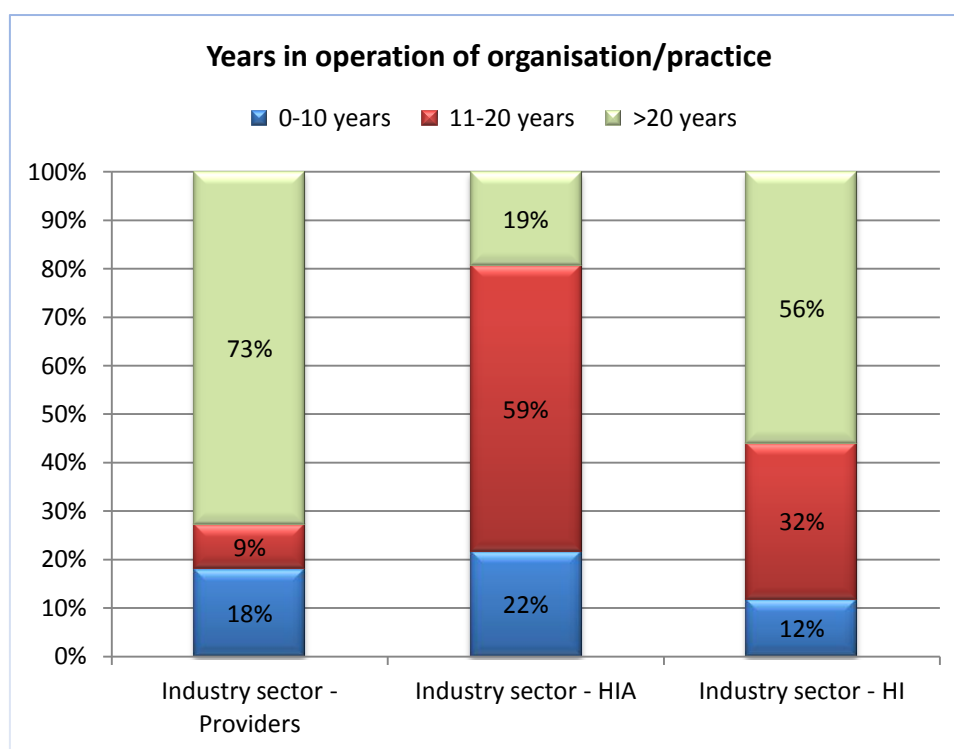


Figure 12 – Firm age

The distribution of the firm age of respondents is summarised based on the forced-choice item that provided the response options displayed in Figure 12.

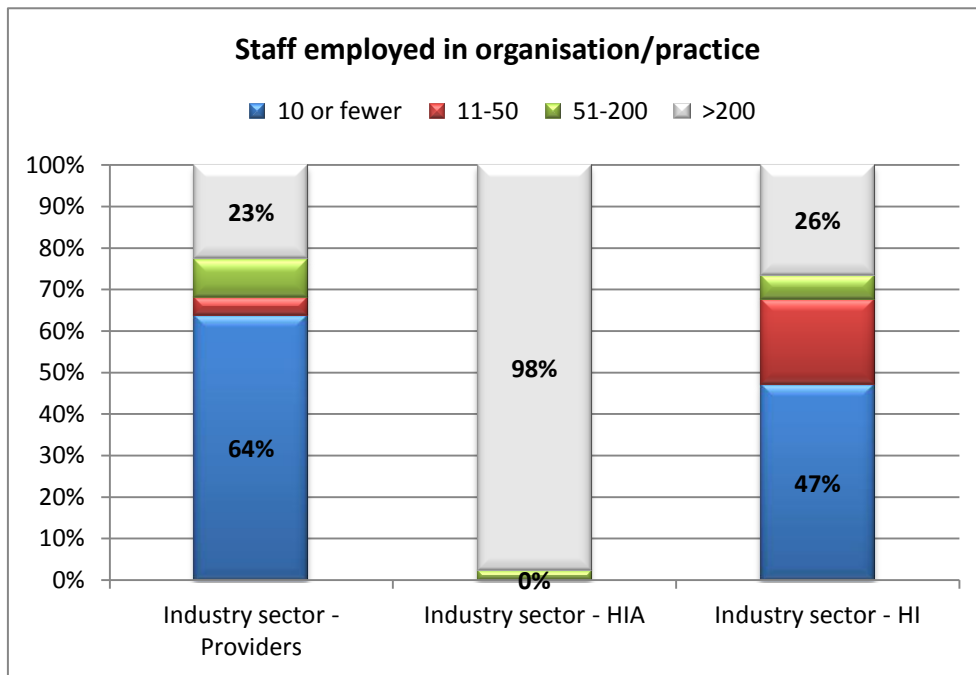


Figure 13 – Firm size (number of permanent employees)

The distribution of the firm size of respondents is summarised based on the forced-choice item that provided the response options displayed in Figure 13.

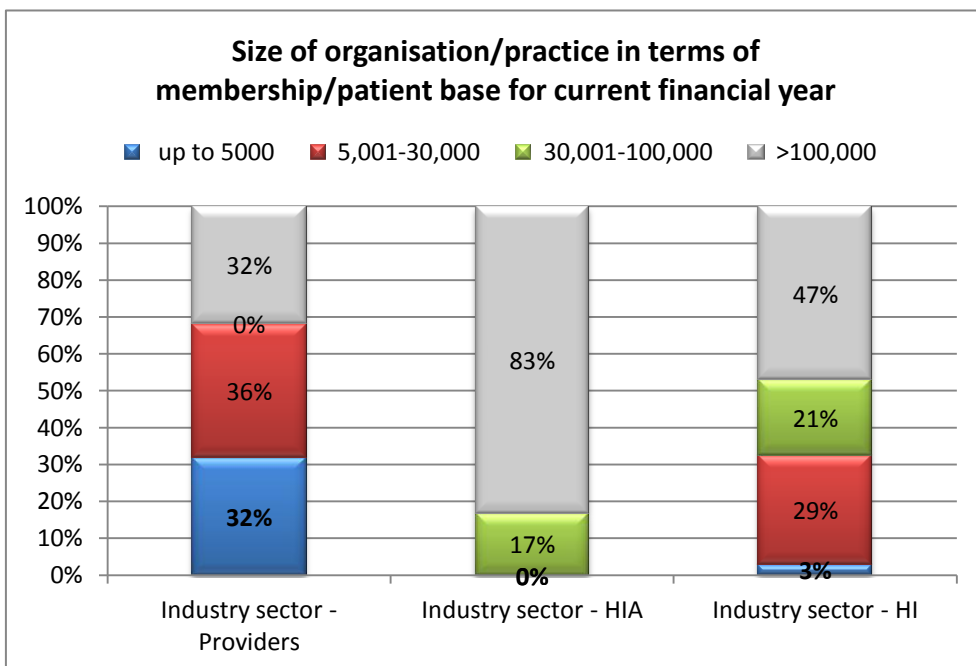


Figure 14 – Firm size (membership/patient base)

The distribution of the firm size of respondents is summarised based on the forced-choice item that provided the response options displayed in Figure 14.

4.2.2 Organisational Competitive Capability

Organisational competitive capability was used as an independent measure of the criterion variable in order to validate the model’s dependent variable, health insurer product innovation (organisational competitiveness). A description of the respondents’ perceptions of their organisations’ competitive capability is presented in table 4, while the validation analysis is presented as part of the measurement aspects of the model in section 4.4.7.

The Organisational competitive capability scale used a seven-point Likert-type scale for measurement. Thus the midpoint value of 4 is considered as a neutral point, with values higher than 4 indicative of respondents’ positive perceptions of the competitive capability of their organisation. The mean and median values of the score distribution (5.8 and 6.00 respectively), and the substantial negative skewness of the score distribution (Figure 15) show that the respondents’ perceptions generally tended to be positive or strongly positive, with few respondents regarding the competitive capability of their organisations as low.

Table 4: Descriptive statistics of Organisational Competitive Capability scores

	Mean	95% Confidence Interval for mean		Median	Std.Dev	Skewness	Kurtosis
Organisational competitive capability	5.80	5.62	5.98	6	1.09	-1.24	1.62

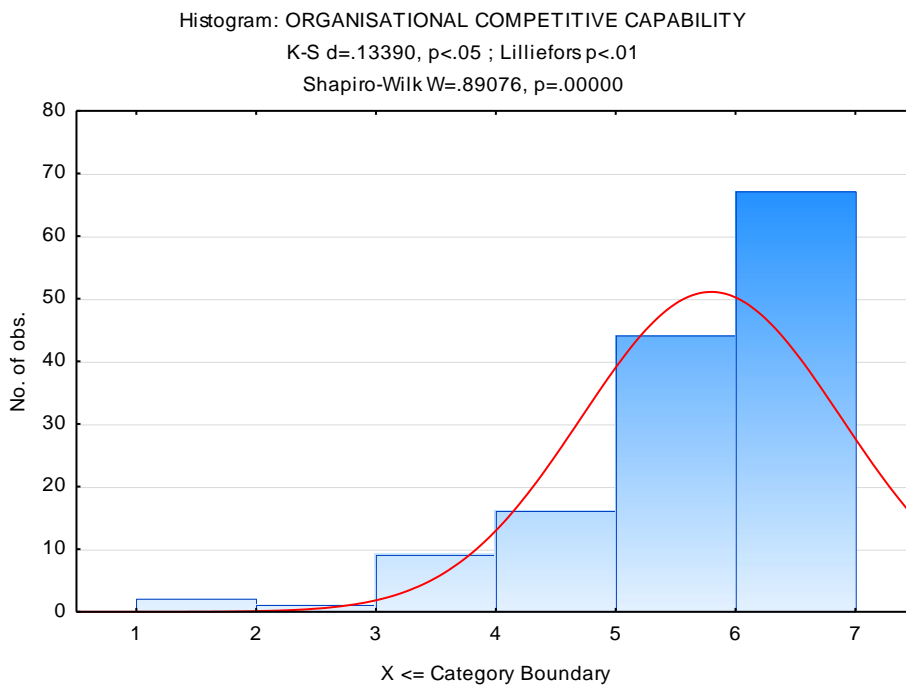


Figure 15: Distribution of Organisational Competitive Capability scores

4.2.3 Organisational Innovation input

Measures of innovation input were used as an additional independent measure used to validate the model's dependent variable, health insurer product innovation (organisational competitiveness), under the assumption that innovation input is a necessary condition for product innovation. Thus organisations with lower levels of innovation input would tend to score low on the dependent variable, health insurer product innovation, while organisations with high levels of innovation input would tend to score more highly. The three variables used to measure innovation input were: 1) whether the organisation has a research and development (R&D) budget; 2) whether the organisation's R&D budget encourages innovation; and 3) the number of R&D staff employed by the organisation's R&D department/division. These variables were considered jointly via multivariate cluster analysis that clustered the respondents as having high, medium or low innovation input respectively.

Table 5 shows the breakdown of the Health insurer (HI), Health insurer administrator (HIA) and Healthcare service provider subgroups in terms of the innovation input clusters (high, medium and low innovation input), showing that health insurer administrators had the highest level of innovation input. This table and the corresponding graphical representation

(Figure 16) show that the majority of HIAs (60% or 49 of 83 respondents) perceive a high level of innovation input, compared to 24% of HIs (8 of 33 respondents) and 18% of healthcare service providers (4 of 22 respondents). The validation analysis for the dependent variable is presented in 4.4.8.

Table 5– Industry sector by Innovation input

Subgroups	High Innovation Input	Medium Innovation Input	Low Innovation Input	Row Total
Health Insurers	8	9	16	33
Health Insurer Administrators	49	26	8	83
Healthcare service providers	4	3	15	22
Total	61	38	39	138

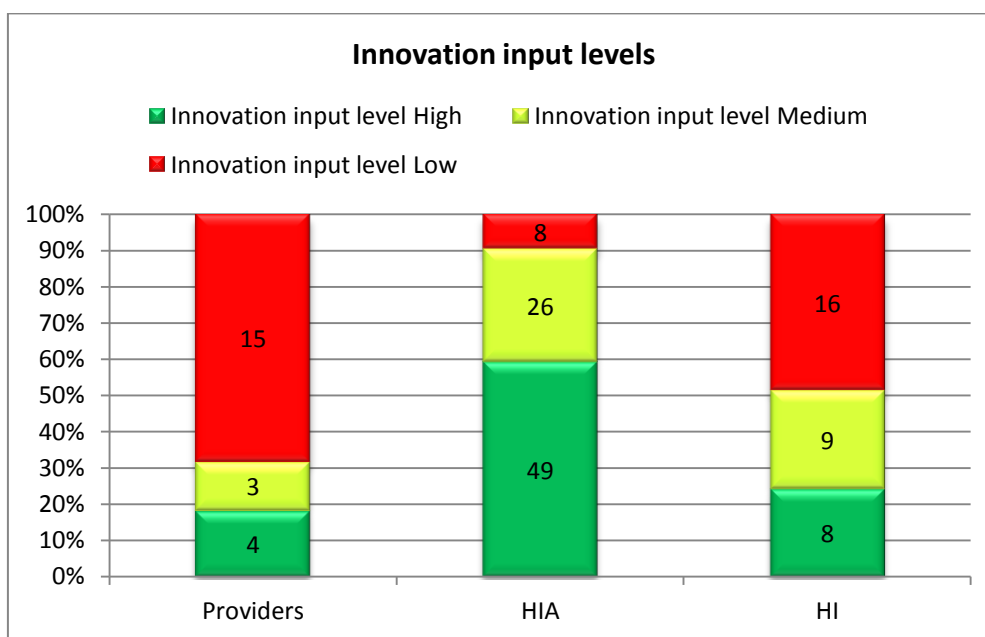


Figure 16: Distribution of Innovation input levels by industry sector

4.3 Reliability of the Theoretically Derived Scales of the Model

The reliabilities of scales were analysed using Cronbach’s alpha coefficient and the average inter-item correlations (Table 6). In presenting these results, a robot-type colour coding was applied whereby the highest values are shaded dark green, and the lowest

values are shaded deep red, with the intermediate shades of green through yellow to red applied to values ranked in between these extremes. Perusal of Table 6 shows that the Cronbach alpha values of the theoretically derived measures of the constructs of regulation, entrepreneurial orientation (EO) and external collaboration variables are all adequate and above the 0.7 cut-off level for internal consistency as indicated by Hair et al. (2010). The Cronbach alpha values for the theoretically derived measures of the innovation generation construct and for the theoretically derived measures of the organisational competitiveness construct (the dependent variable, health insurer product innovation), are around 0.9, indicative of high internal consistency reliability. However, the Cronbach alpha and average inter-item correlations values for innovation adoption, designed to measure a dimension of health insurer product innovation, are at 0.5 and 0.28 respectively, indicating the presence of unacceptably high error variance in the scores of this scale.

Table 6 – Reliabilities of theoretically derived scales

	Number of items	Cronbach alpha	Average inter-item correlation
Regulation			
Increased competition	3	0.786	0.56
HI& and access to private healthcare	6	0.899	0.61
Standards for coverage	4	0.779	0.48
Structure of healthcare delivery	3	0.913	0.79
EO			
Innovativeness	3	0.871	0.70
Proactiveness	3	0.892	0.74
Risk taking	3	0.919	0.80
External Collaboration			
Trustworthiness (T)	6	0.881	0.57
Role specification (RS)	5	0.695	0.33
Relationship initiation (RI)	2	0.871	0.77
Relationship restructure (RR)	5	0.896	0.64
Health insurer product innovation (DV)			
Innovation adoption	3	0.509	0.28
Innovation generation	7	0.907	0.59
Organisational competitiveness	3	0.921	0.81

4.4 Validity of the scales

The validity of the theoretically derived scales of the model was investigated using exploratory factor analysis (EFA) to see whether there was evidence of empirically derived combination of items that differed from theoretical expectation. If so, the empirically derived scales were retained and CFA was applied to both the original theoretical scales as well as the new empirical scales and tested for model fit for each construct. The criterion-related validity of the scales of the dependent variable was also considered.

The assumption of factor analysis that sufficient correlations exist among the variables of the analysis was tested using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) and Bartlett's Test of Sphericity before proceeding with the exploratory factor analysis. It should be noted that in all factor analyses, the factor extraction method used was principal component analysis and the factor rotation method used was varimax.

4.4.1 The Entrepreneurial Orientation (EO) Construct

4.4.1.1 EFA Results

The data matrix of the nine **EO** variables showed sufficient correlations to proceed with the application of factor analysis as the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was high at 0.9 and Bartlett's test of sphericity was significant ($p < 0.001$) (Table 7).

Table 7 - Tests of assumptions of factor analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		
		.926
Bartlett's Test of Sphericity		
	Approx. Chi-Square	1135.324
	df	36
	Sig.	.000

In all EFA summary results, factor loadings higher than 0.70 are marked.

Table 8 – Factor loadings for EO items

	Factor - 1
Top management emphasis on tried & true products	-0.846
During the past 3 years, new products or services launched/marketed	-0.873
Changes to products/services been minor or dramatic during the past 3 years	-0.776
Responds to actions	-0.844
New product introduction	-0.878
Postures	-0.846
Appetite	-0.801
Behaviour	-0.860
Aggressive attitude	-0.889
Expl.Var	6.450
Prp.Totl	0.717

The EFA analysis results in Table 8 indicate that all the scales of the three EO constructs or latent variables of innovativeness, proactiveness and risk taking have loaded as one factor for measuring EO. However, in view of the strength of the three dimensional model of EO in the theoretical literature, the CFA has been applied to the three factor model and thus provides estimates for all three latent variables.

4.4.1.2 CFA Results

Figure 17 graphically presents the standard CFA analysis model for EO, depicting the parameter estimates. Throughout the presentation of the CFA results, a robot-type colour coding style has been applied to the parameters for the items expected to load on the same factor, from green shadings used for the highest values to red for the lowest.

The convention used in reporting the CFA results (StatSoft Inc. 2011), is that the construct or latent variable expected to be reflected by an item appears in rounded brackets in the first column, and the truncated wording of that item appears in square brackets on the same line. In the case of good model fit, high parameter estimates would be expected, together with low standard errors and significance ($p < 0.001$).

Table 9 – CFA Model estimates for EO

Model Estimates (Correlations EO)

Variables	Parameter - Estimate	Standard - Error	T - Statistic	Prob. - Level
(Innovativeness)-1->[Top mana]	0.819	0.032	25.5	0.000
(Innovativeness)-2->[During t]	0.884	0.024	36.8	0.000
(Innovativeness)-3->[Changes]	0.791	0.036	22.1	0.000
(Proactiveness)-4->[Actions]	0.878	0.024	37.1	0.000
(Proactiveness)-5->[Product]	0.913	0.019	47.1	0.000
(Proactiveness)-6->[Postures]	0.800	0.034	23.4	0.000
(Risk taking)-7->[Appetite]	0.823	0.031	26.7	0.000
(Risk taking)-8->[Behaviou]	0.913	0.019	47.5	0.000
(Risk taking)-9->[Aggressi]	0.928	0.018	53	0.000

The CFA results, using the theoretically derived scales for EO indicate that there is a strong relationship between EO as an observed variable and its underlying latent constructs. The factor loadings for all three latent variables in Table 9 are in the range of ± 0.8 to ± 0.93 . This is high and practically significant and is an indication that the factors account for more than 70% of the variance of the variables.

The standard CFA analysis model with parameter estimates is presented in Figure 17.

There is supportive evidence of the construct validity of EO.

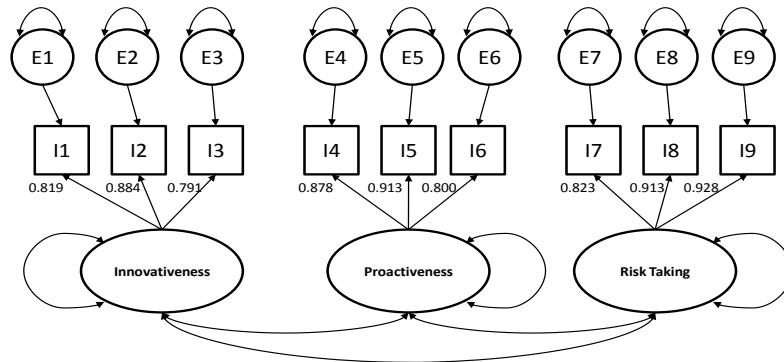


Figure 17 – Standard CFA analysis model for EO, Source: (Own source)

4.4.2 The External Collaboration Construct

4.4.2.1 EFA results

The data matrix of the 18 External Collaboration variables showed sufficient correlations to proceed with the application of factor analysis as the sampling adequacy KMO Measure was high at 0.8 and Bartlett’s test of sphericity was significant ($p < 0.001$) (Table 10).

Table 10 - Tests of assumptions of factor analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.831
	Approx. Chi-Square	1346.533
Bartlett's Test of Sphericity	df	153
	Sig.	.000

Table 11 – Factor loadings for External Collaboration items

Factor Loadings (Marked loadings are >.700000)

Variables	Factor - 1	Factor - 2	Factor - 3	Factor - 4
Trustworthiness (Top management are credible individuals)	0.699	0.159	0.138	0.131
Trustworthiness (Product expertise)	0.757	0.043	0.241	0.256
Trustworthiness (Count on top management to do what they say)	0.804	0.099	0.166	0.220
Trustworthiness (Positive attitudes)	0.760	0.011	0.127	0.263
Trustworthiness (Good working relationship)	0.758	0.150	-0.110	0.110
Trustworthiness (Interactions)	0.753	0.143	0.035	0.147
Role specification (negotiate)	0.443	0.089	0.124	0.608
Role specification (mutually dependent)	0.241	0.275	0.599	0.083
Role specification (will work with each other)	0.333	0.087	0.242	0.564
Role specification (quality patient care mutual dependency)	0.129	0.154	0.873	-0.037
Role specification (product innovation mutual dependency)	0.016	0.059	0.757	0.206
Relationship initiation (Spend sufficient time)	0.177	-0.022	0.053	0.886
Relationship initiation (Show sufficient interest)	0.232	-0.014	0.000	0.860
Relationship restructure (Assist in providing health care information)	0.159	0.795	0.168	0.033
Relationship restructure (Reward for results)	0.192	0.803	0.136	-0.164
Relationship restructure (Simplified billing practices)	0.032	0.805	0.122	0.100
Relationship restructure (Reduce administrative complexity)	0.022	0.874	0.061	0.072
Relationship restructure (New investments in technology)	0.146	0.854	0.052	0.038
Expl.Var	3.979	3.617	1.974	2.542
Prp.Totl	0.221	0.201	0.110	0.141

The EFA results presented in Table 11 show that two items: ‘**quality patient care mutual dependency**’, and ‘**product innovation mutual dependency**’ load highly on a different factor from the other items purported to measure role specification (RS). These items were moved accordingly, and the resultant scale was termed the empirically derived scale.

4.4.2.2 CFA results

CFA was applied to both the theoretically and empirically derived scales of external collaboration, and their parameter values and model fits were compared in order to decide on the measurement scales that would ultimately be used in the regression analyses to test the model of the research.

Table 12 - CFA Model estimates using theory and data outputs for External Collaboration

Model Estimates (Theory): External Collaboration					Model Estimates (Data): External Collaboration				
Variables	Parameter - Estimate	Standard Error	T-Statistic	Prob. - Level	Variables	Parameter - Estimate	Standard Error	T-Statistic	Prob. - Level
(Trustworthiness)-1->[Top mana]	0.680	0.051	13.29	0.000	(Trustworthiness)-1->[Top mana]	0.683	0.051	13.395	0.000
(Trustworthiness)-2->[Product]	0.820	0.034	23.974	0.000	(Trustworthiness)-2->[Product]	0.823	0.034	24.156	0.000
(Trustworthiness)-3->[Count on]	0.858	0.03	28.936	0.000	(Trustworthiness)-3->[Count on]	0.862	0.029	29.416	0.000
(Trustworthiness)-4->[Positive]	0.769	0.041	18.923	0.000	(Trustworthiness)-4->[Positive]	0.762	0.042	18.311	0.000
(Trustworthiness)-5->[Good wor]	0.652	0.054	12	0.000	(Trustworthiness)-5->[Good wor]	0.650	0.055	11.908	0.000
(Trustworthiness)-6->[Interact]	0.688	0.05	13.648	0.000	(Trustworthiness)-6->[Interact]	0.684	0.051	13.456	0.000
(RS)-7->[negotiat]	0.739	0.054	13.66	0.000	(RS)-7->[mutually]	0.558	0.075	7.481	0.000
(RS)-8->[mutually]	0.485	0.076	6.383	0.000	(RS)-8->[quality]	0.877	0.069	12.789	0.000
(RS)-9->[will wor]	0.666	0.06	11.065	0.000	(RS)-9->[product]	0.604	0.072	8.336	0.000
(RS)-10->[quality]	0.374	0.084	4.478	0.000	(RI)-10->[negotiat]	0.647	0.057	11.36	0.000
(RS)-11->[product]	0.353	0.085	4.158	0.000	(RI)-11->[will wor]	0.564	0.065	8.643	0.000
(RI)-12->[Spend su]	0.878	0.044	19.964	0.000	(RI)-12->[Spend su]	0.851	0.037	23.317	0.000
(RI)-13->[Show suf]	0.875	0.044	19.845	0.000	(RI)-13->[Show suf]	0.857	0.036	23.746	0.000
(RR)-14->[Assist i]	0.805	0.036	22.121	0.000	(RR)-14->[Assist i]	0.806	0.036	22.297	0.000
(RR)-15->[Reward f]	0.806	0.036	22.281	0.000	(RR)-15->[Reward f]	0.810	0.036	22.705	0.000
(RR)-16->[Simplifi]	0.726	0.046	15.743	0.000	(RR)-16->[Simplifi]	0.723	0.046	15.589	0.000
(RR)-17->[Reduce a]	0.802	0.037	21.825	0.000	(RR)-17->[Reduce a]	0.802	0.037	21.794	0.000
(RR)-18->[New inve]	0.850	0.031	27.538	0.000	(RR)-18->[New inve]	0.847	0.031	27.165	0.000

The CFA results using the empirically derived scales in Table 12 for external collaboration, indicated that there is a moderate to strong relationship between external collaboration as an observed variable and its underlying latent constructs, trustworthiness (T), role specification (RS), relationship initiation (RI) and relationship restructure (RR). Using the empirically derived scales for the CFA estimates, the factor loadings for trustworthiness are in the range of ± 0.65 to ± 0.86 , which are considered to be practically significant. The factor loadings for role specification are in the range of ± 0.56 to 0.88 , which likewise are considered to be practically significant. The factor loadings for relationship initiation are also considered to be practically significant and are in the range of ± 0.56 to ± 0.86 , and the factor loadings for relationship restructure are in the range of ± 0.7 to ± 0.85 , indicating practical significance.

Using both the theoretically and the empirically derived scales, the CFA has confirmed that two items (items 10 & 11 as per Figure 18) that were expected to measure the latent variable role specification, fit better measuring the latent variable, relationship initiation (RI). In both cases, the factor loadings using the empirically derived scales have slightly reduced when these items were moved to the latent variable, relationship initiation. The EFA analysis as presented in Table 11 also shows these two items loading on different factors.

The decision was thus made to use the empirically derived scales rather than the theoretically derived scales to determine the measurement items of the external collaboration construct. The construct validity of the empirically derived external collaboration variable was therefore supported.

Figure 18 graphically presents the standard CFA analysis model for the empirically validated structure for External Collaboration.

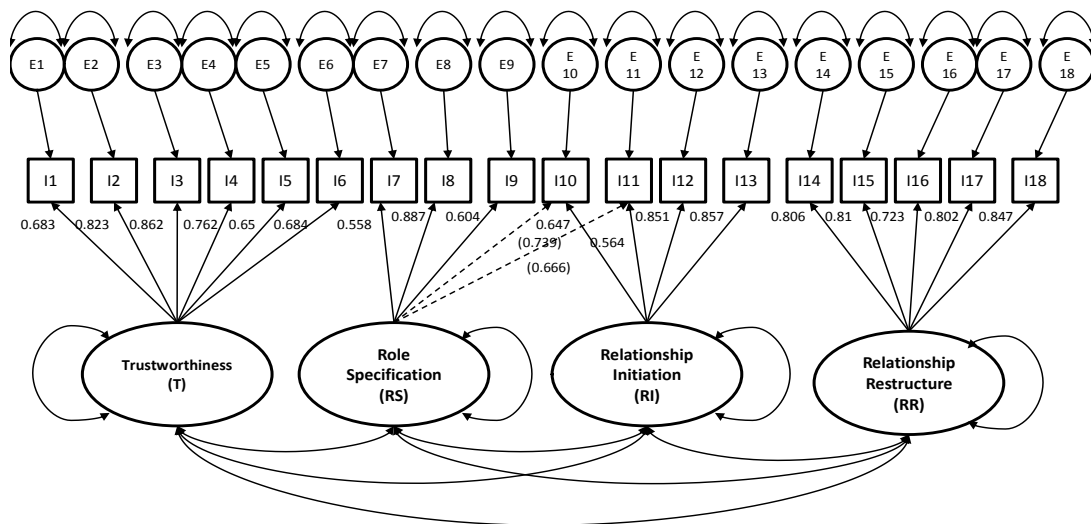


Figure 18 - Standard CFA analysis model for External Collaboration, Source: (Own source)

4.4.3 The Regulation Construct (Moderator Variable)

According to the researcher’s model, regulation was expected to serve as a moderating variable, whereby the relationship between EO and health insurer product innovation, and the relationship between external collaboration and health insurer product innovation, were expected to be weaker when the presence of strategic regulatory factors are low and stronger when they are high. Furthermore, according to theory, the regulation construct was expected to reflect four underlying regulation factors (Increased competition, Health insurance and access, standards for coverage, structure of healthcare delivery).

However, although the model acknowledged the multidimensionality of the regulation construct, it posited the moderation effect of the overall measure of generation rather than positing differential moderation effects for each measure of regulation. Thus from the outset of the research, the researcher’s intention was to obtain a single measure of regulation.

This approach of using a single measure of regulation as the moderator was endorsed when the researcher found strong empirical evidence of high internal consistency reliability among the 16 items of the overall regulation scale (Cronbach alpha = 0.93 with the average inter-item correlation =0.48). It must be emphasised that high internal consistency does not imply unidimensionality of the scale but rather that the items correlate with the total scale score, albeit that they reflect different constructs.

4.4.3.1 EFA results

The data matrix of the 16 Regulation variables showed sufficient correlations to proceed with the application of factor analysis as the sampling adequacy measure of The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was high at 0.9 and Bartlett’s test of sphericity was significant ($p < 0.001$) (Table 13).

Table 13 - Tests of assumptions of factor analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.915
	Approx. Chi-Square	1466.359
Bartlett's Test of Sphericity	df	120
	Sig.	.000

Although the EFA results in Table 14 indicate that the items loaded on three factors rather than the four expected factors, it was decided to pursue the four theoretically derived scales for the CFA analysis based on strong literature support for the regulation constructs.

Table 14 - Factor loadings for Regulation items

Variables	Factor 1	Factor 2	Factor 3
Increased competition (Negotiate prices independently)	0.004	0.206	0.807
Increased competition (Encourages reduced prices)	0.427	0.124	0.758
Increased competition (Contracting efficient providers)	0.374	0.168	0.729
Increased HI&A (Mandatory private coverage)	0.572	0.334	0.262
Incentives for low-income	0.707	0.291	0.263
Design and register health plans	0.838	0.046	0.271
Creates risk pools	0.654	0.406	0.144
Incentivise employer groups	0.789	0.258	0.205
Incentivise individual members	0.816	0.128	0.155
Review of minimum coverage standards	0.509	0.387	0.221
Incentivise healthy living practices	0.734	0.462	0.165
Incentives for compliance	0.333	0.697	0.120
Penalties for noncompliance	-0.003	0.771	0.065
Quality information	0.381	0.670	0.340
Quality information dissemination	0.364	0.634	0.443
Incentives for IT	0.489	0.556	0.301
Expl.Var	4.992	3.135	2.551
Prp.Totl	0.312	0.196	0.159

4.4.3.2 CFA results

The CFA results using the theoretically derived scales for regulation indicated there is a moderately strong to strong relationship between regulation as an observed variable and its underlying latent constructs; increased competition; health insurance and access; standards for coverage and structure of healthcare delivery. The factor loadings for the increased competition variable are considered to be practically significant and are in the range of ± 0.56 to ± 0.88 . The factor loadings for health insurance and access are in the range of ± 0.67 to ± 0.85 , indicating practical significance. The factor loadings for standards for coverage are in the range of ± 0.42 to ± 0.93 indicating practical significance for all items except item 13. Item 13, however, still meets the minimum level for interpretation of structure. The factor loadings for structure of healthcare delivery are in the range of ± 0.8 to ± 0.93 , indicating practical significance.

Table 15 - CFA Model estimates for Regulation

Model Estimates (Correlations Regulation)				
Variable	Parameter - Estimate	Standard Error	T - Statistic	Prob. - Level
(Competition)-1->[Negotiat]	0.56	0.066	8.5120	0.0000
(Competition)-2->[Encourag]	0.88	0.036	24.4080	0.0000
(Competition)-3->[Contract]	0.813	0.041	19.8600	0.0000
(HIA)-4->[Mandator]	0.673	0.051	13.2960	0.0000
(HIA)-5->[Low inco]	0.779	0.038	20.6480	0.0000
(HIA)-6->[Design a]	0.798	0.035	22.6670	0.0000
(HIA)-7->[Creates]	0.728	0.044	16.4420	0.0000
(HIA)-8->[To Incen]	0.849	0.029	29.7840	0.0000
(HIA)-9->[Incentiv]	0.795	0.036	22.2540	0.0000
(SFC)-10->[Review o]	0.683	0.05	13.5600	0.0000
(SFC)-11->[Healthy]	0.927	0.025	37.6710	0.0000
(SFC)-12->[Use Ince]	0.665	0.052	12.6880	0.0000
(SFC)-13->[Penaltie]	0.417	0.075	5.5540	0.0000
(SHD)-14->[Quality]	0.919	0.02	46.2680	0.0000
(SHD)-15->[Dissemin]	0.931	0.019	49.9750	0.0000
(SHD)-16->[IT Incen]	0.803	0.034	23.6110	0.0000

Figure 19 graphically presents the standard CFA analysis model for Regulation.

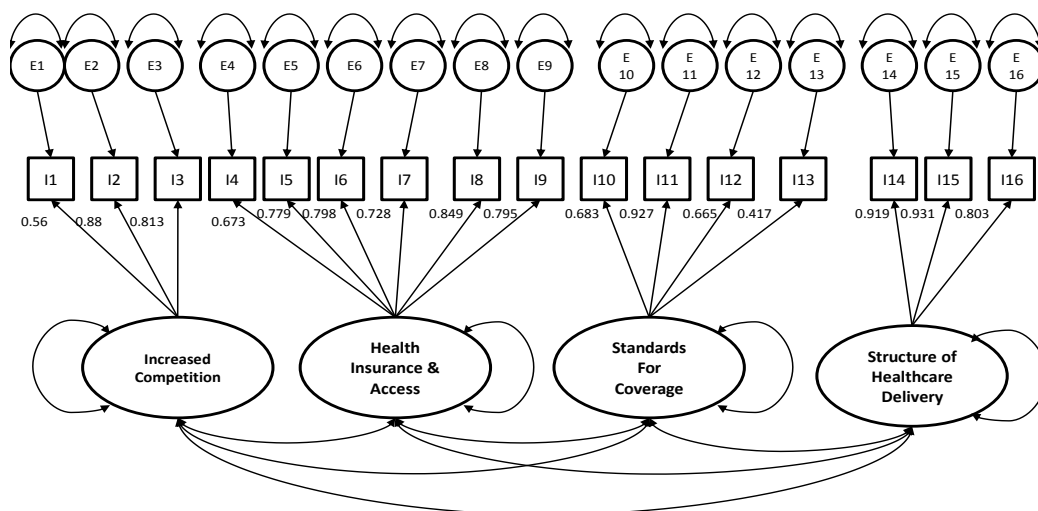


Figure 19 – Standard CFA analysis model for Regulation, Source: (Own source)

4.4.4 The construct of Health Insurer Product Innovation (Dependent Variable) - Innovation Output

4.4.4.1 EFA results

The data matrix of the 13 **Health Insurer Product Innovation** variables showed sufficient correlations to proceed with the application of factor analysis as the sampling adequacy measure of The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was high at 0.9 and Bartlett's test of sphericity was significant ($p < 0.001$) (Table 16).

Table 16 - Tests of assumptions of factor analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.904
	Approx. Chi-Square	1324.488
Bartlett's Test of Sphericity	df	78
	Sig.	.000

Table 17 – Factor loadings for health insurer product innovation items

Variables	Factor 1	Factor 2	Factor 3
Adopting existing products	-0.1811	0.8817	0.0817
Adapting existing products	0.3950	0.7849	0.0270
Generated new hi for organisation	0.6458	0.0923	0.3657
Generated new hi for the industry	0.4532	-0.1745	0.6444
Generated new hi for the world	0.2701	-0.0420	0.8012
Generated new hi for opportunities in new markets	0.5321	0.2295	0.6441
Generated new hi adopted by competitors	0.5080	-0.0047	0.6605
Generated new hi opportunities in uncertain local markets	0.4337	0.1961	0.7123
Generated new hi opportunities in uncertain international markets	0.1927	0.1346	0.8289
Generated new hi making your organisation competitive	0.8392	0.0980	0.2718
Improved financial results through new hi product innovation	0.8690	-0.0651	0.1941
Membership/client growth through new hi product innovation	0.7714	0.0449	0.4711
Improved position in industry through new hi product innovation	0.8341	0.0702	0.3899
Expl.Var	4.4007	1.5643	3.7295
Prp.Totl	0.3385	0.1203	0.2869

The EFA results presented in Table 17 show that one of the items expected to measure innovation adoption (Generated new HI for organisation) and one of the items expected to measure innovation generation (Generated new HI making your organisation competitive) loaded highly on different factors.

4.4.4.2 CFA Results

CFA was applied to both the theoretically and empirically derived scales of health insurer product innovation (innovation output) (table 18). Their respective parameter values and model fits were compared in order to decide on the composition of the measurement scales of the dependent variable to be used in the regression analyses designed to test the researcher's model.

The factor loadings for the latent variables of health insurer product innovation using theoretically derived scales and empirically derived scales are depicted in the standard CFA analysis model for health insurer product innovation (Figure 20).

Table 18 - CFA Model estimates using theoretically derived scales and empirically derived scales for health insurer product innovation

Model Estimates (Theory): Health Insurer Product Innovation (DV)					Model Estimates (Data): Health Insurer Product Innovation (DV)				
Variables	Parameter Estimate	Standard Error	T-Statistic	Prob. - Level	Variables	Parameter Estimate	Standard Error	T-Statistic	Prob. - Level
(Adoption)-1->[1 Adopti]	0.059	0.094	0.625	0.532	(Adoption)-1->[1 Adopti]	0.457	0.067	6.781	0.000
(Adoption)-2->[2 Adapti]	0.426	0.08	5.33	0.000	(Adoption)-2->[2 Adapti]	1.000	0		
(Adoption)-3->[3 Genera]	0.789	0.079	9.95	0.000	(Generation)-3->[3 Genera]	0.665	0.051	13.073	0.000
(Generation)-4->[4 Genera]	0.706	0.046	15.3	0.000	(Generation)-4->[4 Genera]	0.722	0.044	16.294	0.000
(Generation)-5->[5 Genera]	0.716	0.045	16	0.000	(Generation)-5->[5 Genera]	0.735	0.043	17.178	0.000
(Generation)-6->[8 Genera]	0.862	0.026	33.3	0.000	(Generation)-6->[6 Genera]	0.801	0.034	23.262	0.000
(Generation)-7->[6 Genera]	0.808	0.033	24.3	0.000	(Generation)-7->[8 Genera]	0.851	0.028	30.714	0.000
(Generation)-8->[9 Genera]	0.828	0.031	27.1	0.000	(Generation)-8->[9 Genera]	0.840	0.029	28.667	0.000
(Generation)-9->[10 Gener]	0.714	0.045	15.9	0.000	(Generation)-9->[10 Gener]	0.727	0.044	16.652	0.000
(Generation)-10->[7 Genera]	0.762	0.039	19.4	0.000	(Org Competitiveness)-10->[7 Genera]	0.801	0.033	24.572	0.000
(Org Competitiveness)-11->[11 Impro]	0.792	0.034	23.4	0.000	(Org Competitiveness)-11->[11 Impro]	0.801	0.033	24.648	0.000
(Org Competitiveness)-12->[12 Membe]	0.935	0.015	62.9	0.000	(Org Competitiveness)-12->[12 Membe]	0.929	0.015	62.071	0.000
(Org Competitiveness)-13->[13 Impro]	0.961	0.012	78.7	0.000	(Org Competitiveness)-13->[13 Impro]	0.960	0.012	82.966	0.000

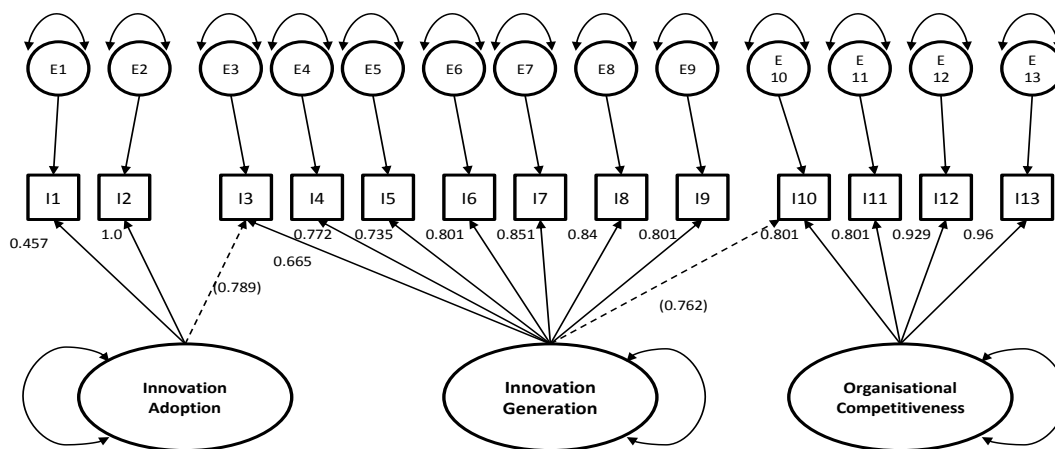


Figure 20 – Standard CFA analysis model for Health Insurer Product Innovation, Source: (Own source)

The CFA results using the empirically derived scales for health insurer product innovation indicated there is a moderate to strong relationship between health insurer product

innovation as an observed variable and two of its underlying latent variables, innovation generation and organisational competitiveness. The relationship between health insurer product innovation output and its latent variable innovation adoption is weaker and the factor loading for item 1 meets only the minimum level of interpretation of structure. The factor loadings for innovation generation are in the range of ± 0.67 to ± 0.85 , indicating practical significance. The factor loadings for organisational competitiveness are in the range of ± 0.8 to ± 0.96 , indicating practical significance.

Using both the theoretically derived scales and the empirically derived scales, the CFA has confirmed that two items (item 3 measuring innovation adoption and item 10 measuring innovation generation as per Figure 20) fits better measuring different latent variables. Item 3 fits better with the latent variable innovation generation and item 10 fits better with the latent variable organisational competitiveness. In both cases, the factor loadings have improved using the empirically derived scales. Accordingly, the decision was made to use the empirically derived scales rather than the theoretically derived scales to determine the items measuring the latent variables of the observed variable, health insurer product innovation.

Furthermore, the decision was made to exclude the variable, innovation adoption, as a variable measuring the dependent variable, health insurer product innovation, owing to its poor reliability and validity as a measurement construct.

Thus there is empirical evidence to support the construct validity for health insurer product innovation if innovation generation and organisational competitiveness only are included as measurement constructs.

4.4.5 Second order Confirmatory Factor Analysis (CFA)

Second order CFA was performed at the subscale level (rather than at the item level as used in the other CFAs) to confirm whether the subscales of the four constructs of the model did indeed reflect these constructs as expected from the theory. Table 19 presents the model estimates for the second order analysis, highlighting the second order constructs (red colour indicator).

Table 19 – Model estimates second order CFA

Model Estimates (Correlations Second order)

Variables	Parameter - Estimate	Standard - Error	T - Statistic	Prob. - Level
(EO)-1->[INNOVATI]	0.934	0.018	53.2	0.000
(EO)-2->[PROACTIV]	0.913	0.02	46.4	0.000
(EO)-3->[RISK TAK]	0.839	0.029	29.1	0.000
(External Collaborati)-4->[TRUSTWOR]	0.703	0.061	11.5	0.000
(External Collaborati)-5->[ROLE SPE]	0.722	0.06	12.1	0.000
(External Collaborati)-6->[RELATIONSHIP]	0.653	0.065	10.1	0.000
(External Collaborati)-7->[RESTRUCT]	0.325	0.088	3.69	0.000
(Regulation)-8->[ENCOURAG]	0.701	0.05	14	0.000
(Regulation)-9->[HIA IMPR]	0.858	0.033	26.3	0.000
(Regulation)-10->[IMPROVE]	0.789	0.04	19.7	0.000
(Regulation)-11->[HD STRUC]	0.816	0.037	22.1	0.000
(HI Product Innovatio)-12->[Adoption]	0.179	0.087	2.06	0.040
(HI Product Innovatio)-13->[Generati]	0.880	0.03	29.8	0.000
(HI Product Innovatio)-14->[Organisa]	0.890	0.029	30.9	0.000

Consistent with the CFA results conducted at item level, the CFA analysis failed to confirm the validity of the relationship restructure (RR) subscale expected to reflect External Collaboration, and the innovation adoption subscale designed to reflect Health Insurer Product Innovation.

These results lend further evidence to the revision of the theoretically derived scales and subscales of the model to strengthen the psychometric quality of the predictor variables of the research model.

4.4.6 Summary of CFA analyses

Table 20 – Model fit results

		Regulation	External collaboration theoretical	External collaboration empirical	EO	HI Product innovation theoretical	HI Product innovation empirical	2nd order
Basic Summary Statistics								
Discrepancy Function		1.475	2.304	2.108	0.556	1.59	1.253	0.886
ML Chi-Square		199.187	311.036	284.553	76.152	219.485	172.912	121.408
Degrees of Freedom		98	129	129	24	62	62	71
p-value		0	0	0	0	0	0	0
RMS Standardized Residual		0.059	0.082	0.085	0.046	0.079	0.076	0.076
Noncentrality Fit Indices								
Population Noncentrality Parameter	Point estimate	0.813	1.289	1.162	0.406	1.206	0.795	0.368
	90% CI	0.53 -1.15	0.94 -1.69	0.83 -1.55	0.24 -0.63	0.9 -1.57	0.54 -1.11	0.17 -0.62
Steiger-Lind RMSEA Index	Point estimate	0.091	0.1	0.095	0.13	0.139	0.113	0.072
	90% CI	0.07 -0.11	0.09 -0.11	0.08 -0.11	0.1 -0.16	0.12 -0.16	0.09 -0.13	0.05 -0.09
Population Gamma Index	Point estimate	0.908	0.875	0.886	0.917	0.844	0.891	0.95
	90% CI	0.87 -0.94	0.84 -0.91	0.85 -0.92	0.88 -0.95	0.81 -0.88	0.86 -0.92	0.92 -0.98
Adjusted Population Gamma Index	Point estimate	0.872	0.834	0.848	0.845	0.77	0.84	0.926
	90% CI	0.83 -0.91	0.79 -0.87	0.81 -0.89	0.77 -0.91	0.72 -0.82	0.79 -0.89	0.88 -0.96
Single Sample Fit Indices								
Joreskog GFI		0.839	0.8	0.81	0.886	0.797	0.839	0.888
Joreskog AGFI		0.776	0.735	0.748	0.786	0.702	0.764	0.834

Table 20 presents the model fit results. Model fit has been determined through key model indices presented in table 20. Model fit is also presented using theoretically derived scales and empirically derived scales for the external collaboration variable (independent variable) and the health insurer product innovation variable (dependent variable). Second order results have also been used as a method to improve model fit.

The chi-square statistic values for all the variables and the second order analysis are relatively large and the corresponding p-values are small. This is an indication that the proposed theory does not fit reality well. Using the empirically derived scales, the chi-square values for external collaboration and health insurer product innovation have reduced (slight improvement in the point estimates).

The Steiger-Lind RMSEA index values for all the variables and second order are all greater than 0.05, indicating weak model fit. Using the empirically derived scales instead of the

theoretically derived scales for variables external collaboration and health insurer product innovation indicated a slight improvement (values reduced) in the point estimates.

The population gamma index values for all the variables and second order are all smaller than 0.95, indicating weak model fit. Using the empirically derived scales instead of the theoretically derived scales for variables external collaboration and health insurer product innovation indicated a slight improvement (values increased) in the point estimates.

The adjusted population gamma index values for all the variables and second order are all smaller than 0.95, indicating weak model fit. Using the empirically derived scales instead of the theoretically derived scales for variables external collaboration and health insurer product innovation indicated a slight improvement (values increased) in the point estimates.

The Joreskog GFI index values for all the variables and second order are all smaller than 0.9 or 0.95, indicating weak model fit. Using the empirically derived scales instead of the theoretically derived scales for variables external collaboration and health insurer product innovation indicated a slight improvement (values increased) in the values.

The Joreskog AGFI index values for all the variables and second order are all smaller than 0.95, indicating weak model fit. Using the empirically derived scales instead of the theoretically derived scales for variables external collaboration and health insurer product innovation indicated a slight improvement (values increased) in the values.

Assessing the standardised root mean residual (SRMR) values for all the variables and second order, indicated values smaller than 0.1 (values are within the guideline), indicating better model fit. Using the empirically derived scales instead of the theoretically derived scales for variables external collaboration and health insurer product innovation indicated a slight value improvement for health insurer product innovation only (value decreased).

The larger discrepancy function values for all the variables and second order indicate that the model does not fit the data well. Using the empirically derived scales instead of the theoretically derived scales for variables external collaboration and health insurer product innovation indicated a slight value improvement for both variables (values decreased).

The model fit analysis shows weak model fit, despite attempting to improve the values using the empirically derived scales instead of the theoretically derived scales.

4.4.7 Criterion related validity of Organisational Competitiveness

In view of the importance of establishing the construct validity of the dependent variable of the model, the researcher included additional variables that were expected to correlate significantly with the measures of the dependent variable. Significant and substantial relationships would be interpreted as evidence of criterion-related validity and further support the construct validity of the scale of the dependent variable.

The Organisational competitive capability scale mean was used for additional validation of health insurer product innovation output (dependent variable) The scatterplot (Figure 21) shows a moderately strong linear relationship ($r=0.63$, $p<0.001$) between the scales of Organisational Competitiveness vs. Organisational Competitive Capacity. As the scale of Organisational Competitive Capacity is considered in previous research to measure a similar construct to Organisational Competitiveness, a strong relationship between the measures was considered as evidence for the construct validity of the scale of Organisational Competitiveness.

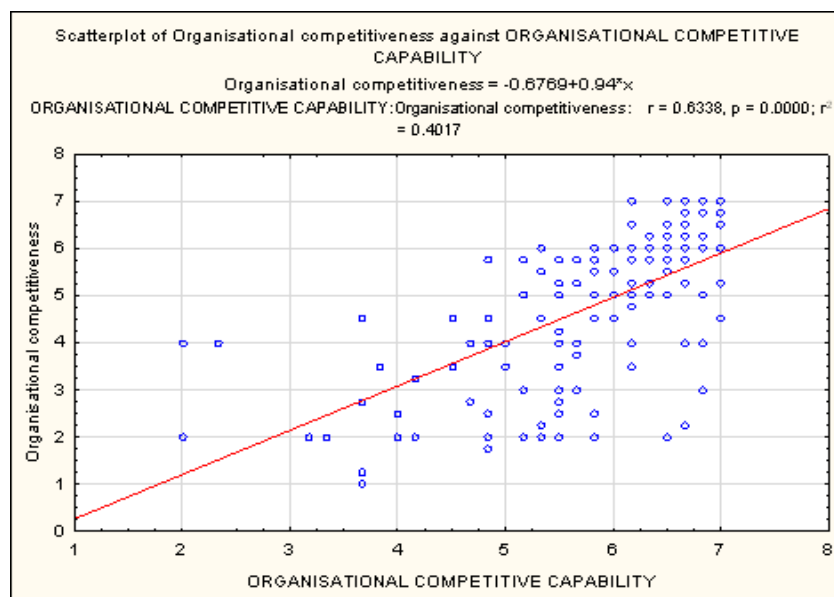


Figure 21 – Organisational competitiveness vs. Organisational competitive capacity

4.4.8 Additional Criterion related validity of Innovation Generation and Organisational Competitiveness

Based on the assumption that innovation input is a necessary condition for product innovation, the researcher expected to find that organisations with lower levels of innovation

input would tend to score relatively lower on the dependent variable measures, while organisations with higher levels of innovation input would tend to score more highly.

Using cluster analysis, respondents were categorised as having high, medium or low innovation input. This clustering variable was formed based on standardised measures of three independent measures of organisational innovation input: 1) whether the organisation has a research and development (R&D) budget; 2) whether the organisation's R&D budget encourages innovation; and 3) the number of R&D staff employed by the organisation's R&D department/division. The cluster variable means are depicted graphically in Figure 22.

This categorisation was then related to the two measures of the model's dependent variable - health insurer product innovation (innovation generation and organisational competitiveness),

One-way analysis of variance (ANOVA) showed that the clusters differed significantly on the three standardised clustering variables, as well as on innovation generation and organisational competitiveness (Table 21). Moreover, post hoc Scheffe tests used to identify significant pairwise mean differences on innovation generation and organisational competitiveness among the clusters, found that all pairwise cluster comparisons were significant (Appendix H). Furthermore, the direction and magnitude of the means for both Innovation generation and Organisational competitiveness were such that these means were highest in organisations with relatively high innovation input, followed by organisations with medium levels of innovation input and lowest for those organisations with low levels of innovation input. The significant results and direction of the clusters' mean measures of the dependent variable have thus fulfilled the expectations underlying the test for the criterion-related validity of the scales of the dependent variable and thus there is further support for the construct validity of health insurer product innovation.

Table 21 – 1-way ANOVA comparisons of clusters on clustering variables and dependent variable measures

	SS - Effect	df - Effect	MS - Effect	SS - Error	df - Error	MS - Error	F	p
R&D budget	118.70	2	59.35	17.13	135	0.13	467.63	0.0000
R&D budget encourages innovation	82.72	2	41.36	54.28	135	0.40	102.87	0.0000
Number of staff employed	99.37	2	49.68	37.35	135	0.28	179.58	0.0000
Innovation generation	107.97	2	53.99	198.10	135	1.47	36.79	0.0000
Organisational competitiveness	153.14	2	76.57	212.15	135	1.57	48.73	0.0000

Cluster means	Innovation input level		
	High (n=61)	Medium (n=38)	Low (n=398)
Innovation generation	5.12	3.85	3.05
Organisational competitiveness	5.85	4.28	3.40

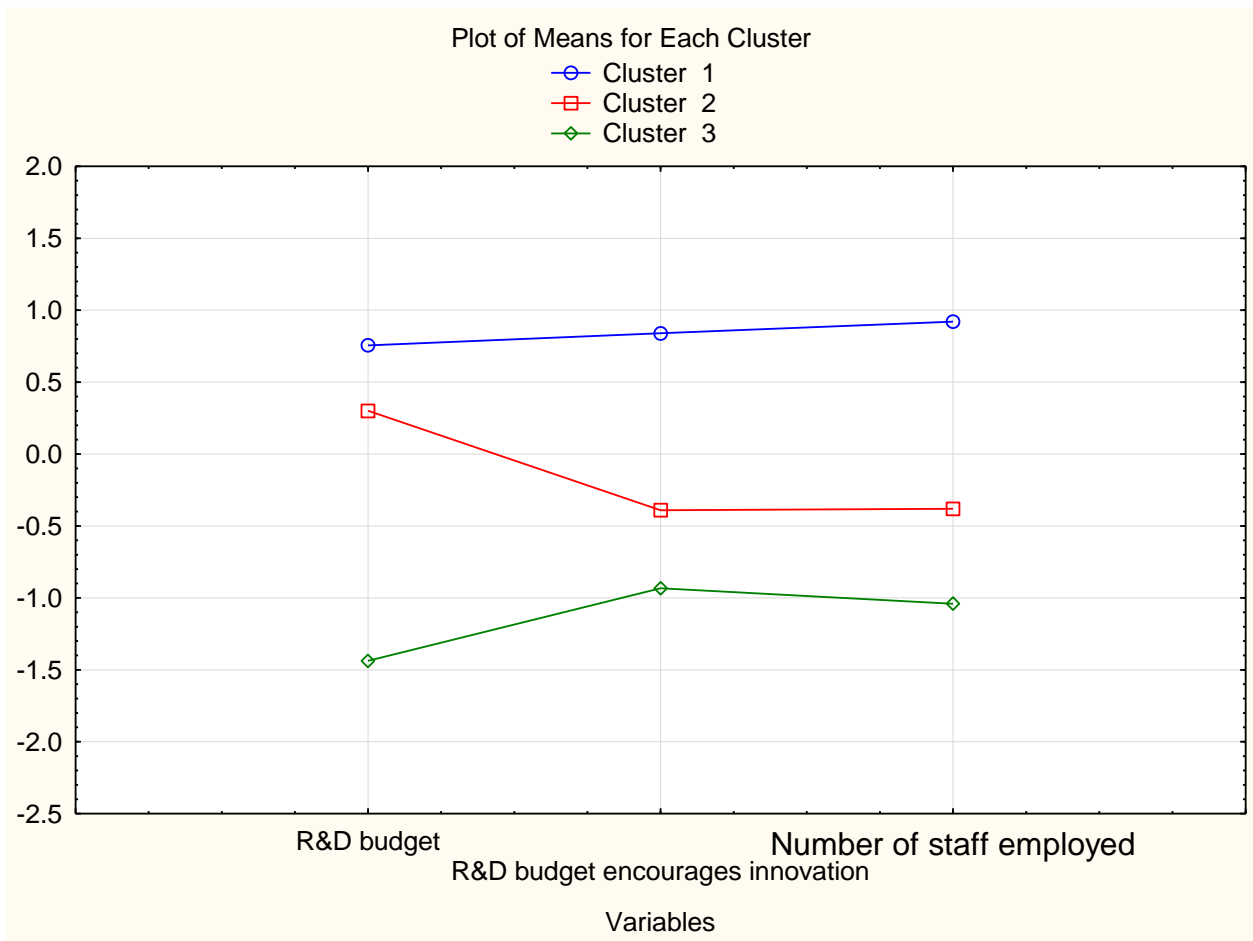


Figure 22 – Clusters based on innovation input variables

4.4.9 Reliabilities of empirically derived measures

Based on the previous results on reliability and validity, empirically derived scales were adopted for further analysis. The table of reliabilities (Table 6) presented for the theoretically based scales has thus been revised to include the reliabilities of the empirically based scales (Table 22). In this table the reliabilities of the empirically based scales are italicised.

Table 22 – Reliabilities of the empirically based scales

	Number of items	Cronbach alpha	Average inter-item correlation
REGULATION			
Increased Competition	3	0.786	0.56
HI & Access to private healthcare	6	0.899	0.61
Standards for coverage	4	0.779	0.48
Structure of healthcare delivery	3	0.913	0.79
EO			
Innovativeness	3	0.871	0.70
Proactiveness	3	0.892	0.74
Risk taking	3	0.919	0.80
EXTERNAL COLLABORATION			
Trustworthiness (T)	6	0.881	0.57
Role Specification (RS)	5	0.695	0.33
Relationship Initiation (RI)	2	0.871	0.77
Relationship Restructure (RR)	5	0.896	0.64
External Collaboration	18	0.879	0.28
<i>External Collaboration (T, RS, RI)*</i>	13	0.872	0.37
HEALTH INSURER PRODUCT INNOVATION			
Innovation adoption	3	0.509	0.28
<i>Innovation adoption*</i>	2	0.627	0.46
Innovation generation	7	0.907	0.59
<i>Innovation generation*</i>	6	0.905	0.62
Organisational Competitiveness	3	0.921	0.81
<i>Organisational Competitiveness*</i>	4	0.929	0.78

**italics=empirically derived scales*

Table 22 indicates that the reliability of innovation adoption, although improved using the empirically derived scale rather than the theoretical scale, is still unacceptably low – the Cronbach alpha value has increased from 0.51 to 0.63 and the average inter-item correlation has increased. Thus the construct of Innovation adoption was excluded from the model due to its poor reliability and validity results.

The Cronbach alpha value using the empirical result for innovation generation shows little change and the Cronbach alpha value for the new organisational competitiveness scale is similar. The empirically derived External Collaboration scale (comprising Trustworthiness

(T), Role Specification (RS) and Relationship Initiation (RI) items) reliability is good, with improved average inter-item correlation, using the empirically derived scale instead of the theoretically derived scale. The average inter-item correlation for innovation generation using the empirically derived scale has improved slightly, although the inter-item correlation for organisational competitiveness has decreased slightly, using the empirically derived scale.

Having established empirical support for reasonably satisfactory psychometric properties (scale reliability and validity reliability) for the scale and subscale measures, the next step in the analysis was to investigate the score distributions and test them for normality.

4.4.10 Descriptive statistics of measurement scales

Table 23 presents the descriptive statistics of central tendency, variability, skewness and kurtosis of the theoretically and empirically derived scales to be used in testing the researcher’s model. The table also includes these statistics for the anticipated moderating variables of the model - EO*Regulation, External Collaboration (T, RS, RI)*Regulation and External Collaboration (RR)*Regulation. These moderating variables were derived by calculating the product of the respective pairs of variables, for example calculating the product of each respondent’s EO and Regulation scores to form the EO*Regulation variable. This table also presents the skew index (SI) and kurtosis index (KI) which aided the assessment of the normality of the distributions of the theoretically and empirically derived variables.

Table 23 – Descriptive statistics of theoretically and empirically derived scales

	Mean	95% CI for mean		Median	Std. Dev.	Skewness	Kurtosis KI	SI	
EO	4.49	4.25	4.74	4.56	1.44	-0.23	-0.93	-0.07	-3.21
External Collaboration (T,RS,RI)	4.65	4.49	4.81	4.64	0.95	-0.19	-0.01	-0.22	-3.01
External Collaboration (RR)	5.83	5.63	6.02	6.00	1.19	-1.47	2.22	-0.88	-1.89
Regulation	3.37	3.15	3.58	3.06	1.28	0.55	-0.55	0.26	-3.21
EO*Regulation	15.48	14.06	16.90	13.54	8.48	0.92	0.56	0.00	-3.00
Ext Coll (T,RS,RI)*Regulation	16.29	14.84	17.74	13.26	8.67	0.96	0.19	0.00	-3.00
Ext Coll (RR)*Regulation	19.83	18.34	21.31	18.23	8.87	0.53	-0.34	0.00	-3.00
Adoption	4.76	4.55	4.98	5.00	1.29	-0.80	0.30	-0.37	-2.89
Generation	4.19	3.94	4.44	4.29	1.49	-0.10	-0.86	-0.03	-3.17
Organisational competitiveness	4.74	4.46	5.01	5.00	1.63	-0.50	-0.80	-0.11	-3.11

4.4.10.1 Distributions

Graphic presentations of the data distributions for all the measurement scales are presented in Figures 23 to 32, and include three tests of Normality - the Kolmogorov-Smirnov (K-S), Lilliefors and Shapiro-Wilk tests. In view of the large sample size, these tests have high power and so small deviations from normality may be significant. Thus these test results were considered in conjunction with the descriptive statistics in Table 19 and together informed the researcher's decision on whether or not the score distributions should be transformed to normality.

However, as none of the values of the skew indices came close to the guideline value of ± 3 for extreme skewness, the researcher considered only the scale of External Collaboration (RR) as possibly eligible for transformation as it had the highest SI value (albeit not very high). The cube transformation applied to the External Collaboration (RR) scores yielded a slight improvement towards normality (skewness = 0.44, SI = 0.00), although the tests of significance showed that the transformed distribution was still significantly different from normality.

Note that the distribution of innovation adoption scores had already been dropped from the model, and the distributions of Organisational competitive capability and the Innovation input variables were not considered in this analysis as they were not variables entered in the regression models.

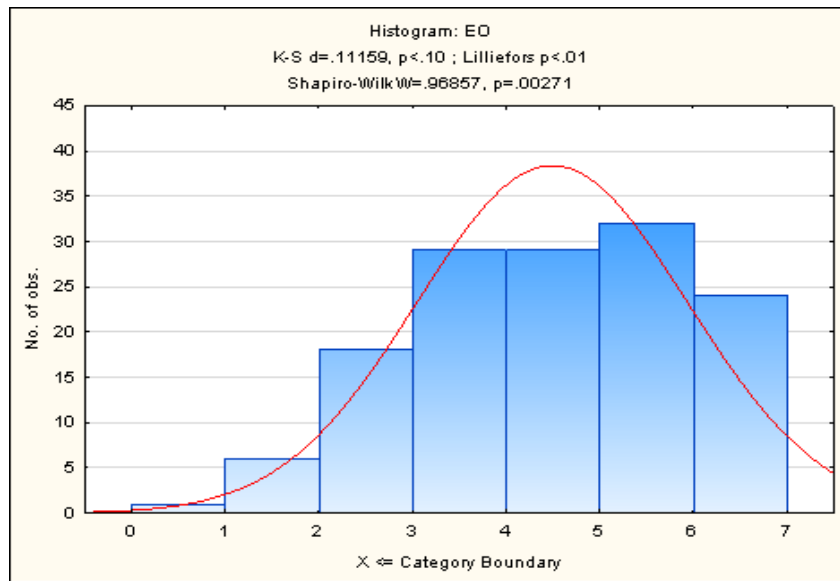


Figure 23 - Distribution of EO scores

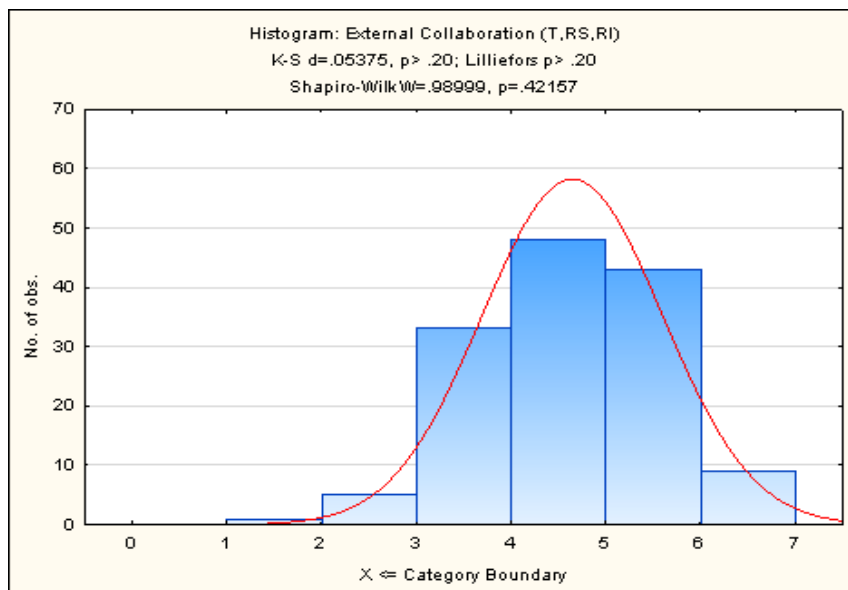


Figure 24- Distribution of External Collaboration scores (T,RS,RI)

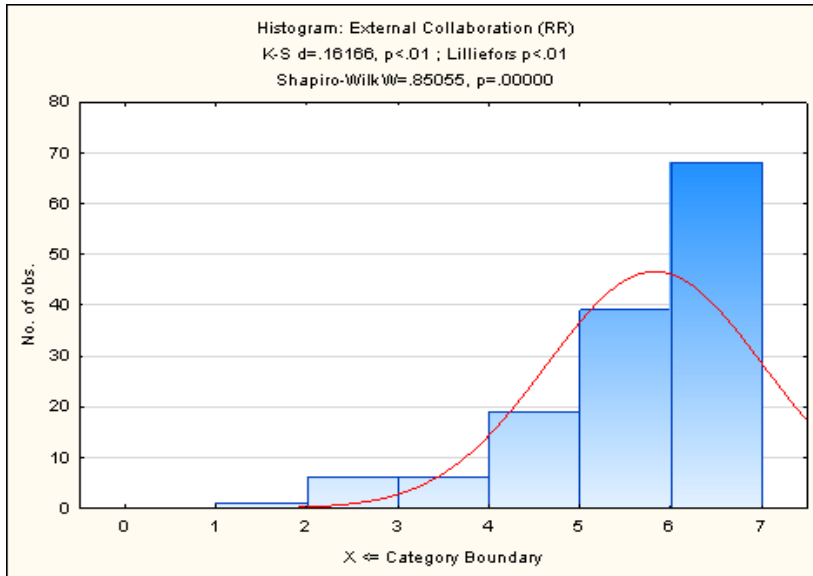


Figure 25 – Distribution of External Collaboration (Relationship Restructure) scores before transformation

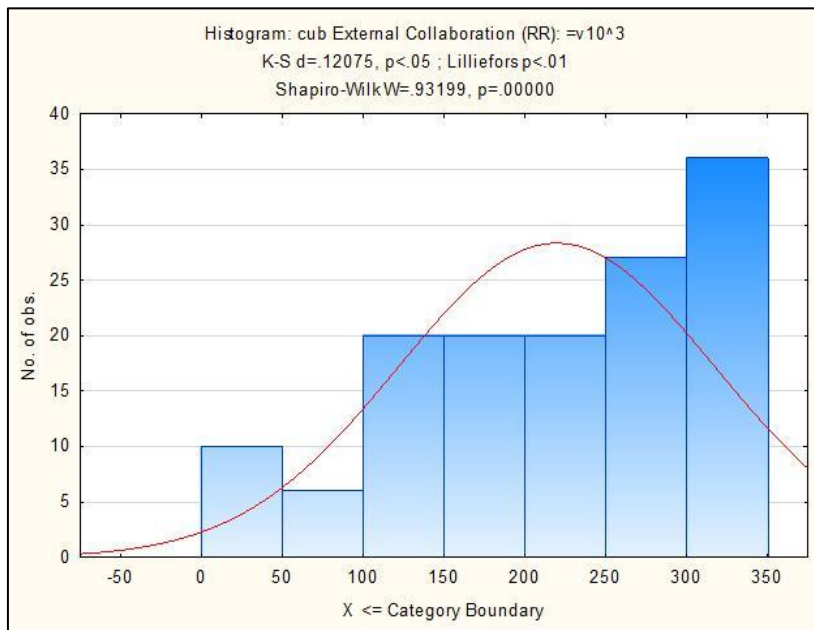


Figure 26 – Distribution of External Collaboration (Relationship Restructure) scores after transformation (cube transformation)

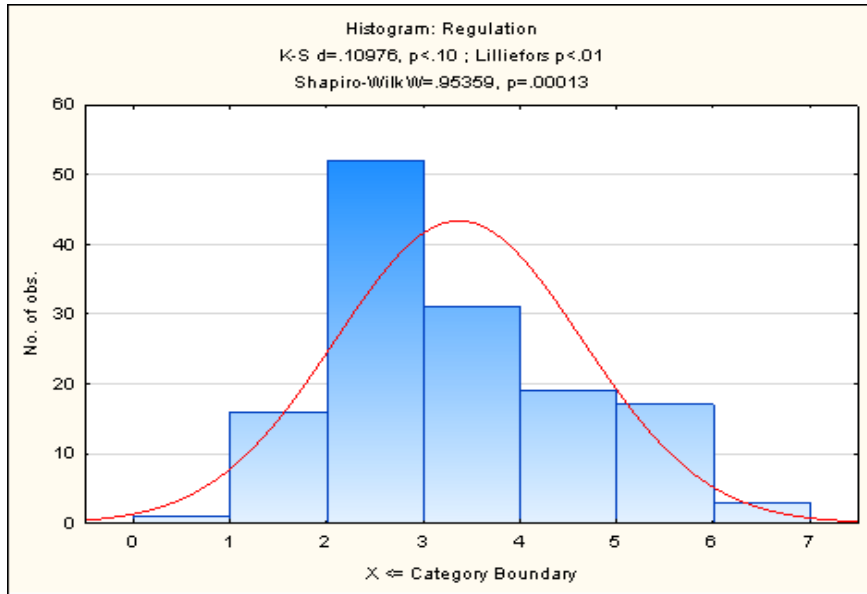


Figure 27 - Distribution of Regulation scores

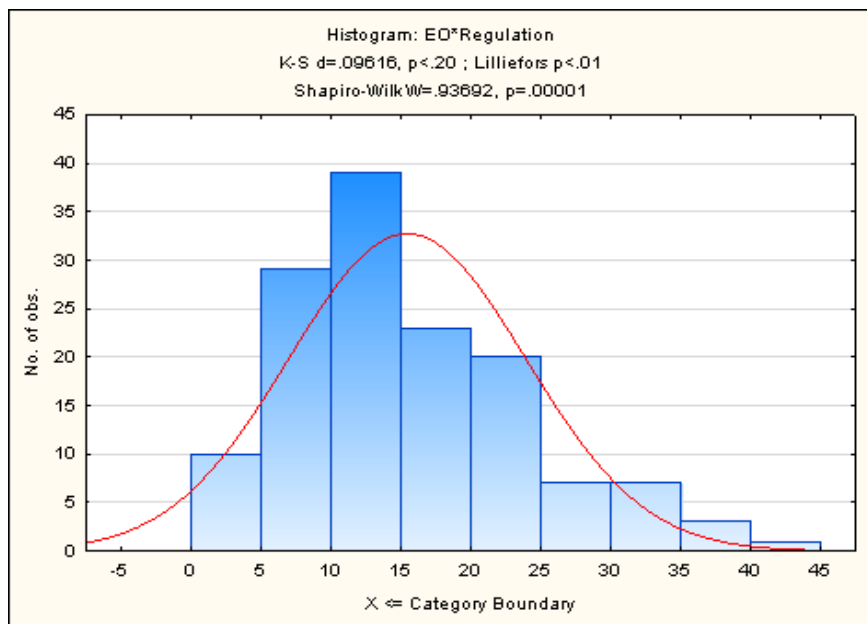


Figure 28 - Distribution of EO*Regulation (interaction term) scores

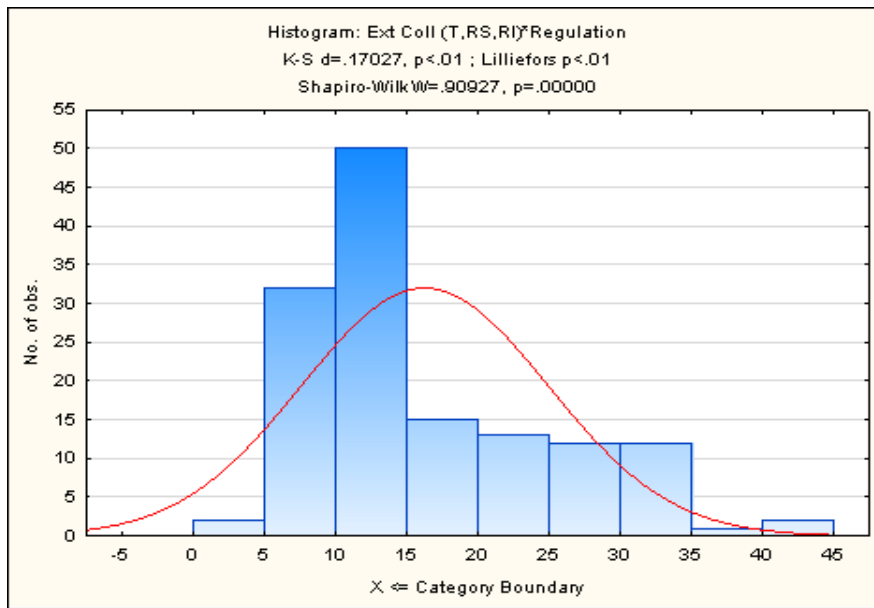


Figure 29 - Distribution of External Collaboration (T,RS,RI)*Regulation scores

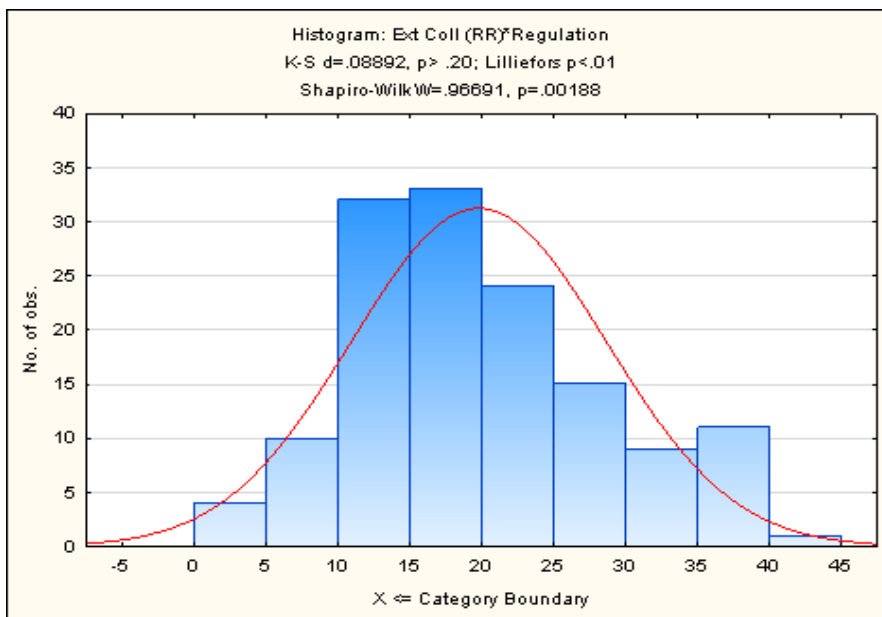


Figure 30 – Distribution of External Collaboration (RR)*Regulation scores

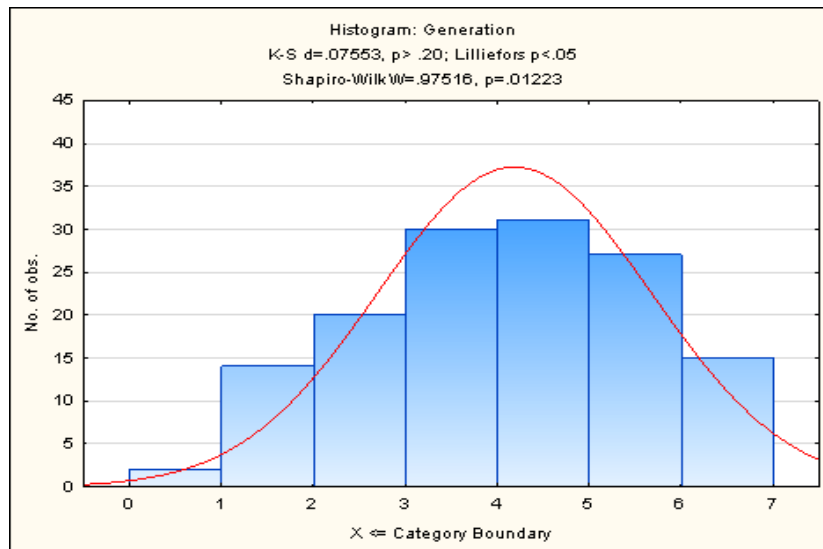


Figure 31 - Distribution of Innovation Generation scores

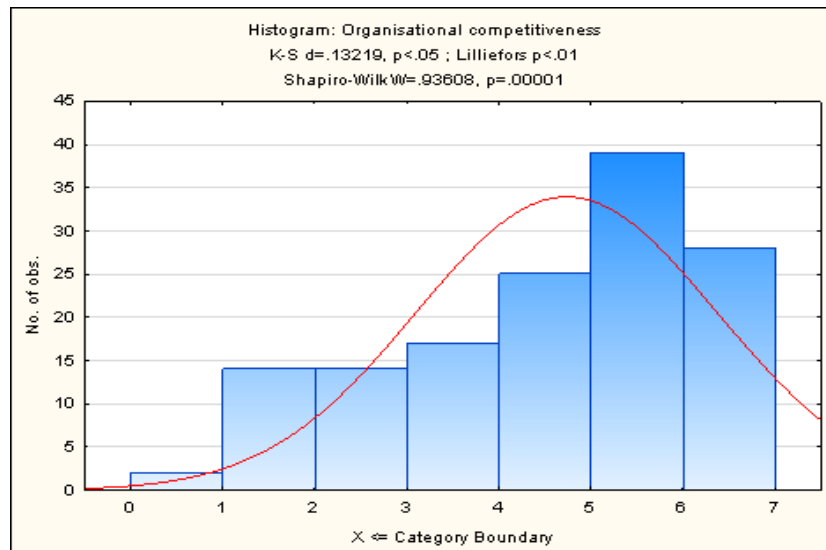


Figure 32 – Distribution of organisational competitiveness scores

4.4.11 Comparison of the subgroups on the measurement variables

Rather than performing a one-way ANOVA to compare all the subgroups simultaneously on the means of the measurement variables, the researcher used the more powerful parametric t-test to compare the HIs and HIAs first, as the combination of HIs and HIAs into a single group was meaningful in the context of the study. Based on the generally non-significant differences between the means of these groups, a second t-test was then used to compare the providers to the combined group of HIs and HIAs.

Appendix I presents these t-test results and includes the effect size (d) for evaluating the strength of the differences between the mean scores of health insurers and health insurer administrators. Table 24 presents the results for the comparison of means of the variables between health insurers/health insure administrators (groups were consolidated based on the results in Appendix I) and healthcare service providers, Figure 33 is a graphical presentation of the difference in scale means for the consolidated health insurers/health insurer administrators, versus the healthcare service providers.

Table 24 – Comparison of scale means of HIs (n=34) and HIAs (n=83)

	Mean - HI HIA	Mean - Providers	t-value	p	Std.Dev. - HI HIA	Std.Dev. - Providers	Effect size d
EO	4.60	3.93	2.020	*	1.46	1.26	0.37
External Collaboration (T,RS,RI)	4.80	3.84	4.639	***	0.85	1.06	0.14
External Collaboration (RR)	5.92	5.33	2.171	*	1.07	1.62	0.05
cub External Collaboration (RR)	225.87	187.61	1.696		92.65	118.66	0.11
Regulation	3.40	3.20	0.687		1.35	0.81	0.35
Adoption	4.95	3.75	4.244	***	1.19	1.38	0.10
Generation	4.39	3.11	3.884	***	1.45	1.23	0.80
Organisational competitiveness	4.99	3.38	4.558	***	1.50	1.70	0.30

***=p<0.001, **=p<0.01, *=p<0.05

According to the tables, HIs and HIAs differ significantly on Innovation generation only ($t(115) = -3.936, p<0.01$), with a higher mean for HIAs than for HIs. None of the other mean differences are significant. However, when comparing the combined HI and HIA groups to the providers, the means of several of the scales to be used for testing the researcher's model are significantly different. A more detailed graphical comparison is provided in the bar graph (Figure 33) of the group means on all the scales and subscales. Moreover, as a seven-point scale has been used for all these scales, the heights of the bars can be used to compare the means across all scales. The pattern shown in the graph is that the means for the providers tend to be lower than those for the HIs and HIAs, except in the case of regulation where the mean scores are relatively low for all groups (see Appendix I for the complete table of t-test results).

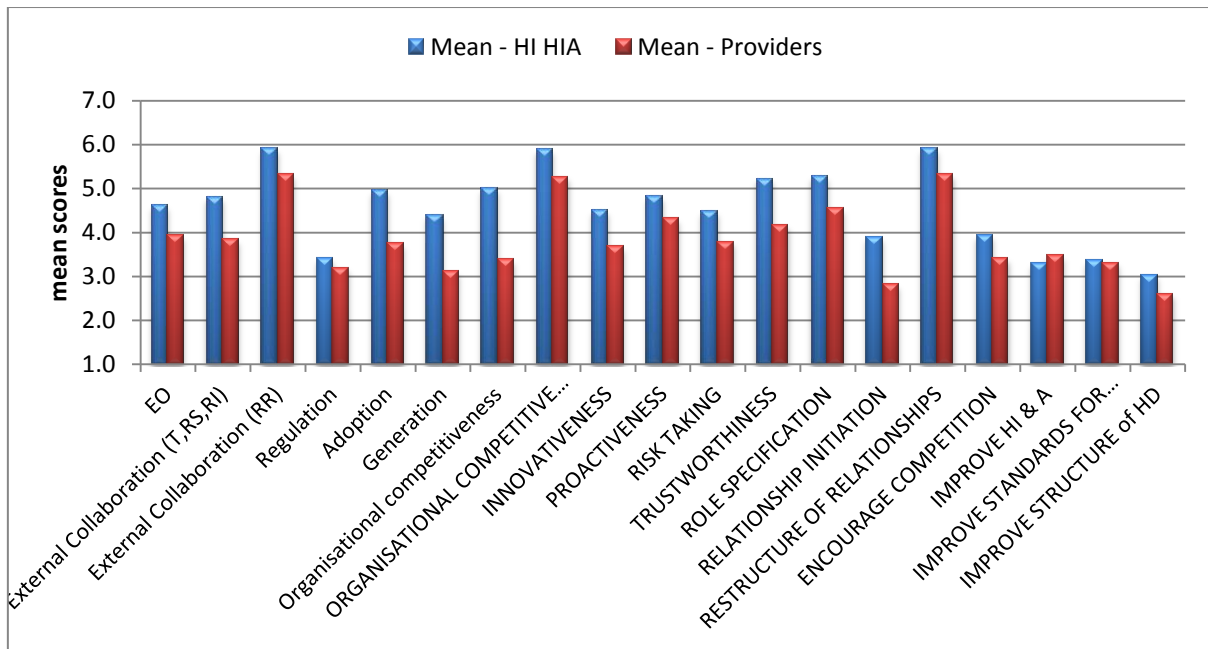


Figure 33 – Comparison of means between health insurers/health insurer administrators and healthcare service providers

4.4.11.1 Intercorrelations among variables

Tables 21-24 present the intercorrelations among the variables for the three subgroups. Table 21 presents the inter correlations among the variables for the consolidated group. Tables 22-24 present the inter correlation differences among variables between the three subgroups – inter correlation differences are highlighted. As previously described, there were three main sectors of the healthcare industry represented by the respondents. Although the researcher’s model was developed for the combined groups of respondents, the possibility existed that the relationships specified in the model could differ by sector, and this may change the correlation among the variables when the total group was considered. Thus the intercorrelations of the variables were compared across the subgroups to assess whether the structure of the relationships were the same for health insurers (HIs), health insurer administrators (HIAs) and healthcare service providers.

The Pearson product moment correlation matrices for the pairwise correlations among the scales to be used in testing the researcher’s model are presented in Table 25 for the total group, table 26, for the HIs, table 27 for the HIAs and table 28 for the healthcare service providers respectively.

The respective correlations of each of the subgroups were then compared pairwise using a normal curve test through the Fisher z transformation of the correlation coefficient (Cohen, 1992). Tables 29, 30 and 31 present the results of the comparisons of the correlations for HIs versus HIAs, HIs versus healthcare service providers, and HIAs versus healthcare service providers.

No significant differences were found between the correlation matrices of the HIs and HIAs, and only one of the pairwise correlations differed significantly between the correlation matrices of the HIs and the service Providers. However, there were several differences between the correlation matrices of the HIAs and the service Providers. Based on this observation, it was decided to conduct the regression analyses that involved these variable pairs on the respondents first including, and then excluding, the service provider group so that any distortion of the regression results due to the effect of the service providers would be apparent.

Table 25 - Intercorrelation matrices of measurement variables for model testing of total group and industry sectors variables

Total group (n=139)	EO	External Collaboration (T,RS,RI)	External Collaboration (RR)	Regulation	Generation	Organisational competitiveness
EO	1.000	0.163	0.190	0.189	0.691	0.668
External Collaboration (T,RS,RI)	0.163	1.000	0.209	0.523	0.260	0.322
External Collaboration (RR)	0.190	0.209	1.000	0.136	0.226	0.332
Regulation	0.189	0.523	0.136	1.000	0.281	0.213
Generation	0.691	0.260	0.226	0.281	1.000	0.781
Organisational competitiveness	0.668	0.322	0.332	0.213	0.781	1.000

Table 26 – Health insurers (HIs)

HI's (n=34)	EO	External Collaboration (T,RS,RI)	External Collaboration (RR)	Regulation	Generation	Organisational competitiveness
EO	1.000	0.136	0.075	0.220	0.691	0.671
External Collaboration (T,RS,RI)	0.136	1.000	0.436	0.453	0.147	0.122
External Collaboration (RR)	0.075	0.436	1.000	0.223	0.216	0.265
Regulation	0.220	0.453	0.223	1.000	0.383	0.250
Generation	0.691	0.147	0.216	0.383	1.000	0.743
Organisational competitiveness	0.671	0.122	0.265	0.250	0.743	1.000

Table 27 – Health insurer administrators - HIAs

HIA's (n=83)	EO	External Collaboration (T,RS,RI)	External Collaboration (RR)	Regulation	Generation	Organisational competitiveness
EO	1.000	0.132	0.304	0.177	0.776	0.745
External Collaboration (T,RS,RI)	0.132	1.000	0.086	0.655	0.181	0.191
External Collaboration (RR)	0.304	0.086	1.000	0.079	0.288	0.444
Regulation	0.177	0.655	0.079	1.000	0.164	0.183
Generation	0.776	0.181	0.288	0.164	1.000	0.767
Organisational competitiveness	0.745	0.191	0.444	0.183	0.767	1.000

Table 28 – Healthcare service providers

Providers (n=22)	EO	External Collaboration (T,RS,RI)	External Collaboration (RR)	Regulation	Generation	Organisational competitiveness
EO	1.000	-0.051	-0.084	-0.123	0.157	0.291
External Collaboration (T,RS,RI)	-0.051	1.000	0.079	0.254	0.081	0.367
External Collaboration (RR)	-0.084	0.079	1.000	0.213	-0.047	0.009
Regulation	-0.123	0.254	0.213	1.000	0.318	0.117
Generation	0.157	0.081	-0.047	0.318	1.000	0.785
Organisational competitiveness	0.291	0.367	0.009	0.117	0.785	1.000

Table 29 - Significance levels (p) of comparisons of correlations between subgroups – HIAs vs. HIs

	HIA vs HI					
p values	EO HIA vs HI	Ext Collab (T,RS,RI) HIA vs HI	Ext Collab (RR) HIA vs HI	Regulation HIA vs HI	Generation HIA vs HI	Organisational competitiveness HIA vs HI
EO	-	-	-	-	-	-
External Collaboration (T,RS,RI)	-	-	-	-	-	-
External Collaboration (RR)	-	-	-	-	-	-
Regulation	-	-	-	-	-	-
Generation	-	-	-	-	-	-
Organisational competitiveness	-	-	-	-	-	-

Table 30 - Significance levels (p) of comparisons of correlations between subgroups – Providers vs. HIs

	Providers vs HI					
p values	EO Providers vs HI	Ext Collab (T,RS,RI) Providers vs HI	Ext Collab (RR) Providers vs HI	Regulation Providers vs HI	Generation Providers vs HI	Organisational competitiveness Providers vs HI
EO	-	-	-	-	0.0223	-
External Collaboration (T,RS,RI)	-	-	-	-	-	-
External Collaboration (RR)	-	-	-	-	-	-
Regulation	-	-	-	-	-	-
Generation	0.0223	-	-	-	-	-
Organisational competitiveness	-	-	-	-	-	-

Table 31 - Significance levels (p) of comparisons of correlations between subgroups – Providers vs. HIAs

	Providers vs HIA					
p values	EO Providers vs HIA	Ext Collab (T,RS,RI) Providers vs HIA	Ext Collab (RR) Providers vs HIA	Regulation Providers vs HIA	Generation Providers vs HIA	Organisational competitiveness Providers vs HIA
EO	-	-	-	-	0.0008	0.0095
External Collaboration (T,RS,RI)	-	-	-	0.0377	-	-
External Collaboration (RR)	-	-	-	-	-	-
Regulation	-	0.0377	-	-	-	-
Generation	0.0008	-	-	-	-	-
Organisational competitiveness	0.0095	-	-	-	-	-

4.5 Evaluation of the model structure via regression analysis

Multiple regression analysis results for the model are presented in this section.

At the outset of the research, the model conceptualised by the researcher comprised two hypotheses to be tested:

Original first hypothesis: The relationship between health insurer product innovation and EO is moderated by industry regulation.

Original second hypothesis: The relationship between health insurer product innovation and external collaboration is moderated by industry regulation.

However, these two hypotheses had to be expanded to accommodate the factorially complex nature of the constructs of product innovation and external collaboration.

The results presented on the construct validity of the measures of health insurer product innovation (4.4.4) confirmed the presence of two underlying dimensions – innovation generation and organisational competitiveness. The presence of two dimensions underlying the dependent variable effectively doubled the number of hypotheses to be tested. Similarly, the construct validity results on external collaboration (4.4.2) confirmed the presence of two underlying dimensions – external collaboration Trustworthiness (T), Role specification (RS) and Relationship initiation (RI), and external collaboration relationship restructure (RR), which had the effect of again doubling the number of hypotheses that involved external collaboration. Finally, additional hypotheses were included that involved all combinations of the variables so that there would be no misspecification of the regression model.

Accordingly, six sets of hypotheses were framed at three levels of analyses for evaluating the model:

The first level of analysis was to test the basic relationship between EO and health insurer product innovation (innovation generation and organisational competitiveness) and the relationship between external collaboration and health insurer product innovation (innovation generation and organisational competitiveness) (Hypotheses 1a-1b, 2a-2d);

The second level of analysis was to investigate whether these basic relationships are moderated by regulation (presence of strategic regulatory factors which encourage product innovation)(Hypotheses 3a-3b, 4a-4d);

The third level of analysis was to investigate possible misspecification of the model (Hypotheses 5a-5b, 6a-6d).

For ease of reference, these hypotheses are presented in Table 32.

Table 32 – Research hypotheses

Level of analysis	Hypothesis	DV	IV 1	IV 2	IV 3	IV 4	Moderating effect
Level 1	1a	Innovation generation	EO				
	1b	Org competitiveness	EO				
	2a	Innovation generation	EC (T,RS,RI)				
	2b	Org competitiveness	EC (T,RS,RI)				
	2c	Innovation generation	EC (RR)				
	2d	Org competitiveness	EC (RR)				
Level 2	3a	Innovation generation	EO	Regulation			EO*Regulation
	3b	Org competitiveness	EO	Regulation			EO*Regulation
	4a	Innovation generation	EC (T,RS,RI)	Regulation			EC (T,RS,RI)*Regulation
	4b	Org competitiveness	EC (T,RS,RI)	Regulation			EC (T,RS,RI)*Regulation
	4c	Innovation generation	EC (RR)	Regulation			EC (RR)*Regulation
	4d	Org competitiveness	EC (RR)	Regulation			EC (RR)*Regulation
Level 3	5a	Innovation generation	EO	EC (T,RS,RI)	EC (RR)	Regulation	EO*Regulation
	5b	Org competitiveness	EO	EC (T,RS,RI)	EC (RR)	Regulation	EO*Regulation
	6a	Innovation generation	EO	EC (T,RS,RI)	EC (RR)	Regulation	EC (T,RS,RI)*Regulation
	6b	Org competitiveness	EO	EC (T,RS,RI)	EC (RR)	Regulation	EC (T,RS,RI)*Regulation
	6c	Innovation generation	EO	EC (T,RS,RI)	EC (RR)	Regulation	EC (RR)*Regulation
	6d	Org competitiveness	EO	EC (T,RS,RI)	EC (RR)	Regulation	EC (RR)*Regulation

Key to table:

EO – Entrepreneurial orientation

EC (T,RS,RI) – External collaboration (Trustworthiness, role specification, relationship initiation)

EC (RR) – External collaboration (relationship restructure)

It is important to note that in view of the number of hypotheses, they are stated in the form of research hypotheses rather than in the form of statistical null and alternate hypotheses. Thus when significant regression results are found and the null hypothesis of no relationship (or zero slope) is rejected, the result is reported as supporting the corresponding research hypothesis of the existence of a relationship.

As the hypotheses in sets 3-6 all involve testing of moderating effects, regression results including and excluding the moderating variables are presented, together with the changes in R^2 and the parameters of the models.

Based on the results of the EFAs and CFAs, the full regression equation of the model was revised as follows:

$$\begin{aligned} \text{Level of Health Insurer Product innovation} = & \alpha + \beta_1(\text{EO}) + \beta_2(\text{External} \\ & \text{Collaboration(T,RS,RI)}) + \beta_3(\text{External Collaboration(RR)}) + \beta_4(\text{Regulation}) + \\ & \beta_5(\text{EO*Regulation}) + \beta_6 (\text{External Collaboration (T,RS,RI)*Regulation}) + \beta_7(\text{External} \\ & \text{Collaboration(RR)*Regulation}) \end{aligned}$$

This model was tested hierarchically through the 18 hypotheses of the research. The regression results for each hypothesis are presented in turn.

4.5.1 Test of Entrepreneurial Orientation (EO) vs. Health insurer product innovation (innovation generation and organisational competitiveness)

Hypothesis 1

Research hypothesis 1 posits that a positive correlation exists between the level of new product innovation by health insurers and entrepreneurial orientation (EO).

A strong positive linear correlation was found between EO and innovation generation ($r=0.69$, $p<0.001$) and between EO and organisational competitiveness ($r=0.67$, $p<0.001$).

Hypothesis 1a

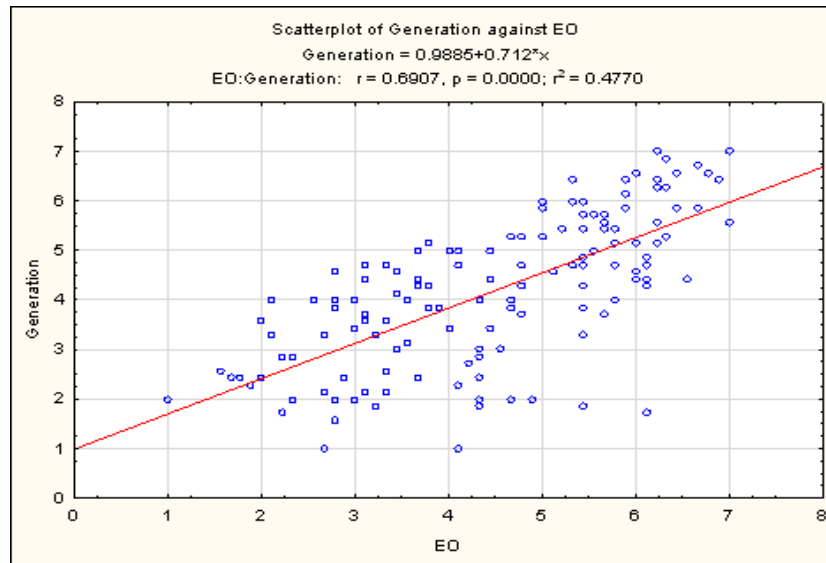


Figure 34 – Hypothesis 1a – scatterplot of innovation generation vs. entrepreneurial orientation (EO)

Results: Hypothesis 1a – The regression output (scatterplot of innovation generation vs. EO) shown in figure 34 indicates an R² value of 0.477. EO (Independent variable) explains 47.7% of the variation in the dependent variable, innovation generation.

Conclusion: There is empirical support for the relationship between EO and innovation generation.

Hypothesis 1b

The significant relationship between EO and Organisational competitiveness is represented as a scatterplot in Figure 35.

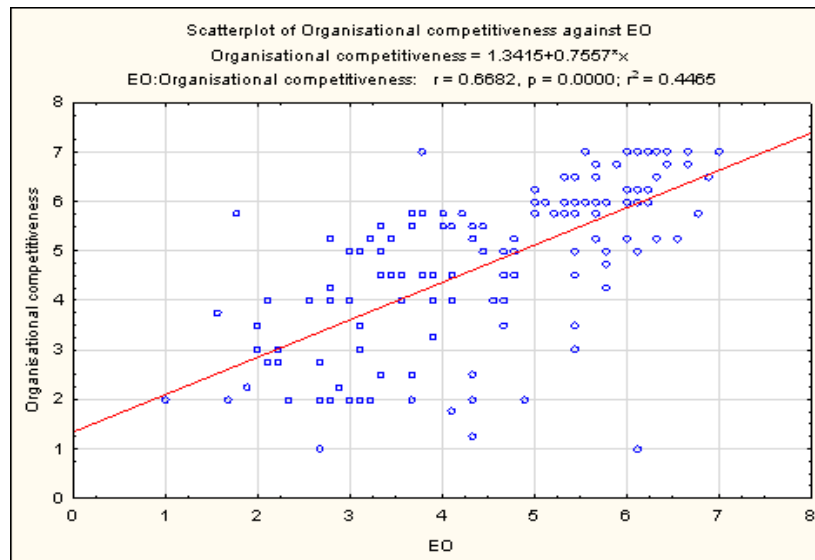


Figure 35 – Hypothesis 1b – scatterplot of organisational competitiveness vs. entrepreneurial orientation (EO)

Results: Hypothesis 1b – The regression output (scatterplot of organisational competitiveness vs. EO) shown in figure 35 indicates an R^2 value of 0.447. EO (Independent variable) explains 44.7% of the variation in the dependent variable, organisational competitiveness.

Conclusion: There is empirical support for the relationship between EO and innovation generation.

The results therefore show that EO is a strong predictor of health insurer product innovation and hypothesis 1 is therefore supported. Furthermore, the correlations between the EO constructs (innovativeness, proactiveness, risk taking) and the health insurer product innovation constructs (innovation generation and organisational competitiveness) are provided in table 33. These correlations are highly significant ($p < 0.001$) with moderate effect size (r^2 ranging between 0.29 and 0.49), thus providing further support for Hypothesis 1 at a lower level of measurement.

Table 33 – Correlations between EO constructs and health insurer product innovation constructs

EO Constructs	Innovation generation	Organisational competitiveness
Innovativeness	0.69	0.70
Proactiveness	0.63	0.62
Risk-taking	0.62	0.54

4.5.2. Tests of hypotheses 2

Test of External Collaboration (T, RS, RI) and External Collaboration (RR) vs. Health Insurer product innovation (innovation generation and organisational competitiveness)

Table 34 - Correlations between innovation generation and organisational competitiveness (DV's) and External Collaboration (T, RS, RI) and External Collaboration (RR)

	External Collaboration (T,RS,RI)	External Collaboration (RR)
Innovation generation	0.2601 p=0.002	0.2264 p=0.007
Organisational competitiveness	0.322 p=0.000	0.3321 p=0.000

Table 34 shows that a weak positive correlation exists between External Collaboration (T, RS, RI) and innovation generation ($r=0.26$, $p<0.01$) and weak positive correlation exists between External Collaboration (RR) and innovation generation ($r=0.23$, $p<0.01$). A weak positive correlation exists between External Collaboration (T, RS, RI) and organisational competitiveness ($r=0.32$, $p<0.001$) and weak positive correlation exists between External Collaboration (RR) and organisational competitiveness ($r=0.33$, $p<0.001$).

Hypothesis 2

Research hypothesis 2 posits that a positive correlation exists between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers.

Figures 36-41 present the results for the testing of hypothesis 2.

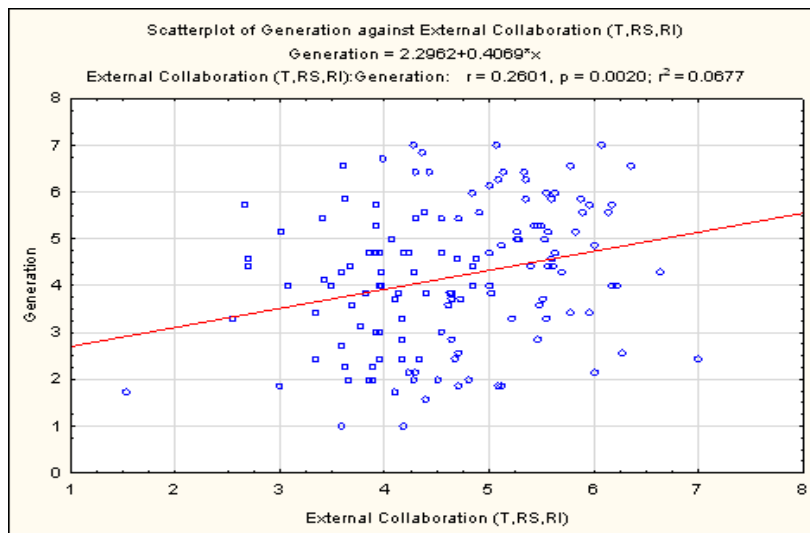


Figure 36 – Hypothesis 2a – scatterplot of innovation generation vs. external collaboration (T, RS, RI)

A weak positive linear correlation was found between External Collaboration (Trustworthiness (T), Role specification (RS), Relationship initiation (RI)) and innovation generation ($r=0.26$, $p<0.01$)

Results: Hypothesis 2a – The regression output (scatterplot of innovation generation vs. External Collaboration (T, RS, RI)) shown in figure 36 indicates an R^2 value of 0.067. External Collaboration (T, RS, RI) (Independent variable) explains 6.7% of the variation in the dependent variable, innovation generation.

Conclusion: There is empirical support, although weak, for the relationship between External Collaboration (T, RS, RI) and innovation generation.

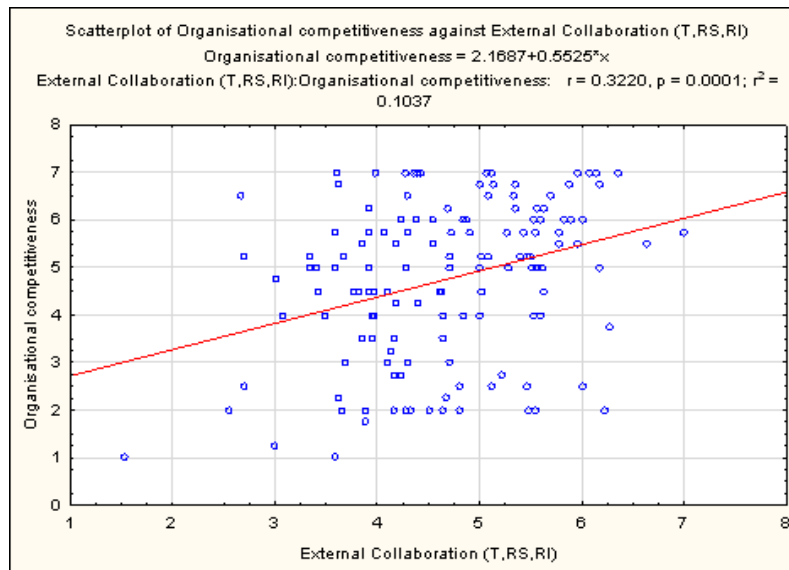


Figure 37 – Hypothesis 2b – scatterplot of organisational competitiveness vs. external collaboration (T, RS, RI)

A weak positive linear correlation was found between External Collaboration (Trustworthiness (T), Role specification (RS), Relationship initiation (RI)) and organisational competitiveness ($r=0.32$, $p<0.001$)

Results: Hypothesis 2b – The regression output (scatterplot of organisational competitiveness vs. External Collaboration (T, RS, RI)) shown in figure 37 indicates an R² value of 0.104. External Collaboration (T, RS, RI) (Independent variable) explains 10.4% of the variation in the dependent variable, organisational competitiveness.

Conclusion: There is empirical support, although weak, for the relationship between External Collaboration (T, RS, RI) and organisational competitiveness.

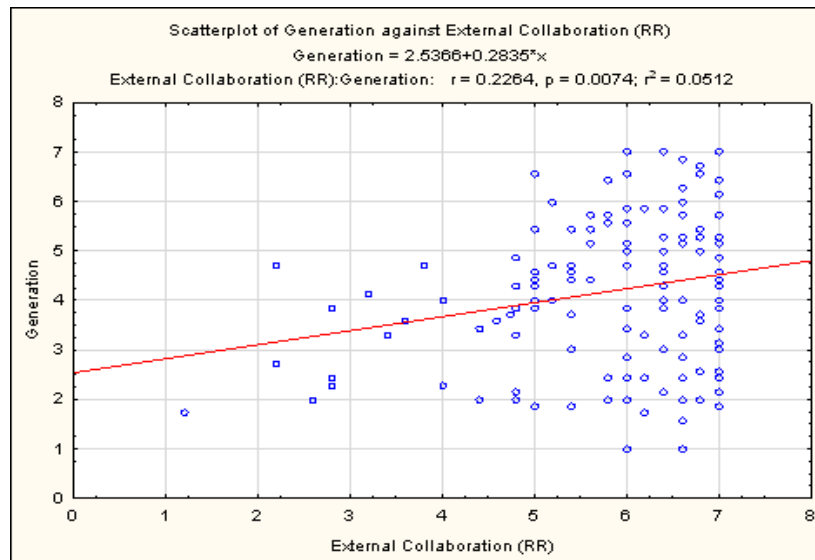


Figure 38 – Hypothesis 2c – scatterplot of innovation generation vs. external collaboration (RR)

A weak positive linear correlation was found between External Collaboration (Relationship restructure (RR)) and innovation generation ($r=0.226$, $p<0.01$)

Results: Hypothesis 2c – The regression output (scatterplot of innovation generation vs. External Collaboration (RR)) shown in figure 38 indicates an R^2 value of 0.051. External Collaboration (RR) (Independent variable) explains 5.1% of the variation in the dependent variable, innovation generation.

Conclusion: There is empirical support, although weak, for the relationship between External Collaboration (RR) and innovation generation.

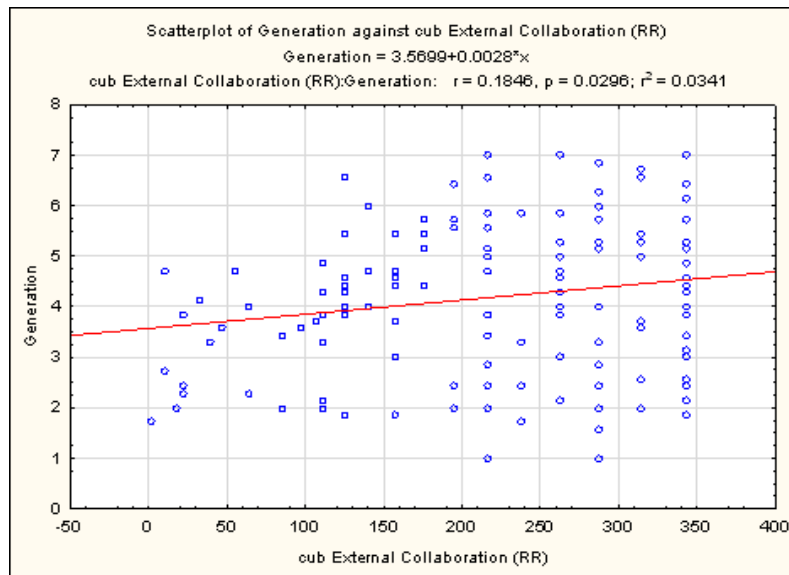


Figure 39 – Hypothesis 2c – scatterplot of innovation generation vs. (cube transformation) external collaboration (RR)

A weak positive linear correlation was found between transformed variable Cube External Collaboration (Relationship restructure (RR)) and innovation generation ($r=0.185$, $p<0.05$)

Results: Hypothesis 2c – The regression output (scatterplot of innovation generation vs. Cube External Collaboration (RR)) shown in figure 39 indicates an R^2 value of 0.034. Cube External Collaboration (RR) (Independent variable) explains 3.4% of the variation in the dependent variable, innovation generation.

Conclusion: There is empirical support, although weak, for the relationship between Cube External Collaboration (RR) and innovation generation.

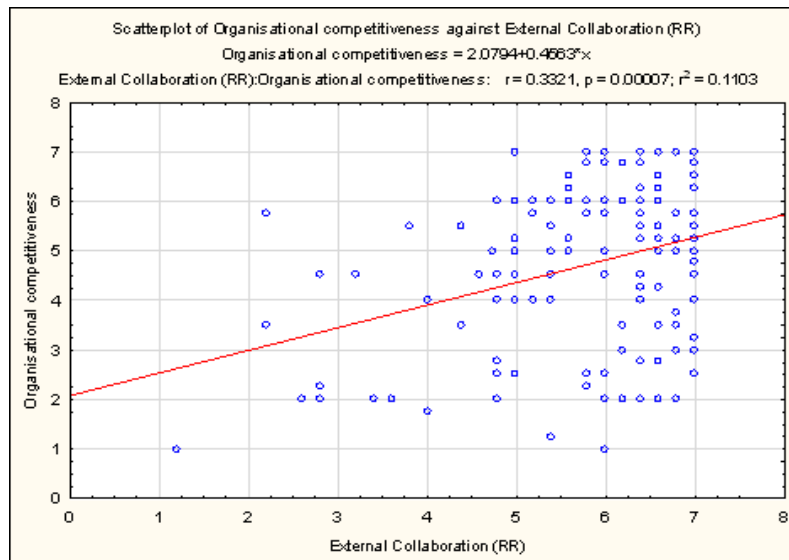


Figure 40 – Hypothesis 2d – scatterplot of organisational competitiveness vs. external collaboration (RR)

A weak positive linear correlation was found between External Collaboration (Relationship restructure (RR)) and organisational competitiveness ($r=0.33$, $p<0.001$)

Results: Hypothesis 2d – The regression output (scatterplot of organisational competitiveness vs. External Collaboration (RR)) shown in figure 40 indicates an R^2 value of 0.110. External Collaboration (RR) (Independent variable) explains 11.0% of the variation in the dependent variable, organisational competitiveness.

Conclusion: There is empirical support, although weak, for the relationship between External Collaboration (RR) and organisational competitiveness.

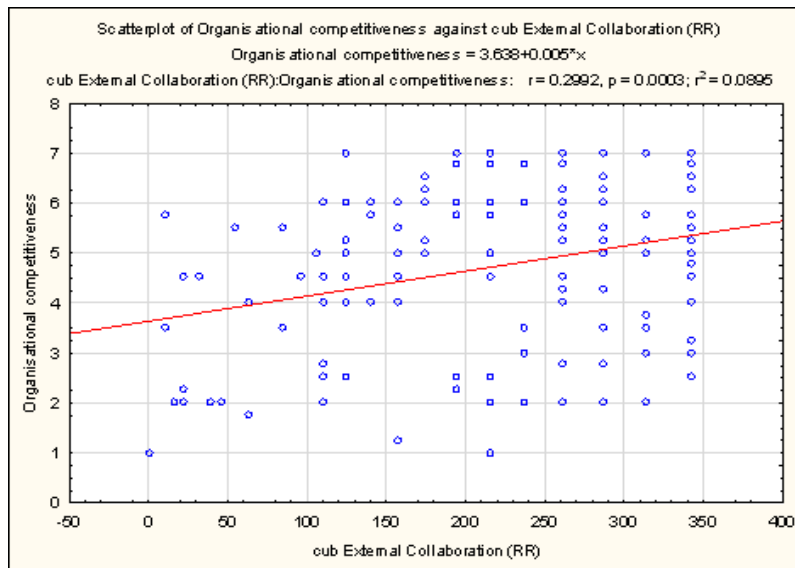


Figure 41 – Hypothesis 2d – scatterplot of organisational competitiveness vs. (cube transformation) external collaboration (RR)

A weak positive linear correlation was found between the transformed variable Cube External Collaboration (Relationship restructure (RR)) and organisational competitiveness (r=0.30, p<0.001)

Results: Hypothesis 2d – The regression output (scatterplot of organisational competitiveness vs. External Collaboration (RR)) shown in figure 41 indicates an R² value of 0.090. Cube External Collaboration (RR) (Independent variable) explains 9.0% of the variation in the dependent variable, organisational competitiveness.

Conclusion: There is empirical support, although weak, for the relationship between Cube External Collaboration (RR) and organisational competitiveness.

4.5.3 Test for hypothesis 3

Research hypothesis 3 posits that the relationship between the level of new product innovation by health insurers and entrepreneurial orientation (EO) is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that the relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.

Hypothesis 3

The regression output for the base model and model including the moderator is presented in table 35. The hypothesis was also tested excluding the health care service provider subgroup (Table 36) in view of the significant differences found between the healthcare provider subgroup versus the other respondents on the correlation between EO and Innovation generation (4.4.11.1).

Results

Table 35 – Hypothesis 3a

Hypothesis 3a	Base model				Including moderator			
	Generation	B	SE	Beta (β) p	B	Std.Err	Beta (β)	p
Intercept	0.5116	0.3498			1.2306	0.7790		
EO	0.6816	0.0636	0.6612	***	0.5253	0.1641	0.5096	**
Regulation	0.1821	0.0719	0.1562	*	-0.0461	0.2323	-0.0395	
EO*Regulation					0.0486	0.0470	0.2764	
R ² base	0.5006							
ΔR ²	0.0039							
F(2,136) base	68.16***							
F(3,135) with moderator	45.82***							

***=p<0.001, **=p<0.01, *=p<0.05

Regression Equation (Base model): Innovation generation = 0.5116+0.6816(EO)+0.1821(Regulation)

Regression Equation (incl. Moderator): Innovation generation = 1.2306+0.5253(EO)-0.0461(Regulation)+0.0486(EO*Regulation)

Conclusion: For the complete sample, there is no support for Hypothesis 3a that Regulation moderates the relationship between EO and innovation generation as:

- There is minimal (less than 0.5%) increase in the explained variance of Innovation generation (R²) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) is not significant (p>0.05)

- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.68 to 0.53).

Results

Table 36 – Hypothesis 3a (excluding healthcare service providers)

Hypothesis 3a EXCLUDING PROVIDERS	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Intercept	0.6278	0.3366			0.9639	0.7217		
EO	0.7213	0.0619	0.7252	***	0.6478	0.1527	0.6512	***
Regulation	0.1308	0.0670	0.1216		0.0233	0.2148	0.0217	
EO*Regulation					0.0229	0.0435	0.1400	
R ² base	0.5779							
ΔR ²	0.0010							
F(2,114)	78.03***							
F(3,113)	51.78***							

***= $p < 0.001$, **= $p < 0.01$, *= $p < 0.05$

Regression Equation (Base model): Innovation generation = 0.6278+0.7213(EO)+0.1308(Regulation)

Regression Equation (incl. Moderator): Innovation generation = 0.9639+0.6478(EO)+0.0233(Regulation)+0.0229(EO*Regulation)

Conclusion: Excluding healthcare service providers, the relationship between EO and Innovation generation is even stronger at 57.8% explained variance. For this reduced sample the results also show no support for the hypothesis that Regulation moderates the relationship between EO and Innovation generation as:

- There is minimal (0.1%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) is not significant ($p > 0.05$)
- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.72 to 0.65).

Hypothesis 3b

The regression output for the base model and model including the moderator is presented in table 37. The hypothesis was also tested excluding the health care service provider subgroup (Table 38) based on the significant difference in the correlations between EO and Organisation competitiveness for healthcare providers compared to the HIAs.

Table 37 – Hypothesis 3b

Hypothesis 3b	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Organisational competitiveness								
Intercept	1.0401	0.4012		*	0.7578	0.8965		
EO	0.7365	0.0729	0.6512	***	0.7978	0.1889	0.7055	***
Regulation	0.1151	0.0825	0.0900		0.2047	0.2674	0.1600	
EO*Regulation					-0.0191	0.0541	-0.0989	
R ²	0.4543							
ΔR ²	0.0005							
F(2,136)	56.6***							
F(3,135)	37.53***							

***=p<0.001, **=p<0.01, *=p<0.05

Regression Equation (Base model): Organisational Competitiveness = 1.0401+0.7365(EO)+0.1151(Regulation)

Regression Equation (incl. Moderator): Organisational Competitiveness = 0.7578+0.7978(EO)+0.2047(Regulation)-0.0191(EO*Regulation)

Conclusion: For the complete sample, there is no support for Hypothesis 3b that Regulation moderates the relationship between EO and organisational competitiveness as:

- There is minimal (less than 0.1%) increase in the explained variance of organisational competitiveness (R²) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) is not significant (p>0.05)
- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.74 to 0.80).

Table 38 – Hypothesis 3b (excluding healthcare service providers)

EXCLUDING PROVIDERS	Base model				Including moderator				
	Organisational competitiveness	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Intercept	1.3533	0.3637			***	0.2991	0.7726		
EO	0.7334	0.0669	0.7147		***	0.9641	0.1635	0.9394	***
Regulation	0.0784	0.0724	0.0706			0.4156	0.2300	0.3745	
EO*Regulation						-0.0719	0.0465	-0.4257	
R ²	0.5371								
ΔR ²	0.0096								
F(2,114)	66.12***								
F(3,113)	45.41***								

***=p<0.001, **=p<0.01, *=p<0.05

Regression Equation (Base model): Organisational Competitiveness = 1.3533+0.7334(EO)+0.0784(Regulation)

Regression Equation (incl Moderator): Organisational Competitiveness = 0.2991+0.9641(EO)+0.4156(Regulation)-0.0719(EO*Regulation)

Conclusion: Excluding healthcare service providers, the relationship between EO and organisational competitiveness is even stronger at 53.7% explained variance. For this reduced sample the results also show no support for the hypothesis that Regulation moderates the relationship between EO and Innovation generation as:

- There is minimal (0.9%) increase in the explained variance of organisational competitiveness (R²) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) is not significant (p>0.05)
- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.73 to 0.96).

4.5.4 Test for hypothesis 4

Hypothesis 4

Research hypothesis 4 posits that the relationship between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers is moderated by perceived strategic regulatory factors

necessary for encouraging health insurer product innovation, such that this relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.

Results: Hypothesis 4a – the regression output for the base model and model including the moderator is presented in table 39.

Table 39 – Hypothesis 4a

Hypothesis 4a Generation	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Intercept	2.2714	0.6050		***	0.9176	1.8837		
External Collaboration (T,RS,RI)	0.2439	0.1495	0.1559		0.5223	0.3962	0.3339	
Regulation	0.2325	0.1115	0.1994	*	0.6472	0.5578	0.5552	
Ext Coll (T,RS,RI)*Regulation					-0.0821	0.1082	-0.4778	
R ²	0.0966							
ΔR ²	0.0038							
F(2,136)	7.27**							
F(3,135)	5.02**							

***=p<0.001, **=p<0.01, *=p<0.05

Regression Equation (Base model): Innovation generation = 2.2714+0.2439(EC(T,RS,RI))+0.2325(Regulation)

Regression Equation (incl. Moderator): Innovation generation = 0.9176+0.5223(EC(T,RS,RI))+0.6472(Regulation)-0.0821(EC(T,RS,RI)*Regulation)

Conclusion: For the complete sample, there is no support for Hypothesis 4a that Regulation moderates the relationship between External Collaboration (EC) (T,RS,RI) and innovation generation as:

- There is minimal (less than 0.5%) increase in the explained variance of Innovation generation (R²) from the base model to the model including the moderator
- The moderating effect (EC(T,RS,RI)*Regulation) is not significant (p>0.05)
- There is minimal change in the parameter value for EC (T,RS,RI) from the base model to the model including the moderator (0.24 to 0.52).

Results: Hypothesis 4b– the regression output for the base model and model including the moderator is presented in table 40.

Table 40 – Hypothesis 4b

Hypothesis 4b	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Organisational competitiveness								
Intercept	2.1603	0.6602		**	2.3692	2.0597		
External Collaboration (T,RS,RI)	0.4976	0.1632	0.2900	**	0.4546	0.4333	0.2649	
Regulation	0.0782	0.1216	0.0612		0.0142	0.6099	0.0111	
Ext Coll (T,RS,RI)*Regulation					0.0127	0.1183	0.0672	
R2	0.1064							
ΔR2	0.0001							
F(2,136)	8.09***							
F(3,135)	5.36**							

***=p<0.001, **=p<0.01, *=p<0.05

Regression Equation (Base model): Org Competitiveness = 2.1603+0.24976(EC(T,RS,RI))+0.0782(Regulation)

Regression Equation (incl Moderator): Org Competitiveness = 2.3692+0.4546(EC(T,RS,RI))+0.0142(Regulation)+0.0127(EC(T,RS,RI)*Regulation)

Conclusion: For the complete sample, there is no support for Hypothesis 4b that Regulation moderates the relationship between External Collaboration (EC) (T,RS,RI) and organisational competitiveness:

- There is minimal (less than 0.1%)increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EC(T,RS,RI)*Regulation) is not significant ($p>0.05$)
- There is minimal change in the parameter value for EC (T, RS, RI) from the base model to the model including the moderator (0.50 to 0.45).

Results: Hypothesis 4c– the regression output for the base model and model including the moderator is presented in table 41.

Table 41 – Hypothesis 4c

Hypothesis 4c	Base model				Including moderator				
	Generation	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
	Intercept	1.7885	0.6464		**	1.5048	1.8253		
	External Collaboration (RR)	0.2401	0.1020	0.1917	*	0.2880	0.3052	0.2299	
	Regulation	0.2971	0.0949	0.2548	**	0.3963	0.6042	0.3400	
	Ext Coll (RR)*Regulation					-0.0166	0.0998	-0.0988	
	R2	0.1150							
	ΔR2	0.0002							
	F(2,136)	8.83***							
	F(3,135)	5.86***							

***=p<0.001, **=p<0.01, *=p<0.05

Regression Equation (Base model): Innovation generation = 1.7885+0.2401(EC(RR))+0.2971(Regulation)

Regression Equation (incl. Moderator): Innovation generation = 1.5048+0.2880(EC(RR))+0.3963(Regulation)-0.0166(EC(RR)*Regulation)

Conclusion: For the complete sample, there is no support for Hypothesis 4c that Regulation moderates the relationship between External Collaboration (EC) (RR) and innovation generation:

- There is minimal (less than 0.1%)increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EC(RR)*Regulation) is not significant ($p>0.05$)
- There is minimal change in the parameter value for EC (RR) from the base model to the model including the moderator (0.24 to 0.29).

Results: Hypothesis 4d– the regression output for the base model and model including the moderator is presented in table 42.

Table 42 – Hypothesis 4d

Hypothesis 4d	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Organisational competitiveness								
Intercept	1.5293	0.6996		*	1.3973	1.9755		
External Collaboration (RR)	0.4244	0.1104	0.3089	***	0.4466	0.3303	0.3250	
Regulation	0.2185	0.1027	0.1708	*	0.2646	0.6539	0.2069	
Ext Coll (RR)*Regulation					-0.0077	0.1080	-0.0419	
R2	0.1389							
ΔR2	0.0000							
F(2,136)	10.97***							
F(3,135)	7.26***							

***= $p < 0.001$, **= $p < 0.01$, *= $p < 0.05$

Regression Equation (Base model): Org Competitiveness =
1.5293+0.4244(EC(RR))+0.2185(Regulation)

Regression Equation (incl. Moderator): Org Competitiveness =
1.3973+0.4466(EC(RR))+0.2646(Regulation)-0.0077(EC(RR)*Regulation)

Conclusion: For the complete sample, there is no support for Hypothesis 4d that Regulation moderates the relationship between External Collaboration (EC) (RR) and organisational competitiveness:

- There is minimal (less than 0.1%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EC (RR)*Regulation) is not significant ($p > 0.05$)
- There is minimal change in the parameter value for EC (RR) from the base model to the model including the moderator (0.42 to 0.45).

4.5.5 Jointly specified hypotheses 5 & 6 – To test for model misspecification

Hypotheses 5 and 6 were created to test for model misspecification by including all the main variables when testing the moderation effects of the interaction terms on the relationship between health insurer product innovation and EO and the relationship between health insurer product innovation and external collaboration.

4.5.5.1 Hypothesis 5

EO * Regulation (including all main variables) vs. health insurer product innovation (innovation generation, organisational competitiveness)

Results: Hypothesis 5a– The regression output for the base model and model including the moderator is presented in table 43. The hypothesis was also tested excluding the health care service provider subgroup (Table 44) in view of the significant differences found between the healthcare provider subgroup versus the other respondents on the correlation between EO and Innovation generation (4.4.11.1).

Table 43 – Hypothesis 5a

Hypothesis 5a	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Generation								
Intercept	-0.3532	0.5933			0.3328	0.9323		
EO	0.6631	0.0643	0.6433	***	0.5184	0.1647	0.5029	**
External Collaboration (T,RS,RI)	0.1337	0.1123	0.0855		0.1222	0.1130	0.0781	
External Collaboration (RR)	0.0904	0.0783	0.0722		0.0938	0.0784	0.0749	
Regulation	0.1225	0.0831	0.1051		-0.0847	0.2325	-0.0726	
EO*Regulation					0.0450	0.0471	0.2559	
R2	0.5124							
ΔR2	0.0033							
F(4,134)	35.2***							
F(5,133)	28.33***							

***=p<0.001, **=p<0.01, *=p<0.05

Regression Equation (Base model):

Innovation generation = -0.3532+0.6631(EO)+0.1337(EC(T,RS,RI))+0.0904 (EC(RR))+0.1225(Regulation)

Regression Equation (incl. Moderator):

Innovation generation = 0.3328+0.5184(EO)+0.1222(EC(T,RS,RI))+0.0938(EC(RR))-0.0847(Regulation)+0.0450(EO*Regulation)

Conclusion: For the complete sample, there is no support for Hypothesis 5a that Regulation moderates the relationship between EO (including all the main variables) and innovation generation as:

- There is minimal (less than 0.5%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) (including all the main variables) is not significant ($p>0.05$)
- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.66 to 0.52).

Results: Hypothesis 5a

Table 44 – Hypothesis 5a (excluding healthcare service providers)

EXCLUDING PROVIDERS	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Generation								
Intercept	0.2027	0.6724			0.5567	0.9219		
EO	0.7079	0.0636	0.7117	***	0.6286	0.1545	0.6320	***
External Collaboration (T,RS,RI)	-0.0022	0.1307	-0.0013		-0.0028	0.1311	-0.0017	
External Collaboration (RR)	0.0866	0.0859	0.0641		0.0885	0.0862	0.0654	
Regulation	0.1263	0.0830	0.1174		0.0109	0.2211	0.0102	
EO*Regulation					0.0246	0.0437	0.1504	
R2	0.5817							
ΔR^2	0.0012							
F(4,112)	38.94***							
F(5,111)	31.03***							

***= $p<0.001$, **= $p<0.01$, *= $p<0.05$

Regression Equation (Base model):

Innovation generation = $0.2027+0.7079(EO)-0.0022(EC(T,RS,RI))+0.0866($
 $EC(RR))+0.1263(Regulation)$

Regression Equation (incl. Moderator):

Innovation generation = $0.5567+0.6286(EO)-0.0028(EC(T, RS,RI))$
 $+0.0885($
 $EC(RR))+0.0109(Regulation)+0.0246(EO*Regulation)$

Conclusion: Excluding healthcare service providers, the relationship between EO and Innovation generation is even stronger at 58.1% explained variance. For this reduced sample the results also show no support for the hypothesis that Regulation moderates the relationship between EO (including all main variables) and Innovation generation as:

- There is minimal (0.1%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) (including all main variables) is not significant ($p>0.05$)
- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.71 to 0.63).

Results: Hypothesis 5b

The regression output for the base model and model including the moderator is presented in table 45. The hypothesis was also tested excluding the health care service provider subgroup (Table 46) based on the significant difference in the correlations between EO and Organisation competitiveness for healthcare providers compared to the HIAs.

Table 45 – Hypothesis 5b

Hypothesis 5b Organisational competitiveness	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Intercept	-1.2594	0.6434			-1.7180	1.0131		
EO	0.6869	0.0697	0.6073	***	0.7836	0.1790	0.6928	***
External Collaboration (T,RS,RI)	0.3475	0.1218	0.2025	**	0.3552	0.1228	0.2070	**
External Collaboration (RR)	0.2458	0.0849	0.1789	**	0.2436	0.0852	0.1773	**
Regulation	-0.0408	0.0902	-0.0319		0.0977	0.2527	0.0764	
EO*Regulation					-0.0301	0.0512	-0.1559	
R2	0.5236							
ΔR2	0.0012							
F(4,134)	36.82***							
F(5,133)	29.38***							

***= $p<0.001$, **= $p<0.01$, *= $p<0.05$

Regression Equation (Base model):

$$\text{Org Competitiveness} = -1.2594 + 0.6869(\text{EO}) + 0.3475(\text{EC} - \text{T, RS, RI}) + 0.2458(\text{EC} - \text{RR}) - 0.0408(\text{Regulation})$$

Regression Equation (incl. Moderator):

$$\text{Org Competitiveness} = -1.7180 + 0.7836(\text{EO}) + 0.3552(\text{EC} - \text{T, RS, RI}) + 0.2436(\text{EC} - \text{RR}) + 0.0977(\text{Regulation}) - 0.0301(\text{EO} * \text{Regulation})$$

Conclusion: For the complete sample, there is no support for Hypothesis 5b that Regulation moderates the relationship between EO (including all main variables) and organisational competitiveness as:

- There is minimal (less than 0.5%) increase in the explained variance of organisational competitiveness (R^2) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) (including all main variables) is not significant ($p>0.05$)
- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.69 to 0.78).

Table 46 – Hypothesis 5b (excluding healthcare service providers)

EXCLUDING PROVIDERS	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Organisational competitiveness								
Intercept	-0.2987	0.6920			-1.2498	0.9408		
EO	0.6855	0.0654	0.6680	***	0.8985	0.1577	0.8755	***
External Collaboration (T,RS,RI)	0.0343	0.1345	0.0196		0.0361	0.1337	0.0206	
External Collaboration (RR)	0.3067	0.0884	0.2200	***	0.3017	0.0880	0.2164	***
Regulation	0.0467	0.0854	0.0420		0.3566	0.2256	0.3213	
EO*Regulation					-0.0661	0.0446	-0.3917	
R2	0.5838							
ΔR^2	0.0081							
F(4,112)	39.28***							
F(5,111)	32.2***							

***= $p<0.001$, **= $p<0.01$, *= $p<0.05$

Regression Equation (Base model):

Org Competitiveness =

-0.2987+ 0.6855 (EO) + 0.0343(EC(T,RS,RI)) + 0.3067(EC(RR))+ 0.0467(Regulation)

Regression Equation (incl Moderator):

Org Competitiveness = -1.2498+0.8985(EO)+0.0361(EC(T,RS,RI))+0.3017

(EC(RR))+0.3566(Regulation)-0.0661(EO*Regulation)

Conclusion: Excluding healthcare service providers, the relationship between EO and organisational competitiveness is even stronger at 58.4% explained variance. For this

reduced sample the results also show no support for the hypothesis that Regulation moderates the relationship between EO (including all main variables) and organisational competitiveness as:

- There is minimal (0.8%) increase in the explained variance of organisational competitiveness(R^2) from the base model to the model including the moderator
- The moderating effect (EO*Regulation) (including all main variables) is not significant ($p>0.05$)
- There is minimal change in the parameter value for EO from the base model to the model including the moderator (0.69 to 0.90).

4.5.5.2 Hypothesis 6

External Collaboration (T, RS, RI) * Regulation (including all main variables) and External Collaboration (RR) * Regulation (including all main variables) vs. health insurer product innovation

Results: Hypothesis 6a

Table 47 – Hypothesis 6a

Hypothesis 6a	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Generation								
Intercept	-0.3532	0.5933			-2.4504	1.4220		
EO	0.6631	0.0643	0.6433	***	0.6727	0.0642	0.6526	***
External Collaboration (T,RS,RI)	0.1337	0.1123	0.0855		0.5795	0.2968	0.3705	
External Collaboration (RR)	0.0904	0.0783	0.0722		0.0717	0.0787	0.0572	
Regulation	0.1225	0.0831	0.1051		0.7809	0.4146	0.6699	
Ext Coll (T,RS,RI)*Regulation					-0.1305	0.0805	-0.7596	
R2	0.5124							
ΔR2	0.0094							
F(4,134)	35.2***							
F(5,133)	29.03***							

***= $p<0.001$, **= $p<0.01$, *= $p<0.05$

Regression Equation (Base model):

**Innovation generation = -0.3532+0.6631(EO)+0.1337(EC(T,RS,RI))
+0.0904(EC(RR))+0.1225(Regulation)**

Regression Equation (incl. Moderator):

$$\text{Innovation generation} = -2.4504 + 0.6727(\text{EO}) + 0.5795(\text{EC-T,RS,RI}) + 0.0717(\text{EC-RR}) + 0.7809(\text{Regulation}) - 0.1305(\text{EC(T,RS,RI)*Regulation})$$

Conclusion: For the complete sample, there is no support for Hypothesis 6a that Regulation moderates the relationship between External Collaboration (EC) (T, RS, RI) (including all the main variables) and innovation generation as:

- There is minimal (less than 1%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EC(T,RS,RI)*Regulation) (including all the main variables) is not significant ($p > 0.05$)
- There is minimal change in the parameter value for EC (T, RS, RI) from the base model to the model including the moderator (0.13 to 0.58).

Results: Hypothesis 6b

Table 48 – Hypothesis 6b

Hypothesis 6b	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Organisational competitiveness								
Intercept	-1.2594	0.6434			-1.4707	1.5571		
EO	0.6869	0.0697	0.6073	***	0.6878	0.0703	0.6082	***
External Collaboration (T,RS,RI)	0.3475	0.1218	0.2025	**	0.3924	0.3250	0.2287	
External Collaboration (RR)	0.2458	0.0849	0.1789	**	0.2439	0.0861	0.1775	**
Regulation	-0.0408	0.0902	-0.0319		0.0255	0.4539	0.0199	
Ext Coll (T,RS,RI)*Regulation					-0.0132	0.0882	-0.0697	
R2	0.5236							
ΔR2	0.0001							
F(4,134)	36.82***							
F(5,133)	29.25***							

***= $p < 0.001$, **= $p < 0.01$, *= $p < 0.05$

Regression Equation (Base model):

$$\text{Org Competitiveness} = -1.2594 + 0.6869(\text{EO}) + 0.3475(\text{EC(T,RS,RI)}) + 0.2458(\text{EC(RR)}) - 0.0408(\text{Regulation})$$

Regression Equation (incl. Moderator):

$$\text{Org Competitiveness} = -1.4707 + 0.6878(\text{EO}) + 0.3924(\text{EC(T,RS,RI)}) + 0.2439(\text{EC(RR)}) + 0.0255(\text{Regulation}) - 0.0132(\text{EC(T,RS,RI)} * \text{Regulation})$$

Conclusion: For the complete sample, there is no support for Hypothesis 6b that Regulation moderates the relationship between External Collaboration (EC) (T, RS, RI) (including all main variables) and organisational competitiveness:

- There is minimal (less than 0.1%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect ($\text{EC(T,RS,RI)} * \text{Regulation}$) (including all main variables) is not significant ($p > 0.05$)
- There is minimal change in the parameter value for EC (T, RS, RI) from the base model to the model including the moderator (0.35 to 0.39).

Results: Hypothesis 6c

Table 49 – Hypothesis 6c

Hypothesis 6c	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Generation								
Intercept	-0.3532	0.5933			-0.7902	1.3942		
EO	0.6631	0.0643	0.6433	***	0.6636	0.0645	0.6438	***
External Collaboration (T,RS,RI)	0.1337	0.1123	0.0855		0.1309	0.1130	0.0837	
External Collaboration (RR)	0.0904	0.0783	0.0722		0.1654	0.2300	0.1321	
Regulation	0.1225	0.0831	0.1051		0.2786	0.4578	0.2389	
Ext Coll (RR)*Regulation					-0.0259	0.0748	-0.1544	
R2	0.5124							
ΔR2	0.0004							
F(4,134)	35.2***							
F(5,133)	28***							

***= $p < 0.001$, **= $p < 0.01$, *= $p < 0.05$

Regression Equation (Base model):

$$\text{Innovation generation} = -0.3532 + 0.6631(\text{EO}) + 0.1337(\text{EC(T,RS,RI)}) + 0.0904(\text{EC(RR)}) + 0.1225(\text{Regulation})$$

Regression Equation (incl. Moderator):

$$\text{Innovation generation} = -0.7902 + 0.6636(\text{EO}) + 0.1309(\text{EC(T,RS,RI)}) + 0.1654(\text{EC(RR)}) + 0.2786(\text{Regulation}) - 0.0259(\text{EC(RR)*Regulation})$$

Conclusion: For the complete sample, there is no support for Hypothesis 6c that Regulation moderates the relationship between External Collaboration (EC) (RR) (including all the main variables) and innovation generation as:

- There is minimal (less than 0.1%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EC(RR)*Regulation) (including all the main variables) is not significant ($p > 0.05$)
- There is minimal change in the parameter value for EC (RR) from the base model to the model including the moderator (0.09 to 0.17).

Results: Hypothesis 6d

Table 50 – Hypothesis 6d

Hypothesis 6d	Base model				Including moderator			
	B	SE	Beta (β)	p	B	Std.Err	Beta (β)	p
Organisational competitiveness								
Intercept	-1.2594	0.6434			-1.3829	1.5125		
EO	0.6869	0.0697	0.6073	***	0.6870	0.0700	0.6075	***
External Collaboration (T,RS,RI)	0.3475	0.1218	0.2025	**	0.3467	0.1226	0.2020	**
External Collaboration (RR)	0.2458	0.0849	0.1789	**	0.2670	0.2495	0.1943	
Regulation	-0.0408	0.0902	-0.0319		0.0032	0.4966	0.0025	
Ext Coll (RR)*Regulation					-0.0073	0.0812	-0.0397	
R2	0.5236							
ΔR2	0.0000							
F(4,134)	36.82***							
F(5,133)	29.24***							

***= $p < 0.001$, **= $p < 0.01$, *= $p < 0.05$

Regression Equation (Base model):

$$\text{Org Competitiveness} = -1.2594 + 0.6869(\text{EO}) + 0.3475(\text{EC(T,RS,RI)}) + 0.2458(\text{EC(RR)}) - 0.0408(\text{Regulation})$$

Regression Equation (incl. Moderator):

$$\text{Org Competitiveness} = -1.3829 + 0.6870(\text{EO}) + 0.3467(\text{EC(T,RS,RI)}) + 0.2670(\text{EC(RR)}) + 0.0032(\text{Regulation}) - 0.0073(\text{EC(RR)*Regulation})$$

Conclusion: For the complete sample, there is no support for Hypothesis 6b that Regulation moderates the relationship between External Collaboration (EC) (RR) (including all main variables) and organisational competitiveness:

- There is minimal (less than 0.1%) increase in the explained variance of Innovation generation (R^2) from the base model to the model including the moderator
- The moderating effect (EC(RR)*Regulation) (including all main variables) is not significant ($p > 0.05$)
- There is minimal change in the parameter value for EC (RR) from the base model to the model including the moderator (0.25 to 0.27).

4.6 Summary of the results

The results chapter is structured to present the data analysis results under three main headings; 1) the sample description, including respondents and organisational characteristics, 2) the measurement aspects of the model and 3) regression analysis to test the model. The presentation of the results included data tables, data figures and graphs to present the results of the data analyses performed. The regression analysis results confirmed the following in terms of the four relational hypotheses:

Hypothesis 1 – the research hypothesis is supported. The results indicated a strong linear relationship between EO and health insurer product innovation. EO explained 47% of the variance in innovation generation and 45% of the variance in organisational competitiveness.

Hypothesis 2 – the research hypothesis is supported, although weak. The results indicated a weak linear relationship between external collaboration and health insurer product innovation. External collaboration (T, RS, RI) explained 7% of the variance in innovation generation and 10% of the variance in organisational competitiveness. External collaboration (RR) explained 5% of the variance in innovation generation and 11% of the variance in organisational competitiveness. External collaboration (RR) (cube transformation) explained

only 3% of the variance in innovation generation and 9% of the variance in organisational competitiveness.

Hypothesis 3 – the research hypothesis is not supported. The results indicated a negligible moderation effect by the interaction term (EO*regulation) in the relationship between health insurer product innovation and EO. The moderation effect was negligible for the regression analysis including healthcare service providers and excluding healthcare service providers.

Hypothesis 4 – the research hypothesis is not supported. The results indicated a negligible moderation effect by the interaction terms (External Collaboration (T, RS, RI)*Regulation and External Collaboration (RR)*Regulation) in the relationship between health insurer product innovation and External collaboration.

Hypotheses 5 and 6 were created to test for misspecification of the model by including all the main variables when testing the moderation effects of the interaction terms on the relationship between health insurer product innovation and EO and the relationship between health insurer product innovation and external collaboration.

Hypothesis 5 – the research hypothesis is not supported. The results indicated a negligible moderation effect by the interaction term (EO*regulation), including all the main variables, in the relationship between health insurer product innovation and EO. The moderation effect was negligible for the regression analysis including healthcare service providers and excluding healthcare service providers.

Hypothesis 6 – the research hypothesis is not supported. The results indicated a negligible moderation effect by the interaction terms (External Collaboration (T, RS, RI)*Regulation and External Collaboration (RR)*Regulation), including all the main variables, in the relationship between health insurer product innovation and External collaboration.

Table 51 provides a summary of the research hypotheses results.

Table 51 – Summary of results of the research hypotheses tests

Research Hypothesis	Description of path	Result
<p>H1 a, b</p> <p>A positive correlation exists between the level of new product innovation by health insurers and entrepreneurial orientation (EO).</p>	<p>EO → Health insurer product innovation (G, OC)</p>	<p>Supported</p>
<p>H2 a-d</p> <p>A positive correlation exists between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers.</p>	<p>External Collaboration (EC) (T, RS,RI) → Health insurer product innovation (G, OC)</p> <p>External Collaboration (EC) (RR) → Health insurer product innovation (G, OC)</p>	<p>Supported</p> <p>Supported</p>
<p>H3 a, b</p> <p>The relationship between the level of new product innovation by health insurers and entrepreneurial orientation (EO) is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that the relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.</p>	<p>EO*Regulation (interaction term) → Health insurer product innovation (G, OC)</p>	<p>Not supported</p>
<p>H4 a-d</p> <p>The relationship between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that this relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence</p>	<p>EC (T,RS,RI)*Regulation (interaction term) → Health insurer product innovation (G, OC)</p> <p>EC (RR)*Regulation (interaction term) → Health insurer product innovation (G, OC)</p>	<p>Not supported</p> <p>Not supported</p>

Research Hypothesis	Description of path	Result
<p>H5 a, b</p> <p>To test for model misspecification</p>	<p>EO*Regulation (interaction term) → Health insurer product innovation (G, OC)</p> <p>(incl. All main variables)</p>	<p>Not supported</p>
<p>H6 a-d</p> <p>To test for model misspecification</p>	<p>EC (T,RS,RI)*Regulation (interaction term) → Health insurer product innovation (G, OC)</p> <p>(incl. All main variables)</p> <p>EC (RR)*Regulation (interaction term) → Health insurer product innovation (G, OC)</p> <p>(incl. All main variables)</p>	<p>Not supported</p> <p>Not supported</p>

CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter consolidates the discussion of the research results, the conclusions of the research study, implications for theory development and for healthcare executives and recommendations for future research.

5.2 Discussion of Results

5.2.1 *Descriptive statistics*

The descriptive analysis reveals for the **entrepreneurial orientation (EO)** scale above midpoint (4) scores across items for health insurers and health insurer administrators, suggesting that these two subgroups of the study have medium to high levels of EO. These are captured through the three EO dimensions: innovativeness, proactiveness and risk-taking. Healthcare service providers show below midpoint (4) scores for the innovativeness and risk-taking constructs and above midpoint scores for the proactiveness construct. The total scores across items for EO for healthcare service providers, as the third subgroup of this study, reveal that the score is below the midpoint (4), suggesting that this subgroup has low to medium levels of EO.

The **external collaboration** scales, trustworthiness, role specification and relationship restructure have above midpoint (4) scores for health insurers, health insurer administrators and healthcare service providers. This suggests that all three subgroups perceive trustworthiness, role specification and relationship restructure to be important elements in driving collaboration between the subgroups. Healthcare service provider scores for trustworthiness only just exceed the midpoint (4) score. This suggests that there could be some level of distrust among healthcare service providers in terms of trusting the strategic alliance strategies of health insurers/health insurer administrators focusing on health insurer product innovation. For all three subgroups the relationship initiation construct scores are

significantly lower than the midpoint (4) and this suggests that the perception of all subgroups is that not sufficient time is spent, or sufficient interest is shown, among the different subgroups to collaborate in improving healthcare efficiencies and the provision of better care to patients. Total scores across scales for external collaboration (including trustworthiness, role specification and relationship initiation) for healthcare insurers and healthcare insurer administrators are above the midpoint (4) and for health care service providers below the midpoint (4). This suggests that external collaboration, viewed from the health insurers and health insurer administrators' perspectives is more important in terms of driving health insurer product innovation than it is for healthcare service providers.

Descriptive analysis reveals for **regulation** (increased competition, health insurance and access, standards for coverage and structure of healthcare delivery) below midpoint (4) scores across items for all three subgroups, health insurers, health insurer administrators and healthcare service providers. This suggests that all three subgroups perceive the South African healthcare regulatory environment to significantly lack strategic regulatory factors, necessary for encouraging health insurer product innovation.

For the **health insurer product innovation** scales, descriptive analysis reveals above midpoint (4) scores across items for health insurer administrators. This suggests that this subgroup has medium to high levels of health insurer product innovation output. Health insurers recorded below midpoint scores for the innovation generation construct only, and this indicates that they have lower levels of innovation generation output than health insurer administrators. This suggests that health insurer administrators are perceived to be the drivers/initiators of health insurer product innovation generation in health insurers due to their close external collaboration strategies. The scores across items for healthcare service providers were below the midpoint (4) and this suggests that healthcare service providers have low levels of product innovation output in the healthcare value chain.

5.2.2 Evaluation of the Model

5.2.2.1 Measurement Characteristics of the scales

The measurement aspects of the model were evaluated first, before evaluating the structural aspects of the model.

Reliability was analysed and computed for the theoretically-derived measurement scales as reliability is a necessary condition (although not a sufficient condition) for validity. The reliabilities of scales were analysed using Cronbach's alpha coefficient and the average inter-item correlations. The results show that the Cronbach alpha values of the theoretically derived measures of the constructs of regulation, entrepreneurial orientation (EO) and external collaboration variables are all adequate and above the 0.7 level. The Cronbach alpha for the theoretically derived measures of the innovation generation construct as well as the theoretically derived measures of the organisational competitiveness construct (the dependent variable, health insurer product innovation), are around 0.9, which is excellent. The Cronbach alpha values of the innovation adoption construct, measuring health insurer product innovation at 0.5, is well below 0.7, which indicates the presence of unacceptably high error variance in the scores of this scale. The Cronbach alpha values, using the empirically derived measures for the innovation adoption construct, improved slightly but was still below 0.7 at 0.63, which indicates the presence of unacceptably high error variance in the scores of this scale. The innovation adoption construct was dropped from the model due to its poor measurement characteristics.

The validity of the theoretically derived scales of the model was investigated using exploratory factor analysis (EFA) to see whether there was evidence of an empirically derived different combination of items that was different from theoretical expectation. If so, the empirically derived scales were retained and confirmatory factor analysis (CFA) was applied to both the original theoretical scales as well as the new empirical scales and tested for model fit for each construct. The results revealed differences between the theoretically derived scales and the empirically derived scales for two of the independent variables: external collaboration (independent variable) and health insurer product innovation (dependent variable). The empirically derived scales for both constructs were retained and the measurement items were altered accordingly. Construct validity was then supported for both constructs. The theoretically derived scales for both EO and regulation were retained and construct validity was supported for both constructs.

As mentioned earlier, the decision was made to exclude the variable, innovation adoption, as a variable measuring the dependent variable, health insurer product innovation. This is due to its poor reliability and validity as a measurement construct for health insurer product

innovation. Thus the results indicate that there is empirical evidence to support the construct validity for health insurer product innovation, if innovation generation and organisational competitiveness are only included as measurement constructs.

Based on the assumption that innovation input is a necessary condition for product innovation, the researcher expected to find that organisations with lower levels of innovation input would tend to score relatively lower on the dependent variable measures, while organisations with higher levels of innovation input would tend to score more highly.

Using the multivariate technique of cluster analysis, respondents were categorised as having high, medium or low innovation input. This clustering variable was formed based on standardised measures of three independent measures of organisational innovation input: 1) whether the organisation has a research and development (R&D) budget; 2) whether the organisation's R&D budget encourages innovation; and 3) the number of R&D staff employed by the organisation's R&D department/division. This categorisation was then related to the two measures of the model's dependent variable - health insurer product innovation (innovation generation and organisational competitiveness). The results of the one-way analysis of variance (ANOVA) showed that the clusters differed significantly on the three standardised clustering variables, as well as on innovation generation and organisational competitiveness. Furthermore, the results showed that the direction and magnitude of the means for both innovation generation and organisational competitiveness were such that these means were highest in organisations with relatively high innovation input, followed by organisations with medium levels of innovation input and lowest for those organisations with low levels of innovation input. The significant results and direction of the clusters' mean measures of the dependent variable have thus fulfilled the expectations underlying the test for the criterion-related validity of the scales of the dependent variable and thus there is further support for the construct validity of health insurer product innovation for the researcher's model.

The results showed that the majority of health insurer administrators (60%) perceive a high level of innovation input, compared to 24% of health insurers and 18% of healthcare service providers. These results suggest that health insurer administrators have the innovation input capacity to drive health insurer product innovation in the South African private healthcare industry.

Organisational competitive capability (external variable) was used for additional validation of health insurer product innovation output (dependent variable). The analysis results show a moderately strong linear relationship ($r=0.63$, $p<0.001$) between the scales of Organisational Competitiveness vs. Organisational Competitive Capacity. As the scale of Organisational Competitive Capacity is considered in previous research to measure a similar construct to Organisational Competitiveness, a strong relationship between the measures is considered as evidence for the construct validity of the scale of Organisational Competitiveness (dependent variable).

Second order CFA on the subscale level confirmed external collaboration (relationship restructure) and innovation adoption as second order constructs and this resulted in the revision of the regression equation for the model, including external collaboration (relationship restructure). As previously mentioned innovation adoption was excluded from the model as a measurement construct due to its poor reliability and validity results.

Comparison of the subgroups on the measurement variables revealed differences between the healthcare service provider subgroup versus the other respondents (health insurers and health insurer administrators) on the correlation between EO and innovation generation. Significant differences in the correlations between EO and Organisational Competitiveness for healthcare service providers compared to health insurer administrators were found. This result prompted the decision to perform the regression analysis, testing the relationship between health insurer product innovation and EO, with and without the healthcare service provider subgroup. The testing of the interaction term (EO*Regulation) on the relationship between health insurer product innovation and EO also included and excluded the healthcare service provider subgroup. Finally, the model fit analysis results showed weak model fit despite attempting to improve the values using the empirically derived scales instead of the theoretically derived scales for external collaboration and health insurer product innovation. The model fit results suggest that the measurement scales for the model need to be refined. The CFA also confirmed that the measurement scales overall need to be improved and refined.

5.2.2.2 Evaluation of the model via regression analysis

The results on the construct validity of the measures of health insurer product innovation (dependent variable) confirmed the presence of two underlying dimensions – innovation generation and organisational competitiveness. The construct validity results on external collaboration similarly confirmed the presence of two underlying dimensions – external collaboration (Trustworthiness (T), Role specification (RS) and Relationship initiation (RI)), and external collaboration (Relationship restructure (RR)). Additional hypotheses were included that involved all combinations of the variables to test the interaction terms on the relationship between health insurer product innovation and EO and the relationship between health insurer product innovation and external collaboration, so that there would be no misspecification of the regression model.

The following relational research hypotheses were tested:

Hypothesis 1: A positive correlation exists between the level of new product innovation by health insurers and entrepreneurial orientation (EO) – hypotheses 1a and b.

Hypothesis 2: A positive correlation exists between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers – hypotheses 2a-d.

Hypothesis 3: The relationship between the level of new product innovation by health insurers and entrepreneurial orientation (EO) is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that the relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence – hypotheses 3a and b.

Hypothesis 4: The relationship between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that this relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence – hypotheses 4a-d.

Hypotheses 5 and 6 were created to test for model misspecification by including all the main variables when testing the moderation effects of the interaction terms on the relationship between health insurer product innovation and EO and the relationship between health insurer product innovation and external collaboration – hypotheses 5a and b and 6a-d.

The regression analyses showed the following results for each of the research hypotheses:

Hypothesis 1

The regression results for research hypothesis 1 (H1a and b) revealed a strong positive linear relationship between health insurer product innovation (for both innovation generation and organisational competitiveness) and EO. Research hypothesis 1 is therefore supported and the finding is supported by the literature. The literature indicates that the strength of a firm's entrepreneurial orientation can have a strong positive effect on performance (Zahra and Covin 1995; Morris and Sexton 1996; Wiklund and Shepherd 2005; Green, Covin and Slevin 2008). According to Wiklund (1999) and Soininen et al. (2011), innovation keeps organisations ahead of their competitors, gaining competitive advantage which leads to improved financial results. According to Goedhuys and Veugelers (2011) product innovation translates into superior sales and growth rates. Li et al. (2006) found a strong link between EO and new product development improvement (Drucker 1985; Lumpkin and Dess 1996; Li et al. 2006). The correlation results between the EO constructs (innovativeness, proactiveness and risk-taking) and the health insurer product innovation constructs (innovation generation and organisational competitiveness) show the correlations to be highly significant ($p < 0.001$) with moderate effect size (r^2 ranging between 0.29 and 0.49), thus providing further support for hypothesis 1 at a lower level of measurement.

The CFA results indicated that innovation adoption was a weak measurement construct for healthcare innovation and it was dropped from the researcher's model. This could suggest that innovation adoption should be positioned differently to actors in the healthcare value chain as it could have a negative or inferior connotation to innovation perceptions by the various subgroups.

Hypothesis 2

The regression results for research hypothesis 2 (H2a-d) revealed a weak positive linear relationship between health insurer product innovation (for both innovation generation and organisational competitiveness) and External Collaboration (T, RS, RI) and External Collaboration (RR). Research hypothesis 2 is therefore supported, although the results were weak. The literature support the importance of the relationship between product innovation and external collaboration: according to Adler et al. (2011), collaborative communities encourage people to continually apply their unique talents to group projects and to become motivated by a collective mission, not just personal gain or the intrinsic pleasures of autonomous creativity. Christensen et al. (2009) explains that because healthcare, according to his 'tools of cooperation model', is in the lower left world of disagreement, certain remedies reformers tried to introduce in the past have not worked. There are also instances in which disagreement among parties that need to cooperate is so fundamental that it is simply impossible to reach consensus on a course of action (Christensen et al. 2009). The weak relationship between health insurer product innovation and external collaboration suggests that industry dynamics could play a part explaining this weak result.

Hypothesis 3

The regression results for research hypothesis 3 (H3a and b) revealed a negligible moderation effect for regulation on the relationship between health insurer product innovation (innovation generation and organisational competitiveness) and EO. Research hypothesis 3 is therefore not supported. The literature indicates that in the healthcare sector, regulatory bodies play a pivotal role in balancing cooperation and competition by means of reforms introduced through legislation (Provan 1984; Mur-Veeman et al. 2001; Baretta 2008). According to Baretta (2008) regulatory bodies can also influence the level of competition in the healthcare industry. According to Christensen et al. (2009) the lack of business model innovation in the healthcare industry is a result of regulators not permitting it. Porter and Teisberg (2006) argue that if every actor in the healthcare system has to measure and report results and compete for every member/subscriber or patient, value will increase and innovation will flourish. They further indicate that the healthcare regulatory framework must include strategic regulatory factors which encourage innovation in: health

insurance and access; standards for coverage; and structure of healthcare delivery. This result suggests, contrary to expectation, that the low levels of strategic regulatory factors necessary to encourage health insurer innovation in the current South African healthcare regulatory framework, do not impact the relationship between health insurer product innovation and EO.

Hypothesis 4

The regression results for research hypothesis 4 (H4a and b) revealed a negligible moderation effect for regulation on the relationship between health insurer product innovation (innovation generation and organisational competitiveness) and External Collaboration (T, RS, RI) and External Collaboration (RR). Research hypothesis 4 is therefore not supported. Baretta (2008) argues that regulatory bodies can also impact on the level of cooperation among providers of healthcare services through many decisions, such as the implementation of a financing model for healthcare service providers that induces collaboration/cooperation among them. According to Porter and Teisberg (2006) healthcare policy has been both a reflection and a contributor to the zero-sum competition that plagues the current inefficient healthcare system. This result suggests, contrary to expectation, that the low levels of strategic regulatory factors necessary to encourage health insurer innovation in the current South African healthcare regulatory framework, do not impact the relationship between health insurer product innovation and external collaboration.

Hypotheses 5 and 6

As mentioned earlier, hypotheses 5 and 6 were created to test for model misspecification by including all the main variables when testing the moderation effects of the interaction terms on the relationship between health insurer product innovation and EO and the relationship between health insurer product innovation and external collaboration. The healthcare service provider subgroup was again excluded and included in the regression analysis for hypothesis 5 – testing for the moderation effect of the interaction term (EO*Regulation) on the relationship between health insurer product innovation and EO. The regression results revealed that both research hypotheses 5 and 6 are not supported, suggesting no evidence of model misspecification.

Analysis conclusion – model testing

The data analysis results indicate that EO is the only strong predictor of health insurer product innovation in the conceptual model designed by the researcher. The results also indicate that regulation is not moderating the relationships between health insurer product innovation and EO and health insurer product innovation and external collaboration. The study results also show that external collaboration between health insurers and healthcare service providers is a weak predictor of health insurer product innovation.

5.3 Conclusions of the study

This research study contributes to entrepreneurship literature and builds on existing entrepreneurship studies. The aim of the research study was to build on the existing Domain Framework of Guth and Ginsberg (1990) for integrating corporate entrepreneurship into the strategic management of a company. The researcher developed a conceptual model, building on the innovation process of the Domain Framework by Guth and Ginsberg (1990), in order to investigate the relationship between the level of health insurer product innovation and entrepreneurial orientation (EO); the relationship between the level of health insurer product innovation and external collaboration between health insurers and healthcare service providers. The research study also investigated whether low levels of presence of perceived strategic regulatory factors, necessary for encouraging health insurer product innovation in the private healthcare industry in South Africa, weakens the relationship between the level of new health insurer product innovation and EO and weakens the relationship between the level of new health insurer innovation and external collaboration between health insurers and healthcare service providers. This study focused on important actors in both the demand and supply side structures of the South African private healthcare value chain, including private health insurers, health insurer administrators, private hospital groups and physician representative societies/associations.

Based on the research findings, the strong positive correlations between EO and health insurer product innovation (innovation generation and organisational competitiveness) provide strong support that in order for health insurers to create new innovative products/plans for the private healthcare industry in South Africa, high firm-level EO is a necessity in terms of product innovation success. The study also found that there is a

perception that health insurer administrators generally control the health insurer product innovation process with health insurers due to their internal innovation input capacity. This finding is important as it suggests that health insurers and healthcare service providers must invest more in innovation input capacity in order to drive greater health insurer product innovation performance in the South African private healthcare industry. The innovation capacity of healthcare service providers is especially important in initiating supply side innovation in the healthcare value chain.

According to Rosenbusch et al. (2011), entrepreneurs and small business owners face the dilemma of deciding whether they should pursue and focus on innovation development projects as firm-internal projects or with strategic alliances (external partners). They indicate that prior research mainly advocates external collaborations and networking for new and small organisations. They also indicate that their findings show that internal innovation projects lead to greater firm performance than innovation projects with external partners. They further stress that their meta-analytical results indicate that the innovation projects that focus on external collaboration do not increase the performance of small and medium enterprises (SMEs).

The study results, contrary to expectation, also show a weak correlation between external collaboration and health insurer product innovation. The results suggest that the perception of the importance of external collaboration as a driver for health insurer product innovation is weaker in the supply side structures than the demand side structures of the private healthcare value chain. However, both the supply and demand side structures have recognition for the fact that the restructuring of the relationship between health insurers and healthcare service providers is a necessary driver for external collaboration and health insurer product innovation progress and success. The study results also suggest that the weak correlation of the relationship between health insurer product innovation and external collaboration could be a result of industry dynamics. Christensen et al. (2009) also indicate through their 'tools of cooperation' matrix, that healthcare is in the lower left world of disagreement, suggesting that actors in the healthcare value chain experience high levels of disagreement in terms of healthcare innovation and reform, impacting external collaboration and innovation negatively.

The study results show that the South African private healthcare regulatory framework for health insurers has low levels of strategic regulatory factors present, necessary for encouraging health insurer product innovation. This is an important finding in terms of contextualising the regulatory environment for health insurers in South Africa. These strategic factors include increased health insurance and access to health insurance by formally employed, uncovered employees; the review of standards for coverage by actors in the healthcare value chain to reduce waste and over-servicing of patients and; the structure of healthcare delivery to facilitate and ensure quality, efficiency and value for subscribers/patients. According to Porter and Teisberg (2006), the structure of healthcare delivery is viewed as a critical element in driving supply side value-based innovation in the healthcare value chain.

The results further revealed, contrary to expectation, a negligible moderation effect for regulation on the relationship between health insurer product innovation (innovation generation and organisational competitiveness) and External Collaboration (T, RS,RI) and External Collaboration (RR). The researcher expected to find a negative moderation result as the literature indicates that the lack of business model innovation is due to regulators not permitting it (Christensen et al. 2009).

This research study therefore highlights important issues impacting health insurer product innovation which could be explored further in light of ensuring the future viability of the private healthcare industry in South Africa. The provision of quality, cost effective and efficient healthcare delivery by both the private and public sectors in South Africa are important social delivery objectives and regulators need to focus more on fostering innovation activities in the healthcare value chain in order to achieve these objectives.

5.3.1 Implications for theory development

This research study contributes to theoretical development in a number of ways. The importance of entrepreneurial orientation (EO) in organisational performance has been recognised in the literature and this study revealed that EO is critical to health insurer product innovation (innovation generation and organisational competitiveness) in the private healthcare industry in South Africa, and provides additional grounding for statements about

the strong positive effect of EO on organisational performance (Zahra and Covin 1995; Morris and Sexton 1996; Wiklund and Shepherd 2005; Green, Covin and Slevin 2008).

The addition of external collaboration between health insurers and healthcare service providers in the researcher's conceptual model, as a predictor of health insurer product innovation, revealed that external collaboration between health insurers and healthcare service providers is a weak predictor of health insurer product innovation. The weak positive linear correlation results of research hypothesis 2 (the relationship between health insurer product innovation and external collaboration) could add to the theoretical view expressed by Christensen et al. (2009) that the level of disagreement between the demand and supply side structures in terms of healthcare innovation could be significant and therefore impedes healthcare innovation and reform. Furthermore, this study could also add to the findings by Rosenbusch et al. (2011) that innovation projects focusing on external collaboration do not increase the performance of small and medium enterprises (SMEs).

Including regulation as a moderator in the researcher's conceptual model further revealed that low levels of strategic regulatory factors are present in healthcare regulation in South Africa. These low levels of strategic regulatory factors do not moderate the relationships between EO and health insurer product innovation and the relationship between external collaboration and health insurer product innovation. The literature expressed a contrarian view on the impact of regulation on innovation and collaboration and this finding could add to the competition and collaboration literature, especially for private healthcare industries. Christensen et al. (2009) indicates that the lack of business model innovation in the healthcare industry is a result of regulators not permitting it and according to Porter and Teisberg (2006) healthcare policy has been both a reflection and a contributor to the zero-sum competition that plagues current inefficient healthcare systems.

5.3.2 Implications for healthcare executives

The findings of the study could have practical and policy implications. The practical implications for healthcare executives are; 1) to ensure that their organisations have the necessary internal innovation input capacity to drive innovation output and that 2) external collaboration between health insurers and healthcare service providers need to be focused on more actively by actors in the healthcare value chain. Both the supply and demand side

structures (subgroups identified for the purposes of this study) have indicated recognition for the fact that the restructuring of relationships between health insurers and healthcare service providers is a necessary driver for collaboration in terms of health insurer product innovation progress and success. This finding suggests that healthcare insurer executives should actively focus on the following initiatives as examples which could drive greater innovation activities between health insurers and healthcare service providers:

- Assist healthcare service providers to have more up-to-date patient information
- Reward healthcare service providers for improving results over time
- Introduce simplified billing practices in terms of contractual arrangements between health insurers and healthcare service providers
- Reduce administrative complexities by eliminating paperwork and transactions
- Make new investments in technology and related infrastructure to facilitate collaboration practices

The policy implications highlighted by this study relate to the perception of the low levels of strategic regulatory factors present in healthcare regulation in South Africa, necessary to drive health insurer product innovation. The strategic regulatory factors necessary to drive health insurer product innovation are: increased health insurance and access to health insurance; standards for coverage; and the structure of healthcare delivery (Porter and Teisberg 2006). Healthcare delivery is viewed as a critical component in terms of driving value-based competition and innovation in healthcare (Porter and Teisberg 2006). Healthcare executives need to work with, and actively lobby, regulators to investigate these aspects which could ignite both demand and supply side innovation activities in the healthcare value chain of the private healthcare industry of South Africa.

5.4 Recommendations for future research

The research study highlighted several areas in terms of future research. The construct validity of the measurement constructs used to measure the variables of the model, EO, external collaboration, regulation and health insurer product innovation were confirmed through CFA. Although, the model fit results indicated weak model fit, the measurement constructs used for this study formed a good foundation from which future research could

be explored and for further refinement of the measurement instruments focusing on the various constructs of the model.

Future research could involve a larger sample of actors in the demand and supply side structures of the South African private healthcare value chain, focusing especially on supply side innovation and focusing on the structure of healthcare delivery. External collaboration, especially in the healthcare environment in South Africa, needs to be explored further based on the weak results found in predicting health insurer product innovation in this specific study. External collaboration is viewed as a critical component in terms of supply side innovation in healthcare. According to Mintzberg (2011) healthcare actors need to build systems that both promote health and treat illness and to do that, more cooperation between healthcare actors are required, not more competition. Future research could focus on the relationship between market dynamism in the private healthcare industry in South Africa and external collaboration between the various actors in the private healthcare value chain.

The impact of regulation on innovation progress in the private healthcare industry needs to be investigated further based on the results of this study, due to the importance of regulation balancing cooperation and competition in the healthcare value chain. The perceived strategic regulatory factors necessary for encouraging health insurer product innovation should be explored further in terms of how this could impact innovation activities in the private healthcare industry of South Africa.

Innovation generation and innovation adoption as two measurement constructs for health insurer product innovation need to be refined and explored further in terms of the private healthcare industry in South Africa, especially the level of health insurer product innovation, which could be classified as innovation adoption and innovation generation. This needs to be linked to health insurer product innovation performance which could provide a clearer differentiation between the two constructs and their respective relationships to health insurer product innovation.

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APPENDIX A

ACTUAL RESEARCH INSTRUMENT

- 1) Please select which industry sector you belong to, from the list below:
- Health insurer
 - Health insurer administrator
 - Health service provider
- 1b) Please indicate whether your organisation is a(n):
- Restricted membership medical scheme
 - Open medical scheme
- 1b) Please select which area you work in, as a healthcare service provider, from the list below:
- Hospital
 - Medical Specialist/Specialist representative body
 - General Practitioner/GP representative body

SECTION A

- 2) How long has your organisation been in operation?
- 0-3 years
 - 4-5 years
 - 6-10 years
 - 11-20 years
 - More than 20 years
- 3) How many staff does your organisation employ? (Please only include permanent staff in your selection choice)
- Less than five permanent
 - 6-10 permanent staff
 - 11-50 permanent staff
 - 51-100 permanent staff
 - 101-200 permanent staff
 - More than 200 permanent staff
- 4) What is the size of your organisation in terms of membership base (i.e. average number of lives insured, lives under administration) for the current financial year?
- Fewer than 1 000
 - 1 000 – 5 000
 - 5 001 – 10 000
 - 10 001 – 30 000
 - 30 001 – 60 000
 - 60 001 – 100 000
 - More than 100 000

5) Does your organisation operate on a national level?

- Yes
 No

5b) In which province(s) does your organisation operate?

- Eastern Cape
 Free State
 Gauteng
 KwaZulu Natal
 Limpopo Province
 Mpumalanga
 Northern Cape
 North West Province
 Western Cape

ORGANISATIONAL COMPETITIVE CAPABILITY

6) For each statement, please select how much you would agree or disagree with the statement in terms of your own organisation's competitive capabilities. Please rate each statement on a 7-point agreement scale.

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
Your organisation exploits entrepreneurial opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation has the capacity to innovate and sustain an economically viable industry position	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation uses entrepreneurial initiatives to explore new technologies or product-market domains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation uses entrepreneurial initiatives to exploit existing technologies or product-market domains	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation is strategically positioned to improve the quality of healthcare delivery for members/patients in the healthcare industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation is able to change the structure of healthcare delivery in the private healthcare industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION B- ENTREPRENEURIAL ORIENTATION (EO)

For the following questions, please select a point on the spectrum identified by the statements on the left and the right, the best describes the perception you have of your origination:

INNOVATIVENESS:

- 7) In general, the top management of your organisation/practice favour.
- 1 A strong emphasis on the marketing of tried and true products or services.
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 A strong emphases on Research & Development leadership and innovations
- 8) During the past 3 years, the quantity of new products or services launched/marketed by your organisation/practice can best be described as:
- 1 Few products or services
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 Many products and services
- 9) Have the changes to products/services been of a minor nature or quite dramatic during the past 3 years?
- 1 Changes in product or services have been mostly of a minor nature.
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 Changes in product or services have usually been quite dramatic.

PRO-ACTIVENESS:

- 10) In dealing with its competitors, your organisation I practice:
- 1 Typically responds to actions which competitors initiate
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 Typically initiates actions to which competitors then respond.

- 11) In dealing with its competitors, your organisation I practice:
- 1 Is very seldom the first business to introduce new products or services, administrative techniques, operating technologies and so on.
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 Is very often the first business to introduce new products or services, administrative techniques, operating technologies, and so on
- 12) In dealing with its competitors, your organisation/practice:
- 1 Typically seeks to avoid competitive clashes, preferring a “live-and-let-live” posture
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 Typically adopts a very competitive, “undo-the-competition” posture

RISK-TAKING

- 13) In general, the top management of your organisation/practice have:
- 1 A strong appetite for low risk projects (with normal and certain rates of return).
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 A strong appetite for high-risk projects (with chances of very high returns)
- 14) In general, the top managers of your organisation/practice believe that:
- 1 Owing to the nature of the environment, it is best to explore it gradually via cautious, incremental behaviour:
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 Owing to the nature of the environment, bold wide-ranging acts are necessary to achieve the organisation’s objectives

- 15) When confronted with decision-making situations involving uncertainty, your organisation/practice
- 1 Typically adopts a cautious “wait and see” posture in order to minimize the probability of making costly decisions
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7 Typically adopts a bold, aggressive posture in order to maximise the probability of exploiting potential opportunities.

SECTION C: EXTERNAL COLLABORATION BETWEEN HEALTH INSURERS (HIs) / HEALTH INSURER ADMINISTRATORS (HIAs) AND HEALTHCARE SERVICE PROVIDERS

TRUSTWORTHINESS

16) Please indicate the extent to which you agree or disagree with the following statements, using the 7-point agreement scale as shown below:

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
The top management of healthcare service providers/His/HIAs that your organisation/practice deals with, are credible individuals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation/practice trusts the product innovation expertise of healthcare service providers/His/HIAs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation/practice Can count on top management of healthcare service providers/His/HIAs to do what they say	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Healthcare service providers/His/HIAs have a positive attitude to collaborating with health insurers/health insurer administrators/health care service providers in terms of innovative products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your organisation/practice has a good working relationship with healthcare service providers His/HIAs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interactions, between your organisation/practice and healthcare service providers His/HIAs are characterised by open communication of both parties.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ROLE SPECIFICATION

17) Please indicate the extent to which you agree or disagree with the following statements, using the 7-point agreement scale as shown below:

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
Health insurers /health insurer administrators and healthcare service providers negotiate to come to agreement on health insurer product design and contractual obligations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health insurers /health insurer administrators and healthcare service providers are mutually dependent on each other in caring for members / patient through innovation health insurer product design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health insurers / health insurer administrators and healthcare service providers will work with each other to overcome disagreements on their roles in managing members / patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In providing quality patient care and members benefits, health insurers /health insurer administrators need healthcare service providers as much as healthcare service providers need health insurers health insurer administrators.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In designing innovative health insurer products / services, health insurers/health insurer administrators depend on healthcare service providers as much as healthcare service providers depend on health insurers/health insurer administrators	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

RELATIONSHIPSHIP INITIATION

18) Please indicate, using a 7-point agreement scale, the extent to which you agree or disagree that healthcare service providers/health insurers (His) / health insurer administrators (HIAs):

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
Spend sufficient time with health insurers/health insurer administrators/health care service providers trying to learn how they can assist in providing better care/patient benefits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Show sufficient interest in improving healthcare efficiencies and quality of patient care/patient benefits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

THE RESTRUCTURE OF THE HEALTH INSURER/HEALTH INSURER ADMINISTRATOR AND HEALTHCARE SERVICE PROVIDER RELATIONSHIPSHIP

19) Please indicate, using a 7-point agreement scale, the extent to which you agree or disagree those health insurers/health insurer administrators in South Africa should:

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
Assist healthcare service providers involved in patient care to have up-to-date patient information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reward healthcare service providers for improving results over time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Move to introduce simplified billing practices in terms of their contracting arrangements with healthcare service providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce administrative complexity by simplifying, standardising and eliminating paperwork and transactions for healthcare service providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make new investments in technology and related infrastructure to facilitate collaboration with healthcare service providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION D: REGULATION

ENCOURAGE COMPETITION IN THE HEALTHCARE VALUE CHAIN TO REDUCE PRICES

20) Please indicate, using a 7-point agreements scale, the extent to which you agree or disagree with the following statements about the South African healthcare regulatory environment.

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
It encourages healthcare insurer/health insurer administrators to negotiate prices independently with health care providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It encourages reduced prices and increased efficiencies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It encourages contracting with only efficient and excellent healthcare service providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

IMPROVE HEALTH INSURANCE AND ACCESS TO PRIVATE HEALTHCARE

21) Please indicate, using a 7-point agreement scale, the extent to which you agree or disagree with the following statements about the South African healthcare regulatory environment

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
It supports mandatory private healthcare coverage for all formally employed people to increase the privately insured population	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It creates incentives for low-income formally employed people to join private health insurers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It enables health insurers to design and register affordable healthcare benefit plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It creates risk pools for high risk individuals in order to spread the risk proportionally among all health insurers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It allows health insurers to incentivise employer groups to improve employee health status	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It allows health insurers to incentivise individual members to improve their health status	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

IMPROVE STANDARDS FOR COVERAGE

22) Please indicate, using a 7-point agreement scale, the extent to which you agree or disagree with the following statements about the South African healthcare regulatory environment.

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
It reviews minimum coverage / benefit standards to update for evolving types of care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It incentivises members of health insurers to participate in healthy living practices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It incentivises members of health insurers to comply with treatment protocols	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It financially penalizes members of health insurers for not complying with treatment protocols	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

IMPROVE THE STRUCTURE OF HEALTHCARE DELIVERY

23) Please indicate, using 7-point agreement scale, the extent to which you agree or disagree with the following statements about the South Africa healthcare regulatory environment.

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
It establishes a process for ensuring that high quality information of provider outcomes for every medical condition is collected for the benefit of members of health insurers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It establishes a process whereby high quality information and provider outcomes are disseminated for the benefit of members of health insurers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It provides incentives to healthcare service providers and health insurers/ health insurer administrators for the adoption of information technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION E: HEALTH INSURER PRODUCT INNOVATION GENERATION AND ADOPTION

INTERNAL INNOVATION INPUT

24) Does your organisation/practice have an approved budget for Research and Development (R&D) activities?

- Yes
- No
- Unsure

25) To what extent do you agree or disagree with the following statement:

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
The approved budget for R&D activities in your organisation/practice encourages innovation	o	o	o	o	o	o	o

26) Please indicate the staff complement of your organisation's R&D function:

- No staff members
- Fewer than 5 staff members
- 5-10 staff members
- more than 11 staff members

INNOVATION OUTPUT

27) How many healthcare products or services has your organisation/practice launched in the last three years that have been innovative for your organisation

- 0
- 1-2
- 3-5
- 6-10
- More than 10

28) How many healthcare products or services has your organisation/practice launched in the 1st three years that have been innovative for the healthcare industry in South Africa?

- 0
- 1-2
- 3-5
- 6-10
- More than 10

29) Over the past three years, to what extent do you agree or disagree that your organisation/practice has (for healthcare service providers: in conjunction with health insurers/health insurer administrators and for health insurer administrators: in conjunction with health insurers).

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
Adopting existing healthcare insurance products/plans for its members/patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adapted existing healthcare insurance products /plans for its members/patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that are new to your organisation/practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that have not yet been launched in the healthcare industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that have not yet been launched elsewhere in the world	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that have been adopted subsequently by your competitors in the healthcare industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that have made your organisation/practice more competitive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that have opened new opportunities in new markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that have opened new opportunities in uncertain local markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generated new healthcare insurance products/plans that have opened new opportunities in uncertain international markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	1- Strongly Disagree	2- Disagree	3- Somewhat Disagree	4- Neither Agree nor Disagree	5- Somewhat Agree	6- Agree	7- Strongly Agree
Improve the financial operating result of your organisation/practice through new health insurer product innovation.	0	0	0	0	0	0	0
Created membership/client/patient growth for your organisation /practice through new health insurer product innovation	0	0	0	0	0	0	0
Improved your organisation's / practice's position in the industry through new health insurer product innovation	0	0	0	0	0	0	0

APPENDIX B

CONSISTENCY MATRIX

Research problem

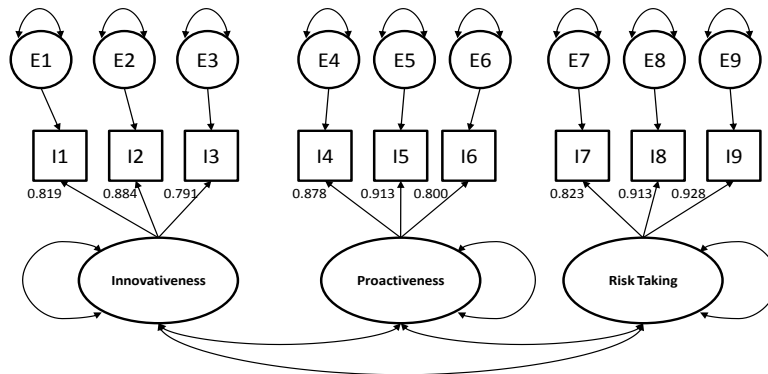
In the context of healthcare inequalities and a struggling and underfunded public healthcare system in South Africa, the South African private healthcare industry is viewed as a national asset. However, the South African private health insurance industry is a complex and heavily-regulated industry, with minimal growth in total lives covered, spiralling healthcare costs and coverage of only 16% of the South African population. There are approximately five-million formally employed uninsured people in South Africa and in order to grow and sustain the private healthcare industry, and lighten the population load of formally employed uninsured people on public healthcare delivery systems, the private healthcare industry needs new, attractive/innovative health insurer products/plans. This could align the incentives of stakeholders (demand and supply side structures) in the private healthcare value chain, and thus could create the necessary access to private healthcare cover for the uninsured.

Purpose of the research study

The purpose of this research study is to investigate the relationship between the level of health insurer product innovation and entrepreneurial orientation (EO); the relationship between the level of health insurer product innovation and external collaboration between health insurers and healthcare service providers and; whether the low presence of perceived strategic regulatory factors, necessary for encouraging health insurer product innovation in the private healthcare industry in South Africa, weakens the relationship between the level of new health insurer product innovation and EO, as well as the relationship between the level of new health insurer innovation and external collaboration between health insurers and healthcare service providers.

Research Hypotheses	Research Questions	Source of data	Type of data	Analysis
<p><u>Hypothesis 1:</u></p> <p>A positive correlation exists between the level of new product innovation by health insurers and entrepreneurial orientation (EO).</p>	<p><u>Research question 1:</u></p> <p><i>Does firm entrepreneurial orientation (EO) promote new product innovation by health insurers?</i></p>	<p>Questionnaire – online survey Sections B, E</p>	<p>Ordinal Interval</p>	<p>Mean, Standard Deviation, EFA, CFA, Cluster analysis, Correlation analysis, Regression analysis</p>
<p><u>Hypothesis 2:</u></p> <p>A positive correlation exists between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers.</p>	<p><u>Research question 2:</u></p> <p><i>Does external collaboration between health insurers and healthcare service providers promote new product innovation by health insurers?</i></p>	<p>Questionnaire – online survey Sections C, E</p>	<p>Ordinal Interval</p>	<p>Mean, Standard Deviation, EFA, CFA, Cluster analysis, Correlation analysis, Regression analysis</p>
<p><u>Hypothesis 3:</u></p> <p>The relationship between the level of new product innovation by health insurers and entrepreneurial orientation (EO) is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that the relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.</p> <p><u>Hypothesis 4:</u></p> <p>The relationship between the level of new product innovation by health insurers and external collaboration between health insurers and healthcare service providers is moderated by perceived strategic regulatory factors necessary for encouraging health insurer product innovation, such that this relationship is weaker where these strategic regulatory factors have lower presence and stronger where they have higher presence.</p>	<p><u>Research question 3:</u></p> <p><i>Does the South African private healthcare regulatory environment impede new product innovation by health insurers?</i></p>	<p>Questionnaire – online survey Section D</p>	<p>Ordinal Interval</p>	<p>Mean, Standard Deviation, EFA, CFA, Cluster analysis, Correlation analysis, Regression analysis</p>

APPENDIX C



The standard CFA model for EO is presented above. The model represents the hypothesis that indicators I1-I3 measure the factor/latent variable innovativeness, indicators I4-I6 measure the factor/latent variable proactiveness and indicators I7-I9 measure the factor/latent variable risk-taking. Each indicator is a continuous variable represented as having two causes, a single factor that the indicator is supposed to measure and all other unique sources of influence represented by the error term (Kline 2011). Each of the indicators has a measurement error term, such as E1 for indicator I1 – measurement errors are independent of each other and of the factors. The lines with single arrow heads that point from the factor (e.g. innovativeness) to the indicator represent the presumed causal effect of the factor on the observed scores. The associations between the factors are unanalysed, so it is assumed that the factors covary.

The statistical estimates of these direct effects are called factor loadings and indicators assumed to be caused by underlying factors are referred to as reflective indicators (Kline 2011). The factor loadings for the latent variable, innovativeness for example, is in the range ± 0.8 to ± 0.88 . This is high and practically significant and is an indication that the factor account for more than 70% of the variance of the variable.

APPENDIX D

List of registered private health insurers in South Africa

Medical Scheme Name	Registration Date	Type
AECI MEDICAL AID SOCIETY	11/02/1971	Restricted
AFROX MEDICAL AID SOCIETY	05/12/1996	Restricted
ALLIANCE MIDMED MEDICAL SCHEME	30/08/1976	Restricted
ALTRON MEDICAL AID SCHEME	01/04/1987	Restricted
ANGLO MEDICAL SCHEME	16/10/1968	Restricted
ANGLOVAAL GROUP MEDICAL SCHEME	28/07/1997	Restricted
BANKMED	29/06/1972	Restricted
BARLOWORLD MEDICAL SCHEME	01/12/1980	Restricted
BESTMED MEDICAL SCHEME	11/08/1971	Open
BMW EMPLOYEES MEDICAL AID SOCIETY	13/01/1984	Restricted
BONITAS MEDICAL FUND	01/03/1982	Open
BP MEDICAL AID SOCIETY	20/02/1968	Restricted
BUILDING & CONSTRUCTION INDUSTRY MEDICAL AID FUND	02/08/2001	Restricted
CAPE MEDICAL PLAN	11/11/1971	Open
CHARTERED ACCOUNTANTS (SA) MEDICAL AID FUND (CAMAF)	08/06/1971	Restricted
COMMUNITY MEDICAL AID SCHEME (COMMED)	26/01/1995	Open
COMPCARE WELLNESS MEDICAL SCHEME	01/06/1978	Open
DE BEERS BENEFIT SOCIETY	29/05/1969	Restricted
DISCOVERY HEALTH MEDICAL SCHEME	08/10/1971	Open
EDCON MEDICAL AID SCHEME	03/03/1978	Restricted
ENGEN MEDICAL BENEFIT FUND	07/08/1997	Restricted
EYETHUMED MEDICAL SCHEME	19/12/2000	Restricted
FEDHEALTH MEDICAL SCHEME	26/11/1969	Open
FISHING INDUSTRY MEDICAL SCHEME (FISH-MED)	20/10/1967	Restricted
FOOD WORKERS MEDICAL BENEFIT FUND	20/10/1967	Restricted
GENESIS MEDICAL SCHEME	25/05/1995	Open
GOLD FIELDS MEDICAL SCHEME	15/01/1997	Restricted
GOLDEN ARROWS EMPLOYEES MEDICAL BENEFIT FUND	30/06/1972	Restricted
GOVERNMENT EMPLOYEES MEDICAL SCHEME (GEMS)	01/01/2005	Restricted
GRINTEK ELECTRONICS MEDICAL AID SCHEME	09/12/1983	Restricted
HORIZON MEDICAL SCHEME	11/09/1996	Restricted
HOSMED MEDICAL AID SCHEME	01/09/1988	Open
IBM (SA) MEDICAL SCHEME	12/02/1971	Restricted
IMPALA MEDICAL PLAN	15/07/2002	Restricted
IMPERIAL GROUP MEDICAL SCHEME	01/12/1995	Restricted
KEYHEALTH	28/05/1968	Open
LA-HEALTH MEDICAL SCHEME	10/01/1968	Restricted
LIBCARE MEDICAL SCHEME	20/02/1969	Restricted

Medical Scheme Name	Registration Date	Type
LIBERTY MEDICAL SCHEME	17/09/1998	Open
LONMIN MEDICAL SCHEME	01/01/2006	Restricted
MAKOTI MEDICAL SCHEME	07/09/1976	Open
MALCOR MEDICAL SCHEME	18/05/1994	Restricted
MASSMART HEALTH PLAN	20/10/1978	Restricted
MBMED MEDICAL AID FUND	05/12/1969	Restricted
MEDIHELP	23/06/1969	Open
MEDIMED MEDICAL SCHEME	12/09/1980	Open
MEDIPOS MEDICAL SCHEME	15/06/1994	Restricted
MEDSHIELD MEDICAL SCHEME	06/02/1968	Open
METROCARE	30/07/1987	Restricted
METROPOLITAN MEDICAL SCHEME	28/10/1970	Restricted
MINEMED MEDICAL SCHEME	18/02/1997	Restricted
MOMENTUM HEALTH	06/05/1971	Open
MOTOHEALTH CARE	01/10/2007	Restricted
NAMPAK (SA) MEDICAL SCHEME	01/02/1971	Restricted
NASPERS MEDICAL FUND	07/03/1972	Restricted
NATIONAL INDEPENDENT MEDICAL AID SOCIETY (NIMAS)	27/01/1971	Open
NEDGROUP MEDICAL AID SCHEME	24/12/1976	Restricted
NETCARE MEDICAL SCHEME	19/12/2000	Restricted
OLD MUTUAL STAFF MEDICAL AID FUND	13/02/1969	Restricted
PARMED MEDICAL AID SCHEME	29/03/1974	Restricted
PG BISON MEDICAL AID SOCIETY	04/01/1983	Restricted
PG GROUP MEDICAL SCHEME	20/11/1970	Restricted
PHAROS MEDICAL PLAN	02/02/1994	Open
PICK N PAY MEDICAL SCHEME	09/05/1996	Restricted
PLATINUM HEALTH	19/12/2000	Restricted
PRO SANO MEDICAL SCHEME	17/05/1976	Open
PROFMED	10/08/1969	Restricted
QUANTUM MEDICAL AID SOCIETY	01/03/1983	Restricted
RAND WATER MEDICAL SCHEME	24/10/1969	Restricted
REMEDI MEDICAL AID SCHEME	18/09/1972	Restricted
RESOLUTION HEALTH MEDICAL SCHEME	09/04/1998	Open
RETAIL MEDICAL SCHEME	10/02/1970	Restricted
RHODES UNIVERSITY MEDICAL SCHEME	15/12/1967	Restricted
SABC MEDICAL AID SCHEME	23/06/1972	Restricted
SAMWUMED	11/11/1968	Restricted
SAPPI MEDICAL AID SCHEME	20/01/1985	Restricted
SASOLMED	17/02/1971	Restricted
SEDMED	19/02/1987	Restricted
SELFMED MEDICAL SCHEME	19/11/1974	Open
SIEMENS MEDICAL SCHEME	06/11/1968	Restricted
SIZWE MEDICAL FUND	17/03/1978	Open

Medical Scheme Name	Registration Date	Type
SOUTH AFRICAN BREWERIES MEDICAL SCHEME	01/09/1970	Restricted
SOUTH AFRICAN POLICE SERVICE MEDICAL SCHEME (POLMED)	01/11/1999	Restricted
SPECTRAMED	23/08/1971	Open
SUREMED HEALTH	20/08/1976	Open
TFG MEDICAL AID SCHEME	18/11/1998	Restricted
THEBEMED	12/09/2002	Open
TIGER BRANDS MEDICAL SCHEME	01/06/1993	Restricted
TOPMED MEDICAL SCHEME	24/04/1972	Open
TRANSMED MEDICAL FUND	22/11/2000	Restricted
TSOGO SUN GROUP MEDICAL SCHEME	30/07/1999	Restricted
UMVUZO HEALTH MEDICAL SCHEME	01/07/2004	Restricted
UNIVERSITY OF KWA-ZULU NATAL MEDICAL SCHEME	01/07/1983	Restricted
UNIVERSITY OF THE WITWATERSRAND - JOHANNESBURG STAFF MEDICAL AID FUND	18/05/1971	Restricted
WITBANK COALFIELDS MEDICAL AID SCHEME	30/04/1969	Restricted
WOOLTRU HEALTHCARE FUND	12/12/1969	Restricted
XSTRATA MEDICAL AID SCHEME	07/08/1968	Restricted

Source: Council for Medical Schemes (2011) (<http://medicalschemes.com>)

APPENDIX E

List of accredited health insurer administrators in South Africa

Accredited Medical Scheme Administrators
AGILITY GLOBAL HEALTH SOLUTIONS AFRICA (PTY) LTD (ADMIN: 3)
ALLCARE ADMINISTRATORS (PTY) LTD (ADMIN: 2)
CAPE MEDICAL PLAN (SELF-ADMINISTERED) (ADMIN: 50)
DE BEERS BENEFIT SOCIETY (SELF-ADMINISTERED) (ADMIN: 57)
DISCOVERY HEALTH (PTY) LTD (ADMIN: 19)
ETERNITY PRIVATE HEALTH FUND ADMINISTRATORS PTY LTD (ADMIN: 10)
MEDIHELP MEDICAL SCHEME (SELF ADMINISTERED) (ADMIN: 46)
MEDSCHEME HOLDINGS (PTY) LTD (ADMIN: 21)
METROPOLITAN HEALTH CORPORATE (PTY) LTD (ADMIN: 17)
METROPOLITAN HEALTH PTY LTD (ADMIN: 18)
MOMENTUM MEDICAL SCHEME ADMINISTRATORS (PTY) LTD (ADMIN: 13)
PLATINUM HEALTH (SELF ADMINISTERED) (ADMIN: 53)
PRIVATE HEALTH ADMINISTRATORS (A DIVISION OF SWEIDAN TRUST (PTY) LTD) (ADMIN: 11)
PRO SANO MEDICAL SCHEME (SELF-ADMINISTERED (ADMIN: 58)
PROFESSIONAL MEDICAL SCHEME ADMINISTRATORS (PTY) LTD (ADMIN: 37)
PROVIDENCE HEALTHCARE RISK MANAGERS PTY LTD (ADMIN: 22)
RAND WATER MEDICAL SCHEME (SELF-ADMINISTERED) (ADMIN: 56)
SANLAM HEALTHCARE MANAGEMENT (PTY) LTD (ADMIN: 47)
SECHABA MEDICAL SOLUTIONS (PTY) LTD (ADMIN: 8)
THEBE YA BOPHELO HEALTHCARE ADMINISTRATORS (PTY) LTD (ADMIN: 7)
UMVUZO HEALTH MEDICAL SCHEME (SELF-ADMINISTERED) (ADMIN: 51)
UNIVERSAL HEALTHCARE ADMINISTRATORS (PTY) LTD (ADMIN: 5)
V MED ADMINISTRATORS (PTY) LTD (ADMIN: 45)
WITBANK COALFIELDS MEDICAL AID SCHEME (RESTRICTED -SELF-ADMINISTERED) (ADMIN: 54)

Source: Council for Medical Schemes (2011) (<http://medicalschemes.com>)

APPENDIX F

List of private hospital groups

Hospital Group	Number of beds 2007	Number of beds 2008	Number of beds 2009	% share of total beds (2009)
Netcare Holdings (listed company)	7576	8177	8984	29%
Mediclinic (listed company)	6732	6685	7807	25%
Life Healthcare (listed company)	6894	7142	7874	25%
Clinix (unlisted company)	657	1154	1290	4%
Independent hospitals	6567	7369	5450	17%
Total private sector beds	28426	30527	31405	100%

Source: HASA (2012) (<http://www.hasa.co.za/about/what/>)

APPENDIX G

List of general practitioner and specialist representative associations

General Practitioners	Association/society
	<p>IPA Foundation (http://www.ipafoundation.co.za)</p> <ul style="list-style-type: none"> - SAMCC (www.samcc.co.za) - ASAIPA (www.asaipa.co.za) - SPNET (www.spnx.co.za)
Specialists	Association/society
	<p>Healthman (http://www.healthman.co.za)</p>
	<p>SA Private Practitioners Forum (http://www.sappf.co.za)</p>
	<p>NPG (National Pathology Group) (http://www.npg.co.za)</p>
	<p>RADSOC (Radiological Society of South Africa) (http://www.rssa.co.za)</p>
	<p>SAMA (South African Medical Association) (http://www.sama.co.za)</p>
	<p>SPESNET (http://www.spesnet.co.za)</p>

APPENDIX H

Scheffe test p values of pairwise cluster mean comparisons on Innovation generation and organisational competitiveness

Scheffe Test p values; Variable: Innovation generation

	Mean Generation		
Innovation input level	High input=5.12	Medium input=3.85	Low input=3.05
High input		0.0000	0.0000
Medium input	0.0000		0.0186
Low input	0.0000	0.0186	

Scheffe Test p values; Variable: Organisational competitiveness

	Mean Organisational competitiveness		
Innovation input level	High input=5.85	Medium input=4.28	Low input=3.40
High input		0.0000	0.0000
Medium input	0.0000		0.0186
Low input	0.0000	0.0186	

APPENDIX I

T-test results: To test for the difference between Health insurer and health insurer administrator means

T-tests; Grouping: Industry sector Group 1: HI Group 2: HIA

VARIABLES	Mean - HI	Mean - HIA	t-value	df	p	Valid N - HI	Valid N - HIA	Std.Dev. - HI	Std.Dev. - HIA	F-ratio - Variances	p - Variances	Effect size d
EO	4.22	4.76	-1.82885	115	0.070013	34	83	1.39	1.46	1.11325	0.747546	0.3723817
External Collaboration (T,RS,RI)	4.72	4.84	-0.67678	115	0.499906	34	83	0.77	0.89	1.310938	0.387452	0.1378872
External Collaboration (RR)	5.96	5.90	0.24503	115	0.806867	34	83	1.17	1.04	1.267349	0.387958	0.0499502
cube External Collaboration (RR)	232.84	223.01	0.51965	115	0.60431	34	83	99.63	90.12	1.222125	0.46193	0.1058092
Regulation	3.06	3.54	-1.74092	115	0.084372	34	83	1.43	1.30	1.223925	0.458795	0.3545217
Adoption	4.87	4.99	-0.4953	115	0.621333	34	83	1.06	1.24	1.370058	0.313368	0.1009316
Generation	3.61	4.71	-3.93642	115	0.000142	34	83	1.47	1.32	1.244058	0.424817	0.8015402
Organisational competitiveness	4.68	5.12	-1.47509	115	0.142921	34	83	1.52	1.47	1.06533	0.796005	0.3003374

Mann-Whitney U test (Health insurers vs. health insurer administrators)

Mann-Whitney U Test By variable Industry sector Marked tests are significant at p <.05000

VARIABLES	Rank Sum - HI	Rank Sum - HIA	U	Z	p-value	Z - adjusted	p-value	Valid N - HI	Valid N - HIA	2*1sided exact p
EO	1700.5	5202.5	1105.5	-1.83093	0.067112	-1.83137	0.067046	34	83	0.066499
External Collaboration (T,RS,RI)	1928.5	4974.5	1333.5	-0.46223	0.643914	-0.46226	0.643896	34	83	0.643298
External Collaboration (RR)	2123.5	4779.5	1293.5	0.70236	0.482458	0.70627	0.480022	34	83	0.482411
cube External Collaboration (RR)	2123.5	4779.5	1293.5	0.70236	0.482458	0.70627	0.480022	34	83	0.482411
Regulation	1689.5	5213.5	1094.5	-1.89696	0.057834	-1.89705	0.057823	34	83	0.057182
Adoption	1839.5	5063.5	1244.5	-0.9965	0.319006	-1.00987	0.312557	34	83	0.319163
Generation	1400	5503	805	-3.63484	0.000278	-3.6369	0.000276	34	83	0.000214
Organisational competitiveness	1758.5	5144.5	1163.5	-1.48275	0.138142	-1.48683	0.137061	34	83	0.137868

Difference in means of variables for subgroups (health insurers/health insurer administrators (combined) and healthcare service providers)

Variables	Mean HIA & HI	Mean Providers	t-value	df	p	Valid N	Valid N	Std.Dev.	Std.Dev.	F-ratio	p	Effect size d
EO	4.60	3.93	2.020	137	0.0453	117	22	1.4577	1.2583	1.3420	0.4440	0.4695
External Collaboration (T,RS,RI)	4.80	3.84	4.639	137	0.0000	117	22	0.8530	1.0629	1.5525	0.1473	1.0781
External Collaboration (RR)	5.92	5.33	2.171	137	0.0317	117	22	1.0727	1.6208	2.2829	0.0058	0.5045
Regulation	3.40	3.20	0.687	137	0.4933	117	22	1.3478	0.8077	2.7845	0.0088	0.1596
Innovation Adoption (DV)	4.95	3.75	4.244	137	0.0000	117	22	1.1890	1.3780	1.3431	0.3257	0.9862
Innovation Generation (DV)	4.39	3.11	3.884	137	0.0002	117	22	1.4499	1.2320	1.3850	0.3940	0.9025
Organisational competitiveness (DV)	4.99	3.38	4.558	137	0.0000	117	22	1.4958	1.6951	1.2842	0.4002	1.0592
ORG COMPETITIVE CAPABILITY	5.90	5.27	2.557	137	0.0117	117	22	0.9586	1.5203	2.5150	0.0019	0.5942
Innovativeness	4.51	3.68	2.339	137	0.0208	117	22	1.5466	1.3896	1.2387	0.5881	0.5436
Proactiveness	4.82	4.32	1.351	137	0.1789	117	22	1.6280	1.3666	1.4192	0.3579	0.3140
Risk taking	4.47	3.79	1.981	137	0.0496	117	22	1.4786	1.5415	1.0868	0.7435	0.4603
Trustworthiness	5.23	4.17	5.005	137	0.0000	117	22	0.8396	1.2462	2.2032	0.0084	1.1631
Role specification	5.28	4.55	3.489	137	0.0007	117	22	0.8456	1.1665	1.9029	0.0333	0.8107
Relationship initiation	3.90	2.82	2.995	137	0.0033	117	22	1.5613	1.4924	1.0945	0.8515	0.6959
Restructure of relationships	5.92	5.33	2.171	137	0.0317	117	22	1.0727	1.6208	2.2829	0.0058	0.5045
Encourage competition	3.93	3.41	1.375	137	0.1713	117	22	1.6611	1.3837	1.4412	0.3365	0.3196
Improve HI & A	3.30	3.46	-0.472	137	0.6380	117	22	1.5646	1.1918	1.7233	0.1506	0.1096
Improve standards for coverage	3.36	3.31	0.172	137	0.8641	117	22	1.3757	1.1545	1.4199	0.3573	0.0399
Improve structure of healthcare delivery	3.02	2.61	1.144	136	0.2545	116	22	1.6346	1.1252	2.1105	0.0509	0.2661
Variables	Mean HIA & HI	Mean Providers	t-value	df	p	Valid N	Valid N	Std.Dev.	Std.Dev.	F-ratio	p	Effect size d
ORG COMPETITIVE CAPABILITY	5.90	5.27	2.557	137	0.0117	117	22	0.9586	1.5203	2.5150	0.0019	0.5942