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Business intelligence, cooperative corporate venturing relating to SMME growth in South Africa

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The University of The Witwatersrand

Business School

Masters of Management in

Entrepreneurship and New Venture Creation

Business Intelligence, Cooperative Corporate Venturing relating to SMME growth in South Africa

By

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

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ABSTRACT

Small, medium and micro enterprises (SMMEs) face significant challenges that include resource scarcity and information asymmetry (when competing with larger well-established firms), and the general problems associated with making timely, market-aware strategic decisions. SMMEs may be able to improve their firm performance by copying aspects of corporate entrepreneurship, such as cooperative corporate venturing, and by adopting of technological innovations such as the use of business intelligence. These are initiatives that are typically utilised by large well-established firms; however, SMMEs should derive similar benefits from cooperative corporate venturing and business intelligence, as would larger well-established firms.

This study sought to determine the relevance of business intelligence and cooperative corporate venturing in the operation of small, medium and micro enterprises and the relation thereof to the economic performance of these firms, as perceived by the owner-managers of the firm.

The study was performed by examining the perceived impact that the strategic initiatives, (namely business intelligence and cooperative corporate venturing) would have on SMME firm economic performance, from the perspective of owner-managers of the firm who participated in the survey. Quantitative data was obtained through a self-administered questionnaire, which was distributed electronically to SMMEs whose email addresses were found online, and physically to individuals attending forums (and workshops) for SMMEs and entrepreneurs; companies operating in and around industrial parks and villages; and, members of the Wits business school community.

It was shown in this study that there is indeed a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance. Ample research has not been conducted that focuses on the hybrid strategy of business intelligence and cooperative corporate venturing on SMME firm performance. This is area of research that potentially benefits SMMEs, and both academic and business intelligence stakeholders.

DECLARATION

I, Harold Campbell, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in 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.

Harold M. Campbell
Student number: 0500290D

Signed at ……

On the …….. day of …… 2014

DEDICATION

For the one who encourages and motivates me; the two who remind me that there is a better tomorrow – thank you for all your sacrifices.

ACKNOWLEDGEMENTS

I am humbled by the support that I have been given during the pursuit of my master's degree at the Wits Business School. While words cannot sufficiently express my gratitude, I would like to take this opportunity to publicly thank several individuals.

To my family, thanks for your support and your patience, for being there during the many long hours.

To the members of the WBS staff, specifically Dr. José Barreira, Professor Boris Urban, Mrs Tozi Zeka, Mrs Merle Werbeloff, and the staff of the Centre for Entrepreneurship, thanks for your guidance and support.

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FORTIS CADERE CEDERE NON POTIS

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LIST OF ABBREVIATIONS

BCE	Branson Centre for Entrepreneurship
BI	Business Intelligence
CCV	Cooperative corporate venturing
FA	Factor Analysis
GEW-1	Global Entrepreneurship Week (Day 3)

GEW-2	Global Entrepreneurship Week (Day 4)
IBM	International Business Machines; An international company that creates business analytics, and cloud solutions and services. (www.ibm.com)
I-Parks	Industrial Villages and Parks
SAP	An international company that creates business analytics solutions. (ww.sap.com)
SEDA	Small Enterprise Development Agency
SME	Small and micro enterprises
SMME	Small, medium and micro enterprises
WBS	Witwatersrand Business School

CHAPTER 1: INTRODUCTION

Key to this study is the academic literature and research in the fields of Knowledge Management, Cooperative Corporate Venturing, and Business Intelligence, with special focus on small, medium and micro enterprises.

1.1. Theoretical background of the study

From a theoretical point of view, knowledge management provides the basis for viewing two seemingly disparate theoretical fields of study, namely, business intelligence and cooperative corporate venturing. As shown later in the literature review, there is indeed an overlapping of business intelligence and cooperative corporate venturing. The overlapping of these fields of studies formed the impetus for this study.

On one hand, business intelligence focuses on how information can be used as a key enabler of the strategic decision-making process, resulting in various organisational benefits, including process efficiency. While on the other hand, cooperative corporate venturing focuses on overcoming skills scarcity, improving operational and financial performance amongst other things.

Jointly, these strategies, when viewed from the context of knowledge management relate to improving the firm's organisation performance while sustaining its competitive advantage. The resultant effect, as explained in the literature, is the measurable change in the firm's performance, both in employee productivity and firm profitability and growth.

Based on the challenges that are faced by small, medium and micro enterprises, as defined in the literature (for instance, access to a skilled work force, information asymmetry, and others); it then becomes necessary to analyse both the adoption of business intelligence and cooperative corporate venturing as strategic initiatives by SMMEs, and their perceived effect, when applied as joint strategic initiatives on the economic performance of the firms.

1.2. Context of the study

Small, medium and micro enterprises (SMMEs) differ from large well-established firms, not only in terms of the number of employees, but also in terms of access to financial resources, access to a diverse pool of skilled employees, as well as access to other intangible resources such as reliable market and customer information (Amabile, Laghzaoui, Peignot, Peneranda, & Boudrandi, 2013; Smit & Watkins, 2012, p. 6324). Further, SMMEs operate in the same diverse market arenas as the large well-established firms, which is due in part, to globalisation and trade liberalisation (Dana, 2004; Smit & Watkins, 2012).

Despite their size, however, SMMEs are significant contributors to the economies in which they operate (Adendorff, Appels, & Botha, 2011; Ismail, Jeffery, & Belle, 2011). In some instances, SMMEs are able to contribute as much as up to 95% of the economy, even though, they operate in the same market place as the large well-established firms (Matthews, 2007; Olszak & Ziemba, 2012; Scholz, Schieder, Kurze, Gluchowski, & Boehringer, 2010; Smit & Watkins, 2012; Wright, Bisson, & Duffy, 2013).

Notwithstanding their adaptability, however, SMMEs still face significant challenges that include resource scarcity and information asymmetry (when competing with larger well established firms), and the general problems associated with making timely, market-aware strategic decisions (Amabile et al., 2013; Smit & Watkins, 2012). The adoption of technological innovations, such as the use of business intelligence practices, is one way in which SMMEs can improve and sustain their competitive advantage (Phan & Vogel, 2010).

With business intelligence systems, SMMEs are able to overcome information asymmetry, make more market-sensitive decisions and are better able to identify customer relationships. These are factors that all result in improved growth and higher levels of economic performance (Matthews, 2007, p. 818; Phan & Vogel, 2010; Trkman, McCormack, de Oliveira, & Ladeira, 2010).

Another way that SMMEs can improve their organisational performance is by copying aspects of corporate entrepreneurship practices that are typically utilised by their larger counterparts (Dana, 2004; Gourova, 2010); cooperative corporate venturing being one such aspect of corporate entrepreneurship that should be copied. SMMEs may benefit from cooperative corporate venturing, or more commonly known as joint venturing, as the SMMEs can leverage strategic partnerships to overcome the various forms of resource scarcity (Kinyeki & Gachanja, 2013).

1.3. Problem statement

The main problem, as outlined below, states the issue that this research is trying to address. Further, the main problem is divided into three sub-problems, each focusing on a specific combination of constructs.

1.3.1. *Main problem*

Determine the relevance of business intelligence and cooperative corporate venturing in the operation of small, medium and micro enterprises and the relation thereof to the economic performance of these firms, as perceived by the owner-managers of the firm.

1.3.2. *Sub-problems*

Sub-problem 1:

Identify if SMMEs are adopting cooperative corporate venturing as a strategic initiative to increase their economic performance.

Sub-problem 2:

Identify if SMMEs are adopting business intelligence as a strategic initiative to increase their economic performance.

Sub-problem 3:

Evaluate the effect of business intelligence and cooperative corporate venturing initiatives considered jointly on the economic performance of SMMEs, as perceived by the owner-managers of the firm.

1.4. Significance of the study

This study focuses on two well-defined and well-researched constructs, namely business intelligence (Elbashir, Collier, & Davern, 2008; Herschel & Yermish, 2009; Yeoh & Koronios, 2010) and cooperative corporate venturing (Morris, Kuratko, & Covin, 2011; Trkman et al., 2010; Zahra & Covin, 1995). However, the study fills a gap, in that, it attempts to find the relationship between SMME economic performance, business intelligence practices and cooperative corporate venturing initiatives.

Although critical for sustaining organisational performance (Dawson & Van Belle, 2013; Hawking & Sellitto, 2010, p. 3), business intelligence is often cited as not being suitable for SMMEs, due to the complexity and related costs (Dawson & Van Belle, 2013, p. 2; O'Brien & Kok, 2006). In recent years, however, and with advances in open-source technology and the improved accessibility to the Internet, SMMEs now seem poised to be able to take advantage of business intelligence practices (Ponelis, 2012; Scholz et al., 2010).

Corporate entrepreneurship is also often cited as being suitable for large well-established firms (Morris et al., 2011). Cooperative corporate venturing, a sub-type of corporate entrepreneurship provides partner firms with various benefits as described in the literature review (*cf.* 2.1.). However, due to changes in market forces, SMMEs are forced to adopt new resource-seeking behaviours to overcome resource scarcity; this may include adopting cooperative corporate venturing as one such strategic initiative.

The output of this study may be beneficial in two important ways. The first applies directly to the practicality of SMMEs strategies, while the seconds adds to the literature. Firstly, the findings from this study may be used to guide business intelligence service providers (for example SAP and IBM), on the importance of packaging their solutions in a way that best suits SMMEs. This would be achieved by evaluating the factors that most significantly influence SMME adoption of business intelligence and the perceived relation that this has on the firm's financial performance.

Secondly, the findings as they relate to the use of cooperative corporate venturing strategies by SMMEs in the Republic of South Africa, and the perceived relation that this has on the firm's financial performance, will be backed by an empirical study. If the related hypotheses are supported by the findings, it may be possible to re-imagine the model of corporate entrepreneurship as depicted in Figure 1.

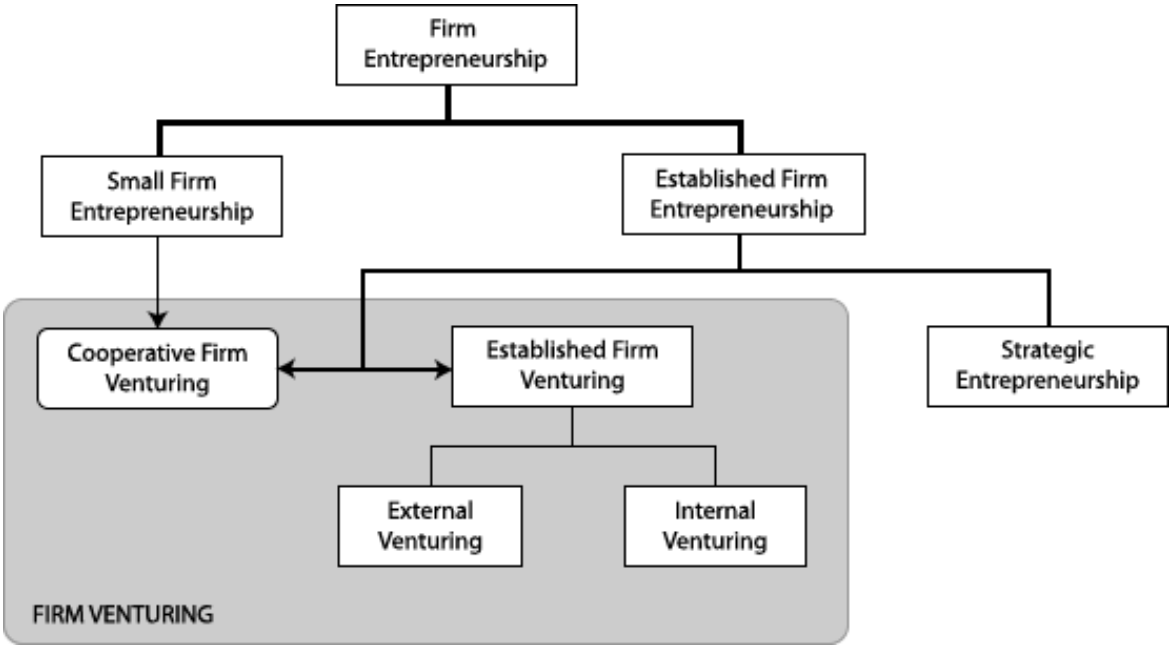


Figure 1: A re-imagined model of Corporate Entrepreneurship (own model)

In the literature (Kuratko & Audretsch, 2013a; Morris et al., 2011; Zahra & Covin, 1995) it is argued that Corporate Entrepreneurship pertains specifically to large well-established firms. Depending on the outcome of this study, I would propose instead, that Corporate Entrepreneurship should be called Established Firm

Entrepreneurship, which would then be a sub-class of a new construct called Firm Entrepreneurship.

In this model, both established firms (the traditional corporate firms) and small firms (the traditional SMMEs) participate in various forms of Firm Entrepreneurship, some of which overlap. Cooperative Firm Venturing, currently called Joint Venturing, would be one such proposed overlap.

Establishing the link between cooperative corporate venturing and SMME (the firm's perceived) firm performance, is one of the sub-problems of this study, and the outcome of the research could be used to provide support for this model.

Firm venturing, currently called Corporate Venturing, would then have two forms:

- Cooperative firm venturing (i.e. Joint Venturing), the form of venturing practised by both SMMEs and large well-established firms; and
- Established firm venturing, the forms of venturing practised by only large well-established firms.

1.5. Delimitations of the study

1.5.1. *Firm size*

This study focused on SMMEs operating in the Republic of South Africa as outlined in the research methodology (*cf.* CHAPTER 3: Research Methodology). Firms that fell outside of the country-specific SMME classification (*cf.* Table 1: Country-specific SMME demarcations by country) were omitted.

1.5.2. *Respondent characteristics*

The self-administered survey will be sent (or given) to either the owner-managers or the senior top-level managers of the SMME.

1.5.3. *Firm characteristics*

The findings include SMMEs regardless of their current business intelligence or joint venture strategic initiatives.

1.6. Definition of terms

1.6.1. *Business Intelligence*

Although there is no commonly agreed-upon term for business intelligence (Amabile et al., 2013, p. 102; Ponelis, 2012), for this purpose of this study, we will refer to business interlligence as the organisational-level practice that includes the related processes and enabling technologies for consuming, disseminating and exploring information from disparate sources (either within the organisation or from its external environment), that facilitae strategic planning and decision-making based on discovered patterns and relationships within the data (Amabile et al., 2013).

1.6.2. *Corporate Entrepreneurship*

Corporate entrepreneurship is defined as the “entrepreneurial behaviour inside an established mid-sized or large organisations” (Morris et al., 2011, p. 11). More succinctly put, corporate entrepreneurship pertains to the process of seeking and exploiting opportunities at the organisational level (Haase & Franco, 2010, p. 58).

1.6.3. *Cooperative Corporate Venturing*

Corporate venturing pertains to the various methods of “creating, adding to, or investing in new business”, of which cooperative corporate venturing is a sub-type (Morris et al., 2011, p. 86). Cooperative corporate venturing is the method that results in the creation of a new business that is jointly owned by two or more companies (Morris et al., 2011, p. 97). Throughout this study, cooperative corporate venturing is used interchangeably with joint venturing.

1.6.4. *Economic performance*

The firm's economic performance is quantified by both the reported profitability and growth of the company, and the realised employee productivity increases (Mathew, Ogbonna, & Harris, 2012, p. 197). Throughout this study, economic performance is used interchangeably with firm performance and growth.

1.6.5. *SMME*

The term 'small, medium and micro enterprise' (SMME) is a country-specific categorisation of firms based on their number of employees (Smit & Watkins, 2012, p. 6324). A summary of various country-specific SMME demarcations is provided in Table 1.

Table 1: Country-specific SMME demarcations by country

Australia (Clark, Eaton, Lind, Pye, & Bateman, 2011)		
Micro	Small	Medium
-	Up to 20	21 - 199
Jamaica (The Ministry of Industry, Investment and Commerce, 2013)		
Micro	Small	Medium
Up to 5	6 – 20	21 – 50
South Africa (Republic of South African, 1996)		
Micro	Small	Medium
Up to 5	6 – 50	51 – 100
United States of America (United States International Trade Commission, 2010)		
Micro	Small	Medium
Up to 19	20 – 99	100 – 499

1.7. Assumptions

Outlined below are the assumptions that were made during the execution of this study.

- Using a survey that was previously tested and retested would not affect the validity and the reliability of the instrument when applied to a small sample.
- Government institutions and other practitioners operating in the SMME space (for example, the Small Enterprise Development Agency (SEDA), SMME incubators, and etcetera) would have provided indirect access to their SMME databases.

Owner-manager related assumptions included:

- The owner-managers would understand and successfully interpret the items in the instrument.
- They would share key demographic information (such as the number of employees).

CHAPTER 2: LITERATURE REVIEW

This literature review is comprised of five sections, the first section establishes an integrative thematic overview that introduces the reader to the topic of this study; the three subsequent sections provide discussions that explore the individual sub-problems; and final section provides a summary of the various constructs and hypotheses.

The discussions that pertain to the sub-problems are structured as follows, section 2.1 explores the first sub-problem and provides the theoretical motivation for the adoption of cooperative corporate venturing by SMMEs as a strategic initiative; section 2.2 explores the second sub-problem and highlights the relevant literature that explores the importance of business intelligence as a strategic initiative for SMMEs; finally, section 2.3 explores the theoretical basis of the third sub-problem, discussing the juxtaposition of business intelligence and cooperative corporate venturing as a pertinent strategic initiative for SMMEs.

2.1. Sub-problem 1: The adoption of cooperative corporate venturing as a strategic initiative for SMMEs

This section presents pertinent literature that provides the contextual background for Sub-problem 1, and a basis for Hypothesis 1.

2.1.1. *The case for corporate entrepreneurship*

Corporate entrepreneurship is defined as the entrepreneurial behaviour inside an established mid-sized or large-sized organisation (Morris et al., 2011). More succinctly put, corporate entrepreneurship pertains to the process of identifying and exploiting opportunities at the organisational-level (Haase & Franco, 2010) within large firms. Additionally corporate entrepreneurship is described as the application of the entrepreneurial process within larger, established organisation (Covin & Miles, 1999) cited in (Morris et al., 2011, p. 35).

To elaborate, corporate entrepreneurship is the vehicle by which firms can create and deliver innovations to the market place (Kuratko & Audretsch, 2013a; Morris et al., 2011). The level of entrepreneurial activities (or intrapreneurship) within a firm, is directly related to its level of corporate entrepreneurship (Bojica & Fuentes, 2012; Lumpkin & Dess, 1996; Zahra & Covin, 1995). Entrepreneurial firms proactively (seek-out and identify gaps in the market), undertake risk-taking activities (when they embark on new projects in "new spaces" or markets) and employ innovation (to create new products that fill gaps in the market once identified) (Bojica & Fuentes, 2012; Zahra & Covin, 1995). As the firm's level of corporate entrepreneurship increases so too is it expected that the company's firm performance should also increase (Kuratko & Audretsch, 2013b; Zahra & Covin, 1995), "even though the outcomes of corporate entrepreneurship activities are not always easily predictable" (Bojica & Fuentes, 2012, p. 398).

Corporate entrepreneurship exists in two broad forms, corporate venturing or strategic entrepreneurship (Kuratko & Audretsch, 2013a, p. 7; Morris et al., 2011). Corporate venturing pertains to the various methods of "creating, adding to, or investing in new business" (Morris et al., 2011, p. 86), while strategic entrepreneurship focuses primarily on organisational-level opportunity and advantage-seeking behaviours, the adoption of far-reaching innovations that aim to improve the company's overall competitive advantage (Morris et al., 2011, p. 97). Further differentiating the two is the fact that strategic entrepreneurship may not always result in new business creation (Morris et al., 2011, p. 97).

2.1.2. *Corporate Venturing*

Corporate venturing is composed of the three separate methods of venturing (Kuratko & Audretsch, 2013a; Morris et al., 2011). Firstly, *internal corporate venturing* is the method that involves the creation of a new business that is wholly owned by the parent company. The firms that are created via this form of venturing, function as semi-autonomous firms which may be housed either within the parent cooperation (potentially as a part of new or pre-existing internal organisational structure) or situated externally (Kuratko & Audretsch, 2013b, p. 8).

Secondly, *cooperative corporate venturing* (or joint venturing) is the method that results in the creation of a new business that is jointly owned by two or more companies. These newly created firms usually exist as separate external companies, that have their own organisational structure and "operate beyond the organisational boundaries of the" parent firms (Kuratko & Audretsch, 2013b, p. 8). Thirdly, *external corporate venturing* is the method where an existing company (or equity in the company) is acquired by another, typically larger company (Kuratko & Audretsch, 2013a; Morris et al., 2011).

2.1.3. *SMMEs and cooperative corporate venturing*

Different definitions have been advanced and used to define the different types of alliances that pertain to SMMEs (Haase & Franco, 2010; Lai & Chang, 2010; Mukherjee, Gaur, Gaur, & Schmid, 2012). The definitions (Kinyeki & Gachanja, 2013; Lai & Chang, 2010; Terjesen, Patel, & Covin, 2011) and justifications (Arend & Amit, 2005; Haase & Franco, 2010; Kinyeki & Gachanja, 2013; Rothaermel, 2001) for alliances between firms, range from constructs that exist as sub-classes of corporate venturing, to those that exist as sub-classes of strategic entrepreneurship – all existing as forms of corporate entrepreneurship even if not explicitly stated (Morris et al., 2011).

For instance, Haase and Franco (2010, p. 59) presented a strategic alliance as a form of strategic renewal, defining the alliance as an inter-firm cooperative arrangement that exists between two or more independent firms for the purpose of exploiting economic and strategic benefits. Further, Haase and Franco qualified learning alliances as a sub-class of strategic alliances, which they stated was essential for strategic renewal and positioning, as learning alliances facilitates the assimilation of new knowledge (Haase & Franco, 2010, p. 59).

Alternatively, Lai and Chang (2010, p. 491) presented research and development (R&D) alliance as a form of joint venture, defining the alliance as a joint venture that specialised in research and development. Further, Lai and Chang delineated their R&D alliances into two further types of alliances; equity-based (or joint ventures, according to Morris et al. (2011, p. 86)) relationships between firms that

resulted in the creation of a new business entity; and non-equity-based relationships between existing firms governed by contractual agreements. Interestingly, Lai and Chang (2010, p. 495) concluded that SMMEs may prefer non-equity type alliances, due to greater perceived flexibility. However, Naldi and Achtenhagen (2011) who cite Stevenson (1983), found that venturing is not specific to large existing firms (2011, p. 36). Based on an empirical study conducted in Sweden, they also found that SMMEs (based on a sample of 468 firms), adopted corporate entrepreneurship initiatives as previously conceptualised. Similarly, Adendorff, Appels and Botha (2011, p. 48) indicated that some South African SMMEs in the construction sector could benefit from joint venture partnerships.

2.1.4. *The benefits of alliances to SMMEs*

There are several factors, both internal and external to the firm that may influence its performance, for instance; internal factors may include “knowledge-based resources, organisational structure” (Bojica & Fuentes, 2012, p. 397), while external factors may include “environmental dynamism, uncertainty and competitiveness” (Bojica & Fuentes, 2012, p. 397).

Corporate entrepreneurship is presented in the literature as an effective method that can be employed by firms to achieve high levels of organisational (Kuratko & Audretsch, 2013a; Morris et al., 2011) and financial performance (Antoncic & Prodan, 2008; Bojica & Fuentes, 2012; Kuratko & Audretsch, 2013a; Zahra & Covin, 1995). Despite their size, however, SMMEs can and do successful adopt aspects of corporate entrepreneurship (Bojica & Fuentes, 2012), which was found to be “predictive of the growth of small and large firms” (Antoncic & Prodan, 2008, p. 258).

Further, strategic alliances are a sub-class of corporate entrepreneurship that can exist between firms regardless of size (Haase & Franco, 2010; Kinyeki & Gachanja, 2013, p. 19; Naldi & Achtenhagen, 2011, p. 19). Consequently SMMEs should derive similar benefits from joint ventures, as would larger well-established firms (Kinyeki & Gachanja, 2013, p. 19). SMMEs who participate in cooperative

corporate venturing may be able to use the strategic initiative to grow their companies, by entering new markets, by acquiring new skills, competencies, and resources that they would not be able to acquire by themselves (Adendorff et al., 2011).

Bojica and Fuentes (2012), found evidence that supported a relationship between firm performance and firm size (as well as other variables such as environment dynamism, and firm age) in SMMEs. Additionally, firm size was positively related to firm innovation; however, the degree varied, based on the sector in which the firm operated. They concluded that although “firm size may influence knowledge acquisition and knowledge exploitation for innovative and entrepreneurial purposes” (Bojica & Fuentes, 2012, p. 405), the larger the firm, the more likely the firm is able to participate in more inter-organisational relationships.

The important point here is that acquiring knowledge (as discussed further in section 2.3.1) can benefit the firm, and that joint venturing can provide resource strapped firms with such knowledge. This argument was previously echoed by Kirby and Kaiser (2003), who sought to identify the characteristics of SMMEs that had adopted joint venturing, while identifying the firms’ experiences. They found that joint venturing when adopted by SMMEs, joint venturing could aid access to new markets, as it provided a means for the SMMEs to overcome both their resource and knowledge scarcity (Kirby & Kaiser, 2003).

Strategic alliances and joint venturing promote improved competitive positioning, access to new markets, to critical skills, to information, to knowledge transfer, and also aided in overcoming resource scarcity, and in sharing risk (Kinyeki & Gachanja, 2013; Lai & Chang, 2010; Rothaermel, 2001; Terjesen et al., 2011), these are antecedents to business success (Morris et al., 2011). However, the literature speaks in general terms and does not provide a clear link between the effects that joint ventures have on the economic performance of the South African SMMEs.

2.1.5. *Hypothesis 1*

One of the limitations highlighted by Naldi and Achtenhagen (2011) in their study, was the fact that they used only Swedish-based SMMEs, while Kirby and Kaiser (2003) conducted their research on European SMMEs that had joint ventures with Chinese firms. The scholars suggested that a more generalised study should be conducted as a topic for future research. Although Naldi and Achtenhagen (2011), and Kirby and Kaiser (2003) found that SMMEs do adopt corporate entrepreneurship initiatives in their respective geographic regions, this researcher did not find evidence in the literature to support the conclusion that cooperative corporate venturing is being used as a strategic initiative by SMMEs within the South African context. Based on Naldi and Achtenhagen (2011), and Kirby and Kaiser (2003), it is expected that:

Hypothesis 1:

> *There is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted cooperative corporate venturing.*

2.2. Sub-problem 2: The relevance of business intelligence practices to SMMEs

Knowledge management is a practice that when implemented successfully, allows the firm to improve its organisational performance as well as to sustain their competitive advantage (López, Peón, & Ordás, 2009). Business intelligence exists as a subset of knowledge management (Herschel & Yermish, 2009). But what is business intelligence?

2.2.1. *The definition of Business Intelligence*

Despite the link being found between knowledge management and business intelligence, there is no common definition for business intelligence (Ponelis, 2012) in the literature. The definitions pertaining to business intelligence (BI) were observed to contain two disticnt themes. On the one had, were definitions that linked information systems with decision-making (Amabile et al., 2013; Elbashir et al., 2008; Lutu & Meyer, 2008), while on the other hand, were definitions that focused primarily on the data exploration abilities of information systems (Hawking & Sellitto, 2010; Kumar, 2012; O'Brien & Kok, 2006; Yeoh & Koronios, 2010).

For instance, Lutu and Meyer (2008) argued that business intelligence is a set of technologies that facilitate the collection, integration and analysis of data within a firm, thus enabling the decision-making process. Similarly, Amabile, Laghzaoui, Peignot, Peneranda and Boudrandi (2013) concluded that business intelligence involves processes for consuming information from disparate sources within an organisation and its external environment, that facilitate strategic planning and decision-making based on the discovered patterns and relationships, based on (Choo, 2001). Alternately, Yeoh and Koronios (2010) stated that business intelligence included systems that provided a means to perform multidimensional analysis and exploration on data that has been consumed and integrated from multiple sources. While O'Brien and Kok (2006) simply referred to business intelligence as an advanced computer application for processing and analysing data.

Herschel and Yermish (2009) had argued that business intelligence should not be viewed primarily as isolated information systems and that the concept "must expand beyond the IT-driven initiatives" (Herschel & Yermish, 2009, p. 133), but as an integrative system that operates within the confines of knowledge management. In 2011, a global survery was conducted by IBM, consisting of more than 3000 chief executive officers. They indicated that business intelligence enabled them to optimise their decision-making process, which improved their firms' competitiveness (IBM Institute for Business Value, 2011). The recent IBM survey provided the empirical support for the arguments advanced by Herschel

and Yermish (2009), namely a definition for business intelligence that focuses on both decision-making and information systems. Consequently, the definition provided by Amabile et al. (2013) seems most prudent.

2.2.2. *The signifiance of business intelligence intiatives*

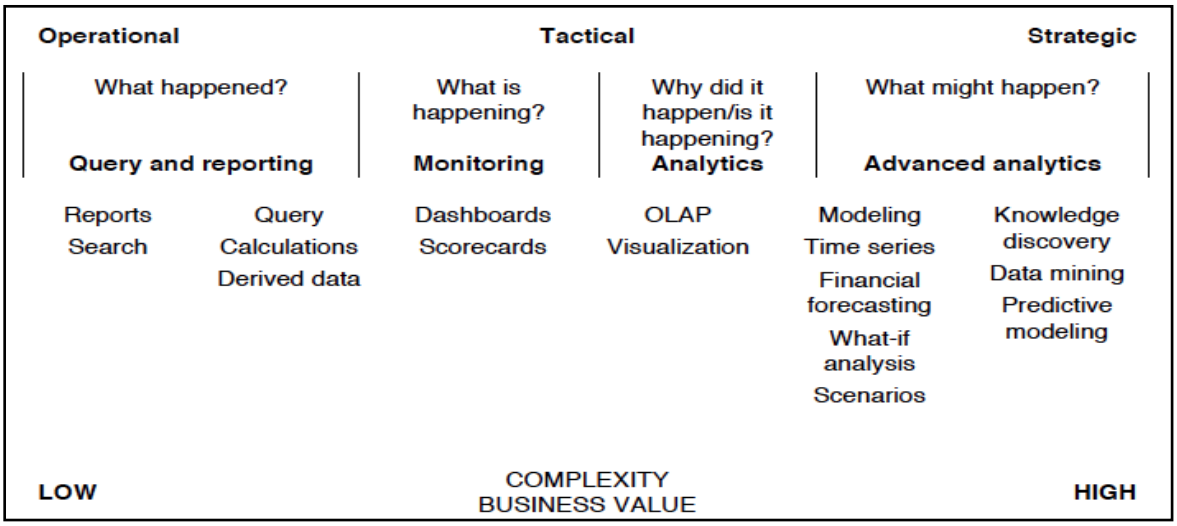


Figure 2: Continuum of Business Intelligence functionality (Ponelis, 2012)

Business intelligence systems can be ranked on a continuum based on their functionality (Olszak & Ziemba, 2012; Ponelis, 2012) and business value, specifically from operational to strategic as shown in Figure 2. As the value of the business intelligence system transitions from low to high, so does the cost and the information complextity of the system (Ponelis, 2012, pp. 61–63). The basic business intelligence system may include spreadsheet programs and accounting packages that generate reports, while the more complicated systems that may provide advanced analytics and preditive models (Herschel & Jones, 2005; Ponelis, 2012).

In addition to providing decision-making support at the organisation level, business intelligence is also used to provided pattern and relationship identification, and data exploration (Amabile et al., 2013; Herschel & Jones, 2005; IBM Institute for Business Value, 2011). Further, business intelligence initiatives can be used to improve and maintain competitive advantage (Kumar, 2012, p.

363; O'Brien & Kok, 2006, p. 6), increase cost savings (Hawking & Sellitto, 2010; O'Brien & Kok, 2006) and improve employee efficiency (O'Brien & Kok, 2006) which are factors that impact organisational performance (Hawking & Sellitto, 2010, p. 3; Lutu & Meyer, 2008, pp. 164–165). These factors collectivelly impact the firm's economic performance (Elbashir et al., 2008, pp. 143–144) as indicated by the findings of their study, which consisted of 1873 managers across 612 organisations.

Business intelligence is crucial to firms regardless of firm size (Lutu & Meyer, 2008; Ponelis, 2012, p. 11) and is only constrained by the complexity and cost of the system being implemented (Ponelis, 2012), despite claims by some scholars to the contrary (Dawson & Van Belle, 2013, p. 2; O'Brien & Kok, 2006). Large enterprises are better suited for business intelligence systems that provide advanced analytics (Ponelis, 2012) which, may be integrated into their existing Enterprice Resource Planning (Hawking & Sellitto, 2010) and Customer Relationship Management (Kumar, 2012) systems. Based on the continuum (cf. Figure 2), micro-sized firms are best suited with business intelligences systems that provided simple spreadsheet reports, and, as these company transitions in size, they may take an iterative approach in improve their business intelligence systems (Bijker & Hart, 2013; Ponelis, 2012) while they improve their information systems.

2.2.3. *The schematics of a Business Intelligence system*

Within well-established organisations, a business intelligence system consists of multiple components, technologies and subsystems (Yeoh & Koronios, 2010). Though not prescriptive, components may include technologies for dashboarding (Bijker & Hart, 2013, p. 21), "reporting, online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, benchmarking, text mining and predictive analytics" (Kumar, 2012, p. 358).

These technologies resided on top of a data warehouse, which is the central component of the business intelligence system (Yeoh & Koronios, 2010). The data

warehouse is used for storing the data (from the disparate sources), translating the data (into a convention that is meaningful to the users), protecting the data (so that onces stored, the data becomes *Read Only*), and providing timely access to the data (for the BI users) (Bijker & Hart, 2013; Kumar, 2012; Yeoh & Koronios, 2010).

The front-facing (or user-facing) technologies, include the reporting and various analytics components and are often made accesible to the user via a dashboard (Bijker & Hart, 2013). In essence, business intelligence systems can be divided into three groups of technologies, as shown in Figure 3, namely data processing and integration technologies (i.e. data mining, process mining, complex event and transaction processing); data persistence technologies; and presentation and interrogation technologies (for instance, dashboarding, reporting, online analytical processing, benchmarking, text mining, business performance management, predictive analytics, and other analytics) (Bijker & Hart, 2013; Kumar, 2012; Ponelis, 2012; Venter & Tustin, 2009; Yeoh & Koronios, 2010).

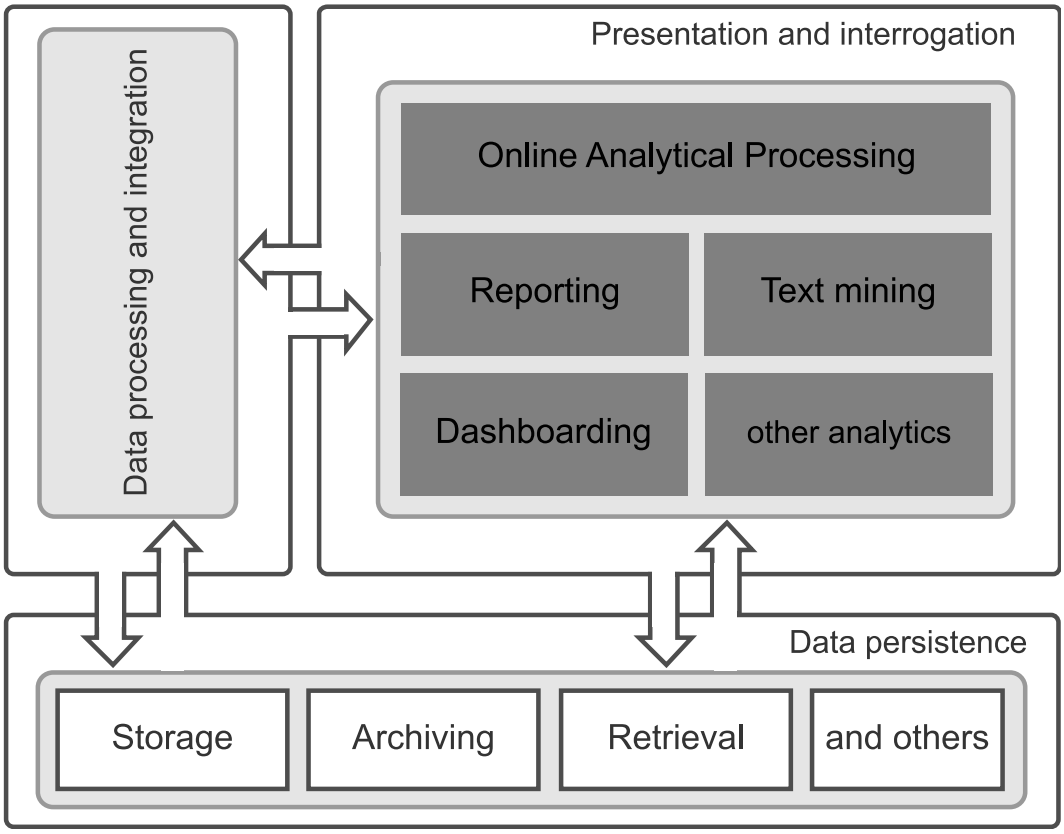


Figure 3: Simplified view of a business intelligence system (own model)

SMMEs can perform data processing and presenation and interrogation tasks using a smaller set of tools, thought not to the same degree, as well-established firms (Ponelis, 2012). As previously discussed, SMME owner-manager may be able to adequtely use spreadsheet programs and accounting packages that generate reports in their decision-making process (Herschel & Jones, 2005; Ponelis, 2012). However, before being able to use these business intelligence systems (large or small), these systems must be successfully implemented.

2.2.4. *Critical Success Factors in implementing Business Intelligence*

The successful implementation of business intelligence systems has been found to be governed by several overlapping, yet inconclusive, critical success factors (CSFs) (Adamala & Cidrin, 2011; Popovič, Hackney, Coelho, & Jaklič, 2012). The reason for the varying levels of success (and by extension, the variety of success factors), lies in the fact that the implementation of business intelligence systems can be complex, while requiring significant investments in infrastructure and resources over lengthy periods of time (Adamala & Cidrin, 2011, p. 110; Hawking & Sellitto, 2010; Yeoh & Koronios, 2010, p. 23).

Further, business intelligence systems are not the same as typical information system (IS) applications (such as day-to-day, transactional systems, or databases, and others) (Adamala & Cidrin, 2011; Olszak & Ziemba, 2012, p. 136; Yeoh & Koronios, 2010). Consequently, success measures that are used to measure and evaluate typical IS applications and systems are not adequate for measuring the implementation success of business intelligence systems (Adamala & Cidrin, 2011; Hawking & Sellitto, 2010; Olszak & Ziemba, 2012).

Hawking and Sellitto summarised a list of CSFs in their literature review, spanning several authors (*cf*. Figure 4), while others were found and summarised in Table 2. In all cases, it was found that the success factors did not exist purely in the technical information system domain, but instead, and according to the literature (Adamala & Cidrin, 2011; Hawking & Sellitto, 2010; Olszak & Ziemba, 2012; Yeoh & Koronios, 2010), consisted of both technical and non-technical factors, with the non-technical factors having higher significance.

Author	Factors
Farley (1998)	Fast implementation, Ability to adjust to business requirements, Useful information, Ease of navigation
Watson and Haley (1997)	Management support, Adequate resources, Change management, Metadata management
Chen et al (2000)	User satisfaction
Sammon and Finnegan (2000)	Business driven approach, Management support, Adequate resources including budgetary and skills, Data quality, Flexible enterprise model, Data stewardship, Strategy for automated data extraction methods/tools, Integration of data warehouse with existing systems, Hardware/software proof of concept.
Little and Gibson (2003)	Management support, Enterprise approach, Prototyping data warehouse use, Metadata, Sound implementation methodology, External support (consultants)
Mukherjee and D'Souza (2003)	Data quality, Technology fit, Management support, Defined business objectives, User involvement, Change management.
Rudra and Yeo (2000)	Technical factors (data quality and data consistency, etc.)
Joshi and Curtis (1999)	Project-related factors (project plan must match with business demands and the scope of project management), Technical factors (DBMS selection, data loading, and efficiency of data access, etc.)
Wixom and Watson (2001)	Data quality, System quality, Management support, Adequate resources, User participation, Skilled project team.
Chenweth et al (2006)	Management support, Champion, Architecture (data marts), Organisational Fit/User Acceptance
Yeoh and Koronios (2010)	Management support, Clear vision and business case, Business champion, Balanced team, Iterative development approach, Change management, Suitable technical framework, Data quality

Figure 4: BI Critical Success Factors (Hawking & Sellitto, 2010, p. 3)

From a technical point of view, the success of business intelligence seems to depend heavily on data quality, which is unsurprising, as overcoming information asymmetry is one of the main challenges of any firm (Amabile et al., 2013). Smit and Watkins posited that SMMEs can use information-gathering activities (coupled with education and training) to overcome operational issues that they face within their organisation. They further highlighted the fact that within the South African context, SMME own-managers, need to include the "identification and assessment of risk" (Smit & Watkins, 2012, p. 6327) as a part of the firm's risk management process, given that they operate and compete with larger well-established firms in the same product markets (Smit & Watkins, 2012, p. 6327).

The argument made by Smit and Watkins (2012) relates to the importance of having data (or information) coming into the firm from its environment; Yeoh and Koronios (2010) quantified that not only is it important to have data coming into

the firm, they found that the quality of the information being gathered is equally important (Bijker & Hart, 2013, p. 24) to the overall decision-making process. Although there are other important technical factors, such as security, speed of access, and system performance factors, the business intelligence system will be rendered useless, if the quality of the information that is being extracted and used for decision-making is unreliable (Popovič et al., 2012, p. 737).

Table 2: Other BI CSFs compiled from literature

Author	Non-technical Factors	Technical Factors
Adelman (2002) cited by Adamala (2011)	Management Issues, Changing requirements, Justification and budget, Organisation and staffing, User issues, Team issues, Project planning and scheduling,	Data warehouse standards, Tools and vendors, Security, Data quality, Integration, Data warehouse architecture, Performance
Olszak & Ziemba (2012)	Budget, Clear business vision and plan, BI supplier experience and support, Leadership, Team qualifications, Management support, Effective change management, Well defined business problem and processes, Well defined user's expectations, Clear requirements	Data quality, Integration, Appropriate technology and tools, BI system usability, System flexibility
Dawson & Van Belle (2013)	Management support, Business Vision, User involvement, Resources	Data quality
Kumar (2012)	Users, Governance	BI System, Information
Bijker & Hart (2013)	Perceived value, Executive buy-in and support, Business focus and ownership, Education and support, Incremental development, Information quality, Availability, Vendor relationship and support, Regulatory compliance	Infrastructure capacity, BI tool usage

The non-technical CSFs were dominated by management support (occurring in 11 of the 15 articles) and the clarity of the business vision (occurring in six of the 15 articles). These non-technical success factors, when viewed from the context of SMMEs, reside squarely in the domain of a small group of individuals within the firms, specifically the owner-managers, and the senior managers (Lumpkin & Dess, 1996; Smit & Watkins, 2012).

Within the literature it was found that, senior managers of SMMEs did not see the importance of business intelligence (Dawson & Van Belle, 2013, p. 3), and that owner-managers and other key senior personnel were “too busy running the enterprise” (Olszak & Ziemba, 2012, p. 139) to be focused on the BI system selection and the implementation process. These oversights by SMMEs senior management are factors that directly result in employee skills mismatch, and a larger far-reaching organisational mismatch with the BI systems (Olszak & Ziemba, 2012). Yeoh and Koronios (2010, p. 25) hinted at the importance of key personnel buy-in to the success of business intelligence system implementation in a general framework for BI implementation.

In their framework (*cf.* Figure 5), Yeoh and Koronios (2010, p. 25) linked the “Perceived business benefits” of business intelligence directly to the CSFs. This is in line with the arguments made by Olszak and Ziemba (2012), Dawson and Van Belle (2013), and Bijker and Hart (2013), who found that the top manager buy-in was instrumental to the success of the implementation of the BI systems. The overall theme of the CSFs literature is that while there are technical factors that are necessary for business intelligence initiatives to be successful, these technical factors are not the most important (Adelman et al., 2002; Dawson & Van Belle, 2013; Olszak & Ziemba, 2012; Yeoh & Koronios, 2010). Consequently, the most important CSFs are non-technical in nature, and with regards to SMMEs, the owner-managers (and the other senior personnel) their attitudes towards business intelligence seem to the critical limiting factor towards the adoption and resulting success of business intelligence implementation (Adamala & Cidrin, 2011; Klaas, Klimchak, Semadeni, & Holmes, 2010; Olszak & Ziemba, 2012).

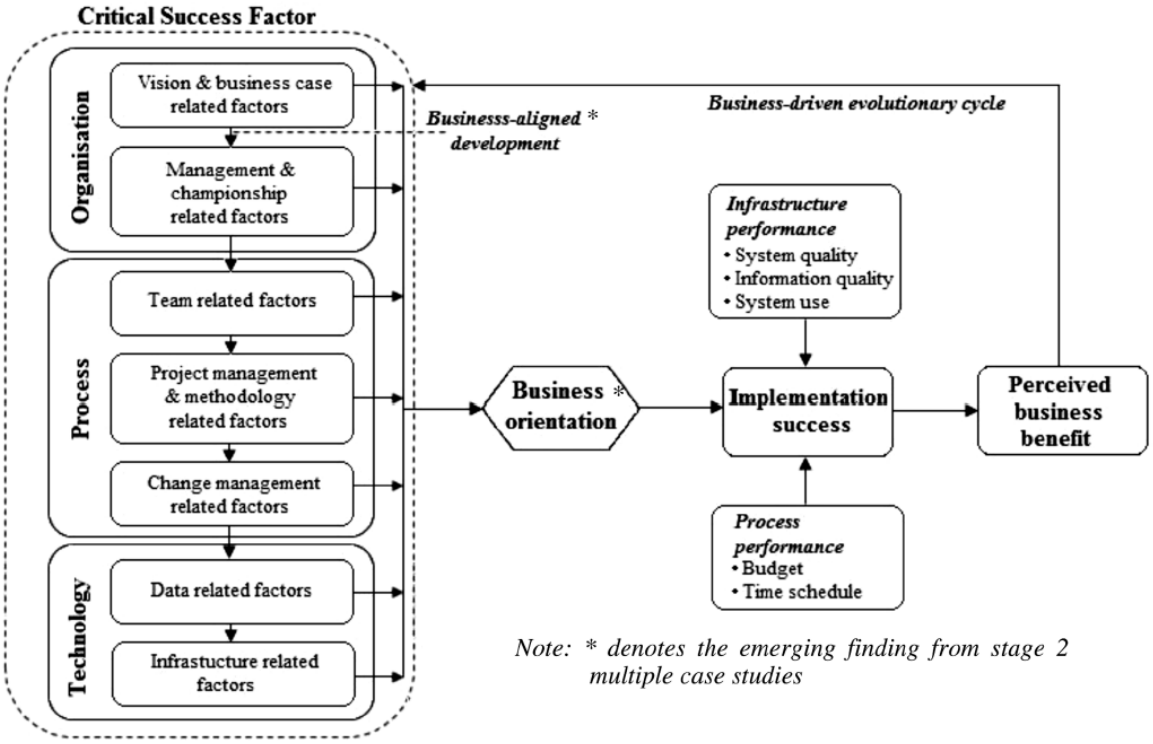


Figure 5: CSFs Framework for Implementation of BI Systems (Yeoh & Koronios, 2010)

2.2.5. *Incremental System Maturity*

Although owner-managers are a possible limiting factor in the success of business intelligence implementation and its adoption, the simplified organisational structure (when compared to large well-established firms) allow SMMEs to be more agile in their decision-making process (Gourova, 2010, p. 640). However, in situations that require “knowledge development, information sharing, collaboration and coordination” (Klaas et al., 2010, p. 351), and that facilitate innovation and market-driven change, the centralised strategy that limits all knowledge and decision-making to the owner-managers is potentially infeasible (Klaas et al., 2010, p. 351). A mature business intelligence systems coupled with an integrative management process that institutes organisational knowledge transfer may result in organisational innovations (Joseph & Jacob, 2011) as knowledge diversity was found to be a key condition for innovation (Chen, Huang, Lin, & Hsieh, 2011, p. 9).

By a “mature business intelligence system”, reference is being made to the more advanced business intelligence systems that include “advanced analytical technologies, such as OLAP (Online Analytic Processing), datamining, and dashboards” (Popovič et al., 2012, p. 737). The addition of these advanced technologies improves the information quality of the business intelligence system, which, as previously indicated, improve the decision-making process (Amabile et al., 2013; Bijker & Hart, 2013; Popovič et al., 2012). Successful adoption of business intelligence by SMMEs therefore requires an incremental path (Bijker & Hart, 2013).

To benefit from business intelligence, owner-managers of SMMEs should possibly first adopt simple IS technologies (such as spreadsheets and accounting packages) (Ponelis, 2012), expanding to the more advanced systems as determined by the business’ growing needs and market orientation (i.e. making the customers happy by gaining a deeper understanding of their needs) (Popovič et al., 2012; Scholz et al., 2010; Venter & Tustin, 2009; Wright et al., 2013). Wright, Bisson and Duffy (2013, p. 6) outlined that the conversion of information to intelligence is critical to the firm’s competitive advantage. Likewise, the budget allocated to the stage in business intelligence implementation should be defined by a specific business challenge that needs to be overcome (Adamala & Cidrin, 2011; Adelman et al., 2002; Bijker & Hart, 2013; Olszak & Ziemba, 2012) or the achievement of a specific objective (Wright et al., 2013, p. 7).

2.2.6. *Applying Business Intelligence initiatives to SMMEs*

Despite the findings that SMMEs are more resource-constrained than large firms (Bojica & Fuentes, 2012; Smit & Watkins, 2012), SMMEs can utilise business intelligence to their advantage when competing in the same spheres as their larger, more established counterparts (Herschel & Yermish, 2009; Ponelis, 2012, pp. 8–9). Additionally, Ponelis (2012) indicated that SMMEs rely heavily on external data and that owner-managers spent significant time pursuing external data about their “customers, competitors, emerging business trends, sources of funding, opportunities for partnership, new technologies and changes in laws and

regulations" (Ponelis, 2012, p. 27) that would provide their organisations with a competitive edge (O'Brien & Kok, 2006, p. 6,14) – tasks that are best suited for a business intelligence systems.

Further, as the firm grows, the need for information sourced within the orgranisation will also increase; this information will prove critical to the decision-making process of the organisation (Ponelis, 2012, p. 27 cited Levy & Powell, 2005, p. 36). As such, business intelligence will not only benefit the day-to-day operation of the firm (Lutu & Meyer, 2008, p. 165), but will also result in more effective, informed and timely decision-making for the SMME (Ponelis, 2012, p. 54).

However, SMMEs face three types of inhibitors that limit the large scale adoption of business intelligence systems. The first are *the cost and the resource inhibitors* (Bijker & Hart, 2013, pp. 24–25; Olszak & Ziemba, 2012, p. 139), which include the high licensing cost of business intelligences tools, and the high infrastructual cost (as the cache of internal data grows) (Levy & Powell, 2005). The second is related to *accessing skilled employees* that are adequately trained to understand and interpret the analytics data (Bijker & Hart, 2013, p. 25). The third is *the interpretation and the evaluation of business intelligence results* (Bijker & Hart, 2013; Ponelis, 2012, p. 25), which is cited as one of the primary hinderances that SMMEs faced with the implemenation of business intelligence systems (Olszak & Ziemba, 2012, p. 139).

2.2.7. *Business intelligence in the South African context*

With regards to the South African context, skilled employees and reliable internet connections seem to be the main obstacles hindering the adoption of business intelligence. The Organisation for Economic Co-operation and Developmentoecd (OECD) reported that South Africa has many deficiencies in its education and training institutions (OECD, 2010). In the Republic of South Africa, this further compounds the typical challenges that SMMEs would face in finding and recruiting skilled analysts (Ponelis, 2012).

Ponelis (2012) identified the lack of fast and reliable internet connection as a primary obstacle in the adoption of business intelligence. It was found that web-based packages provided a cost-effectvive alternative to bespoke and pre-packaged business intelligence solutions; however, due the internet accessibility issues, South African SMMEs are not readily able to benefit from this option (Ponelis, 2012, p. 68).

2.2.8. *Hypothesis 2*

The research related to business intelligence and the relationship to SMME performance have been primarily based on qualitative studies (Ponelis, 2012). In her report, Ponelis (2012) recommended that a quantitative study should be conducted to assess the extent to which the relationship between business intelligence practices affect the economic performance of SMMEs. Based on Ponelis (2012), Olszak and Ziemba (2012), and Bijker and Hart (2013), it is expected that:

Hypothesis 2:

> *There is a relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted business intelligence*.

2.3. Sub-problem 3: The compounded effect of cooperative corporate venturing and business intelligence on SMME economic performance

This section presents pertinent literature that provides the contextual background for Sub-problem 3, and the basis for Hypothesis 3 and 4.

2.3.1. *Knowledge management and firm performance*

The argument was advanced that knowledge is a necessary component for firms to achieve a competitive advantage (Bojica & Fuentes, 2012; Simonin, 1997). This is similar to the idea presented in the "SECI" model, as posited by Nonaka and Takeuchi (1995) who described the roles played by the different types of combination of knowledge in business. The model consists of four quadrants (Herschel & Yermish, 2009; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009), specifically:

- The *Socialisation process*, which consists of pure forms of tacit knowledge exchanges;
- The *Externalisation process*, which involves taking tacit knowledge and converting that knowledge into explicit knowledge. An activity that often occurs in the decision-making process (Herschel & Yermish, 2009, p. 134);
- The *Combination process*, which involves finding and interpreting patters and relationships due to the combination of various types explicit knowledge; and finally,
- The *Internalisation process*, which involves the transfer of explicit knowledge back to tacit knowledge based on the validation of the explicit knowledge and related relationship within a known context.

Knowledge management allows the firm to improve its organisational performance while sustaining its competitive advantage (Evangelista, Esposito, Lauro, & Raffa, 2010; López et al., 2009), and involves the consumption and utilisation of tacit and explicit knowledge, for both the day-to-day and the long-term decision-making processes (Nonaka & Takeuchi, 1995); a view that has been corroborated by Herschel and Yermish (2009) and others such as Nonaka and von Krogh (2009).

Evangelista, Esposito, Lauro, and Raffa (2010, p. 36) pointed out that not only do SMMEs adopt knowledge management, but the type of knowledge that these firms create is intrinsically tacit in nature. Further, by adopting knowledge management, SMMEs can improve their chances of survival, enhance their growth rate and ultimately, their firm performance (Evangelista et al., 2010).

Similarly, Gourova (2010) argued that knowledge management should be adopted by SMMEs, as the adoption of the initiative can result in improved “decision-making and knowledge sharing, faster innovation, reducing duplication of work and improving business processes” (Gourova, 2010, p. 639).

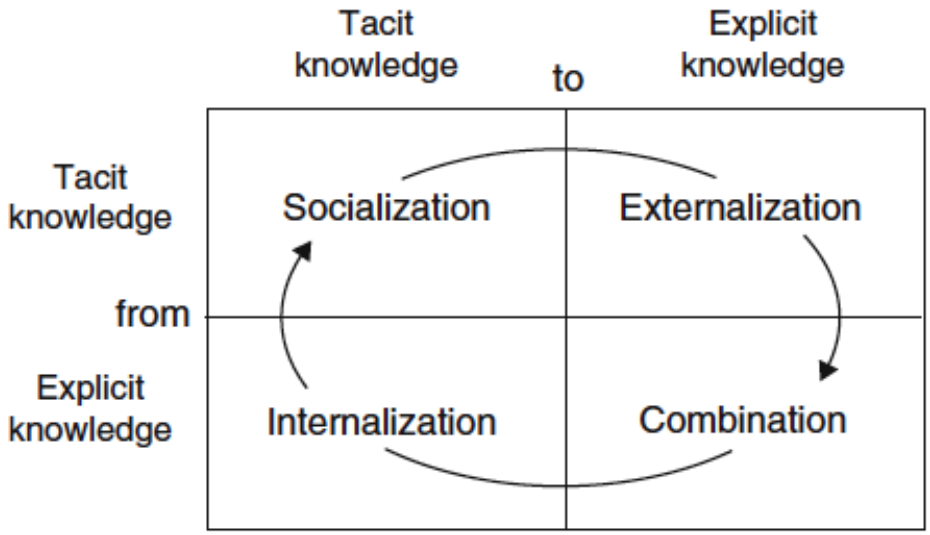


Figure 6: The SECI Model (Herschel & Yermish, 2009; Nonaka & Takeuchi, 1995)

It is fair to deduce that business intelligence is a subset of knowledge management, while cooperative corporate venturing when adopted as a strategic initiative, provides key benefits to the firm that embody aspects of knowledge management.

2.3.2. *The knowledge link between business intelligence and cooperative corporate venturing*

Using an empirical study, Herschel and Jones (2005) was able to show that business intelligence is not a separate and distinct field from knowledge management, but instead, a sub-set of knowledge management. Within the context of the SECI model, business intelligence activities occur inside the combination process (Herschel & Yermish, 2009), as shown in Figure 7, which further corroborates the findings of Herschel’s and Jones’ (2005) earlier work.

Similarly, using an empirical study, Li, Poppo and Zhou (2010) were able to show that subsidiaries or “joint ventures” (Li et al., 2010, p. 349) are equally dependent on both tacit and explicit forms of knowledge transfer. Similarly, Park, Vertinsky and Lee (2012) also found evidence of a link between tacit knowledge and joint venturing, albeit from an international joint venturing point of view. Based on Li et al. (2010), it would seem that cooperative corporate venturing occurs at varying degrees, at the different tacit-explicit knowledge/explicit-tacit knowledge regions of the SECI model, as shown in Figure 7.

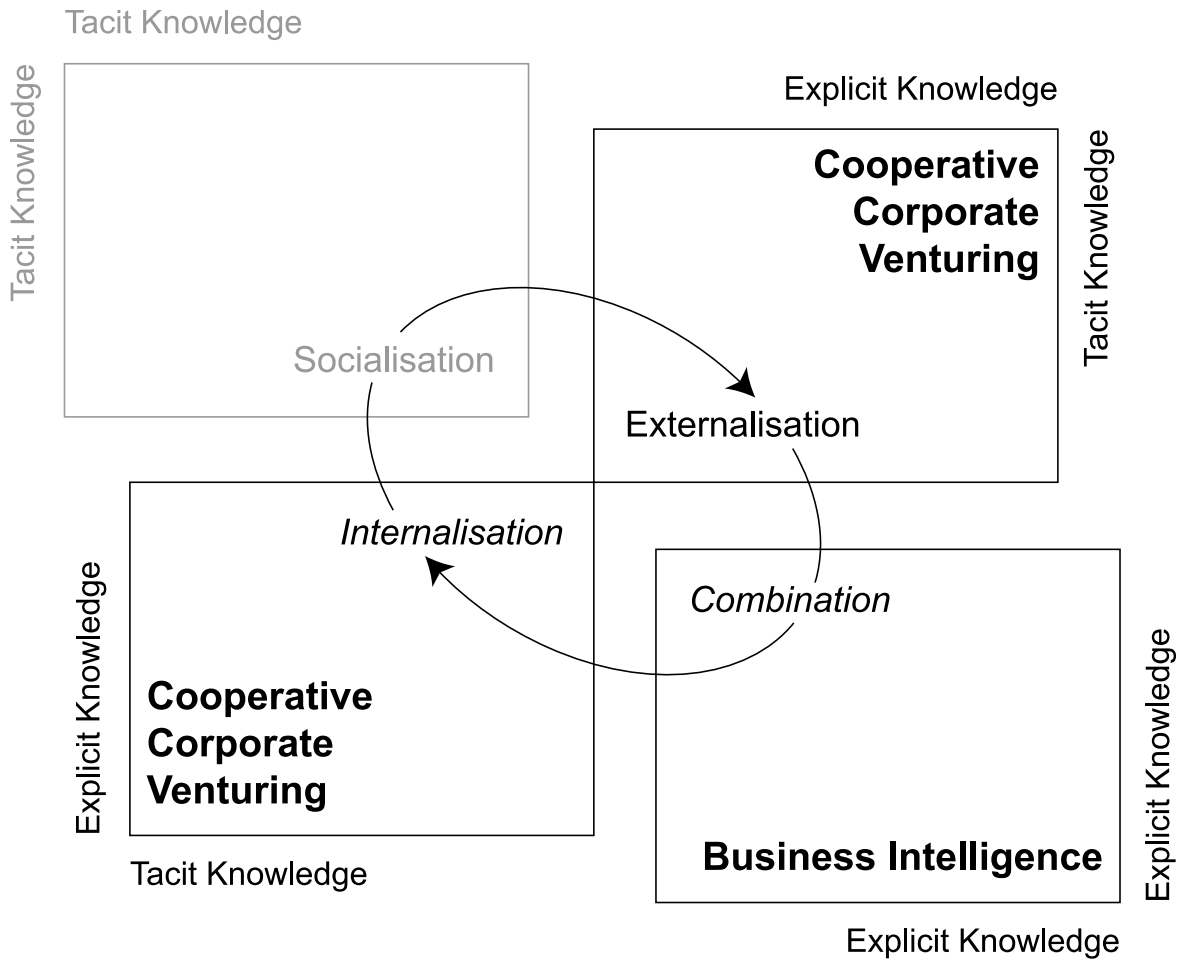


Figure 7: Business Intelligence, Cooperative Corporate Venturing and the SECI Model (own model, based on Herschel and Jones (2009))

2.3.3. *Corporate entrepreneurship, business intelligence and firm performance*

Based on the literature (Morris et al., 2011; O'Brien & Kok, 2006), the link between the adoption of cooperative corporate venturing, business intelligence and firm performance is summarised in Figure 8. Elbashir et al. (2008) highlighted that business intelligence leads to improvements in process efficiencies and other organisational benefits. While Simonin (1997), and Lunnan and Haugland (2008) collectively highlighted that cooperative corporate venturing leads to improvements in performance (both financial and operational) and overall employee skills. However, Mathew, Ogbonna and Harris (Mathew et al., 2012) created a generalised theory that included factors that influence firm performance, and showed that productivity at work, results in profitability and growth (Mathew et al., 2012, p. 199), which are antecedents for firm performance. These findings are not surprising as corporate entrepreneurship and business intelligence provide critical forms of business knowledge, which as established above was found to be beneficial to firm performance (López et al., 2009).



Figure 8: Firm Performance Link (own model)

2.3.4. *Leveraging Competitive Intelligence*

Firms in pursuit of sustained profitability need to find innovative and creative ways to achieve greater performance (Osman, Ahmad, Rashid, & Hussain, 2011; Wright et al., 2013). The authors indicated that by using market orientation (MO), which consists of three dimensions, namely customer orientation, competitor orientation and inter-functional coordination, firms (especially SMMEs) can realise greater organisational performance, and consequentially, sustained profitability (Osman et al., 2011, p. 5975; Wright et al., 2013, p. 7). This is comparable to the earlier findings of Venter and Tustin (2009, p. 89) who looked at aspects of the use and availability of competitive and business intelligence in South Africa.

Although focusing on larger well-established firms, Venter and Tustin provided a succinct description of MO; stating specifically that market orientation "is the firms ability to anticipate, react and capitalise on environmental changes, which result in superior performance" (Venter & Tustin, 2009, p. 89). Based on the literature, the relationship between knowledge management and firm performance is further solidified with the introduction of MO.

Firms with improved access to "actionable intelligence" will have improved customer and competitor focus (Osman et al., 2011; Venter & Tustin, 2009). By taking advantage of the inter-functional coordination, firms will gain improved information sharing which results in better decision-making (Venter & Tustin, 2009); this seems to be further occurring, as a result of the consumption and utilisation of knowledge (Herschel & Jones, 2005). A validation of this insight exists in the form of "hybrid management intelligentsia" (Onunka, 2013), which links various forms of intelligence (such as business, competitive and strategic intelligence), and knowledge management, using a combination of forms of various information and data for decision-making (Onunka, 2013).

To leverage competitive intelligence, firms need to first have a management intelligence system, which is an outcome of using business intelligence. Business intelligence, and consequently knowledge management, allows the firms to become more competitive (Onunka, 2013). The adoption of knowledge

management subsequently improves the priority that is ascribed to information management within the firm, owing to the awareness that improved knowledge management strategies improve management's responsiveness (Onunka, 2013, p. 31). The ultimate objective is to be able to share knowledge within the firm, providing timely access to the knowledge, to the units within the firm that can benefit from the information/knowledge (Joseph & Jacob, 2011, p. 23; Yip, Hong Ng, & Din, 2012, p. 24).

2.3.5. *Hypothesis 3*

Business intelligence (Dawson & Van Belle, 2013; Elbashir et al., 2008; Hawking & Sellitto, 2010; O'Brien & Kok, 2006) and cooperative corporate venturing (Antoncic & Prodan, 2008; Kinyeki & Gachanja, 2013; Rothaermel, 2001; Terjesen et al., 2011), were found to separately affect the organisational performance of well-established firms, and by extension their economic performance. Within this section (*cf.* 2.3.2) we provided a link between the business intelligence and cooperative corporate venturing.

Using the literature (Dawson & Van Belle, 2013; Kinyeki & Gachanja, 2013; Li et al., 2010; Naldi & Achtenhagen, 2011; Ponelis, 2012), and referring to "the joint application of business intelligence and cooperative corporate venturing" as a SMME hybrid strategy, we expect that:

Hypothesis 3:

> *Firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not adopted the hybrid strategy.*

2.3.6. *Hypothesis 4*

Corporate entrepreneurship is an over-arching strategy (Kuratko & Audretsch, 2013a; Morris et al., 2011), encompassing cooperative corporate venturing (Morris et al., 2011; Zahra & Covin, 1995), and various forms of alliances (Haase

& Franco, 2010; Kinyeki & Gachanja, 2013; Lai & Chang, 2010; Rothaermel, 2001). Corporate entrepreneurship, and by extension cooperative corporate venturing has been argued by some (Morris et al., 2011), as not being suitable for SMMEs; this is also the case for business intelligence, as some scholars (Dawson & Van Belle, 2013, p. 2; O'Brien & Kok, 2006) have presented business intelligence initiatives as being suitable only for large well-established firms.

The contrasting views on the applicability of cooperative corporate venturing and business intelligence to small firms (Naldi & Achtenhagen, 2011; Ponelis, 2012) alludes to the firm's size as being a moderating variable in the suitability of the strategies (Terziovski, 2010). Therefore, if the hybrid strategy may be adopted by SMMEs (Dana, 2004; Lutu & Meyer, 2008; Ponelis, 2012; Terziovski, 2010), the perceived benefits of the strategy should differ based on the size of the firm. For firms having adopted a hybrid strategy, this leads to:

Hypothesis 4:

> *Firm size will moderate the relationship between the benefits of the hybrid strategy and the levels of SMME economic performance as perceived by the owner-managers of the firms.*

2.4. Conclusion of literature review

The literature review explored the constructs business intelligences and cooperative corporate venturing within the context of large, well-established firms and SMMEs. Evidence was found that intimated that the constructs could also be applied to SMMEs as a strategic initiative, thereby yielding higher levels of economic performance. Also explored was the concomitant relationship between the economic performance of the SMMEs and the aforementioned constructs.

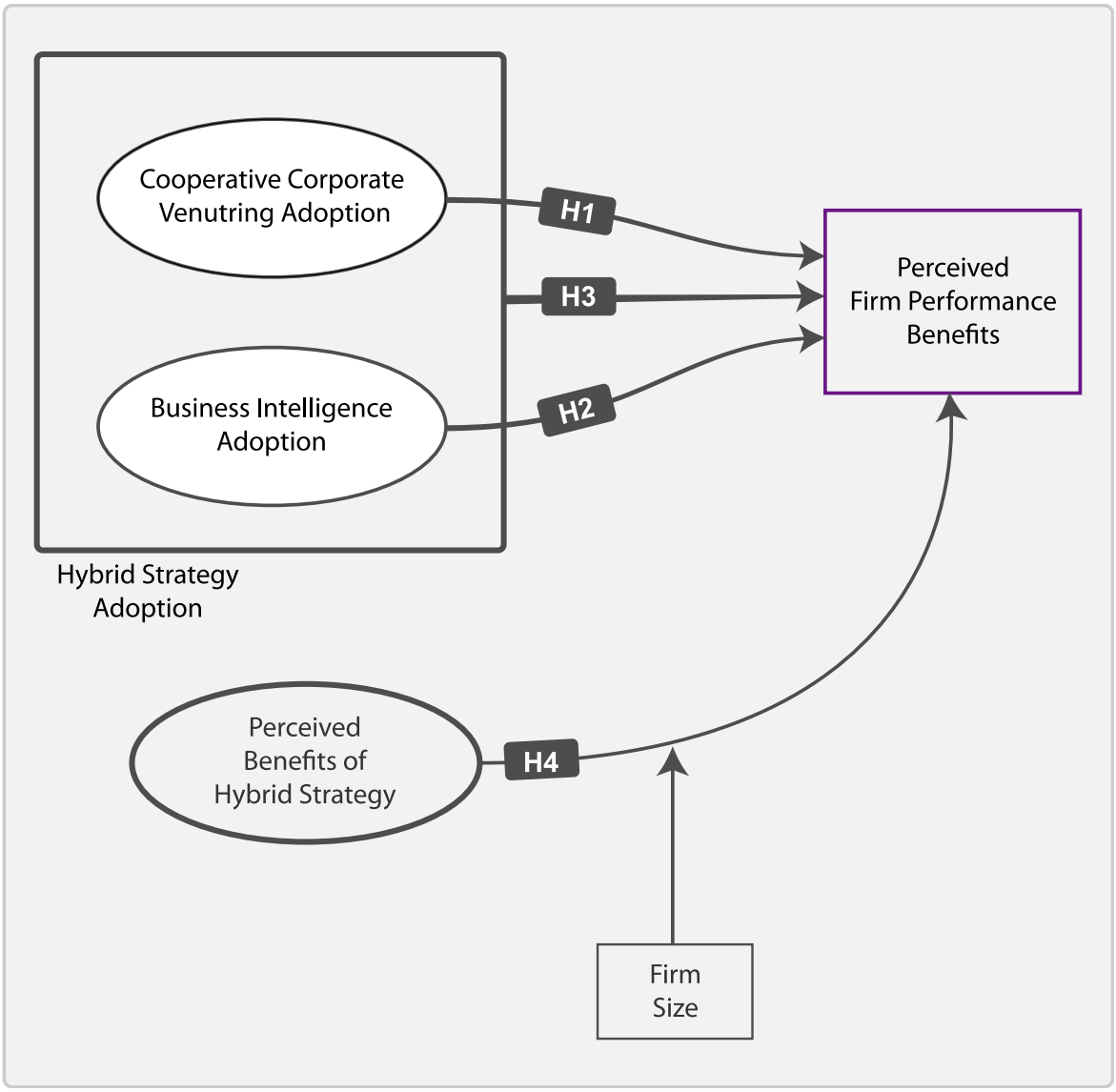


Figure 9: Research Conceptual Model (own model)

Presented visually (*cf.* Figure 9), the relationship between the various constructs is displayed in the figure above. Likewise, Table 3 presents an overview of the sub-problems aligned with the hypotheses of the research, as perceived by the owner-managers/senior managers of the SMMEs.

Table 3: Research sub-problems and hypotheses overview

Sub-problem 1 **Identify if SMMEs are adopting cooperative corporate venturing as a strategic initiative to increase their economic performance.**		
Hypothesis 1	$\mathbf{H_0}$:	There is no relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance.
	$\mathbf{H_A}$:	There is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted cooperative corporate venturing.
Sub-problem 2 **Identify ways in which SMMEs are adopting business intelligence practices as a strategic initiative with the objective to increase their economic performance.**		
Hypothesis 2	$\mathbf{H_0}$:	There is no relationship between the adoption of business intelligence and the perceived level of SMME firm performance.
	$\mathbf{H_A}$:	There is a relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted business intelligence.
Sub-problem 3 **Evaluate the compounded effect that business intelligence and cooperative corporate venturing initiatives have on the economic performance of SMMEs.**		
Hypothesis 3	$\mathbf{H_0}$:	The perceived level of SMME economic performance will be no different for firms that have adopted the hybrid strategy and those that have not adopted the hybrid strategy.
	$\mathbf{H_A}$:	Firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not adopted the hybrid strategy.
Hypothesis 4	$\mathbf{H_0}$:	Firm size will not moderate the relationship between the perceived benefits of the hybrid strategy and the perceived levels of SMME economic performance.
	$\mathbf{H_A}$:	Firm size will moderate the relationship between the benefits of the hybrid strategy and the levels of SMME economic performance as perceived by the owner-managers of the firms.

CHAPTER 3: RESEARCH METHODOLOGY

This section details the research methodology that was used to assess the sub-problems of the research and the associated stated hypotheses. Critical literature is used to justify the key methodological decisions of this study.

3.1. Research methodology / paradigm

A quantitative research methodology was adopted for this study as the literature identified a formal quantitative research methodology as being suitable for evaluating propositions, hypotheses and research questions in an objective manner (Cooper & Schindler, 2003). The alternative methodology, a qualitative study, is used to understand the observed phenomena from the individual's perspective (Cooper & Schindler, 2003; Scotland, 2012).

The aim of this research was to collect quantitative data by using a survey, to analyse the data in an objective manner using statistical analysis, and to test the hypotheses within the confines of the literature. The decision to use a formal quantitative research strategy was guided by the three main objectives of a formal study, specifically: to provide a description of the observed phenomena with regards to a specific sample population, to provide an estimation of the population that has the observed characteristics, and to provide correlations between variables where appropriate (Cooper & Schindler, 2003) as well as to test hypotheses involving moderation effects.

3.2. Research Design

The research design section identifies the type of study conducted and the reasons for its selection.

3.2.1. *Types of studies*

A longitudinal study is best suited for measuring causation (or impact) of phenomena given a prior and a post state, while a cross-sectional study captures a snapshot of

phenomena being studied at a specific point in time (Cooper & Schindler, 2003; Styne, Smit, Du Toit, & Strasheim, 1994). The cross-sectional study is a branch of the non-experimental research method, belonging to the sub-category of correlational research design (Tolmie, Muijs, & McAteer, 2011, p. 33). As cited in the literature, the correlational research design, (and by extension, the cross-sectional study), is best suited for performing correlational analysis of the various variables and relationships in the study based on the analysis of the observed data, collected at a specific point in time (Styne et al., 1994, p. 55; Tolmie et al., 2011, p. 33,36).

3.2.2. *Research design selection and justification*

It was necessary to adopt a cross-sectional research design for this study, primarily due to resource and academic time constraints of the researcher. The study was performed by examining the perceived impact that the strategic initiatives, (namely business intelligence and cooperative corporate venturing) would have on a SMME firms economic performance, from the perspective of owner-managers of the firm who participated in the survey.

3.3. Population and sample

A study is only as good as the sample that is being used to approximate the population (Field, 2009, p. 40; Tolmie et al., 2011, p. 19). This section outlines the relevance of the population and sample as it relates to the study, while discussing the sampling method that was used.

3.3.1. *Population*

The target population of the study is firms that have between 1–100 employees. This is pertinent as the focus of the study is on SMMEs operating within the Republic of South Africa. The number of employees as stated, was determined based on the categorisation of SMMEs as defined by the government of the Republic of South Africa (Republic of South African, 1996).

Research problem restated for convenience:

> *"Determine the relevance of business intelligence and cooperative corporate venturing in the operation of small, medium and micro enterprises and the relation thereof with the economic performance of these firms, as perceived by the owner-managers of the firm."*

Further, given that the research problem is industry and revenue agnostic, it is sufficient to use the number of employees of the firm as the sole method by which firms were screened for suitability for the study.

There were an estimated, 536 000 registered SMMEs operating in the Republic of South Africa as of August 2008, according to the South African Department of Trade and Industry (Department of Trade and Industry, Republic of South Africa, 2008). However, the actual number of SMMEs (including unregistered firms) operating in South African is unknown, so that the size of the target population of SMMEs for the study, and thus the sampling ratio could not be determined.

3.3.2. *Sample and sampling method*

A sampling frame of 140 responses (n = 140) from SMMEs was targeted; this was to ensure that meaningful statistical analysis (Kotrlik & Higgins, 2001) could be conducted, leading to a resolution of the problem statement. The sample for the study consisted of respondents from four main groups, namely:

1. Individuals attending forums and workshops for SMMEs and entrepreneurs;
2. Companies operating in and around industrial parks and villages;
3. SMMEs whose email addresses were found online; and
4. Members of the Wits business school community.

As a result of this, the study is considered to have adopted mixed sampling methods, specifically, convenience sampling (for the business school community) and judgment sampling for rest of the sample.

Sampling errors occur due to the inability of the sample to represent the entire population which affects the accuracy of the information obtained from the sample (Styne et al., 1994, p. 20). Sampling bias, on the other hand, refers to the selection criteria used to obtain the respondents of the sample, which may result in some or all of particular groups of the population being omitted form the sample (Styne et al., 1994, p. 20). By extension, it is possible that there may be significant sampling error and sampling bias due to the use of sampling methods adopted for this study. However, given that the sample consists of respondents included from a broad spectrum of individuals, the sample may be more representative of the target population, thus improving the external validity, when compared to a sample that would have been drawn from a single source.

There are two general classes of sampling procedures; probability, and non-probability (Styne et al., 1994, p. 21). Probability sampling procedures provide researchers with higher objectivity and accuracy than do non-probability procedures (Styne et al., 1994, p. 21). Both convenience and judgement sampling are considered to be non-probability sampling procedures.

Convenience sampling is useful for identifying weaknesses in research instruments, as it is inexpensive to execute and can be executed quickly. However, convenience sampling is not useful for research that requires a high degree of accuracy, and whose outcome will “be used in any decision-making process” (Styne et al., 1994, p. 39). Judgement sampling is considered to be somewhat better than convenience sampling, and is useful in situations where “small samples have been drawn from heterogeneous populations” (Styne et al., 1994, p. 39) and the selection of the samples is left to the “good judgement” (1994, p. 39) of the researcher.

Respondent profile

Owner-managers of the SMMEs were identified as the ideal subjects for the questionnaire used in this study. Alternatively, persons within the firm that making key strategic decisions and having access to pertinent information about the company’s financial status at any given point in time were also selected in lieu of the owner-managers. The rationale for choosing these individuals, is that in small companies, the organisational-level strategic decisions are made by either the owners of the firm, or by a few key individuals (Lumpkin & Dess, 1996). Further, purpose of this study, it is

necessary we choose either class of individuals, as they would be aware of how changes in strategic initiatives affect the company's economic performance.

3.4. The research instrument

The research instrument that was used for this study was a self-administered questionnaire. This was a suitable choice for this study, as the researcher was conducting a quantitative study that adhered to a cross-sectional research design (Du Plooy, 2001; Tolmie et al., 2011). Further, the self-administered questionnaire ensured that both the researcher's conduct and the measuring instrument were unobtrusive, both attributes that are necessary and contribute to the internal validity of a cross-sectional study (Du Plooy, 2001, p. 85).

Subjects were provided access to either an online survey or a paper-based questionnaire. For the online survey, the research instrument was distributed by one of three methods, namely:

- Directly by the researcher. In these instances, an introductory email with an embedded link to the online survey, was sent to the subjects;
- By a third party associated with a government or private institution. The researcher provided a brief biography, the aims and objectives, and the individual then distributed an email with an embedded link to the online survey to their SMME associates or members; or,
- By a third-party within the researcher's social network. Also in this case, the researcher provided a brief biography, with the aims and objectives of the survey, and the individual then distributed an email with an embedded link to the online survey to their SMME associates or colleagues.

Alternatively, the paper-based questionnaire was handed out to individuals attending forums (and workshops) for SMMEs and entrepreneurs, companies operating in and around industrial parks and villages.

The research instrument is divided into four different sections, one for each construct, including the demography. Additionally, the questionnaire includes a definition of pertinent terms where necessary, which attempted to reduce interpretation disparities.

With regards to the survey items, these were grouped and presented as follows:

- A nominal item for demography;
- A mix of ordinal, nominal and Likert-scaled for the firm characteristics;
- 7-point Likert scaled items for the Business Intelligence construct;
- 5-point Likert scaled items for the Joint Venturing construct; and,
- 7-point Likert scaled items for the Firm Performance construct.

The decision to use the Likert-scaled items was to facilitated “objective, systematic, and quantitative descriptions” (Cooper & Schindler, 2003, p. 460) of the information being communicated. According to Cooper and Schindler (2003), by limiting the response options of each item, and presenting the participants with a list of responses, the researcher is able to reduce the repetitious and irrelevant answers when compared to close-ended items. Also, by virtue of having the responses in a tabular format, the researcher will better be able to analyse the responses of the participants.

3.4.1. *Sampling observation errors*

The decision to use the Likert-scaled items was an attempt to reduce the sampling observation errors. As described by the literature, these are the class of errors “made by the sampler or the respondent during the collection of the sampling of the data” (Styne et al., 1994, p. 20).

3.4.2. *Known issues with Likert-scale*

Further, Cooper and Schindler (2003) had identified that there is a controversy with regards to the Likert scale. Some scholars view a Likert scale as being an equal-interval scale while others view the scale as an ordinal scale (Cooper & Schindler, 2003). However, as noted by Cooper and Schindler (2003) and Leung (2011), it is more important to be consistent, adopting the convention that best suits the study.

The Likert scales were used as an equal interval scale (where the difference between consecutive values is equal over the range of the scale). This determination is based on how the scales were originally designed (Elbashir et al., 2008; Lunnan & Haugland, 2008; Mathew et al., 2012; Simonin, 1997).

3.4.3. *Firm characteristics*

Measuring the firms' characteristics consisted of multiple items. These include the following:

- An ordinal item to capture and control for SMME size;
- Two nominal items that directly measured the usage of business intelligence and cooperative corporate venturing initiatives within SMMEs;
- Additionally, the adoption of business intelligence and cooperative corporate venturing initiatives within SMMEs was measured separately with a ten-item, custom 5-point Likert scale.

The 5-point Likert adoption scale was designed by the researcher, and consisting of two sub-scales. The scale was designed to indirectly measure the adoption of business intelligence and joint venturing respectively.

3.4.4. *Business Intelligence scale*

The business intelligence dimensions and items were based on the 22-item, 4-factor instrument of Elbashir et al. (2008); this instrument was chosen, due to the relevance to the topic being researched and the fact that they were peer-reviewed and cited (103 citations).

To ensure that the instrument is aligned with this study, it was necessary to modify the items of scale, while maintaining the 7-point Likert scale format. Additionally, to reduce (the likelihood of) acquiescence responses, several reverse and distractor items were added.

The dimensions for business intelligence include:

1. *Processes efficiency benefits*. This dimension consists of eight items, three of which are reversed items. The original factor consisted of four items, none of which were reversed.

2. *Organisation benefits*. This factor consists of eight items, three of which are reversed items. The original factor consisted of six items, none of which were reversed.

3.4.5. *Cooperative corporate venturing scale*

For the evaluation of cooperative corporate venturing, three dimensions were be measured. These items were obtained by modifying the items from pre-existing survey instruments. Two factors, namely financial performance and "existing skills & knowledge skills" were based on Simonin's (1997, p. 1162) instrument (cited 803 times), while the third was based on Lunnan and Haugland (2008) (cited 106 times); both were chosen because they were relevant to the topic, peer-reviewed and cited.

To ensure that the instrument aligned with this study, it was necessary to modify the items of scales. The scale formats were changed to a 5-point Likert scale according to Vagias' (2006) Likert-type scales response anchors.

The items for cooperative corporate venturing were grouped as follows:

1. *Financial Performance benefits*. This was based on combining the profit contribution, sustaining competitive advance and market share contribution factors of Simonin's (1997, p. 1164) instrument. Two additional reversed items and one distractor item were added. This dimension consisted of six items.

2. *Operational Performance benefits*. This was based on Lunnan's and Haugland's (2008) instrument. The instrument was modified to include two reversed items and one distractor item. Also, one of the original items was removed, as it was not pertinent to this study. This dimension consisted of six items.

3. *Skills benefits*. This dimension was based on Simonin's (1997, p. 1164) existing skills and knowledge skills factors. Consolidated, the factors consisted of four items. Two additional items were added, a reverse item and a distractor item. This dimension consisted of six items.

3.4.6. *Economic performance scale*

The dependent variable, economic performance, was measured using a bi-dimensional instrument that was based on the instrument created by Mathew et al. (2012, p. 202) . Specifically, the "profitability and growth" (Mathew et al., 2012, p. 202) and the "productivity at work" (2012, p. 202) dimensions were used to measure the economic performance construct.

To ensure that the instrument is aligned with this study, it was necessary to modify the items of scales. The scale was changed to a 7-point, belief-anchored Likert scale according to Vagias' (2006) Likert-type scales response anchors. The items for economic performance were grouped as follows:

1. Profitability and growth. This dimension was modified to include two reversed items and one distractor item. This dimension consists of seven items.

2. Productivity at work. This dimension was modified to include two reversed items and one distractor item. This dimension consists of seven items.

3.4.7. *Demography scale and control variables*

To capture the demography of the respondents, one nominal item was used. The item was used to capture the role of the person within the firm that was completing the survey. The item presents the participant with three options, “I am the owner and manager”, “I am a top level manager, reporting directly to the owner”, and “other”. The first two options were used to identify viable responses.

3.5. Procedure for data collection

This section describes aspects of the research methodology that pertain to the data collection procedures.

3.5.1. *Data collection*

Initially, attempts were made to gain indirect access to SMMEs via the respective databases of several government agencies, not listed due to privacy concerns. Most of these institutions denied (both direct and indirect) access to their SMME databases (citing privacy and anti-spamming policies), while few, including some government and private agencies, promised access to their SMMEs via indirect distribution of the research instrument. In each case, the claim of distribution could not be credited or discredited, for instance,

- A Gauteng-based government institution offered only to provide a link to the online questionnaire via a *members* only page on their website; and,
- A Limpopo-based government institution offered to email the link to the online questionnaire to their SMMEs.

Ultimately, data was collected from the following sources:

- Individuals attending forums (and workshops) for SMMEs and entrepreneurs;
- Companies operating in and around industrial parks and villages;
- SMMEs whose email addresses were found online; and,
- Members of the Wits business school community.

3.5.2. *Administration and collation procedure*

The electronic version of the questionnaire was created and distributed with the google.com survey tool. Each person on the SMME list was emailed an introductory letter and a URL to the survey, others were provided with a link to the survey (via a third party).

As it pertains to the manual field work, questionnaires were distributed and collected at the following venues:

- An entrepreneurship forum at the Wits Education Campus (The Global Entrepreneurship Week event – Day 3 (GEW-1));
- A panel discussion at the Wits Business School Campus (The Global Entrepreneurship Week event – Day 4 (GEW-2));
- The Bronson Centre for Entrepreneurship (BCE); and,
- Industrial parks and villages (I-Parks) in Roodepoort and Germiston.

The online survey tool automatically collected the responses from the individuals who had completed the survey, and a Microsoft Excel file was then generated. Once the Microsoft Excel file was generated, the survey responses that were captured from the manual fieldwork were manually added to that file.

3.5.3. *Data Manipulation*

Cursory data manipulation was administered to the Microsoft Excel file, a process also known as the “cleaning” of the data. This entails reversing the values of reversed items and removing distractor items (*cf*. 3.4.3) before the calculation and the addition of the means columns where added to the file. Once the data had been cleaned, the resulting Microsoft Excel fill was imported into SPSS (version 21) for further statistical analysis.

Scale means, as described in Table 27 (*cf*. section C.4 of APPENDIX C: STATISTICAL RESULTS), were also added to the Microsoft Excel file. Additionally, variables were created in Microsoft Excel to code for the adoption of Business Intelligence (USING_BI), Cooperative Corporate Venturing (USING_CCV), and the joint adoption of the strategies (USING_HYBRID).

The coding rules are summarised in Table 4 below.

Table 4: Adoption Dummy Variable Coding

Dummy Variable	Resulting Value	Item Conditions
USING_BI	YES	Item D1.3 is YES ***and*** D21_MEAN must have a mean that is three or above
	NO	Item D1.3 is NO ***or*** D21_MEAN has a mean that is less than three
	Remains blank	D1.3 is blank ***or*** D21_MEAN is also blank
USING_CCV	YES	Item D1.4 is YES ***and*** D31_MEAN must have a mean that is three or above
	NO	Item D1.4 is NO ***or*** D31_MEAN has a mean that is less than three
	Remains blank	D1.4 is blank ***or***, D31_MEAN is blank
USING_HYBRID	YES	USING_BI is YES ***and*** USING_CCV is YES
	NO	USING_BI is NO ***or*** USING_CCV is NO
	Remains blank	USING_BI is blank ***or*** USING_CCV is blank

3.5.4. *Researcher ethics*

During the data collection phase of the study, the researcher ensured that no personal contact information from the respondents was recorded, captured or collected on the surveys that could be used to link participants to their completed questionnaires. In the three instances that participants asked if they could record their personal details (so as to get a copy of the results of the study), they were instructed to record the researcher's contact details, which were included in the introduction letter that was affixed to the front of the questionnaire.

3.6. Data analysis and interpretation

This section describes aspects of the research methodology that pertain to the data analysis.

3.6.1. *Describing the data*

For this study, descriptive statistics were used to analyse the findings of the study even though the sample sizes obtained was not large enough to be representative of the population of SMMEs in the Republic of South Africa. As such our analysis focuses on the entire sample (Cooper & Schindler, 2003).

Descriptive data analysis

The firm characteristics data, namely, the use of business intelligence, and the use of cooperative corporate venturing (*cf*. Research instrument), is described primarily with frequency distributions and figures (Cooper & Schindler, 2003, pp. 223, 592). As described in the Table 5, the ordinal data, specifically categorised firm size, is described similarly to the nominal data (Cooper & Schindler, 2003, pp. 225, 596).

Table 5: Firm Characteristics Variables

Variable		Data Type	Descriptive Analysis
Firm size		Ordinal	Mode, Percentage
Business Intelligence	Usage directly measured	Categorical	Mode
	Adoption indirectly measured	Equal-Interval	Mean, Standard deviation
Cooperative Corporate Venture	Usage directly measured	Categorical	Mode
	Adoption indirectly measured	Equal-Interval	Mean, Standard deviation

In conjunction to the nominal (yes/no) items that were used to directly assess the usage of business intelligence and cooperative corporate venturing, equal interval scales were also used to indirectly assess the usage of these variables (*cf.* Table 7: Hypothesis Statistical Tests Summary). This provides an additional and indirect dimension of usability with which to measure the usage of these variables by the firms.

Table 6: Strategy Adoption (indirectly measured)

Variable	No. Items
Business Intelligence Adoption	6 (including 2 reversed items)
Cooperative Corporate Venture Adoption	4 (including 1 reversed item)

Cooperative corporate venturing, although conceived as a dichotomous variable (i.e. the firm is either participating in joint venturing or they are not participating in joint venturing) was converted into an equal interval scale with four items, based on the three attributes of joint venturing, as depicted in the Figure 10 below. The attributes in the figure each relate to one item in the usage scale, with the exception of attributes "1: Participating in joint venturing", which translated into two items on the scale, one of which was reversed (*cf*. Research instrument).

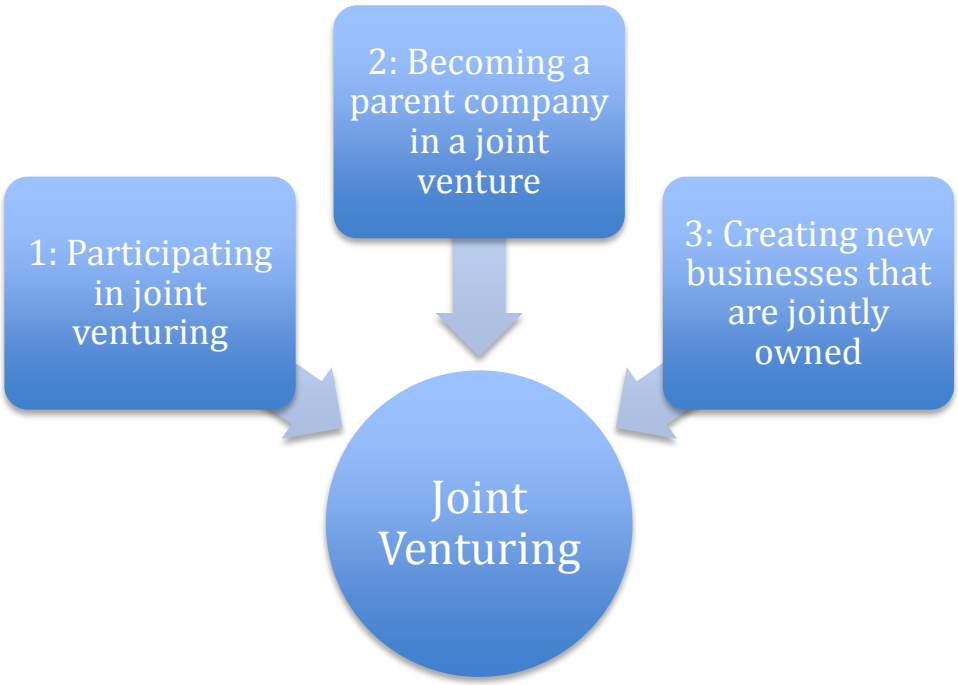


Figure 10: Attributes of Joint Venturing (own model)

Distribution Normality and Skewness

To assess the normality of the distributions for the different variables, the **z-scores** for skewness will be used. This is calculated using the formula:

$$Z_{skewness} = \frac{Skewness - 0}{SE_{skewness}}$$

This is a suitable test for normality, for this study as the sample size is small (less than 200). The test for normality requires the non-rejection of the null hypothesis, that the data is normally distributed. For this to be achieved, (i.e. the non-rejection of the null hypothesis), the standard score for the skewness and kurtosis must both be less than the critical value of 2 (and consequently *p >. 05*). Thus the absolute $Z_{skewness}$ scores should be less than 1.96 (p > .05) for the distribution to approximate to normality; the closer the score is to zero, the closer the distribution is to normality. This is similar for kurtosis.

Table 7 lists the variables (which are discussed in detail in section 4.3.7), along with their respective natural log transformations, which were performed to correct the skewness in the data. According to Howell (2006), Tabachnick and Fidell (2007), Log_{10}(Constant-X) transforms are suitable for correcting data that has a moderately negative skewness. The side effect of the natural log transformations is that they reverse the data. This resulted in another (final) transformation to correct the reversals. Variables ending in _***TRANS*** (*cf.* Table 28 in section C.4 of APPENDIX C: STATISTICAL RESULTS) represent the final transformation and were used in the different statistical analysis.

3.6.2. *Independent and dependent variable analysis*

This study consists of four independent variables (firm size, business intelligence adoption, cooperative corporate venturing adoption, and the perceived benefits of the hybrid strategy) and one dependent variable (perceived firm performance). The independent and dependent variables are interval scaled, each containing multiple dimensions or indicators (with the exception of the size variable).

Since the measurement scales are considered equal interval, with more than five items per construct, factor-analysis was appropriate to examine the factor-structure of the questionnaire.

This was however contingent on the following:

- Intercorrelations – The items of the scales must be intercorrelated (Field, 2009; Pallant, 2010, p. 183) with a correlation coefficient greater than .3 (Pallant, 2010, p. 183);
- Sample adequacy – The Kaiser-Meyer-Olkin measure of sampling adequacy should be at least .6, and the Bartlett's test of sphericity should be significant ($p < .05$) (Pallant, 2010, p. 183); and,
- Sample Size – There is some debate with regards to the minimum sample size that is necessary to perform regression and factor analysis. For instance, Kotrlik and Higgins (2001) suggested that a minimum of 140 responses is necessary, while Pallant (2010) highlighted that other authors tending to focus on the ratio of participants to items/expected factors, instead of a fixed minimum sample size, suggesting possible cases/factor ratios of 10–1, and 5–1. For this study, the 10–1, cases/factor ratios 'rule of thumb' was chosen based on both Field (2009, p. 647) and Pallant (2010, p. 183).

3.6.3. *Analysis of hypotheses*

This section contains the analysis of the hypotheses as perceived by the owner-managers/senior managers of the SMMEs.

Hypotheses restated for convenience:

Hypothesis 1	$\mathbf{H_0}$:	There is no relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance.
	$\mathbf{H_A}$:	There is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted cooperative corporate venturing.
Hypothesis 2	$\mathbf{H_0}$:	There is no relationship between the adoption of business intelligence and the perceived level of SMME firm performance.
	$\mathbf{H_A}$:	There is a relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted business intelligence.

Hypothesis 3 **H_0**: The perceived level of SMME economic performance will be no different for firms that have adopted the hybrid strategy and those that have not adopted the hybrid strategy.

H_A: Firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not adopted the hybrid strategy.

Hypothesis 4 **H_0**: Firm size will not moderate the relationship between the perceived benefits of the hybrid strategy and the perceived levels of SMME economic performance.

H_A: Firm size will moderate the relationship between the benefits of the hybrid strategy and the levels of SMME economic performance as perceived by the owner-managers of the firms.

The table below (*cf*. Table 7) presents a summary of the various statistical analyses that will be performed on the different hypotheses.

Table 7: Hypothesis Statistical Tests Summary

Hypothesis	Statistical Test (Field, 2009)
Hypothesis 1, 2, 3	Descriptive statistics and Independent sample *t*-test
Hypothesis 4	Pearson's correlation, hierarchical regression analysis

Factor Analysis

Factor analysis is a suite of reduction techniques used to reduce the number of variables in a dataset to a smaller set of variables, or factors (Field, 2009; Pallant, 2010).

According to Pallant (2010), factor analysis is used primarily as either exploratory or confirmatory analysis. The main difference between the two strategies is the stage in the research when the analysis is performed and the motivation for conducting the analysis.

Exploratory factor analysis is conducted early in the research, when the researcher has a large dataset, and is not sure what the variables are, as such, they then use exploratory factor analysis to "explore the interrelationships among" (Pallant, 2010, p. 181) various configurations of data. Alternatively, confirmatory factor analysis is often conducted in the later stages of the research. It typically used in conjunction with more complex statistical tests, where the researchers is trying to "confirm specific hypotheses or theories" (Pallant, 2010, p. 181).

This study used exploratory factor analysis, with Principal Component Analysis (PCA) as the reduction method; the resulting factor structure of the loadings was checked visually. With PCA, the reduction is done, taking into account all of the variance of the variables, and is ideal since this study has consist of a large dataset (Field, 2009; Pallant, 2010).

Further factor analysis was conducted as the scales that were used in the research instrument each consisted of two or more sub-scales; business intelligence consisted of two subscales (process efficiency and organisational benefits); joint venturing consisted of three subscales (financial performance, operational performance and skills); while firm performance consisted of two sub-scales (profitability and growth, and productivity at work). It was necessary to reduce the scale measuring the same construct to one factor, by reducing the dimensionality of the data to a more parsimonious structure before performing further statistical analysis as it was expected that the items in the sub-scales would be highly intercorrelated.

t-test Analysis

As explained in the literature (Field, 2009, p. 204; Tolmie et al., 2011, p. 304), a *t*-test for independent groups is a significance test that is used for assessing the means of two groups for statistically difference. Further, the significance (also referred to as the *p*-value can be used to determine if the observed differences are real or possibly occurring due to errors in the observations. A requirement of the *t*-test is that the data meets the assumptions for parametric testing (Field, 2009, pp. 204, 822).

The independent samples *t*-test is suitable for evaluating Hypothesis 1, 2 and 3, as the hypotheses have dichotomous categorical predictors (i.e. adoption) and a continuous dependent variable (i.e. performance) (Field, 2009, pp. 204, 822). To elaborate, in the case of the Hypotheses 1 and 2, there are two generalized groups, those SMMEs that have adopted the constructs under observation i.e. business intelligence, or joint venturing, and those that have not. For each group, it is necessary to compare the level of perceived firm performance so as to be able to say if the research hypotheses are supported. In the case of Hypothesis 3, the relationship being analysed is also based on two groups of SMMEs, those that have adopted a hybrid strategy, and those that have not. To evaluate if the relationship exists, and if the Hypothesis 3 is supported, the means of the level of perceived firm performance of the two groups must be compared.

Effect Size

The effect size is a statistic that is used to evaluate the practical significance or importance of the differences that are observed between either two groups, or between the differences between the outcome and the predictor variables (Field, 2009, p. 332; Pallant, 2010, p. 210). While a statistical test, for instance a *t*-test, may be statistically significant, the importance of the effect "in real terms", may not be significant, especially in cases where the sample size is large, and small differences are statistically significant (Pallant, 2010, p. 210).

The Pearson's correlation coefficient *r* effect size for evaluating *t*-test was calculated with the equation (Field, 2009, p. 332) below:

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

There are three categories of results for the Pearson's correlation coefficient effect size (Field, 2009, p. 57), specifically:

- *r* = .1: A small effect, explaining 1% of total variance;
- *r* = .3: A medium effect, explaining 9% of total variance; and,
- *r* = .5: A large effect, explaining 25% of total variance.

3.6.4. *Validity*

To ensure that this survey is actually "testing what it is supposed to test" within the South African context, the researcher is basing the research instruments on instruments that have been previously peer-reviewed and validated (Elbashir et al., 2008; Lunnan & Haugland, 2008; Mathew et al., 2012; Simonin, 1997). According to the literature, this refers to validity of the instrument assessing how well an instrument is testing what it is supposed to be measuring (Fink, 2003, p. 60).

Further, the test validity used in the data analysis of this study, falls under the category of construct validity. This is so because the instruments and related tests are based on existing theories (Tolmie et al., 2011, p. 149).

To assess the construct validity of the instruments, factor analysis was used to evaluate whether items that were expected to be highly inter-correlated based on theory did indeed load highly on the same factor (convergent validity) and not on different factors (divergent validity).

3.6.5. *Reliability*

The reliability of the instrument pertains to the accuracy with which the instrument is actually able to test the constructs that are under observation. In other words, reliability seeks to identify how consistently the instrument measures the items under evaluation (Fink, 2003, p. 47). According to Fink (Fink, 2003), there are four common types of reliability, these include stability (or test-retest reliability), internal consistency, homogeneity, and inter- and intra-rater reliability. The researcher relied on internal consistency to evaluate the reliability of the instrument for this survey.

The internal consistency is a means to evaluate how well all the items measure a particular construct (Fink, 2003, p. 49). Cronbach's Alpha was used to measure the internal consistency (Cooper & Schindler, 2003; Field, 2009, pp. 674–676) of the scales. The values ranged from 0 to 1.0, with higher scores (typically above .6) indicating that the items are more closely measuring the same construct (Field, 2009, pp. 675–676; Lee, 2007).

In all cases, the original instruments used as the basis for the creation of the instruments for this study had Cronbach's Alpha values higher than .79, with the highest being .9 (Elbashir et al., 2008).

Suggested "rule of thumb" values (Tolmie et al., 2011, p. 148) for Cronbach's Alpha are as follows:

- Poor: $\alpha < .6$;
- Adequate: $.6 < \alpha < .7$;
- Good: $.7 < \alpha < .8$;
- Very good: $.8 < \alpha < .9$; and,
- Too good (perhaps): $\alpha > .9$.

Schmitt (1996) cautioned however, that using Cronbach's Alpha as a means of evaluating homogeneity. Further, he warned that simply having a scale with alpha of 0.7 was not always enough to evaluate if the scale is reliable, as other factors, such as the dimensionality and construct validity of the scale must also be taken into consideration. Further, Schmitt (1996) indicated that a Cronbach's Alpha as low as .49 (1996, p. 351) may be acceptable in some cases such as for academic or job related measures given that the instrument has both unidimensionality and meaningful content coverage (Schmitt, 1996, p. 352).

3.7. Limitations of the study

This section briefly outlines the limitations and some of the anticipated potential weaknesses of the study.

3.7.1. *Time Constraint Limitation*

This study was primarily limited by the time constraints of the researcher's enrolment at WBS. An argument has been made in the study that business intelligence and cooperative corporate venturing can impact an SMME's economic performance, which ideally requires a longitudinal study (Cooper & Schindler, 2003, p. 149) for the verification of the causal relationship. Due to time constraints, a cross-sectional study, which "represents a snapshot at one point in time" (Cooper & Schindler, 2003, p. 149), was undertaken instead of the longitudinal study. Further, the research sought to quantify the importance of the relations between the afore-mentioned constructs and the firm's performance as perceived by the owner-manager/senior managers of the SMMEs. In other words, this study did not directly measure the impact that the constructs might have had on the firm's performance, but instead, measured the perceived impact that they may have on the firm's performance.

3.7.2. *Analysis Limitation*

Another limitation of this study was the type of analysis that was conducted. Correlational analysis had to be conducted on the various relationships between variables, a limitation of a cross-sectional study (Cooper & Schindler, 2003, p. 149). As such, while the study

was able to identify and quantify the relationships between the variables, causation cannot not be ascertained, for instance, the researcher will not be able to say if business intelligence and/or cooperative corporate venturing are causing the improvement in the firms economic performance or vice versa.

3.7.3. *Sampling Limitation*

Due to resource limitations, the researcher was unable to target SMMEs that are verifiable and span the three types of economies as defined by the Global Competitiveness Index (World Economic Forum, 2012, p. 7). Instead, the population was reduced to SMMEs, operating in the Republic of South Africa, a country that has been categorised as an Efficiency-driven economy. Additionally, within the South African context, the subjects of the sampling frame exhibited “survey fatigue” due to repeated survey requests by WBS and other business students from other universities.

Finally, the survey is not representative of the population of SMMEs. This study used a convenience sample with a target of a minimum of 120 respondents, although 140 respondents would have been ideal (Kotrlik & Higgins, 2001).

3.7.4. *Pilot Limitation*

A pilot study was done to identify weaknesses in the design of the instruments (Cooper & Schindler, 2003, p. 86). However, due to the time limitation of the study, and the limited population sample, the pilot was conducted using Wits business school students in the MBA and MMENVC streams instead of a random sample of SMMEs. However, during the pilot, no errors were found with the research instrument.

3.8. Validity and reliability

This section briefly describes the validity and reliability aspects of the study, citing pertinent literature so as to provide the necessary context as they related to this study.

3.8.1. *External validity*

The external validity of a study refers to the generalisability of the results of study, and the degree to which the results still hold true in a different context from those of the study (Gravetter & Forzano, 2012, p. 167; Hulley, Cummings, Browner, Grady & Newman, 2013). There are two concerns for external validity for this study, specifically, population generalisation and sample demography.

Due to the small sample size of this study (fewer than 300 SMMEs) the results may not be representative of the general population of SMMEs. Within the context of the demography, this study includes the full spectrum of SMMEs. Based on this, the external validity of this study should not be compromised if administered outside of the Republic of South Africa.

3.8.2. *Internal validity*

The concept of internal validity, as described by Hulley et al. (2013), asserts that a study should allow the researcher to infer the correct conclusion of the research based on the variables that are being measured or that are under observation. In other words, the internal validity seeks to reduce the amount of non-random error or bias (Fink, 2003, p. 60; Litwin, 2003). The internal validity of the research may be compromised inadvertently (and without the researchers knowledge) due to the introduction of external variables, such as errors in the actual instrument (Struwig & Stead, 2001).

Due to the small sample size, and the fact that this is a convenience sample, it is expected that these factors will affect the interval validity of the study. Additionally, the lack of control over external factors (such as the bank lending rates, the financial environment, and others) may affect perceptions of the subjects and ultimately the internal validity of this study.

3.8.3. *Reliability*

Vogt and Johnson (2011, p. 336) refer to the reliability of a study as the level of similarity that will be observed between the results of the study when the instrument is repeated under similar conditions. The reliability of the study will be comparable if future

researchers observe and reproduce the conditions as described in this section of the study.

CHAPTER 4: PRESENTATION OF RESULTS

Within this chapter, various tables and figures will be used to present and describe the results of the study. The reader will be familiarised with the results making references to the research methodology where necessary.

The chapter first presents the results of the demographic and firm characteristics, followed by a presentation of scale-related measurements, and finally the results of the tests of the hypotheses.

4.1. Demographic profile of respondents

This section contains information relating to the demographic profile of the respondents, including (where necessary), a description and comparison of the expected results versus the actual results that were obtained.

4.1.1. *Description of Data-source*

The majority of responses (52%) were obtained from venues (i.e. BCE, GEW-1, and GEW-2) that catered to educating and empowering SMMEs, while additional fieldwork conducted in the industrial villages and parks (denoted *I-Parks* in the table) (*cf.* Table 8: Survey responses by fieldwork data-source).

Table 8: Survey responses by fieldwork data-source

Data-Source	Frequency	Percent
BCE	14	11
GEW-1	42	34
GEW-2	9	7
I-Parks	23	19
Online	36	29
Total	124	100.0

Despite being the second largest individual response group, it was expected that all of the responses would have been obtained from the online group.

4.1.2. *Description of Owner Manager*

The demography item (*cf.* D1.2, APPENDIX A, p. 123) was used to capture the ownership and management information of the respondent. This item consisted of three options; specifically, owner-managers of the firms (*n* = 84); managers reporting to the owner-managers (*n* = *27*); and all other employees (*n* = 11). There were two responses in the sample (representing 2% of the total sample (*n* = 124)) for which this item was blank.

Based on the results item D1.2 (described above), a categorical dichotomous variable called OWNER_MANAGER was created and used to indicate if the responded was an owner-manager. The items for owner-managers of the firms, and managers reporting to the owner-managers, were recoded as one item (YES, *n* = 111), which now constituted 90% of the sample (*n* = 124); the other "employees" item was recoded as (NO, *n* = 11).

4.2. Firm characteristics

The criterion for the selection of firms for this study wass the firm size. Specifically, firms had to between 1 – 100 employees to be considered a SMME; eight responses (*n* = 8) from the total set of responses (*n* = 124) were discarded, as they did not meet the firm size criterion for the study. Specifically, seven were not SMMEs (their number of employees was greater than 100 employees), while the firm size could not be established for the remaining response (as the firm-size item was not completed). This resulted in a smaller effective sample size (*n* = 116).

4.2.1. *Description of Firm Size*

The results of the study were expected to contain firms from each of the three groups of SMMEs namely, small-sized firms (6 – 50 employees), medium-sized firms (51 – 100 employees) and micro-sized firms (1 – 5 employees).

The firm size item (*cf*. D1.1, APPENDIX A, p. 123) was recoded to a new FIRM_SIZE variable. The "6 – 20" and "21 – 50" options were combined and coded as SMALL, the "less than 6" option was coded as MICRO, and the "51 – 100" option was coded as MEDIUM.

The majority of responses obtained (68%) originated from micro-sized firms as shown in Table 9.

Table 9: Firm size characteristics

Firm Size	Frequency
MEDIUM	2
MICRO	79
SMALL	35
Total	116

4.2.2. *Description of firm strategies*

With regards to firm strategy, as shown in Table 10, half of the respondents (*n* = 116) reported directly (usage items D1.3 and D1.4 (cf. APPENDIX A, p. 123)) that they used business intelligence, while the majority reported that they did not use joint venturing.

Table 10: Business Intelligence (direct measure) usage results

Business Intelligence usages (*n* = 116)		
	Frequency	Percent
No response to item	3	3
NO	55	47
YES	**58**	**50**
Joint Venturing usage (*n* = 116)		
No response to item	2	2
NO	**95**	**82**
YES	19	16

The indirect usage of these strategies is presented below and is contrasted with the findings direct usage results.

4.3. Measurement aspects of the scales

The measurement aspects of the scales section takes a detailed look at the descriptive statistics for the various constructs of the study, and discusses the reliability scales and the assessment of scales measuring both the independent and the dependent variables.

The section ends with a discussion about the findings of the factor analysis that was conducted on the affected scales.

4.3.1. *Descriptive statistics: Business Intelligence Scales*

This section presents the descriptive statistics for the business intelligence scales.

Business Intelligence Adoption (Indirect measure) Scale

The 5-item Likert indirect usage scale for business intelligence is considered to be an equal interval scale, as such a scale mean of 3 or greater indicates that the respondents are using business intelligence strategies. Using descriptive statistics it was found that most of the firms in the sample (n = 115) of were on average, using business intelligence (*M = 2.99, SE = .09, SD = 0.96*). Additionally, the scale was found to be bimodal, with the smaller mode having a value of 3, while the range was 4.

The skewness is not apparent in the normal distribution curve, pictured in Figure 11, and displayed in Table 12.

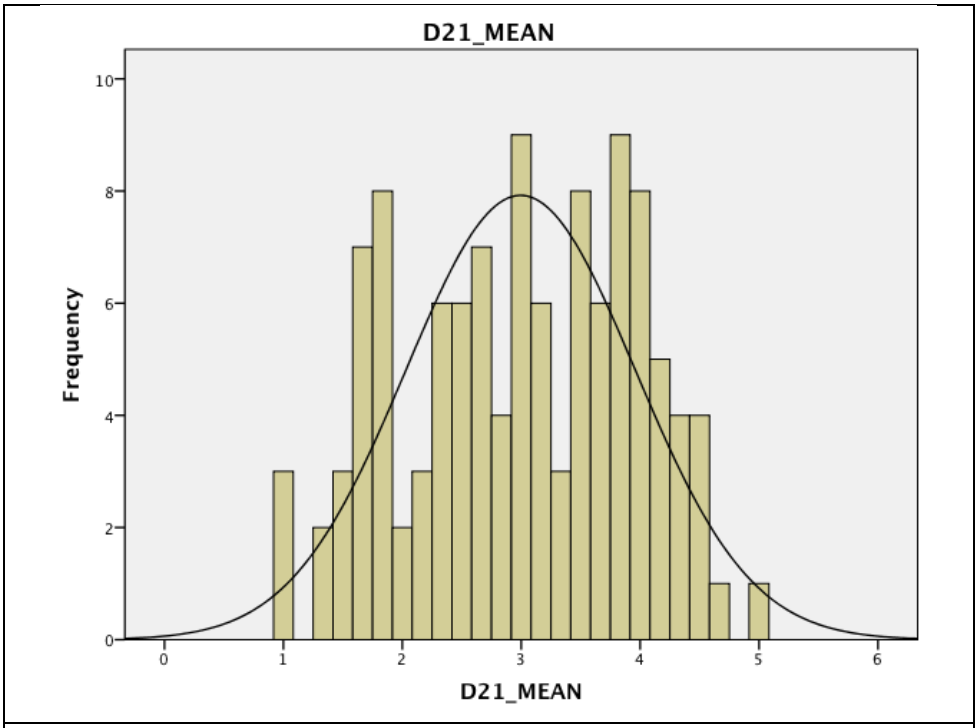


Figure 11: Business Intelligence usage (indirect measure) distribution

Additionally, it was observed that respondents scored three and above on all of the items (with the exception of item D2.1 and D2.2 (*cf.* Table 11)) in the item frequency tables (*cf.* Table 21 in section C.1.1 of APPENDIX C: STATISTICAL RESULTS).

Based on the summary presented in Table 11, for item D2.1, 47% of the respondents (*n* = 114) are using some form of business intelligence in their decision-making process, while for item D2.2, 48% of the respondents (*n* = 111) are using some form of pattern analysis. Overall the results of Table 11 indicate that the majority of SMMEs in the sample have just about adopted business intelligence, which is comparable to the findings of the Direct Measure for business intelligence, displayed in Table 10 (above).

Table 11: Business Intelligence usage (indirect measure) item summaries

Items	Responses with Scores 1 – 2	Responses with Scores 3 and above	Total Responses
D2.1 Software generated trend analysis is used in the decision-making process	60	54	114
D2.2 Pattern/relationship identification are done without technology (unreversed)	58	53	111
D2.3 Data analysis is used to aid management decisions	41	70	111
D2.4 Computer applications are used for processing data	33	78	111
D2.5 Data analysis done manually (unreversed)	33	78	111
D2.6 Spreadsheet programs are used to improve competitive advantage	36	76	112

Process Efficiency and Organisational Benefits Scales

Both scales had 109 responses from the total sample (*n* = 116) and had slightly above average means. For the process efficiency scale, the mean was 4.52 (*SE* = 0.1, *SD* = 1.07); for the organisational benefits scale, the mean was 4.89 (*SE* = 0.11, *SD* = 1.12). However, the process efficiency scale had greater range in responses (*range* = *6*) than did the organisational benefits scale (*range* = *4.5*). Also, both scales approximated to

normal distributions based on their skewness as presented in Table 12, Figure 15, and Figure 16, (*cf.* figures in APPENDIX C: STATISTICAL RESULTS).

Table 12: Business Intelligence scales statistics

	BI Adoption (Indirect Measure)	Process Efficiency (G11_MEAN)	Organisational Benefits (G19_MEAN)
Median	3	4.5	4.88
Mode	3[a]	4[a]	4
Variance	.93	1.14	1.26
Skewness	-0.18	-.001	.07
Std. Error of Skewness	0.23	.23	.23
$Z_{skewness}$	0.78	.004	.3
Kurtosis	-0.93	.51	-.899
Std. Error of Kurtosis	0.44	.46	.46

a. Multiple modes exist. The smallest value is shown

4.3.2. *Descriptive statistics: Cooperative Corporate Venturing Scales*

This section presents the results of the descriptive statistics for the Joint Venturing related scales. This consists of the adoption scale, and the three sub-scales for joint venturing.

Joint Venturing Adoption (Indirect measure) Scale

The usage scale for cooperative corporate venturing had a moderately low mean of 2.45 (*SE* = 0.09, *SD* = 0 .94) from 116 responses. While the range for the usage scale was 4, the mode for the responses was 2.

The distribution is non-normal, as is observable in Figure 12, and Table 13; the distribution exhibits a positive skewness.

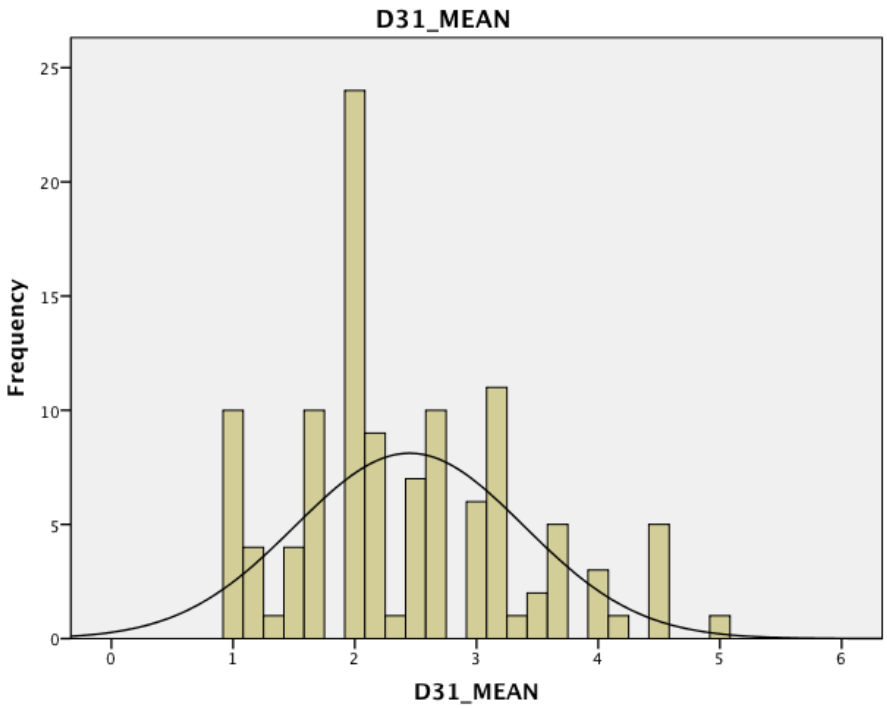


Figure 12: Cooperative Corporate Venturing usage (indirect measure) distribution

Table 13: Distribution skewness statistics

	Joint Venturing Adoption (Indirect measure) Scale	Financial Performance Scale	Operational Performance Scale	Skills Scale
Skewness	.52	-0.25	0.43	-0.11
Std. Error of Skewness	.23	0.25	0.25	0.26
$Z_{skewness}$	2.26	1	1.72	0.42
Kurtosis	-.24	-0.53	-0.67	0.29
Std. Error of Kurtosis	0.45	0.49	0.5	0.51

Using frequency tables (*cf.* Table 22 and Table 23 in section C.2.1 of APPENDIX C: STATISTICAL RESULTS), it was found that with the exception of item D3.2, the majority of respondents scored 1-2 for the items on the scale. Based on the results of the indirect

usage scale, it appears that the majority of SMMEs in the sample do not use cooperative corporate venturing, which is comparable to the findings of direct measure as presented earlier in Table 10.

All three sub-scales of the cooperative corporate venturing scale, exhibited some evidence of non-normality. However, based on the test criteria of skewness and kurtosis, there is insufficient evidence to say that the data distributions were actually non-normal. The distributions for the three sub-scales approximate to a normal distribution.

Financial Performance Scale

The financial performance scale had a moderately above average mean of 3.17 (*SE* = .09, *SD* = .82), with a range of 3.8. The sample for this scale was only 94 out of a possible 116 responses. Please see Figure 17 (in section C.2.2 of APPENDIX C: STATISTICAL RESULTS), and Table 13 for information regarding the data distribution.

Operational Performance Scale

The operational performance scale had more than 78% of the participants in the sample (*n* = 116) completing the scale. The mean of the scale was 3.46 (*SE* = 0.09, *SD* = 0.83) while the range was 3.2 and both the mode and median were 3.4. Please see Figure 18 (in section C.2.2 of APPENDIX C: STATISTICAL RESULTS), and Table 13 for information regarding the data distribution.

Skills Scale

The sample for this scale had only 89 responses out of a possible 116 responses and had mean of 3.4 (*SE* = 0.08, *SD* = 0.77), with a range of 4. Please see Figure 19 (in section C.2.2 of APPENDIX C: STATISTICAL RESULTS), and Table 13 for information regarding the data distribution.

4.3.3. *Descriptive statistics: Firm Performance Scales*

The firm performance construct consisted of two sub-scales. The sub-scales shared several similarities in the descriptive statistics. These included the mean (which differed by only 0.01), the median, and even the range and mode.

Profitability and Growth Scale

The sample for this scale consisted of 103 responses out of a possible 116 responses, indicating that 13 responses were missing. For the sample, the mean was 5.11 (*SE* = 0.1, *SD* = 1.04) with a range of 4.

Although the distribution was non-normal, as indicated by the negative skewness of -0.01 (*SE* = 0.24) and kurtosis of -0.8 (*SE* = 0.47), the distribution approximates closely to a normal distribution as the Z_{skewness} was 0.04 ($p > .05$).

Productivity at Work Scale

As indicated previously, the central tendency measures for the Productivity at Work Scale shared several similarities to the Profitability and Growth Scale. The sample for this scale consisted of 102 responses; the mean was 5.1 (*SE* = 0.1, *SD* = 1.03).

The distribution was also non-normal, however for the Productivity at Work Scale, the distribution was more skewed (skewness = 0.18, SE = 0.24; kurtosis = -0.2, *SE* = 0.47). Notwithstanding the increased skewness, the distribution still approximates to a normal distribution as the Z_{skewness} was 0.75 ($p > .05$).

4.3.4. *Descriptive statistics: Adoption Variables*

Table 14 below, shows the descriptive statistics for the coded adoption variables, which were based on coding rules, summarised in Table 4 of section 3.5.3 above.

Table 14: Adoption variable descriptives statistics

Dummy Variable	Adoption	Total Firms (*n = 116*)
USING_BI *business intelligence adoption*	**YES**	**73** *(63%)*
	NO	43 *(37%)*
USING_CCV[a] *cooperative corporate venturing adoption*	YES	40 *(34%)*
	NO	**75** *(65%)*
USING_HYBRID[a] *hybrid strategy adoption*	YES	31 *(27%)*
	NO	**84** *(72%)*

a: 1 item was missing representing 1% of total.

4.3.5. *Reliability: Independent Variables*

This section discusses the reliability of the independent variables, and adjustments that were made to the scales.

Business Intelligence Variables: Indirect Usage Reliability

The Business Intelligence (indirect measure) scale now consists of five items (namely, D2.1, D2.2, D2.3, D2.4, and D2.6), and has a good reliability, *α* = .81. By removing item D2.5, the distribution for the scale became slightly less normal, $Z_{\text{skewness}} = 1$ (which was previously $Z_{\text{skewness}} = 0.78$). Please see Table 24 in section C.2.3 of APPENDIX C: STATISTICAL RESULTS, for a comparison of other changes due to the adjustment of the scale.

The scale initially had a low but acceptable internal consistency (*α* = .76). Based on the item-total statistics deleting item D2.5 was expected to result in a significant increase in the internal consistency (*α* = .81), but also a resulting decrease of the scale mean to 14.84 (down from 18.09). Item D2.5 also had the lowest correlation with the overall scale (*r* = -.13), further adding credence for its removal.

After deleting item D2.5 and revaluating the internal consistency, alpha increased to (*α* = .81). Additionally, deleting item D2.5 from the scale did not change the number of valid cases, which remained at (*n* = 106) for the sample (*n* = 116).

Item D2.2 was also a possible candidate for deletion, but it would only increase alpha by .05, and as such it was *not* deleted.

Business Intelligence Variables: Process Efficiency Reliability

The Process Efficiency scale now consists of six items (namely, G1.1, G1.2, G1.3, G1.4, G1.5, and G1.7), and has a good reliability, *α* = .83. By altering the scale, the skewness of distribution was affected; see Table 24 in section C.2.3 of APPENDIX C: STATISTICAL RESULTS, for a comparison of other changes due to the adjustment of the scale.

The internal consistency for the scale, using all eight items was low (α = .63), accounting for only 98 valid cases included in the reliability analysis from a sample of 116

respondents. Item G1.6 “The cost of effective decision-making has increased” was a valid candidate for removal from the scale as it was expected to increase alpha to .75 and only had a correlation of (*r* = -.28) with the overall the scale.

When item G1.6 was deleted, alpha was actually increased to .76. Further inspection found that with item G1.6 removed, the internal consistency could be further improved by removing item G1.8 “Operational costs have increased”, which had a very low correlation of (*r* = .02) with the overall the scale.

With item G1.8 removed, and using only six items, the scale now appears to have a good internal consistency (*α* = .83). Further, the scale now includes 87% of the responses from the sample (*n* = 116) in the reliability analysis as compared to initially only using 84%.

Business Intelligence Variables: Organisational Benefits Reliability

The Organisation Benefits scale now consists of seven items (namely, G1.9, G1.11, G1.12, G1.13, G1.14, G1.15, and G1.16), and has a good reliability, *alpha* = .82. By altering the scale, the skewness of distribution was affected; see Table 24 in section C.2.3 of APPENDIX C: STATISTICAL RESULTS, for a comparison of other changes due to the adjustment of the scale.

The original scale had fairly good internal consistency (*α* = .79), which improved when item G1.10 is deleted. The number of responses included in the reliability analysis was only 93 out of the sample of 116.

With item G1.10 removed, leaving seven remaining items, the scale’s alpha for the sample (*n* = 116) increased to .82. However, the number of valid cases included in the reliability analysis for the sample did not change, as there were still 23 excluded responses.

Cooperative Corporate Venturing Variables: Indirect Usage Reliability

The Cooperative Corporate Venturing (indirect measure) scale remains unchanged with four items (namely, D3.1, D3.2, D3.4, and D3.6), and has a good reliability, *α* = .63.

The scale has a low but acceptable internal consistency (α = .63) that could be increased to (α = .75) if item D3.2 were deleted. It was decided, however, to retain the item, as its removal would only increase the number of cases included in the reliability analysis by 3% (i.e. 106 cases instead of 103 cases).

Cooperative Corporate Venturing Variables: Financial Performance Reliability

The 5-item Financial Performance scale now consists of four items (namely, G2.1, G2.2, G2.3, G2.5), and has a good reliability, *α* = .68. With the change to the scale, the skewness of distribution decreased slight (see Table 24 in section C.2.3 of APPENDIX C: STATISTICAL RESULTS, for a comparison of other changes due to the adjustment of the scale).

The scale initially had a very low internal consistency (α = .48) and had only 69% of the case being included in the reliability analysis.

It was observed that the reliability would be increased (*α = .68),* if item G2.6 was removed from the scale. With item G2.6 removed, *a* further improvement to the internal consistency could be gained by also excluding item G2.1, as alpha would then have an excellent value of .91. However, this was *not* done, even though this would increase the number of cases being included in the reliability analysis to 77 (up from 76), as the deletion of the item would reduce the number of items in the scale to only three.

Cooperative Corporate Venturing Variables: Operational Performance Reliability

The Operation Performance scale now consists of four items (namely, G2.7, G2.8, G2.9, G2.11), and has a good reliability (*α* = .65). The alteration to the scale significantly decreased the skewness of distribution (see Table 24 in section C.2.3 of APPENDIX C: STATISTICAL RESULTS, for a comparison of other changes due to the adjustment of the scale).

Initially, the Cronbach's Alpha (*α* = .5) for the scale was poor, and only 81 cases were considered valid and included in the reliability analysis, out of the sample of 116 respondents.

Based on the item-total statistics it was decided to remove item G2.12 as it was expected to increase alpha to .64, and since this item had a low correlation (r = -0.09) with the scale.

Once item G2.12 was deleted, the measure of reliability for the scale increased (α = *.65*), as did the number of cases (n = 84) included in the reliability analysis.

Further evaluation of the resulting Item-Total statistics generated by SPSS showed that alpha could be further increased to .84 *if* item G2.8 was removed. However this was *not* done, as the number of valid cases that would included in the reliability analysis would only increase by two (n = 86), while the number of items in the scale would decrease to three.

Cooperative Corporate Venturing Variables: Skills Reliability

The Skills scale now consists of four items (namely, G2.13, G2.16, G2.18), and has a good reliability, α = .7.

The reliability analysis for the initial 5-item scale included 67% of the sample (n = 116), and had a very low internal consistency, α = .42. Deleting item G2.14 was expected to slightly improve the internal consistency. This was the case when the item was deleted (α = .49).

By also deleting the second reversed item, namely, item G2.17, the reliability measure for the scale increased significantly (α = .7). The decision was made to delete the item G2.17, even though this would reduce the number of items in the scale to three, as the alpha would have remained unacceptably low (α = .49). With items G2.14 and G2.17 removed the number of cases included in the reliability analysis is now 83 (or 72%) of the sample (n = 116).

4.3.6. *Reliability: Dependent Variables*

This section discusses the reliability of the dependent variables, and adjustments that were made to the scales.

Firm Performance Variables: Profitability and Growth Reliability

The Profitability and Growth scale now consists of five items (namely, G3.1, G3.3, G3.5, G3.6, and G3.7), and has a good reliability (α = .78). The alterations to the scale resulted in increased skewness of the distribution. Please see Table 24 in section C.2.3 of APPENDIX C: STATISTICAL RESULTS, for a comparison of other changes due to the adjustment of the scale.

In assessing the reliability statistics of the initial scale, the results showed that the internal consistency of the scale was adequate, α = .68. Item G3.4 correlated very poorly (r = .005) with the rest of the scale, and its removal resulted in alpha increase by 0.1 (α = .78).

The number of cases included in the reliability analysis did not change, and remained at 83%, or 96 responses out of the sample (n = 116). The removal of item G3.6 could potentially increase alpha to .9, but it was decided that despite its low correlation, it was better to *keep* the item, as its removal only increased the number of valid cases by two.

Firm Performance Variables: Productivity at Work Reliability

The Productivity at Work scale remains unchanged with six items (namely, G3.8, G3.9, G3.10, G3.11, G3.13, and G3.14), and has a good reliability (α = .66).

All six items in the scale were retained, as the removal of the item with the lowest scale correlation – item G3.9, would only marginally improve alpha by 0.03.

Table 15: Cronbach's Alpha and Scale Modification

Scale	Stage	Item information	Cronbach's Alpha
BI: Indirect Usage	Resulting Scale	6 items	.81
	Original Scale	*7 items*	*.76*
	Item deleted	*D2.5*	
BI: Process Efficiency	Resulting Scale	6 items	.83
	Original Scale	*8 items*	*.63*
	Item deleted	*G1.6*	
	Item deleted	*G1.8*	
BI: Organisational Benefits	Resulting Scale	7 items	.82
	Original Scale	*8 items*	*.79*
	Item deleted	*G1.10*	
CCV: Indirect Usage	Scale Unchanged	4 items	.63
CCV: Financial Performance	Resulting Scale	4 items	.68
	Original Scale	*5 items*	*.48*
	Item deleted	*G2.6*	
CCV: Operational Performance	Resulting Scale	4 items	.65
	Original Scale	*5 items*	*.5*
	Item deleted	*G2.12*	
CCV: Skills	Resulting Scale	4 items	.7
	Original Scale	*5 items*	*.42*
	Item deleted	*G2.17*	
FP: Profitability and Growth	Resulting Scale	5 items	.78
	Original Scale	*6 items*	*.68*
	Item deleted	*G3.4*	
FP: Productivity and Work	Scale Unchanged	6 items	.66

Note: BI means Business Intelligence; CCV means Cooperative Corporate Venturing; and, FP means Firm Performance.

4.3.7. *Validity*

This section consists of the findings of the Principal Component Analysis that was conducted on the different equal interval item scales, using a varimax rotation. The results of the factor analysis (FA) are summarised in Table 16 below.

Table 16: Summary of Construct Validity

Construct	Composite scales	Items	KMO value	Factors identified	Variance explained by 1st and 2nd components
SMME (perceived) Firm Performance	1: Profitability and Growth 2: Productivity at Work	11	.84	2	Factor 1: 49% Factor 2: 20%
SMME Hybrid Strategy	1: Process Efficiency 2: Organisational Benefits scales 3: CCV Financial Performance 4: CCV Operational Performance 5: CCV Skills	25	.78	2	Factor 1: 40% Factor 2: 30%

Note: The Bartlett's Test of Sphericity was significant ($p < .001$) for all constructs.

SMME (perceived) Firm Performance comprised of two subscales (as listed in Table 16) and 11 items (based on the modifications described in Table 15).

Using the total variance explained and eigenvalues, two components were identified for extraction. The first component had an eigenvalue of 5.39 and accounted for 49% of the variance, while the second factor accounted for 20% of the variance and had an eigenvalue of 2.19; combined the factors explained 69% of the variance.

The first component was retained (and extracted as FAC1_1_FIRM) as it consisted of eight items, all of which had loadings above .6 (with seven of the items having loading above .8). The loadings are presented in Table 26 (in section C.3 of APPENDIX C: STATISTICAL RESULTS).

The FAC1_1_FIRM scores (as shown in Table 29, in section C.4 of APPENDIX C: STATISTICAL RESULTS) were significantly skewed, but were corrected as described in section 3.6.1, *Distribution Normality and Skewness* and Table 28: Data transformations.

FAC1_1_FIRM_TRANS was used to represent the firm performance variable.

SMME Hybrid Strategy comprised of five previous subscales used in business intelligence as listed in Table 16.

The scale consisted of a total of 25 items (*cf*. Table 15 for the scale modification details). There were initially a total of five components that were identified, explaining 71% of the variance. The first component had an *eigenvalue* of 9.96 explained 40% of the total variance.

The FA was repeated, but instead of using eigenvalue for the extraction option, two factors were chosen for extraction since the first component consisted of 16 of the items with loading above .5 (with ten of the 16 items having loading above .6). The loadings are presented in Table 25 (in section C.3 of APPENDIX C: STATISTICAL RESULTS).

The resulting factor extraction resulted in the same first factor retaining the same 16 items. This factor was retained and called FAC1_1_HYBRID.

Further analysis revealed that the scores in the FAC1_1_HYBRID variable were significantly skewed (*cf.* Table 29), but they were corrected as described in section 3.6.1, *Distribution Normality and Skewness* and Table 28: Data transformations.

FAC1_1_HYBRID_TRANS was used to represent the hybrid strategy variable.

4.4. Results pertaining to Hypothesis 1

The grouping variable USING_CCV, which had possible values of “YES” and “NO”, was used for the hypothesis test, representing the adoption of cooperative corporate venturing.

Additionally, the mean that was used to calculate the perceived SMME firm performance for the hypothesis, was the extracted and transformed factor variable, FAC1_1_FIRM_TRANS, resulting from the Principal Component Analysis (as described in section 4.3.7).

Hypothesis restated for convenience:

> ***Hypothesis 1***: *There is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted cooperative corporate venturing.*

Based on an independent samples *t*-test, firms that had adopted cooperative corporate venturing initiatives were found to have higher levels of perceived firm performance (M = .56, SE = .02, SD = 0.13) than do those that had not adopted cooperative corporate venturing (M = .49, SE = .02, SD = 0.13).

The difference between the means was significant; $t(85) = 2.48$, $p = .02$, with a small effect size of $r = .26$.

4.5. Results pertaining to Hypothesis 2

The grouping variable USING_BI, which had possible values of “YES” and “NO”, was used for the hypothesis test, representing the adoption of business intelligence.

The mean that was used to calculate the perceived SMME firm performance for the hypothesis, was the extracted and transformed factor variable, FAC1_1_FIRM_TRANS, resulting from the Principal Component Analysis (as described in section 4.3.7).

Hypothesis restated for convenience:

> ***Hypothesis 2****: There is a relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted business intelligence.*

Based on an independent samples *t*-test, firms that have adopted business intelligence initiatives, on average appeared to have a slightly higher level of perceived firm performance (*M* = .52, *SE* = .02, *SD* = 0.14) than those firms that did not (*M* = .5, *SE* = .02, *SD* = .13).

However, the difference was not statistically significant *t*(85) = .54, *p* = .59, with a negligible effect size of *r* = 0.06.

4.6. Results pertaining to Hypothesis 3

The mean that was used to calculate the perceived SMME firm performance for the hypothesis, was the extracted and transformed factor variable, FAC1_1_FIRM_TRANS, resulting from the Principal Component Analysis (as described in section 4.3.7).

The grouping variables USING_BOTH (which had possible values of “YES” and “NO”) and USING_BOTH_NUM (which had values of 1 for “YES” and 0 for “NO”), were used for the hypothesis test, representing the adoption of the hybrid strategy.

Hypothesis restated for convenience:

> *Hypothesis 3: Firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not adopted the hybrid strategy.*

Using an independent sample *t*-test, a non-significant difference was found in the average perceived levels of SMME economic performance of firms that have adopted a hybrid strategy *t*(85) = 1.91, *p* = .06, *M* = .56, *SE* = 0.03, *SD* = 0.14 and firms that have not (*M* = .5, *SE* = .02, *SD* = .13). The difference represented a small effect size of *r* = .2.

Additionally, a Pearson product-moment correlation coefficient was also used to investigate the relationship between the average perceived levels of SMME economic performance of firms (as measured by FAC1_1_FIRM_TRANS) that have adopted a hybrid strategy (as measured by USING_BOTH_NUM).

The findings indicate that there is a weak, positive, non-significant relationship between the two variables, $r = .2$, $p = .06$, $n = 87$.

4.7. Results pertaining to Hypothesis 4

Hypothesis restated for convenience: For firms having adopted a hybrid strategy,

> *Hypothesis 4: Firm size will moderate the relationship between the benefits of the hybrid strategy and the levels of SMME economic performance as perceived by the owner-managers of the firms.*

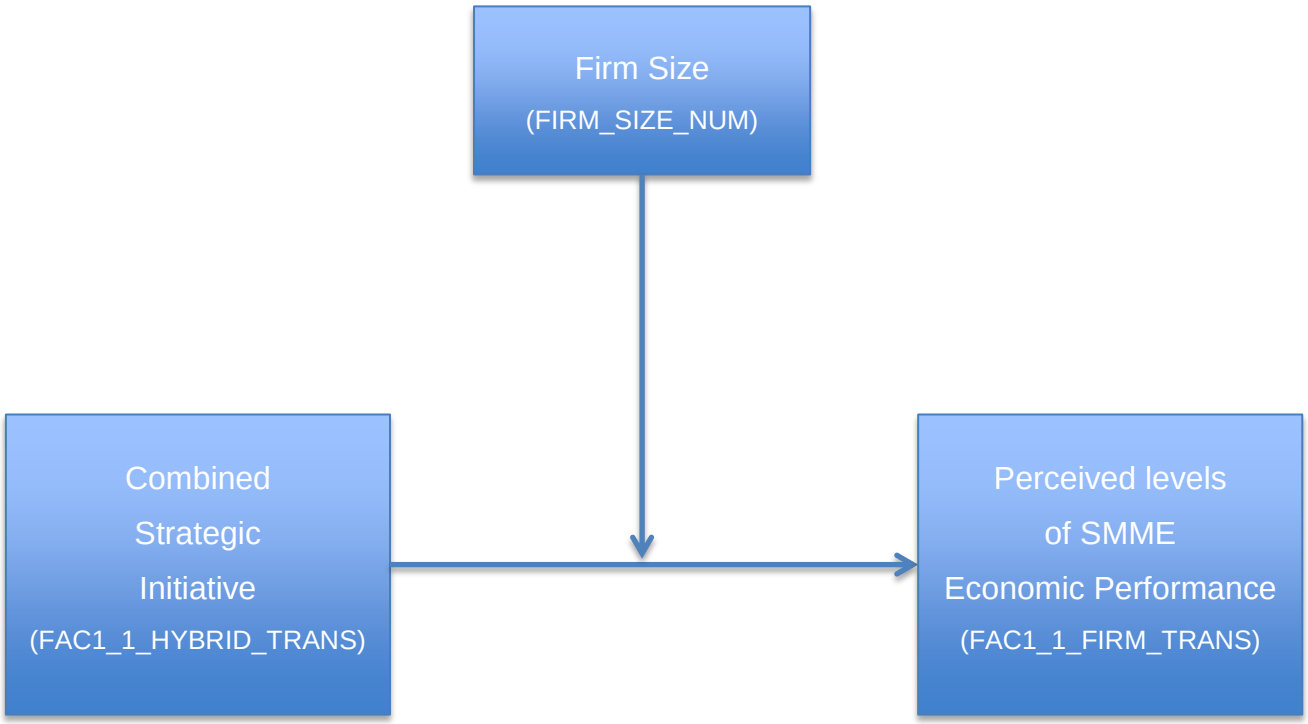


Figure 13: Hypothesis 4 conceptual diagram

Using hierarchical regression analysis, support was not found for Hypothesis 4, as conceptualised by Figure 13.

Firm size did not have a significant moderation effect on the relationship between the perceived benefits of the combined strategic initiative and the perceived levels of SMME economic performance (*p = .91)*, as shown in Table 17 and Table 18.

Without the moderating variable, the model though significant accounted for only 39% of the variance in the sample. With the inclusion of the moderator variable, FAC1_1_HYBRID_TRANS * DUMMY_SIZE_2, the model accounted for only an additional 1%, and was reduced in significance.

Table 17: Summarised Coefficients

	Base model		**Model including moderator**	
	B	*p*	B	*p*
Intercept	.13	.5	.11	.66
FAC1_1_HYBRID_TRANS	.52	.02	.54	.06
DUMMY_SIZE_2	-0.02	.77	.02	.96
IV5[a]			-.05	.91
a: IV5 = FAC1_1_HYBRID_TRANS * DUMMY_SIZE_2				

Table 18: Summarised Model Summary

R^2 Base model	**R^2 Including moderator**	**ΔR^2**	**F(2, 14) Base model**	**F(3, 13) Including moderator**
.394	.395	.001	4.56 (p = .03)	2.83 (p < .08)

Finally, the model only represents only small- and micro-sized firms, as there were not sufficient medium-sized firm cases in the sample for analysis. The DUMMY_SIZE_2 variable was used to code for the small- and micro-sized firms.

4.8. Summary of the results

The highlights of the data analysis of the study found that from a sample of 116 respondents, most (53%) of who were from venues (i.e. BCE, GEW-1, and GEW-2) that catered to educating and empowering SMMEs. The majority (79%) of the sample was comprised of micro-sized SMMEs while the remaining portion was made up of small- and medium-sized SMMEs.

The study sought the opinions of owner-managers with regards to the constructs business intelligence, cooperative corporate venturing and perceived firm performance. The majority (90%) of the responses (collectively) came from owner-manager or managers reporting directly to the owner.

It was found that nearly half of the sample had adopted business intelligence initiatives, while only about 16% had adopted cooperative corporate venturing initiatives. On average, respondents reported that business intelligence had marginally helped benefits the firms' process efficiency or had other organisational benefits. Similarly, cooperative corporate venturing was also reported as having small positive benefits.

Finally, Table 19 summarises the findings of the analysis of the hypotheses.

Table 19: Hypothesis Outcome Summary

Analysis Outcome	Hypotheses
Support found	**Hypothesis 1**: There is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted cooperative corporate venturing.
Support not found	**Hypothesis 2**: There is a relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance, than firms that have not adopted business intelligence.
	Hypothesis 3: Firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not adopted the hybrid strategy.
	Hypothesis 4: Firm size will moderate the relationship between the benefits of the hybrid strategy and the levels of SMME economic performance as perceived by the owner-managers of the firms.

CHAPTER 5: DISCUSSION OF THE RESULTS

While the results were presented in the previous chapter, Chapter 5 discusses and explains those results, with reference to the literature review. This chapter first presents the reader with a discussion pertaining to the demographic profile of respondents; here the focus is on the respondents that participated in the study, with key statistics presented to provide the reader with context about who participated. The chapter continues with discussion and conclusions pertaining to each of the four hypotheses. Finally, the chapter closes with a summary conclusion.

5.1. Demographic profile of respondents

During the design of this study, several government and private institutions had been identified as likely candidates for the distribution of the online survey to their member SMMEs. However, during the actual field research, it was found that most of these institutions were unwilling to participate in the research; some cited confidentiality clauses that barred them from sending third-party email messages to their members; while others simply refused to participate.

In total, 435 emails had been sent via Google's survey tool, while 223 paper questionnaires were distributed, representing a total of 678 questionnaires. From the total of 124 collected responses, 88 (or 71%) were collected from the printed questionnaires, with the remaining responses coming from the online group. Overall, the 124 responses represent a fairly high response rate of 18%.

This study hinges on getting feedback from this owner-managers or senior managers reporting to the owners of SMME firms. The majority of the respondents of the sample indicated that they were either the owner-managers (68%) or senior managers reporting to the owner (22%).

Unfortunately however, an evenly distributed sample of small-, medium- and micro-sized firms was not obtained. Of the valid responses collected (n = 116), the majority were micro-sized firms (68%). Only 35 responses from small-sized firms and two from

medium-sized firms were collected. It was expected that an even distribution of firms would have been represented in the sample.

Figure 14 presents a concise overview of the data that was collected; the information includes the data-source of the surveys, the types of SMME firms that participated, as well as usage comparisons for business intelligence and joint venturing of the sample.

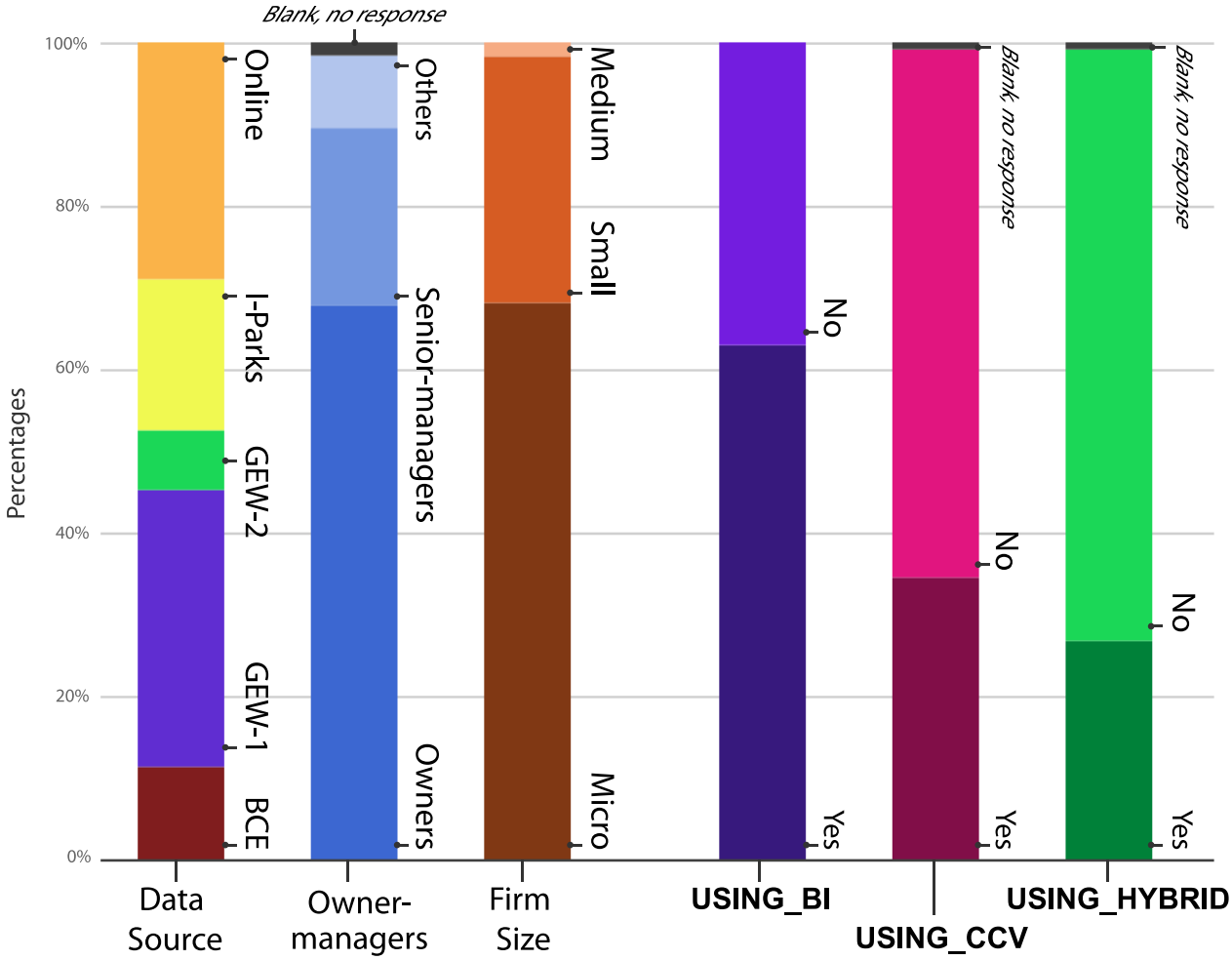


Figure 14: Summarised descriptive data

The shortfall in medium-sized firms is due likely to the data-source from which the data was collected. With the exception of the online group and industrial parks and villages group, the majority of data was collected at venues that catered to educating and mentoring new and upcoming owner-managers (i.e. small- and micro-sized firms). Further discussion pertaining to how to improve the response rate of medium-sized firms is addressed later in the conclusion of this report.

5.2. Discussion pertaining to Hypothesis 1

Hypothesis 1 restated for convenience:

> ***H_0**: There is no relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance.*
>
> ***H_A**: There is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted cooperative corporate venturing.*

The literature relating to corporate entrepreneurship indicated that corporate entrepreneurship, and by extension cooperative corporate venturing, is "predictive of the growth of small and large firms" (Antoncic & Prodan, 2008, p. 258), and strategic alliances being a sub-class of corporate entrepreneurship can exist between firms regardless of size (Haase & Franco, 2010; Kinyeki & Gachanja, 2013, p. 19; Naldi & Achtenhagen, 2011, p. 19).

Although different definitions have been advanced and used to define the different types of alliances that pertain to SMMEs (Haase & Franco, 2010; Lai & Chang, 2010; Mukherjee et al., 2012). This study is more aligned with those that focused on the creation of a new ventures as a part of the alliance, for example, Lai and Chang (2010, p. 491) argued that (research and development) alliance is a form of joint venture, as did Antoncic and Prodan (2008).

Hypothesis 1 was used to investigate Sub-problem 1, which sought to ***identify if SMMEs are adopting cooperative corporate venturing as a strategic initiative to increase their economic performance***.

This led to an investigation that focused on the owner-managers of SMMEs in the Republic of South Africa, measuring the adoption of cooperative corporate venturing initiatives and the perceived benefit of this on their firms' financial performance. It was expected that a positive relationship would exist between the adoption of joint venturing and the perceived firm performance in the South African SMMEs. This would indicate

that SMMEs should be able derive similar benefits from joint ventures, as did larger well-established firms (Kinyeki & Gachanja, 2013, p. 19).

This study confirms the results of Bojica and Fuentes (2012), who had found that there is a positive relationship between corporate entrepreneurship and firm performance among SMMEs. Similarly, Naldi and Achtenhagen (2011) had found that joint venturing is not specific to large existing firms (2011, p. 36), based on the results of their research on Swedish SMMEs.

5.2.1. *Conclusion pertaining to the findings relating to Hypothesis 1*

Support was found in this study, that indicated that owner-managers of SMMEs in the Republic of South Africa that had adopted cooperative corporate venturing as a strategic initiative perceived this as being beneficial to their firms' performance.

Finding evidence of joint venturing in the sample, which consists of primarily micro- and small-sized firms, is interesting. Possible justifications for this may include SMMEs partnering so as to increase their market growth or to ensure their firm's survival (Bojica & Fuentes, 2012; Kinyeki & Gachanja, 2013; Kirby & Kaiser, 2003). Adendorff, Appels, and Botha (2011) posited that SMMEs who participated in cooperative corporate venturing may be able to use the strategic initiative to grow their companies, by entering new markets, by acquiring new skills, competencies, and resources that they would not be able to acquire by themselves.

This study focused on identifying if SMMEs participated in joint venturing, further research is required to identify the motive for partnering.

As such, **we reject the Null Hypothesis and thus support the researcher's Hypothesis 1**.

5.3. Discussion pertaining to Hypothesis 2

Hypothesis 2 restated for convenience:

> ***H_0**: There is no relationship between the adoption of business intelligence and the perceived level of SMME firm performance.*
>
> ***H_A**: There is relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted business intelligence.*

Business intelligence exists as a subset of knowledge management (Herschel & Yermish, 2009), that when implemented successfully, allows the firm to improve its organisational performance as well as to sustain their competitive advantage (López et al., 2009). Although there is no clear definition for business intelligence (Ponelis, 2012), this study adopted the integrative view of business intelligence as posited by Amabile et al. (2013), namely that business intelligence involved processes for consuming information from disparate sources within an organisation and its external environment, that facilitate strategic planning and decision-making based on the discovered patterns and relationships.

Evidence suggests (Hawking & Sellitto, 2010; Herschel & Jones, 2005; Herschel & Yermish, 2009; IBM Institute for Business Value, 2011; Kumar, 2012; O'Brien & Kok, 2006) that business intelligence improves firm performance, as it can be used to optimise the decision-making processes and is directly linked to the firm's sustained, tactical competive advantage. Adding further credence to this argument is IBM, a vendor of business intelligence software, who found in a global survey of more than 3 000 chief executive officers (CEOs) that these CEOs linked the use of business intelligence to the firms' performance (IBM Institute for Business Value, 2011).

Given the challenges, however, that large, well-established and well-funded enterprises face in successfully implementing a business intelligence systems (Adamala & Cidrin, 2011; Popovič et al., 2012), the argument against the adoption of business intelligence initiatives by SMMEs (Bijker & Hart, 2013; Levy & Powell, 2005; Olszak & Ziemba, 2012) seems plausable. The second sub-problem of this study investigated that argument.

Specifically, Sub-problem 2, sought to **identify if SMMEs are adopting business intelligence as a strategic initiative to increase their economic performance**.

Though a marginal difference does appear to exist in the perceived firm performance between groups that had adopted business intelligence and those that had not, the difference was not statistically significant $t(85) = .54$, $p = .59$, nor was the effect size meaningful. Given that the sample consists of primarily micro-sized firms, the findings of this study seem to be inline with the previously identified adoption inhibitors. Specifically, these are:

1. The cost and the resource inhibitors (Bijker & Hart, 2013, pp. 24–25; Olszak & Ziemba, 2012, p. 139), which include the high licensing cost of business intelligences tools, and the high infrastructual cost (as the cache of internal data grows) (Levy & Powell, 2005);
2. The availabilty of skilled employees inhibitor (Bijker & Hart, 2013, p. 25), which relates to finding employees that are adequately trained to understand and interpret the analytics data; and,
3. The interpretation and the evaluation inhibitors of business intelligence results (Bijker & Hart, 2013; Olszak & Ziemba, 2012; Ponelis, 2012).

While it may be unreasonable to believe that small- and micro-sized firms will have the assets, the resource, and the skilled employees necessary for using and benefiting from business intelligence, further research is needed to understand the relationship between the adoption of business intelligence and the importance of these inhibitors.

Ponelis (2012) identified the lack of fast and reliable internet connection as a primary obstacle in the adoption of business intelligence by South African SMMEs. However, when contrasted with the discussions made in section 2.2.4, the non-technical CSFs had higher significance than did the technical CSFs. It was found that management support and the clarity of the business vision were the dominating non-technical CSFs that determined the successful adoption of business intelligence initiatives. In other words, the non-technical success factors, when viewed from the context of SMMEs, reside squarely in the domain of a small group of individuals within the firms, specifically the owner-managers, and the senior managers (Lumpkin & Dess, 1996; Smit & Watkins, 2012).

5.3.1. *Conclusion pertaining to the findings relating to Hypothesis 2*

In a sample where more than 60% of the firms are micro-sized (i.e. having less than six employees) and operated by the owner, the findings are not surprising when compared to those of Olszak and Ziemba (2012) who found that owner-managers and other key senior personnel were “too busy running the enterprise” (2012, p. 139). Similarly, Dawson and Van Belle (2013) found that owner-managers and other senior managers of SMMEs did not see the importance of business intelligence.

In this study, although it was found that firms that have adopted business intelligence initiatives, on average appeared to have a slightly higher level of perceived firm performance. **Meaningful statistically support was not found to indicate that owner-managers of SMMEs that had adopted business intelligence as a strategic initiative perceived business intelligence as being beneficial to their firm’s performance**.

As such, there is insufficient evidence to reject the Null Hypothesis, and **there is insufficient evidence to support the researcher’s Hypothesis 2**.

5.4. Discussion pertaining to Hypothesis 3

Hypothesis 3 restated for convenience:

> ***H_0**: The perceived level of SMME economic performance will be no different for firms that have adopted the hybrid strategy and those that have not adopted the hybrid strategy.*
>
> ***H_A**: Firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not adopted the hybrid strategy.*

Hypotheses 1 and 2 sought to separately quantify the relationship between firm performance and the adoption of the business intelligence, and cooperative corporate venturing respectively. To assess Sub-problem 3, however, it is necessary to **evaluate the effect of business intelligence and cooperative corporate venturing initiatives considered jointly on the economic performance of SMMEs, as perceived by the owner-managers of the firm**. For Hypothesis 3 and 4, it was therefore necessary to focus on firms that have adopted *both* business intelligence and the adoption cooperative corporate venturing initiatives.

As depicted in Figure 7, the hybrid strategy consists of three of the four different types of combinations of knowledge used in business, as described by Nonaka and Takeuchi (1995) in their “SECI” model. Further, given that the consumption and utilisation of knowledge is necessary for both the day-to-day and the long-term decision-making processes (Herschel & Yermish, 2009; Li et al., 2010; Park et al., 2012), the need for a hybrid strategy seems plausible.

However, although there was a marginal difference between the means of those that had adopted the hybrid strategy and those that did not, it was unexpected to find that the difference was non-significant, given that:

1. A large percentage of the sample indicated that they were using business intelligence; and,
2. The micro-sized firms (that represent the majority of the sample) that had adopted had adopted cooperative corporate venturing initiatives, were found to have higher levels of perceived firm performance.

While a large percentage (63%) of the firms indicated that they were using business intelligence, they were probably using low-level business intelligence initiatives (such as spreadsheet programs), and the owner manager may not see these activities as being something that aids or benefits the company's firm performance due to their ubiquitous nature.

A closer look at items D2.4 and D2.6 of the business intelligence (indirect) adoption scale provides support for this conjecture. For item D2.4, 61 of the 111 responses, showed that computer applications are used for data analysis, while for item D2.6, 58 of the 112 respondents indicated that spreadsheet program were used to aid the firm's competitive advantage. While items D2.1 and D2.2 indicated that the majority of owner-managers did not use software to aid in their decision-making process (*cf.* Table 11). These findings seem to justify the earlier argument that these owner-managers, the majority of whom are operating firms with less than six employees, are using low level business intelligence initiatives (based on Figure 2: Continuum of Business Intelligence functionality (Ponelis, 2012)), and that they do not see the value of business intelligence. The argument is further validated by item D2.5, where 45 respondents indicated that they routinely process data manually, while 34 indicated that they occasionally process data manually.

It is likely that had the owner-managers seen the value and potential of using business intelligence within their firms, the number of respondents who indicated that they were manually processing data would have been lower. The literature supports the argument that owner-managers of small firms may not see the need

for business intelligence, a claim that seems to be supported by the findings of this study.

Questions that arise from this study include:

1. Do the owner-managers of South African SMMEs understand the importance of business intelligence?
2. Is there a difference between the education levels between the owner-managers of micro-, small- and medium-sized firms?

5.4.1. *Conclusion pertaining to the findings relating to Hypothesis 3*

In this study, **meaningful statistically support was not found to indicate that there is a relationship between the adoption of a hybrid strategy and perceived levels of SMME economic performance, such that firms that have adopted the hybrid strategy will have a higher perceived level than firms that have not as perceived by owner-managers of the SMMEs**.

As such, there is insufficient evidence to reject the Null Hypothesis, and **there is insufficient evidence to support the researcher's Hypothesis 3**.

5.5. Discussion pertaining to Hypothesis 4

Hypothesis 4 restated for convenience: For firms having adopted a hybrid strategy,

> ***H_0**: Firm size will not moderate the relationship between the perceived benefits of the hybrid strategy and the perceived levels of SMME economic performance.*
>
> ***H_A**: Firm size will moderate the relationship between the benefits of the hybrid strategy and the levels of SMME economic performance as perceived by the owner-managers of the firms.*

Based on the literature, business intelligence and cooperative corporate venturing were separately found to benefit firm performance. Elbashir et al. (2008) linked business intelligence to improvements in firm performance, while Simonin (1997), and Lunnan and Haugland (2008) collectively highlighted that cooperative corporate venturing also

resulted in improvements in firm performance. As such, it was expected that the benefits of a joint hybrid strategy (i.e. using both business intelligence and cooperative corporate venturing), should be related to the firm's economic performance. Based on the findings of this study, this was also found to be the case.

Using hierarchical regression analysis, a positive relationship was found between the perceived benefits of the adopted hybrid strategy, and the perceived levels of SMME economic performance. It was found in this study that as the perceived benefits of the hybrid strategy increased, so too is the expected perceived level of economic performance. Caution should be taken during the interpretation of these results, as, even though a positive relationship has been found, causality cannot be determined and is not being implied.

Given that there is evidence to support a linear relationship between the hybrid strategic initiative (half of which includes an aspect of corporate entrepreneurship) and perceived levels of SMME economic performance, the findings add to the literature that SMMEs should derive similar benefits from aspect of corporate entrepreneurship. Additionally, the findings of this study, support those of Naldi and Actenhagen (2011) and Kinyeki and Gachanja (2013), who previously conducted studies, and presented findings that suggest that, just as larger well-established firms benefited from aspects of corporate entrepreneurship, so too could SMME. However, the motives for employing the hybrid strategic, specifically the joint application of business intelligence and cooperative corporate venturing initiatives, have not been explored.

5.5.1. *Antecedence for business intelligence*

Although support was not found for Hypothesis 2 (i.e. the relationship between the adoption of business intelligence and the perceived level of SMME firm performance), an indirect relationship was found between the benefits of business intelligence (as the hybrid strategy does consist, in part, of business intelligence initiatives) and the perceived level of SMME firm performance, during the investigation of Hypothesis 4. This then implies that there are certain conditions when the relationship between the adoption of business intelligence and the perceived level of SMME firm performance is valid, here in the Republic of South Africa. One possible condition may be that there has

to be aspects of corporate entrepreneurship initiatives present, as is evident in the findings of this study, however, further research needs to be conducted, to investigate the validity of this claim.

Additionally, given that we have already established that business intelligence exists at the explicit/explicit knowledge boundaries (*cf.* section 2.3.2), the adoption of business intelligence may be contingent on the existence of other initiatives that simultaneously operate at the explicit/tacit knowledge and/or the tacit/explicit knowledge boundaries. The argument for this is that indirect support was found for the relationship between the business intelligence (based on the hybrid strategy which straddles the explicit/tacit, the tacit/explicit, and the explicit/explicit knowledge boundaries) and the perceived level of SMME firm performance. In the absence of the explicit/tacit, the tacit/explicit knowledge initiatives (i.e. cooperative corporate venturing), support was not found (for Hypothesis 2). Though causality is not being suggested, there is sufficient evidence to warrant further research into the linkage between the joint adoption of business intelligence by SMMEs and initiatives that operate within either of the explicit/tacit knowledge or tacit/explicit knowledge boundaries.

5.5.2. *The significance of firm size*

Based on the arguments of some scholars, cooperative corporate venturing (Kuratko & Audretsch, 2013a; Morris et al., 2011; Zahra & Covin, 1995) and business intelligence (Dawson & Van Belle, 2013, p. 2; O'Brien & Kok, 2006) are not suitable for SMMEs, and that these initiatives are only suitable for large well-established firms; Hypothesis 4 sought to identify if firm size was a moderating variable between the hybrid strategic initiative and perceived levels of SMME economic performance relationship.

Bojica and Fuentes (2012), found evidence that supported a relationship between firm performance and firm size (as well as other predictor variables such as environment dynamism, and firm age) in SMMEs. However, when corporate entrepreneurship was added to their model, the firm size variable was no longer significant. Bojica and Fuentes made the conclusion that although firm size "may influence knowledge acquisition and knowledge exploitation for innovative and entrepreneurial purposes" (2012, p. 405), the

larger the firm, the more likely is it able to participate in more inter-organisational relationships.

Even though the sample consisted of primarily micro- and small-sized firms, these two groups were large enough to investigate the role of size in the relationship. However support was not found to indicate that firm size was a moderating variable. The rationale for expecting a difference between the levels, based on the firm size, is that it is believed that as firms get larger and better established (Amabile et al., 2013; Smit & Watkins, 2012, p. 6324), they should:

- Generate more information, resulting in the need for better tools, and structures;
- Become more knowledge and growth seeking, resulting in the need for partnership.

5.5.3. *Conclusion pertaining to the findings relating to Hypothesis 4*

In this study, **meaning statistical support was not found that indicated that the relationship between the perceived benefits of the hybrid strategic initiative and the perceived levels of SMME economic performance is moderate by the firm size, with larger firms having higher perceived benefits**.

As such, there is insufficient evidence to reject the Null Hypothesis, and **there is insufficient evidence to support the researcher's Hypothesis 4**.

5.6. Conclusion

This study was not done in isolation, and to provide context for the findings it was necessary to review the pertinent literature that guided the creation of this study. The four hypotheses of this study were reviewed, and compared with key literature as briefly discussed below.

Hypotheses 1, 2 and 3 looked at the adoption of cooperative corporate venturing, business intelligence, and the hybrid strategy respectively in relationship with the perceived level of SMME firm performance. While support was only found for Hypothesis 1, it was expected that Hypothesis 2 and 3 would have been supported.

Hypothesis 4 focused on the relationship between the perceived benefits of the hybrid system and the perceived level of SMME firm performance, while trying to identify the role of firm size in the relationship. Statistical support was not found for Hypothesis 4, indicating that firm size does not moderate the relationship between the perceived benefits of the hybrid strategy and the perceived levels of SMME economic performance.

5.6.1. *Assessment of the problem statement*

Main problem restated for convenience:

> *Determine the relevance of business intelligence and cooperative corporate venturing in the operation of small, medium and micro enterprises and the relation thereof with the economic performance of these firms, as perceived by the owner-managers of the firm.*

By aligning the findings of this study with the problem statement, it was found that both business intelligence and cooperative corporate venturing are relevant in the operation of small, medium and micro enterprises, but in varying degrees.

Direct support was found linking the adoption of cooperative corporate venturing with the economic performance of these firms, as perceived by the owner-managers of the firm. Consequently results pertaining to the assessment of Sub-problem 1, *"Identify if SMMEs are adopting cooperative corporate venturing as a strategic initiative to increase their economic performance"*, may be stated as follows:

> *SMMEs seemed to do adopt cooperative corporate venturing as a strategic initiative to increase their economic performance.*

A significant statistically link was not found that directly linked the adoption of business intelligence with the economic performance of these firm. Consequently the results pertaining to the assessment of Sub-problem 2, *"Identify if SMMEs are adopting business intelligence as a strategic initiative to increase their economic performance"*, are stated as follows:

> *Evidence was not found that could indicate that SMMEs adopted business intelligence as a strategic initiative to increase their economic performance.*

Finally, in evaluating Sub-problem 3, "*Evaluate the effect of business intelligence and cooperative corporate venturing initiatives considered jointly on the economic performance of SMMEs, as perceived by the owner-managers of the firm"*, support was not found for the link between the joint adoption of a hybrid strategy and firm performance. However, a small positive relationship was found between the perceived benefits of the hybrid strategic initiative and the perceived levels of SMME economic performance. Based on this, the results pertaining to the assessment of Sub-problem 3 are stated as follows:

> *Despite having found a small positive relationship between the perceived benefits of the hybrid strategic initiative and the perceived levels of SMME economic performance, the adoption of business intelligence and cooperative corporate venturing initiatives considered jointly, as perceived by the owner-managers of the firms, has not effect on the economic performance of the firms.*

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

This study used academic literature and research in the fields of knowledge management, corporate entrepreneurship, cooperative corporate venturing, and business Intelligence, with special focus on small, medium and micro enterprises, to evaluate the relevance of business intelligence and cooperative corporate venturing in the operation of small, medium and micro enterprises and the relation thereof with the economic performance of these firms, as perceived by the owner-managers of the firm. From a theoretical point of view, knowledge management provided the basis for viewing two seemingly disparate theoretical fields of study, namely business intelligence and cooperative corporate venturing. A comprehensive literature review was conducted, showing that there is indeed an overlapping of business intelligence and cooperative corporate venturing. The overlapping of these fields of studies formed the impetus for this study.

This section presents the conclusions and recommendations of the study. The findings are summarised and presented to the reader, followed by a list of recommendations, and finally suggestions for further research.

6.1. Conclusions of the study

Small, medium and micro enterprises (SMMEs) differ from large well-established firms, not only in terms of the number of employees, but also in terms of access to financial resources, access to a diverse pool of skilled employees, as well as other intangible resources such as, reliable market and customer information (Amabile et al., 2013; Smit & Watkins, 2012, p. 6324). Further, SMMEs operate in the same diverse market arenas as the large, well-established firms, which is due, in part, to globalisation and trade liberalisation (Dana, 2004; Smit & Watkins, 2012).

Despite their size, however, SMMEs are significant contributors to the economies in which they operate (Adendorff et al., 2011; Ismail et al., 2011). SMMEs are still able to contribute on average, to 95% of the economy, even though, they operate in the same market place as the large well-established firms (Matthews, 2007; Olszak & Ziemba, 2012; Scholz et al., 2010; Smit & Watkins, 2012; Wright et al., 2013).

Notwithstanding their adaptability however, SMMEs still face significant challenges that include resource scarcity and information asymmetry (when competing with larger well established firms), and the general problems associated with making timely, market-aware strategic decisions (Amabile et al., 2013; Smit & Watkins, 2012). Given the importance of SMMEs, this study was structured to investigate the relevance of business intelligence and cooperative corporate venturing in the operation of SMMEs in the Republic of South Africa, and the relation thereof with the economic performance of these firms, as perceived by the owner-managers of the firm.

6.1.1. *Findings related to cooperative corporate venturing*

Corporate entrepreneurship is presented in the literature as an effective method that can be employed by firms to achieve high levels of organisational (Kuratko & Audretsch, 2013a; Morris et al., 2011) and financial performance (Antoncic & Prodan, 2008; Bojica & Fuentes, 2012; Kuratko & Audretsch, 2013a; Zahra & Covin, 1995), it was found to be "predictive of the growth of small and large firms" (Antoncic & Prodan, 2008, p. 258). South African SMMEs may be able to improve their organisational performance by copying aspects of corporate entrepreneurship practices that are typically utilised by their larger counterparts (Dana, 2004; Gourova, 2010).

By adopting cooperative corporate venturing, or more commonly, by forming joint ventures, SMMEs can leverage strategic partnerships to overcome the various forms of resource scarcity (Kinyeki & Gachanja, 2013). Bojica and Fuentes (2012), found evidence that supported a relationship between firm performance and firm size in SMMEs partnership. Kirby and Kaiser (2003) also found that joint venturing when adopted by SMMEs could aid in access to new markets, as it provided a means for the SMMEs to overcome both their resource and knowledge scarcity (Kirby & Kaiser, 2003).

Similar to previous research (Bojica & Fuentes, 2012; Kinyeki & Gachanja, 2013; Kirby & Kaiser, 2003), support was found for **Hypothesis 1** (i.e. there is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance, than firms that have not adopted cooperative corporate venturing) in this study, which indicated that

owner-managers of SMMEs in the Republic of South Africa that had adopted cooperative corporate venturing as a strategic initiative perceived this as being beneficial to their firms' performance.

6.1.2. *Findings related to business intelligence*

Business intelligence is crucial to firms regardless of firm size (Lutu & Meyer, 2008; Ponelis, 2012, p. 11) and is only constrained by the complexity and cost of the system being implemented (Ponelis, 2012), despite claims by some scholars to the contrary (Dawson & Van Belle, 2013, p. 2; O'Brien & Kok, 2006). Large enterprises are better suited for business intelligence systems that provide advanced analytics (Ponelis, 2012) which, may be integrated into their existing Enterprice Resource Planning (Hawking & Sellitto, 2010) and Customer Relationship Management (Kumar, 2012) systems. Based on the continuum (cf. Figure 2), micro-sized firms are best suited with business intelligence systems that provided simple spreadsheet reports, and, as these company transitions in size, they may take an iterative approach in improve their business intelligence systems (Bijker & Hart, 2013; Ponelis, 2012) while they improve their information systems.

SMMEs can use business intelligence systems to overcome information asymmetry, to make more market-sensitive decisions and to identify customer relationships, perform data processing, and presenation and interrogation tasks using a smaller set of tools, thought not to the same degree, as well-established firms (Ponelis, 2012). These are factors that can help SMMEs to improve and sustain their competitive advantage (Phan & Vogel, 2010), and will result in improved growth and higher levels of economic performance (Matthews, 2007, p. 818; Phan & Vogel, 2010; Trkman et al., 2010).

Within the literature it was found that, some senior managers of SMMEs not see the importance of business intelligence (Dawson & Van Belle, 2013, p. 3) and that owner-managers and other key senior personnel were "too busy running the enterprise" (Olszak & Ziemba, 2012, p. 139) to be focused on the BI system selection and the implementation process. These oversights by SMMEs senior management are factors that directly result in employee skills mismatch, and a larger far-reaching organisational mismatch with the BI systems (Olszak & Ziemba, 2012). The importance of key

personnel buy-in to the success of business system implementation is hinted at in a general framework for BI implementation that was presented by Yeoh and Koronios (2010, p. 25).

Herschel and Yermish (2009), and Ponelis(2012) found that SMMEs can utilise business intelligences to their advantage, when competing in the same spheres as their larger more established counterparts. Based on previous findings of research by Ponelis (2012), Olszak and Ziemba (2012), and Bijker and Hart (2013), it was expected that support would be found indicating the presence of a positive relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance, than firms that have not adopted business intelligence.

However, based on the sample used in this study, even though it was found that firms that have adopted business intelligence initiatives, on average appeared to have a slightly higher level of perceived firm performance, meaningful statistical support was not found the claim for **Hypothesis 2**. In this regards, the outcome of this study differs from the findings of Herschel and Yermish (2009), and Ponelis(2012).

6.1.3. *Findings related to the hybrid strategy*

Based on previously cited literature (Morris et al., 2011; O'Brien & Kok, 2006), the link between the adoption of cooperative corporate venturing, business intelligence and firm performance is summarised in Figure 8. Elbashir et al. (2008) highlighted that business intelligence leads to improvements in process efficiencies and other organisational benefits. While Simonin (1997), and Lunnan and Haugland (2008) collectively highlighted that cooperative corporate venturing leads to improvements in performance (both financial and operational) and overall employee skills. Mathew and Ogbonna (Mathew et al., 2012) created a generalised theory that included factors that influence firm performance, and showed that productivity at work results in profitability and growth (Mathew et al., 2012, p. 199), which are antecedents for firm performance. These findings are not surprising as corporate entrepreneurship and business intelligence are

sub-types of knowledge (as established above), and were also found to be beneficial to firms' performance (López et al., 2009).

Firms in pursuit of sustained profitability need to find innovative and creative ways to achieve greater performance (Osman et al., 2011; Wright et al., 2013). The authors indicated that by using market orientation (MO), which consists of three dimensions, namely, customer orientation, competitor orientation and inter-functional coordination, firms (especially SMMEs) can realise greater organisational performance, and consequentially, sustained profitability (Osman et al., 2011, p. 5975; Wright et al., 2013, p. 7). This is comparable to the earlier findings of Tustin and Venter (2009, p. 89) who looked at aspects of the use and the availability of competitive and business intelligence in the Republic of South Africa.

Business intelligence (Dawson & Van Belle, 2013; Elbashir et al., 2008; Hawking & Sellitto, 2010; O'Brien & Kok, 2006) and cooperative corporate venturing (Antoncic & Prodan, 2008; Kinyeki & Gachanja, 2013; Rothaermel, 2001; Terjesen et al., 2011), were found to separately affect the organisational performance of well-established firms, and by extension their economic performance. Within section 2.3.2, the link between the business intelligence and cooperative corporate venturing was provided.

Using the literature (Dawson & Van Belle, 2013; Kinyeki & Gachanja, 2013; Li et al., 2010; Naldi & Achtenhagen, 2011; Ponelis, 2012), and referring to "the joint application of business intelligence and cooperative corporate venturing" as an SMME hybrid strategy, **Hypothesis 3** sought to find if there was a relationship between the adoption of a hybrid strategy and perceived levels of SMME economic performance, such that firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not, while **Hypothesis 4** explored if there was a positive relationship between the perceived benefits of the hybrid strategy and the perceived levels of SMME economic performance, moderate by the firm size, with larger firms having higher perceived benefits.

Based on previous work by several scholars, specifically Herschel and Jones (2005) who showed that business intelligence is not a separate and distinct field from knowledge management, but instead, a sub-set of knowledge management; Li, Poppo and Zhou (2010) were able to show that subsidiaries or "joint ventures" (Li et al., 2010, p. 349) are

equally dependent on both tacit and explicit forms of knowledge transfer; Li, Poppo and Zhou (2010) who showed that subsidiaries or “joint ventures” (Li et al., 2010, p. 349) are equally dependent on both tacit and explicit forms of knowledge transfer; and, Park, Vertinsky and Lee (2012) who found evidence of a link between tacit knowledge and joint venturing, albeit from an international joint venturing point of view, it was expected that support would have been found for hypotheses 3 and 4. However, based on the sample used for this study, meaningful statistical support was not found for hypotheses 3 and 4.

6.2. Recommendations

This section provides recommendations for stakeholders (that were previously identified in section 1.4) based on the findings of the study. The output of this study may be beneficial in two important ways; firstly, it applies directly to the practicality of SMMEs strategies, and secondly it adds to the academic literature. These are discussed in details below.

6.2.1. *Business Intelligence Stakeholders: SMME strategy*

About half of the SMMEs in this sample indicated that they were using business intelligence. However, given that the findings of this study were not statistically significant as it relates to the adoption of business intelligence initiatives by South African SMMEs, business intelligence service providers and vendors (for example SAP and IBM) should conduct further research, as a means to evaluate the viability of extending their BI product offerings to South African SMMEs.

Additionally, business intelligence stakeholders may examine the literature review section of this report, where topics that relate to the use of business intelligence as a strategic initiative were discussed.

They may be guided by:

- The factors that influence the adoption of business intelligence and the perceived relation that this has on the SMMEs firms' financial performance;
- The critical success factors for business intelligence system implementation; and,
- The inhibitors to the adoption of business intelligence systems. Some of which include:
    - Cost and the resource inhibitors (Bijker & Hart, 2013; Olszak & Ziemba, 2012);
    - The availabilty of skilled employees inhibitor (Bijker & Hart, 2013); and,
    - The interpretation and the evaluation inhibitors of business intelligence results (Bijker & Hart, 2013; Olszak & Ziemba, 2012; Ponelis, 2012).

6.2.2. *Academic stakeholders: A re-imagined model of Corporate Entrepreneurship*

Support was found linking the adoption of cooperative corporate venturing strategies by SMMEs in the Republic of South Africa, and the perceived relation that this has on the firm's financial performance. In light of these findings, it is recommended that further research should be conducted, with the intention to further evaluate the validity of the proposed model of corporate entrepreneurship as depicted in Figure 1.

As indicated earlier in section 1.4, it is believed that a more inclusive model of corporate entrepreneurship could be defined by highlighting *Small Firm Entrepreneurship* and *Established Firm Entrepreneurship*, which would be categories of *Firm Entrepreneurship*. Additionally, *Firm venturing* (what is currently called Corporate Venturing) would consist of two forms of venturing; *Cooperative Firm Venturing* (i.e. joint venturing), which would be the form of venturing practice by both SMMEs and large well-established firms, and *Established Firm Venturing*, would represent the forms of venturing practice by only large, well-established firms.

6.3. Suggestions for further research

This section contains discussions about further research based on the findings of this study. Additionally, the reader is provided with a list of proposed research questions that arose during the investigation of main problem of this study.

6.3.1. *Joint venturing motivation among SMMEs*

Evidence was found in this study that indicated that South African SMMEs participated in joint venturing. This is interesting as the sample consisted of primarily micro- and small-sized firms. Possible justifications for this may include the need for SMMEs to partner so as to increase their market growth or to ensure their firm's survival (Bojica & Fuentes, 2012; Kinyeki & Gachanja, 2013; Kirby & Kaiser, 2003). This argument is backed by the theoretical insights of Adendorff, Appels, and Botha (2011) who posited that SMMEs participated in cooperative corporate venturing as a strategic initiative so as to grow their companies by entering new markets, by acquiring new skills, competencies, and resources that they would not be able to acquire by themselves.

This study focused on identifying if SMMEs participated in joint venturing, as such, further research is required to answer the following questions:

Proposed Research Question 1:

> *What are the underlying motives that determine if South African SMMEs participate in joint venturing?*

Proposed Research Question 2:

> *Do South African micro- and small-sized firms that participate in joint venturing share the same motives?*

6.3.2. *Business intelligence inhibitors among micro-sized SMMEs*

Given that the sample consists of primarily micro-sized firms, the findings of this study seem to be inline with the previously identified adoption inhibitors.

Specifically:

1. The cost and the resource inhibitors (Bijker & Hart, 2013; Olszak & Ziemba, 2012), which include the high licensing cost of business intelligences tools, and the high infrastructual cost as the cache of internal data grows (Levy & Powell, 2005);
2. The availabilty of skilled employees inhibitor (Bijker & Hart, 2013), which relates to finding employees that are adequately trained to understand and interpret the analytics data; and,
3. The interpretation and the evaluation inhibitors of business intelligence results (Bijker & Hart, 2013; Olszak & Ziemba, 2012; Ponelis, 2012).

While it may be reasonable to believe that small- and micro-sized firms will not have the assets, the resource (Adendorff et al., 2011; Dana, 2004; Smit & Watkins, 2012), and the skilled employees necessary for using and benefiting from business intelligence (Amabile et al., 2013), further research is required to understand the role of these inhibitors. This leads to the following question:

Proposed Research Question 3:

> *What is the relationship between the adoption of business intelligence and the afore-mentioned inhibitors?*

6.3.3. *The link between owner-manager's mind-set, education and their attitude towards technology*

In assessing Hypothesis 3, the researcher argued that, had the owner-managers believed that using business intelligence within their firms was important, then the number of respondents who indicated that they were manually processing data would have been lower. The literature (Dawson & Van Belle, 2013; Olszak & Ziemba, 2012) supports the argument that owner-managers of small firms may not see the need for business intelligence, a claim that seems to be supported by the findings of this study.

Additional questions that arise from this study include:

Proposed Research Question 4:

> Do the owner-managers of South African SMMEs understand the importance of business intelligence?

Proposed Research Question 5:

> *Is there a difference between the education levels between the owner-managers of micro-, small- and medium-sized firms?*

6.3.4. *The linkage between the joint adoption of business intelligence and the knowledge boundaries*

Given that there is evidence to support a linear relationship between the hybrid strategic initiative (half of which includes an aspect of corporate entrepreneurship) and perceived levels of SMME economic performance, the findings add to the literature that SMMEs should derive similar benefits from aspect of corporate entrepreneurship. The motives for employing the hybrid strategic, specifically the joint application of business intelligence and cooperative corporate venturing initiatives, have not been explored. This leads to the research question:

Proposed Research Question 6:

> *What are the motives for jointly applying business intelligence and cooperative corporate venturing practices as a strategic initiative?*

During the investigation of Hypothesis 4 (*cf.* section 4.7), a weak, indirect relationship was found linking the benefits of business intelligence and the perceived level of SMME firm performance. This implied that there were certain conditions when the relationship between the adoption of business intelligence and (the perceived level of SMME) firm performance was valid. One possible condition may be that there has to be aspects of corporate entrepreneurship initiatives present, as is evident in the findings of this study, however, further research needs to be conducted, to investigate the validity of this claim. This leads to the following questions:

Proposed Research Question 7:

> *What role does corporate entrepreneurship play in the adoption of business intelligence initiatives among SMMEs?*

Additionally, given that we have already established that business intelligence exists at the explicit/explicit knowledge boundaries (*cf.* section 2.3.2), the adoption of business intelligence may be contingent on the existence of other initiatives that simultaneously operate at the explicit/tacit knowledge and/or the tacit/explicit knowledge boundaries.

Though causality is not being suggested, there is sufficient evidence to warrant further research into the linkage between the joint adoption of business intelligence by SMMEs and initiatives that operate within either of the explicit/tacit knowledge or tacit/explicit knowledge boundaries.

Proposed Research Question 8:

> *Is the adoption of business intelligence among SMMEs contingent on the existence of other initiatives that simultaneously operate at the explicit/tacit knowledge and/or the tacit/explicit knowledge boundaries?*

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APPENDIX A: **RESEARCH INSTRUMENT**

Appendix A contains a copy of all the items that will be sent to the subject. These items include an introductory letter (cf. A.1) and the survey items (cf. A.2).

A.1. Introductory letter

Dear Sir/Madam,

My name is Harold Campbell and I am currently a student at the Wits Business School (WBS) who is enrolled in the Master of Management in Entrepreneurship and New Venture Creation programme (http://www.wbs.ac.za/programmes/degrees/mm_in_entrepreneurship_and_new_venture_creatio).

For academic requirements, I am conducting a research that evaluates the use of business intelligence practices and joint ventures. The survey is brief and requires 5-10 minutes to complete. Your participation and insight would be greatly appreciated.

To protect your privacy and to ensure objectivity, the survey is completely anonymous. Your participation is entirely voluntary, so you may withdraw at any stage during the survey. If you would like to receive the results of the survey, and the results of the findings, the information will be posted on July 31, 2014 at the following URL:

If you have any questions or concerns, you may contact me at harold.campbell@gmail.com, or alternatively, you may contact my Academic Officer Mrs. Tozi Zeka at WBS tozi.zeka@wits.ac.za, my Student Number is 0500290D.

I thank you in advance for your time and participation.

Best regards,

Harold Campbell

A.2. Research Instruments

This section presents the research instrument that was presented to respondents. The italicised item-type indicators and numbers, for example *(D1.1)*, were not included in the final questionnaire, and have been included here for convenience and references for the presentation and discussion of the results.

General Questions

For EACH question below, please select an answer from the box, which best describes your firm.

1. *(D1.1)* How many full-time employees do you currently employ?

Less than 6	6 – 20	21 – 50	51 – 100	101 – 150	151 – 200	201 – 250	More than 250

2. *(D1.2)* Which best describes your role within the firm?

I am the owner and manager	I am a top level manager, reporting directly to the owner	Other

3. *(D1.3)* Is your firm currently employing **business intelligence** practices?

YES	NO

Business intelligence *involves using technologies to aid in the strategic planning and decision-making process, based on patterns and relationships that may be discovered within the data, and communicated through spreadsheet reports (such as MS Excel), accounting package forcasts, trend analysis, and/or other analytics, etc.*

4. *(D1.4)* Is your firm currently a **parent company** in a **joint venture**?

YES	NO

A joint venture *is a business entity that is created and owned together by two or more previously existing companies.*

A parent company *is a company that partly owns equity in a joint venture.*

Notes:

1. **The item-type notations (i.e. DX.Y) were not included in the final questionnaire.**

Usage Questions (Research Instruments continued)

Please respond on the following scale, where 1=Never, to 5=Every Time.

How do you describe the frequency of your firm's usage of the following?	Never				Every Time
(D2.1) Software generated trend analysis is used in the decision-making process	1	2	3	4	5
(D3.1) We participate in joint venture relationships	1	2	3	4	5
(D2.2) [R] Pattern/relationship identification is done without technology	1	2	3	4	5
(D3.6) Forming a joint venture requires that we are a parent company	1	2	3	4	5
(D2.3) Data analysis is used to aid management decisions	1	2	3	4	5
(D3.2) [R] We avoid forming joint venturing relationships	1	2	3	4	5
(D3.4) We create new businesses that are jointly owned by other companies	1	2	3	4	5
(D2.4) Computer applications are used for processing data	1	2	3	4	5
(D2.5) [R] Data analysis is done manually	1	2	3	4	5
(D2.6) Spreadsheet programs are used to improve competitive advantage	1	2	3	4	5

Notes:

1. **The item-type notations (i.e. R, DX.Y) were not included in the final questionnaire;**
2. Items preceded with the superscript **R** represent reversed items. The notation was not included in the final questionnaire;
3. Items D3.3 and D3.5 were removed during the design phase of the research instrument;
4. D2.1 – D2.6 are the Business Intelligence usage items; and,
5. D3.1 – D3.6 are the Cooperative Corporate Venturing usage items.

Business Intelligence Questions (Research Instruments continued)

Please respond on the following scale, where 1=Strongly Disagree, to 7=Strongly Agree

How do you perceive the effect that business intelligence has had on the following characteristics of your company?	Strongly Disagree						Strongly Agree
(G1.1) The efficiency of our internal processes has improved	1	2	3	4	5	6	7
(G1.2) Making long-term decisions is easier	1	2	3	4	5	6	7
(G1.3) Staff productivity has increased	1	2	3	4	5	6	7
(G1.4) R It is harder to retain customers	1	2	3	4	5	6	7
(G1.5) Employees have become more effective	1	2	3	4	5	6	7
(G1.6) R The cost of effective decision-making has increased	1	2	3	4	5	6	7
(G1.7) Customer satisfaction has increased	1	2	3	4	5	6	7
(G1.8) R Operational costs have increased	1	2	3	4	5	6	7
(G1.9) Revenues/services provided have increased	1	2	3	4	5	6	7
(G1.10) R There was a reduction of company performance	1	2	3	4	5	6	7
(G1.11) Geographic distribution of services has increased	1	2	3	4	5	6	7
(G1.12) R There was a decline in employee performance	1	2	3	4	5	6	7
(G1.13) Profit margin/surplus has been enhanced	1	2	3	4	5	6	7
(G1.14) Return on investment (ROI) has increased ROI (return on investment) is defined as follows: (Gain from Investment – Cost of Investment) / Cost of Investment	1	2	3	4	5	6	7
(G1.15) R There was a reduction of service	1	2	3	4	5	6	7
(G1.16) The competitive advantage of the company has improved	1	2	3	4	5	6	7

Notes:

1. **The item-type notations (i.e. R, DX.Y) were not included in the final questionnaire;**
2. G1.1 – G1.8 represent items for the Process Efficiency dimension; and,
3. G1.9 – G1.16 represent items for the Organisational Benefits dimension.

Joint Venturing Questions (Research Instruments continued)

Please respond on the following scale, where 1=Strongly Disagree, to 5=Strongly Agree

How do you perceive the effect that joint venturing has had on the following characteristics of your company?	Strongly Disagree				Strongly Agree
(G2.1) [R] It was harder to generate profits	1	2	3	4	5
(G2.2) Our market share/ROA has improved ROA (return on assets) is defined as follows: ROA = Net Earnings / Total Assets	1	2	3	4	5
(G2.3) Sustaining our competitive advantage has improved	1	2	3	4	5
(G2.4) [D] The CEO of the partner companies needed to be my friend	1	2	3	4	5
(G2.5) Our profits have increased	1	2	3	4	5
(G2.6) [R] If we exited the joint venture, our profits will increase	1	2	3	4	5
(G2.7) The joint venture has resulted in firm growth.	1	2	3	4	5
(G2.8) [R] The joint venture has resulted in reduced market growth.	1	2	3	4	5
(G2.9) The joint venture has resulted in new products.	1	2	3	4	5
(G2.10) [D] Changing marketing strategies during a recession will decrease customer loyalty	1	2	3	4	5
(G2.11) The joint venture has resulted in new competencies.	1	2	3	4	5
(G2.12) [R] The joint venture has prevented new market entrances.	1	2	3	4	5
(G2.13) We have increased our profits/capital repatriation	1	2	3	4	5
(G2.14) [R] We would increase our revenue if we exit the joint venture	1	2	3	4	5
(G2.15) [D] Our employees may demand more salaries	1	2	3	4	5
(G2.16) We have been able to leverage the knowledge-skills acquisition	1	2	3	4	5
(G2.17) [R] The venture has affected the sales team, resulting in a decline in revenue and sale	1	2	3	4	5
(G2.18) We have implemented knowledge-skills safeguarding measures	1	2	3	4	5

Notes:

1. **The item-type notations (i.e. R, DX.Y) were not included in the final questionnaire;**
2. G2.1 – G2.6 represent items for the Financial Performance dimension;
3. G2.7 – G2.12 represent items for the Operational Performance dimension; and,
4. G2.13 – G2.18 represent items for the Skills dimension.

Firm Performance Questions (Research Instruments continued)

Please respond on the following scale, where 1=Very untrue to what I believe, to 7=Very true to what I believe

In your opinion, using both a business intelligence and a joint venture strategy will result in?	Very untrue to what I believe						Very true to what I believe
(G3.1) An increase in firm profitability	1	2	3	4	5	6	7
(G3.2) [D] A more competent labor-force	1	2	3	4	5	6	7
(G3.3) A positive change in long-term profitability	1	2	3	4	5	6	7
(G3.4) [R] A reduction of overall sales performance	1	2	3	4	5	6	7
(G3.5) A sustained growth of net profit over years	1	2	3	4	5	6	7
(G3.6) [R] A decline in the achievement of sales targets	1	2	3	4	5	6	7
(G3.7) An increased growth rate of sales	1	2	3	4	5	6	7
(G3.8) Better use of the employees capabilities	1	2	3	4	5	6	7
(G3.9) [R] A reduced level of employee performance	1	2	3	4	5	6	7
(G3.10) An increase in the number of productive man-hours	1	2	3	4	5	6	7
(G3.11) The deployment of the right people at right projects	1	2	3	4	5	6	7
(G3.12) [D] Employees arriving at work earlier	1	2	3	4	5	6	7
(G3.13) Better resource utilisation in organisation	1	2	3	4	5	6	7
(G3.14) [R] Fewer assigned tasks being completed by employees	1	2	3	4	5	6	7

Notes:

1. **The item-type notations (i.e. R, DX.Y) were not included in the final questionnaire;**
2. G3.1 – G3.7 represent items for the Profitability and Growth dimension; and,
3. G3.8 – G3.14 represent items for the Productivity at Work dimension.

APPENDIX B: **CONSISTENCY MATRIX**

B.1. Research Consistency matrix

Table 20: Consistency matrix

Determine the relevance of business intelligence and cooperative corporate venturing in the operation of small, medium and micro enterprises and ascertain the resultant effect in the economic performance of these firms, as perceived by the owner-managers of the firm.

Sub-problem	Literature Review	Hypotheses or Propositions or Research questions	Source of data	Type of data	Analysis
Identify if SMMEs are adopting cooperative corporate venturing as a strategic initiative to increase their economic performance.	(Antoncic & Prodan, 2008) (Covin & Miles, 1999) (Haase & Franco, 2010) (Kinyeki & Gachanja, 2013) (Kuratko & Audretsch, 2013) (Lai & Chang, 2010) (Lee, 2007) (Naldi & Achtenhagen, 2011) (Terjesen et al., 2011) (Zahra & Covin, 1995)	**Hypothesis 1**: There is a relationship between the adoption of cooperative corporate venturing and the perceived level of SMME firm performance, such that firms that have adopted cooperative corporate venturing as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted cooperative corporate venturing.	Hypothesis 1: Survey Items D3, G2	Interval	Statistical means and correlations
Identify ways in which SMMEs are adopting business intelligence practices as a strategic initiative with the objective to increase their economic performance.	(Amabile et al., 2013) (Bijker & Hart, 2013) (Dawson & Van Belle, 2013) (Elbashir et al., 2008) (Hawking & Sellitto, 2010) (Lutu & Meyer, 2008) (O'Brien & Kok, 2006) (Ponelis, 2012) (Simonin, 1997) (Venter & Tustin, 2009) (Yeoh & Koronios, 2010)	**Hypothesis 2**: There is a relationship between the adoption of business intelligence and the perceived level of SMME firm performance, such that firms that have adopted business intelligence as a strategic initiative will have a higher level of perceived firm performance than firms that have not adopted business intelligence.	Hypothesis 2: Survey Items D2, G1	Interval	Statistical means and correlations

Determine the relevance of business intelligence and cooperative corporate venturing in the operation of small, medium and micro enterprises and ascertain the resultant effect in the economic performance of these firms, as perceived by the owner-managers of the firm.

Sub-problem	Literature Review	Hypotheses or Propositions or Research questions	Source of data	Type of data	Analysis
Evaluate the compounded effect that business intelligence and cooperative corporate venturing initiatives have on the economic performance of SMMEs.	(Antoncic & Prodan, 2008) (Amabile et al., 2013) (Bijker & Hart, 2013) (Covin & Miles, 1999) (Dawson & Van Belle, 2013) (Elbashir et al., 2008) (Haase & Franco, 2010) (Hawking & Sellitto, 2010) (Kinyeki & Gachanja, 2013) (Kuratko & Audretsch, 2013) (Lai & Chang, 2010) (Lee, 2007) (Lutu & Meyer, 2008) (Mathew et al., 2012) (Naldi & Achtenhagen, 2011) (O'Brien & Kok, 2006) (Ponelis, 2012) (Simonin, 1997) (Terjesen et al., 2011) (Venter & Tustin, 2009) (Yeoh & Koronios, 2010) (Zahra & Covin, 1995)	**Hypothesis 3**: Firms that have adopted the hybrid strategy will have a higher perceived level of SMME economic performance than firms that have not adopted the hybrid strategy. **Hypothesis 4**: Firm size will moderate the relationship between the benefits of the hybrid strategy and the levels of SMME economic performance as perceived by the owner-managers of the firms.	Hypothesis 3: Survey Items D1-D3, G1-G3 Hypothesis 4: Survey Items D1-D3	Interval	Statistical means and correlations

APPENDIX C: **STATISTICAL RESULTS**

C.1. Business Intelligence Statistic Results

C.1.1. *Business Intelligence usage (indirect measure) Frequency Tables*

Table 21: Business Intelligence usage (indirect measure) Item Frequencies

		Item D2.1 Software generated trend analysis is used in the decision making process		Item D2.2 Pattern/relationship identification are done manually without technology		Item D2.3 Data analysis is used to aid management decisions		Item D2.4 Computer applications are used for processing data		Item D2.5 Data analysis is done manually (unreversed)		Item D2.6 Spreadsheet programs are used to improve competitive advantage	
		Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Valid	1.0	43	37.1	41	35.3	29	25.0	17	14.7	15	12.9	18	15.5
	2.0	17	14.7	17	14.7	12	10.3	16	13.8	18	15.5	18	15.5
	3.0	30	25.9	27	23.3	24	20.7	17	14.7	34	29.3	18	15.5
	4.0	12	10.3	12	10.3	20	17.2	15	12.9	18	15.5	20	17.2
	5.0	12	10.3	14	12.1	26	22.4	46	39.7	27	23.3	38	32.8
	Total	114	98.3	111	95.7	111	95.7	111	95.7	112	96.6	112	96.6
Missing	System	2	1.7	5	4.3	5	4.3	5	4.3	4	3.4	4	3.4
Total		116	100.0	116	100.0	116	100.0	116	100.0	116	100.0	116	100.0

C.1.2. *Business Intelligence scale distributions*

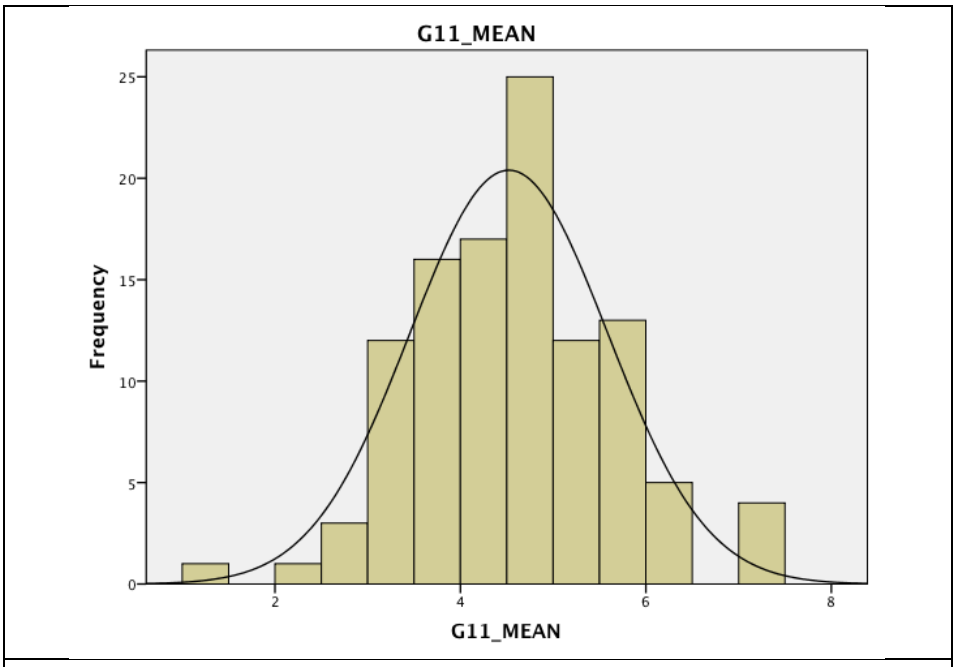


Figure 15: Business Intelligence Process Efficiency scale distribution

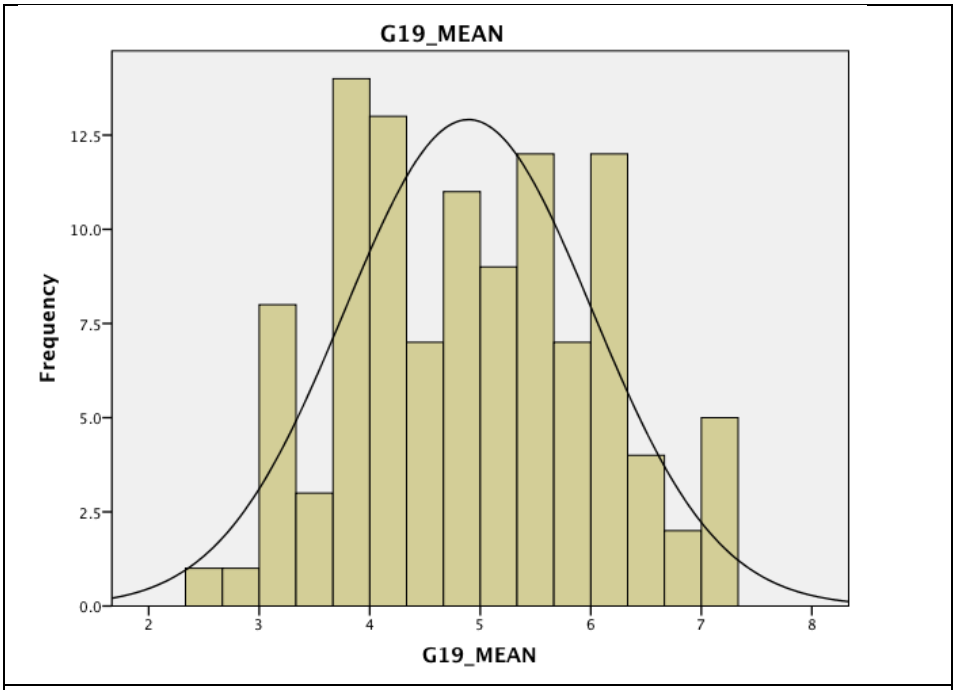


Figure 16: Business Intelligence Organisational Benefits scale distribution

C.2. Cooperative Corporate Venturing Statistic Results

C.2.1. *Cooperative Corporate Venturing usage (indirect measure)*

Table 22: Cooperative Corporate Venturing usage (indirect measure) item summaries

Items	Responses with Scores 1 – 2	Responses with Scores 3 and above	Total Responses
D3.1 We participate in joint venture relationships	74	39	113
D3.2 We avoid forming joint venturing relationships (unreversed)	20	89	109
D3.4 We create new businesses that are jointly owned by other companies	74	37	111
D3.6 Forming a joint venture requires that we are a parent company	73	37	110

Table 23: CCV Firm Usage (Indirect Measure) Item Frequencies

		Item D3.1 We participate in joint venture relationships		Item D3.2 We avoid forming joint venture relationships		Item D3.4 We create new businesses that are jointly owned by other companies		Item D3.6 Forming a joint venture requires that we are a parent company	
		Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Valid	1.0	49	42.2	10	8.6	57	49.1	61	52.6
	2.0	25	21.6	10	8.6	17	14.7	12	10.3
	3.0	20	17.2	22	19.0	20	17.2	23	19.8
	4.0	9	7.8	24	20.7	9	7.8	2	1.7
	5.0	10	8.6	43	37.1	8	6.9	12	10.3
	Total	113	97.4	109	94.0	111	95.7	110	94.8
Missing	System	3	2.6	7	6.0	5	4.3	6	5.2
Total		116	100.0	116	100.0	116	100.0	116	100.0

C.2.2. *Cooperative Corporate Venturing scale distributions*

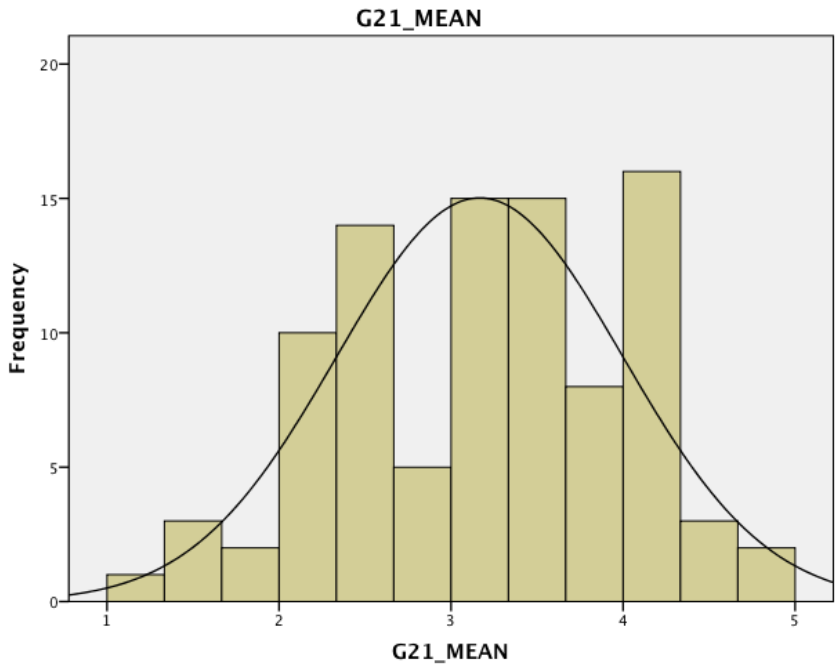


Figure 17: Cooperative Corporate Venturing: Financial Performance Scale distribution

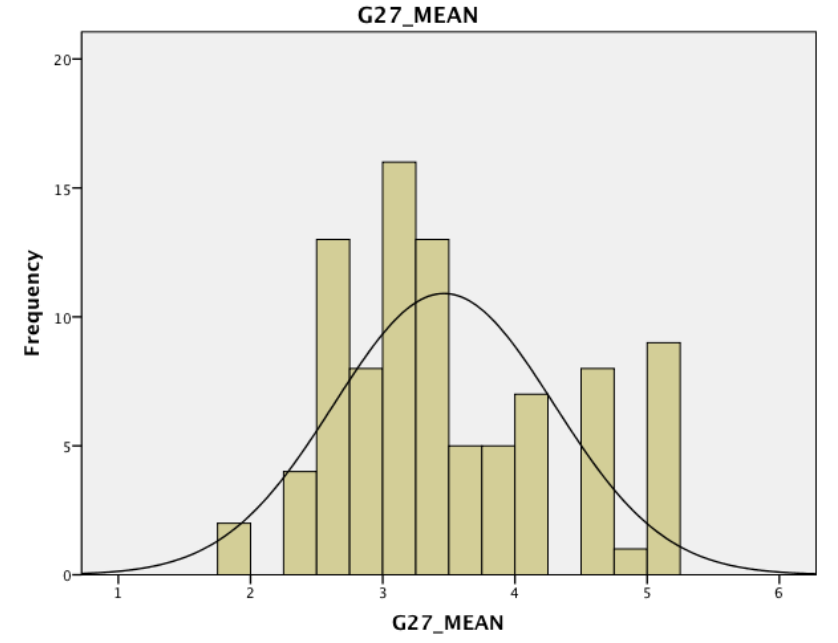


Figure 18: Cooperative Corporate Venturing: Operational Performance Scale distribution

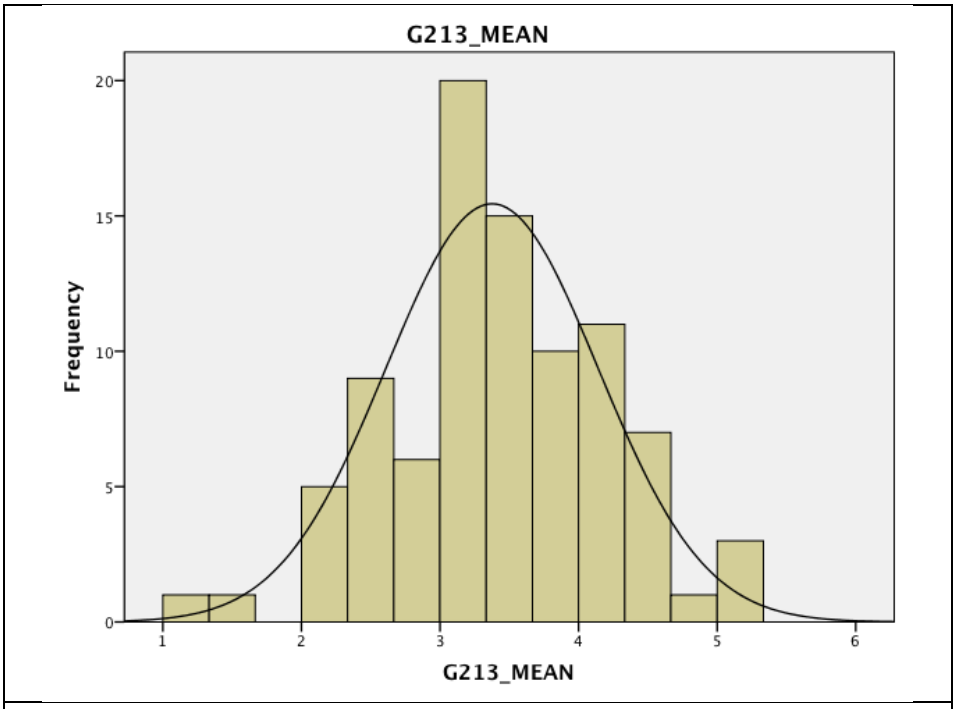


Figure 19: Cooperative Corporate Venturing: Skills Scale distribution

C.2.3. *Combined Scale Mean Statistics*

The table in this section provides a comparison of the scale means before and after items were removed from the scales as a result of improving the scales' internal consistency. Items with "DEL", represent the scale means for the modified scales. Scales D31 (Cooperative Corporate Venturing, usage scale (indirect measure)), and G38 (Firm Performance, Productivity at Work scale) were not modified.

Table 24: Combined Scale Mean Descriptive Statistics

	N	**Range**	**Mean**		**Std. Deviation**	**Variance**	**Skewness**		
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	**Statistic**	**Std. Error**	$Z_{skewness}$
D21_MEAN	115	4	2.99	.09	0.96	.93	**-.18**	**.23**	0.78
D21_DEL_MEAN	115	4	2.95	.10	1.08	1.16	**-.23**	**.23**	1.00
D31_MEAN	115	4	2.45	.088	0.9	.89	**.52**	**.23**	2.26
G11_MEAN	109	6	4.52	.1	1.07	1.14	**-.001**	**.23**	0.00
G11_DEL_MEAN	109	6	4.81	.13	1.37	1.87	**-.33**	**.23**	1.43
G19_MEAN	109	4.5	4.89	.11	1.12	1.26	**.07**	**.23**	0.30
G19_DEL_MEAN	109	5.14	4.82	.12	1.22	1.48	**.06**	**.23**	0.26
G21_MEAN	94	3.8	3.17	.09	0.83	.69	**-.25**	**.25**	1.00
G21_DEL_MEAN	94	4	3.22	.11	1.02	1.05	**-.19**	**.25**	0.76
G27_MEAN	91	3.2	3.46	.09	0.83	.69	**.43**	**.25**	1.72
G27_DEL_MEAN	91	3.50	3.3993	.10480	.99973	.999	**.14**	**.25**	0.56

Table 24: Combined Scale Mean Descriptive Statistics (continued)

	N	Range	Mean		Std. Deviation	Variance	Skewness		
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	**Statistic**	**Std. Error**	$Z_{skewness}$
G213_MEAN	89	4.00	3.3751	.08121	.76609	.587	**-.11**	**.26**	0.42
G213_DEL_MEAN	89	4.00	3.2875	.08833	.83333	.694	**-.21**	**.26**	0.81
G31_MEAN	103	4.00	5.1115	.10277	1.04300	1.088	**-.01**	**.24**	0.04
G31_DEL_MEAN	103	4.80	5.2044	.11598	1.17707	1.385	**-.29**	**.24**	1.21
G38_MEAN	102	4.00	5.0951	.10240	1.03416	1.069	**.18**	**.24**	0.75
Valid N (listwise)	85								

C.3. Factor Analysis/Principal Component Analysis

This section contains the list of tables generated during the factor analysis (FA) of the various scales.

Table 25: FA Results: Hybrid Strategy

Scale Dimensions	Items	Component Matrix[a]		Rotated Component Matrix[a]		Communalities	
		Component		Component			
		1	2	1	2	Initial	Extraction
BI - Process Efficiency	G11_Theefficiencyofourinternalprocesseshasimproved	0.695	0.32	0.376	**0.667**	1	0.586
	G12_Makinglongtermdecisionsiseasier	0.504	0.435	0.154	**0.648**	1	0.443
	G13_Staffproductivityhasincreased	0.83	0.173	0.572	**0.627**	1	0.72
	G14_Itishardertoretaincustomers	0.362	0.538	-0.022	**0.648**	1	0.421
	G15_Employeeshavebecomemoreeffective	0.825	0.2	0.551	**0.645**	1	0.72
	G17_Customersatisfactionhasincreased	0.758	0.129	0.539	**0.548**	1	0.591
BI - Organisational Benefits	G19_Revenuesservicesprovidedhaveincreased	0.692	0.188	0.451	**0.557**	1	0.514
	G111_Geographicdistributionofserviceshasincreased	0.694	-0.044	**0.588**	0.371	1	0.484
	G112_Therewasadeclineinemployeeperformance	0.234	0.654	-0.193	**0.668**	1	0.483
	G113_Profitmarginsurplushasbeenenhanced	0.81	0.232	0.521	**0.662**	1	0.71
	G114_ReturnoninvestmentROIhasincreased	0.771	0.186	0.517	**0.602**	1	0.629
	G115_Therewasareductionofservice	0.31	0.482	-0.031	**0.572**	1	0.329
	G116_Thecompetitiveadvantageofthecompanyhasimproved	0.858	0.142	0.613	**0.618**	1	0.757

Table 25: FA Results: Hybrid Strategy (continued)

Scale Dimensions	Items	Component Matrix[a]		Rotated Component Matrix[a]		Communalities	
		Component		Component			
		1	2	1	2	Initial	Extraction
CCV - FP	G21_Itwashardertogenerateprofits	-0.144	0.208	-0.238	0.084	1	0.064
	G22_OurmarketshareROAhasimproved	0.791	-0.192	**0.753**	0.307	1	0.662
	G23_Sustainingourcompetitiveadvantagehasimproved	0.751	-0.181	**0.715**	0.293	1	0.597
	G25_Ourprofitshaveincreased	0.693	-0.294	**0.734**	0.168	1	0.566
CCV - Operational Performance	G27_Thejointventurehasresultedinfirmgrowth	0.686	-0.316	**0.741**	0.145	1	0.57
	G28_Thejointventurehasresultedinreducedmarketgrowth	0.086	0.246	-0.074	0.25	1	0.068
	G29_Thejointventurehasresultedinnewproducts	0.452	-0.542	**0.684**	-0.175	1	0.498
	G211_Thejointventurehasresultedinnewcompetencies	0.646	-0.415	**0.767**	0.042	1	0.59
CCV - Skills	G213_Wehaveincreasedourprofitscapitalrepatriation	0.756	-0.297	**0.787**	0.202	1	0.66
	G214_Wewouldincreaseourrevenueifweexitthejointventur	-0.156	0.051	-0.156	-0.05	1	0.027
	G216_Wehavebeenabletoleveragetheknowledgeskillsacquisi	0.67	-0.345	**0.745**	0.113	1	0.568
	G218_Wehaveimplementedknowledgeskillssafeguardingmeasures	0.46	-0.445	**0.633**	-0.091	1	0.41

a: Two components extracted, and Rotation converged in three iterations. Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalisation.

Table 26: FA: Firm Performance

Scale Dimension	Items	Component Matrix[a]		Rotated Component Matrix[a]		Communalities	
		Component		Component			
		1	2	1	2	Initial	Extraction
FP - Profitability and Growth	G31_Anincreaseinfirmprofitability	0.811	-0.079	**0.815**	-0.028	1	0.665
	G33_Apositivechangeinlongtermprofitability	0.839	-0.1	**0.843**	-0.046	1	0.713
	G35_Asustainedgrowthofnetprofitoveryears	0.843	0.101	**0.835**	0.155	1	0.721
	G36_Adeclineintheachievementofsalestargets	0.124	0.737	0.076	**0.744**	1	0.559
	G37_Anincreasedgrowthrateofsales	0.902	0.066	**0.896**	0.123	1	0.818
FP- Productivity and Work	G38_Betteruseoftheemployeescapabilities	0.821	-0.054	**0.823**	-0.002	1	0.677
	G39_Areducedlevelofemployeeperformance	0.034	0.872	-0.021	**0.872**	1	0.761
	G310_Anincreaseinthenumberofproductivemanhours	0.645	-0.293	**0.662**	-0.252	1	0.502
	G311_Thedeploymentoftherightpeopleatrightprojects	0.836	0.016	**0.833**	0.069	1	0.699
	G313_Betterresourceutilizationinorganization	0.833	0.055	**0.828**	0.108	1	0.697
	G314_Fewerassignedtasksbeingcompletedbyemployees	0.064	0.875	0.009	**0.877**	1	0.769

a: Two components extracted, and Rotation converged in three iterations. Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.

C.4. Data Manipulation: Means description

The following means were added to the Microsoft Excel file:

Table 27: Scale Means

Mean	Description
D21_MEAN	Business Intelligence adoption (indirect measure) scale mean
D31_MEAN	Cooperative Corporate Venturing adoption (indirect measure) scale mean
G11_MEAN	BI Process Efficiency scale mean
G19_MEAN	BI Organizational Benefits scale mean
G21_MEAN	CCV Financial Performance scale mean
G27_MEAN	CCV Operational Performance scale mean
G213_MEAN	CCV Skills scale mean
G31_MEAN	FP Profitability and Growth
G38_MEAN	FP Productivity at Work

Table 28: Data transformations

Old Variable	New Variable	Transform Formula
FAC1_1_FIRM	FAC1_1_FIRM_LG10_3_1_8	$Log_{10}(3.18 - X)$
FAC1_1_FIRM_LG10_3_1_8	**FAC1_1_FIRM_TRANS**	1 – X
FAC1_1_HYBRID	FAC1_1_HYBRID_LG10_2	$Log_{10}(2 - X)$
FAC1_1_HYBRID_LG10_2	**FAC1_1_HYBRID_TRANS**	1 – X

Table 29: Factor Variable Skewness Comparisons

	FAC1_1_FIRM	FAC1_1_FIRM_LG10_3_1_8	FAC1_1_FIRM_TRANS	FAC1_1_HYBRID	FAC1_1_HYBRID_LG10_2	FAC1_1_HYBRID_TRANS
Skewness	-0.91	-0.001	0.001	-0.78	-0.02	0.02
Std. Error of Skewness	0.26	0.26	0.26	0.32	0.32	0.32
$Z_{skewness}$	-3.53	-0.004	0.004	-2.48[a]	-0.06	0.06