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List of abbreviations

AsgiSA	Accelerated and Shared Growth Initiative of South Africa
BI	Business intelligence
BSM	Business Sophistication Measure
BUSA	Business Unity South Africa
CC	Close corporation
CEO	Chief Executive Officer
CI	Competitive intelligence
CIO	Chief Information Officer
CIPC	Companies and Intellectual Property Commission
CIPRO	Companies and Intellectual Property Registration Office
COO	Chief Operational Officer
CRM	Customer relationship management
CSF	Critical success factor
DP	Data processing
DSS	Decision support systems
dti	Department of Trade and Industry
DVD	Digital Versatile Disc
DW	Data warehousing
EIS	Executive information system
ERP	Enterprise resource planning
ETL	Extraction, transformation and loading
GCIS	Government Communication and Information System
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
HR	Human resources
IASB	International Accounting Standards Board
ICT	Information and communication technology
IFC	International Finance Corporation

IFRS	International financial reporting standard
IT	Information technology
KEI	Knowledge Economy Index
KM	Knowledge management
MIS	Management information systems
NAICS	North American Industry Classification System
OECD	Organisation for Economic Co-operation and Development
OLAP	Online analytical processing
SaaS	Software as a service
SADC	Southern African Development Community
SARS	South African Revenue Service
SCIP	Strategic and Competitive Intelligence Professionals
SEDA	Small Enterprise Development Agency
SLA	Service level agreement
SME	Small- and medium-sized enterprise
SMME	Small, medium and micro-enterprise
STP	SEDA Technology Programme
UK	United Kingdom
UNIDO	United Nations Industrial Development Organisation
USA	United States of America

Chapter 1 Introduction

1.1. Introduction

This chapter presents the background against which the problem statement of this thesis is to be seen. It outlines the purpose and objectives of the thesis that arise as a result of the limitations in current literature, and provides an overview of the research paradigm, design and method applied to reach the objectives. The significance of the study as well as the contribution that the candidate hopes to make is presented followed by definitions of key terms and concepts referred to in the thesis are provided. The chapter concludes with the structure of the thesis.

1.2. Background

In the global economy, competitiveness has become increasingly important. Comparing the top 10 countries rated as competitive by the World Economic Forum in its Global Competitiveness Report (World Economic Forum, 2009) to the top twenty countries with respect to the World Bank's *Knowledge Economy Index* (KEI)[1], 7 of the countries[2] appear on both lists (The World Bank, 2009a). Expanding the comparison to the top 20 countries the commonality increases to 17 countries[3] or 85%. Competitiveness seems to be linked as much to knowledge as the traditional economic factors tied to land, capital or labour.

In a definition attributed to The World Bank a knowledge economy is an economy where "organizations and people acquire, create, disseminate, and use knowledge more effectively for greater economic and social development" (Barquin, 2007). In such an economy there is a greater dependence on knowledge, information and high

[1] The KEI takes into account whether the environment is conducive for knowledge to be used effectively for economic development.
[2] The seven countries are Canada, Denmark, Finland, Sweden, Switzerland, The Netherlands, and the United States.
[3] The countries are Australia, Austria, Belgium, Canada, Denmark, Finland, Germany, Japan, New Zealand, Norway, Singapore, Sweden, Switzerland, Taiwan (China), The Netherlands, United Kingdom, and the United States.

skill levels, and a greater need for ready access thereto by both the business and public sectors (OECD, 2005). According to The World Bank (2009b) a knowledge economy rests on four pillars:

- "An economy that provides incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship.
- An educated and skilled population that can create, share, and use knowledge well.
- An efficient innovation system of enterprises, research centers, universities, and other organizations that can utilize the growing global knowledge base, assimilate and adapt it to local needs, and create new technology.
- Information and communication technologies (ICT) that facilitate the effective communication, dissemination, and processing of information" with ICT as a tool to release the "creative potential and knowledge embedded in people" (Frederick and McIlroy, 1999:181).

In order to improve their competitiveness and benefit from the knowledge economy, developing countries need to build on their strengths and carefully plan appropriate investments in their human capital, relevant technologies, and competitive and innovative enterprises. Governments need to ensure that they create an environment that allows enterprises to create and exploit knowledge in order to establish a competitive advantage in the marketplace, provide an educated and skilled population, and establish an efficient innovation system. The more innovative and intelligent a location is, the "higher its rank in the ladder of global investment" (Frederick and McIlroy, 1999:183). At the level of the enterprise, competitiveness relates to the identification and development of competitive advantage that is evidenced by the enterprise's ability to outperform their competition through effective use of resources. By and large South Africa, similar to New Zealand in the 1990s, is still engaged predominantly in the export of commodities and commodity products, and have yet to make the transition from an agricultural economy to one based on

information where knowledge is a considerable part of its products (Frederick and McIlroy, 1999).

Small, medium and micro-enterprises (SMMEs)[4] are an important part of all economies (Storey, 1994). The participation of SMMEs in the knowledge economy is important not only for their own competitive advantage in the marketplace but also for the competitiveness of their country as a whole. Their contribution in economies is essential to most countries as they employ the majority of workers (Levy and Powell, 2005:373): according to The World Bank close to 140 million SMMEs in 130 countries employed 65% of the labour force as of July 2006 (The World Bank, 2006). It comes as no surprise that one of the most important roles of the SMME sector in both developing countries and transitional economies is to serve as vehicles of economic development (UNIDO, 2003). This is reiteratred by Newberry (2006) stating that the majority of the world's emerging economies indicate that SMMEs will be the predominant enterprise for the foreseeable future as these enterprises play a key role in economic growth and development. SMMEs also play an important role with respect to enhancing the competitiveness of economies through the processes of creation, elimination and restructuring of ecnomic sectors (Bharati and Chaudbury, 2006:88). To this end, government policies are geared towards supporting the growth of SMMEs through a variety of programs that include amongst others technical assistance, training, regulatory provisions, and policy interventions (O'Shea and Stevens, 1998) and South Africa is no exception.

South Africa has between 1.6 and 3 million SMMEs that contribute between 52% and 57% to GDP and provide about 61% of employment (Berry *et al.*, 2002). In South Africa the SMME sector is expected to fulfill a number of roles ranging from

[4] The terminology used differs across the globe. The term small and medium enterprise (SME) is most commonly used in Europe. In South Africa both SME and small, medium and micro-enterprises (SMMEs) are used whilst micro, small and medium enterprise (MSME) is used in Africa. In the USA the terms small and medium business (SMB) is commonly used. In this thesis SMMEs is used unless quoted authors refer to SMEs, or SMBs or MSMEs or the scope of their research was specifically limited to small and medium enterprises and excluded micro-enterprises as defined in 2.2.

poverty alleviation and employment creation to international competitiveness (SME Survey, 2010).

According to the Finscope survey (African Response, 2007) the total number of businesses using ICT in the day-to-day running of their enterprises at the time was 24% in BSM6 and 77% in BSM7. More than half of SMMEs using ICT had access to the internet and e-mail and 22% had a website to promote their businesses. Drawing from a larger sample of 5164 respondents in a proprietary database the SME Survey (2007) indicated that 85% of respondents used e-mail and 64% used the internet for research purposes. Fourty-seven percent had websites or were represented on websites. However, the interim results of a survey conducted in 2011 (SME Survey, 2012) shows that nearly two thirds (65%) of all registered SMMEs now have their own websites, which represents a significant increase from 2007, and 89% of SMMEs operating in the IT and telecoms sectors have websites. Results furthermore indicated that one out of every five of these SMMEs would not be able to survive without a web presence.

The South African context adds additional dimensions with regard to classifying enterprises. As a result of apartheid policies South Africa has a split economy which is reflected in the SMME sector: the first economy comprises formally registered businesses whereas the second or informal economy comprises survivalist small and micro-enterprises. This corresponds with other economies in transition such as in Central and Eastern Europe after the fall of communism where “business activity becomes a defensive last hope for physical self-preservation, not a means for creative self-fulfilment” (Glinkina, 2003:52). This results in a distinction between entrepreneurship where earnings are reinvested and capital accumulated over time in order to grow the business versus proprietorship where businesses consume the surpluses generated, i.e. the survivalist small and micro-enterprises. Some registered SMMEs straddle this divide by choice rather than circumstance: these enterprises are referred to as lifestyle SMMEs since the owner-manager either does

not want to or does not have the capability in terms of expertise or resources to grow the business (McMahon, 1998).

In their 2000 study the Micro Enterprise Alliance (MEA) distinguished between organised and unorganised SMMEs in urban areas: organised enterprises have salaried employees and fixed premises whereas unorganised enterprises consist of artisans without fixed premises with few or no employees. On the other hand, the South African Global Entrepreneurship Monitor (GEM) report distinguishes formal and informal enterprises on the basis of legal status, formal being those with legally registered businesses and informal enterprises those with unregistered businesses. The economic contribution of and education levels in these categories differ markedly: informal entrepreneurs employ 0.8 people on average whereas formal entrepreneurs employ 7.2 people on average; two-thirds of informal entrepreneurs do not have a matric compared to two-thirds of formal entrepreneurs who do (Foxcroft *et al.*, 2002). According to the 2009 GEM report (Herrington *et al.*, 2009) the only South African provinces where the percentage of formal enterprises were greater than the percentage of informal enterprises were Gauteng, the Western Cape and Northern Cape provinces.

As a result of the duality and complexity of the landscape with respect to SMMEs in South Africa a new classification measure was developed that goes beyond the size, assets and turnover but instead segments SMMEs by measures such as formality and place of business, recordkeeping, access to finance, education level of the business owner (African Response, 2007). This segmentation gave rise to the Business Sophistication Measure (BSM) with 7 segments ranging from the survivalist micro-enterprise of informal street vendors to the more sustainable business practices of lifestyle and growth firms. The BSM provides a finer classification and richer lens through the different needs of SMMEs with different levels of sophistication can be viewed, thus enhancing the ability of researchers, policy-makers and service providers to focus their efforts.

Businesses in BSM7 are well established and employ on average 9 employees having been in business for several years. Of these 52% are close corporations and 15% are partnerships (the nature of the remaining 33% was not reported) (African Response, 2007). There is evidence of planning in these businesses with 57% having a business budget, 45% a written business plan, and 47% updated financial records. Most use technology and these enterprises also have access to a wide variety of financial products. BSM6 businesses are considered to be in the transition zone with 41% being unregistered individuals and 15% sole proprietors and have on average emloyees 1.78 employees. Planning also takes place in these businesses but there is less evidence thereof with 27% having a business budget and 17% a written business plan with technology also being used by many of these businesses. On the other end of the scale BSM1 businesses are predominantly stall traders (99%) operating on footpath (76%) in predominantly informal areas or settlements and central business districts. Referring to the GEM distinction 94% of businesses in BSM7 in the Finscope study were formal whereas 100% of businesses in BSM1 were informal (African Response, 2007). Although there is clearly much need for support at the lower end of the BSM spectrum the relative sophistication of the businesses at the high end does not mean that no support is needed but rather that the needs of these enterprises will be different from businesses in the lower BSM classifications.

In spite of the efforts by the South African government to support survivalist small and micro-enterprises to grow into larger formal enterprises the research does not support this transition. The findings of the FinScope survey show that this assumption is open to question. The extent of graduation would appear to be low, and it is difficult for people to climb the ladder out of the second economy (African Response, 2007; Napier and Hudson, 2007). Whilst providing the necessary support for the “second economy” survivalist businesses is important, it is therefore also beneficial to provide support for fast “high-demand, fast-growth” SMMEs that

account for a larger share of jobs in developed countries such as the in the United States of America (USA) where these SMMEs are usually started by consultants or computer programmers "who have high human capital," that is knowledge-based growth SMMEs in the higher BSMs that can generate higher returns to scale and offer a greater growth potential (Frederick and McIlroy, 1999:182), create employment for more people and thereby help to improve South Africa's position in the global knowledge economy.

A pivotal part of the South African government's ten-year vision of Accelerated and Shared Growth Initiative of South Africa (AsgiSA) is for the country to become an entrepreneurial nation with a vibrant and competitive SMME sector with enterprises that grow in both turnover and employment (South African Government, 2007). AsgiSA recognizes amongst others the regulatory burden on SMMEs as a constraint to achieving this goal (Mlambo-Ngcuka, 2006) and seeks to reform labour legislation, tax administration, as well as requesting all government departments to review the impact of their respective laws and regulations on particularly small businesses. In the 2011 budget provision was made for targeted financial and enterprise development programmes and tax relief measures for the small business sector as well as tasking the National Treasury to engage the banking industry with respect to lending practices (Gordhan, 2011). Business Unity South Africa (BUSA) indicated that they would like to see further action on legislative reforms to ease the cost of doing business for small business, which has been on the agenda in previous budgets as well (GCIS, 2011).

In the Pastel SME Survey (Janse van Rensburg, 2011) focussed on organised, formal SMMEs in the higher BSM classifications, 17% of 2000 online respondents indicated that the greatest hindrance to the growth of their enterprises is the inability to find adequately skilled workers whilst 11% felt that the stringent labour laws prevented them from employing more workers. Twenty percent of respondents in the survey did not know where to raise capital or struggled to obtain funding and

26% of the respondents felt that compliance (tax, accounting, etc.) was a burden that took them away from running their businesses; even so South Africa is considered to be globally competitive in this regard according to the 2010-2011 World Economic Forum Global Competitiveness Report (World Economic Forum, 2010).

The economic landscape in South Africa has changed dramatically: from a buoyant economic climate with an abundant availability of credit with relatively reliable and stable power supply in the 1990s, SMMEs now find themselves challenged in ways they had never expected. SMMEs face obstacles such as weaker economy, increased competition, reduced access to credit and resulting tightened budgets, labour issues, increased concerns about the impact of crime and a technology landscape more complex than ever (SME Survey, 2010; Janse van Rensburg, 2011). In such a challenging environment organisations must be flexible and quick to respond to constantly changing business conditions. To do so, timely intelligence about the organisation, its processes, and its business partners must be available to inform decisions and actions to achieve or maintain a competitive advantage in the marketplace (Herschel and Yermish, 2009), they must in effect learn to "turn their unmapped, untapped knowledge into a source of competitive advantage" (Frederick and McIlroy, 1999:183). The ability to utilise technology and information systems is a key influence upon the competitiveness of SMMEs (Bergeron and Raymond, 1992; Levy and Powell, 2005:vii) with even micro-enterprises hindered from growth and efficient functioning by an inability to use ICT effectively (Kamal *et al.*, 2011). The South African SME Survey 2007 (World Wide Worx, 2007) found that there is "a statistically significant correlation between resources used and the likelihood of being highly competitive," which implies that business decision-makers can make their enterprises more competitive by taking advantage of the same resources. According to Sen and Taylor (2007) it is "essential for small businesses in today's competitive environment to take a strategic approach to their information needs if they wish to develop and remain competitive."

Making informed decisions is important for any organisation, but is especially crucial for SMMEs as valuable time and money cannot be wasted on incorrect decisions when economic belts are already tightened. Numerous decisions on the sourcing and allocation of resources are necessary and owner-managers need an abundance of information (Jorosi, 2006). As Maguire *et al*. (2007:39) state: "SMEs need to make operational, tactical, and strategic decisions and without accurate information they will struggle to undertake this role." The following section outlines current research with regard to support of managerial decision-making.

1.3. Statement of problem

Ensuring that high-quality information is consistently available and disseminated to those who need it in an organisation is "among the most challenging tasks of the modern corporation and one of the most under appreciated contributors to high performance and competitive advantage" (Neilson *et al*., 2010). Decision-making, the process of making a reasoned or rational choice among alternatives (Mallach, 2000), is intertwined with management functions such as planning, co-ordination, monitoring, and control, all of which can require that decisions be made. Systems that support decision-making in organisations are therefore an important component in organisational information dissemination and have the potential to impact positively on performance and competitiveness.

It is not surprising that systems supporting decision-making have been evolving since the introduction of computers to commercial enterprises began in the mid-1950s when they were used for repetitive processing of data (hence the orginal term data processing or DP). As the use of computers evolved transaction processing came to denote the repetitive processing of business events and storing the associated data. Managers soon realised that summarised transactional data had value with respect to their decision-making. In the 1970s the first versions of analytical software packages appeared on the market referred to as management information systems (MIS). These systems supported primarily structured decisions

(Mallach, 2000:4-6). The 1980s saw the release of spreadsheet software that continues to be widely used. By the mid-1980s and early 1990s, executive information systems (EIS) (Turban *et al.*, 2011) were introduced that quickly grew in popularity. These systems promised to provide top management with easy access to both internal and external information relevant to their decision-making needs (Rasmussen *et al.*, 2002). The "easy access" was due to user-friendly interfaces and powerful analytical functionalities. Similar factors accounted for the popularity of decision support systems (DSS)[5] (Carlsson *et al.*, 2002), which included amongst others exception reporting and an integrated data repository. DSS supported semi-structured and unstructured decision-making tasks (Chen, 1989:11). The most recent development over the last decade is business intelligence (BI). BI systems and technology allow organisations to query, understand, and analyse their data in order to make better decisions by means of a variety of technologies, such as data warehousing, data mining, and online analytical processing (OLAP) amongst others (Popovič *et al.*, 2010).

Although the term 'business intelligence' was used as early as the 1950s (Luhn, 1958:314), the meaning ascribed to it today was defined only in the 1990s (Fleisher, 2003:63). Howard Dresner of Gartner Research is credited with the first use of the term business intelligence in 1989 to denote "a broad category of software and solutions for gathering, consolidating, analysing and providing access to data in a way that lets enterprise users make better business decisions." In spite of Dresner's often-cited 1989 definition many authors point out that there is little agreement in the literature on a common definition of BI (Arnott and Pervan, 2005:71; Pirttimäki, 2007; Chee *et al.*, 2009; Watson, 2009; Foley and Guillemette, 2010:2; Wixom and Watson, 2010, Turban *et al.*, 2011) but even so in a global survey conducted by IBM 94% of more than 2,500 chief information officers (CIOs) identified BI and associated analytics as the next best way to enhance their

[5] Note that DSS refers to both a particular technology and to the discipline.

organisation's competitiveness (IBM Institute for Business Value, 2009) by allowing them to optimise their decision-making.

In their role as owner-managers a significant portion of their time is spent on decision-making, a task that encompasses information seeking in order to understand and define problem situations, to generate alternatives and to identify and select the optimal choice amongst the alternatives. The aim of BI is to support decision-making, whether operational, tactical or strategic, by providing interactive access to integrated, primarily internal data. It would thus appear that there is a case for BI in SMMEs, a view that is stated categorically by Levy and Powell (2005:24): "SMEs have as much need for business intelligence as large firms." A market research study conducted in 2007 about BI in South Africa reflected a "high confidence in the value that BI could offer to business in general and to small business establishments in particular [own emphasis]" (Tustin and Venter, 2007) but in spite of the increasing interest in SMMEs and BI there has been limited empirical research on the use of BI in SMMEs in general and in South Africa in particular. There has, however, been a plethora of articles, white papers and even books published and/or sponsored by the ICT industry and software vendors in an effort to expand their market beyond large firms, particularly to medium-sized enterprises (Jones, 2010; SAP AG, 2008; Scott, 2009; Swoyer, 2007; Swoyer, 2008). Considerable research has been conducted on BI in large firms globally (Khan *et al*., 2010; Petrini and Pozzebon, 2004; Ranjan, 2008) and to a lesser extent in South Africa (Vanmare, 2006; Venter and Tustin, 2009). Given the important role of SMMEs in all economies, if large enterprises are able to adopt business intelligence to enhance their decision-making and SMMEs fail to follow suit SMMEs will find it increasingly difficult to compete in the knowledge economy and could potentially undermine social and economic stability in both developed and developing countries. Against this background of the benefits that ICT in the form of BI can deliver to SMMEs, it is necessary to understand whether BI is indeed being used to inform

decision-making and thus an exploration of the use of BI SMMEs is timely and justified.

1.4. Purpose and objectives

Before establishing the purpose and objectives of the research, a comprehensive review of existing literature pertaining to the role of information, ICT and BI in SMMEs was undertaken. This review of previous research revealed that there isn't sufficient understanding and knowledge about BI in SMMEs and necessitating an exploratory study. In exploratory research the research questions may have yet to be formulated; in such cases the purpose of the research is defined at the outset (Rowley, 2002). The purpose of this study was to engage with owner-managers of SMMEs in South Africa to explore the use of BI in their enterprises to provide insight into the situation with regard to BI in South African SMMEs. The study had three objectives: first, to explore and understand whether and how BI is used in SMMEs in order to describe the BI practices and technologies in the context of the particular SMMEs, and if not, to understand why not. The second objective is to indicate the implications for BI in SMMEs of the research results for SMMEs and their owner-managers, BI vendors, and policy makers, and third, to make recommendations for future research. The proposed research approach and methodology is discussed in more detail in the following section.

1.5. Research paradigm, design and method

Emerging technologies researchers usually have an exploratory and applied focus (Barnes *et al*., 1992). Although this increases the relevance for IS managers and other stakeholders, there is a tendency to pay too little attention to research methodology. This study aims to be both relevant but at the same time to ensure adequate grounding in research methodology.

In order to understand SMMEs and to effect changes in such firms researchers should strive to see the world from the perspective of the key SMME decision-maker,

the owner-manager (Hill and Wright, 2001). These authors further contend that although research in SMMEs for the most part "has its roots in positivist thinking, such approaches do not yield a rich understanding of the key issues" that affect SMMEs decision-making (Hill and Wright, 2001: 435). This is confirmed by Storey's statement that the diversity of SMMEs reflects the diversity of human beings, which makes generalizations hazardous (Levy and Powell, 2005:viii). Hawkins and Winter (1996) agreed that research results cannot easily be generalised across all SMMEs. Grant and Perrin (2002) found that much of small business and entrepreneurship research is dominated by approaches within the functionalist paradigm of Burrell and Morgan (1979). They go on to call for "call for paradigmatic experimentation, engagement and debate" to move beyond this "paradigmatic cage" in order to develop new perspectives on entrepreneurship (Grant and Perrin, 2002:202). The argument is, therefore, that an interpretive rather than positivist paradigm is more suited to research that seeks to understand SMMEs from the perspective of the key SMME decision maker.

Gilmore and Carson (2000) advocate a qualitative research approach within the interpretive research paradigm when conducting research on the decision-making processes of SMME owner-managers. When seeking understanding, as is the case in exploratory research, case studies are the most appropriate method (Levy and Powell, 2005:6; Mouton, 2001:149). Arnott and Pervan (2008:667) also advocate the use of case studies, in particular interpretive case studies to increase the relevance of research since case studies "can illuminate areas of contemporary practice in ways that studies such as laboratory experiments and surveys cannot." Moreover, case-based research supports the relevance of the study since case studies are considered more persuasive to owner-managers than theoretical discussions (Storey in Levy and Powell, 2005:viii). Although there is a dearth of literature on the role of BI in SMMEs, the proposed research design has been utilised in a number of studies seeking to explore and understand specific aspects of SMMEs that is similar in nature to this study such as Hill and Scott (2004), Fink and

Disterer (2006) and Levy and Powell (2005) who used the case study approach for their study of SMMEs in the United Kingdom when they sought to understand the role of information and information systems in these enterprises. Given the exploratory nature of the research together with the lack of a sufficiently large body of literature to draw on for the study of BI in SMMEs in the South African context, this study adopted an interpretivist research paradigm using qualitative case studies.

Miles and Huberman (1994:17) stress the importance of "prestructured research" for new qualitative researchers working in areas where some understanding has already been achieved. Accordingly, the researcher explored the emerging literature on business intelligence and the broader literature on small, medium and micro-enterprises in order to generate the problem statement and research objectives that would contribute to extant knowledge, frame the research and provide guidance for the data gathering in the empirical study (Hartley, 1994:217). Exploratory case studies do not start with propositions developed from a prior review of literature; rather the analytic strategy is to develop a descriptive framework for organising the case studies (Rowley, 2002:24). As a result of the lack of a single widely accepted definition of BI, BI was first defined within the context of this study through qualitative content analysis of a selection of definitions of BI by academics, practitioners and software vendors. The resulting descriptive framework was used as a descriptive framework. The framework outlines the themes according to which data was gathered. The themes were also used to analyse the data.

Evidence from multiple cases is "often considered more compelling" (Yin, 2009:53) and provides a valid basis for understanding (Levy and Powell, 2005:7). Hill and Scott (2004:52) report that prior research suggested that it was useful to "work with companies with strong commonality" in interpretive research and therefore knowledge-based SMMEs were targeted with the expectation that these enterprises would be more likely to use information for decision-making and have knowledge and experience of BI (Hill and Scott, 2004) given that 50% of 5164 South African

SMMEs participating in the SME Survey 2007 spent less than 1% of their turnover on ICT (Goldstuck, 2008). Eisenhardt (1989:537) states that the "random selection of cases is neither necessary, nor even preferable" and relevance to the research questions rather than representativeness is the criterion the selection of cases (Carson *et al.*, 2001). Due to the large amounts of data produced together with the consequent difficulties of analysis Curran and Blackburn (2001:59) indicate that case studies in SMME research are often fewer than ten. For these reasons seven cases were selected using purposive sampling from a list of SMMEs identified through personal networks, word-of-mouth referrals and through a science park associated with the University of Pretoria. Data was collected through semi-structured, face-to-face interviews conducted with the owner-managers of seven organized, formal knowledge-based growth SMMEs located in Gauteng. Owners of affiliated or franchise businesses may be influenced by the parent company and therefore only independent, non-affiliated, non-franchisee businesses were considered.

A limitation of this research paradigm, design and method is lack of generalizability (Mouton, 2001:150). However, according to Walsham (2009:15) the validity of extrapolation from cases depends "not on the representativeness of such cases in the statistical sense, but on the plausibility and cogency of the logical reasoning used in describing the results from the cases, and in drawing conclusions from them."

1.6. Contribution and significance

Although the majority of the world population lives and works in developing, emerging, or transitional economies and ICT are important drivers for economic development (Steinberg, 2003), mainstream information systems research remains focused on the issues related to ICT in developed, mature economies in North America and Europe (Hunter, 2004; Roztocki and Weistroffer, 2008). Yet emerging economies are growing in economic importance: although these markets currently account for approximately 20% of the world's economy, Van Agtmael (2007:10) predicts that this figure will grow to 50% within 25 years.

According to Duan and Xu (2009:974) in spite of their importance to local and national prosperity the problems of SMMEs are not always accorded the same importance as those of large organisations when it comes to the use of ICT. Most IS research is focused on large organisations even if this is not stated explicitly (Chesney, 2003:1,2). Furthermore, most studies on support for SMME management are more commonly from a social or economic viewpoint with few studies addressing decision support needs in the context of ICT use (Duan and Xu, 2009:974). Given the important role that SMMEs can and ought to play in developing countries and their economies and the role that ICT can play to enable competitiveness of SMMEs, this study/research seeks to add to the literature by exploring how a specific ICT is used to support decision-making in knowledge-based growth SMMEs in South Africa and indicating what the implications are based on this so that entrepreneurial practice may be improved. Such improvement of practice is considered to be one of the two fundamental aspects of entrepreneurship research by Bygrave (2007). Arnott and Pervan (2008:688) argue that the relevance of the field of decision support systems research can be improved if research agendas shift towards "the effective development and deployment of data warehouse and business intelligence systems" and thus this study also advances theoretical development in the field.

The results of this research may be of value to owner-managers, vendors and policy makers in order to better understand the extent to which BI is used (or not used) in SMMEs, what BI means in the context of SMMEs and how it can be supported. Through the reflection that the chosen research paradigm engenders the study enables participating SMME owner-managers to reflect on their own practices and allows other SMME owner-managers to benchmark their own endeavors in relation to the use of BI against the research results. The case-based research method supports the relevance of this study since case studies are considered more persuasive to SMME owners-managers than theoretical discussions (Storey in Levy and Powell, 2005:viii). Insight into the nature of enterprise-level decision-making

may provide value to software vendors to, for example, develop suitable solutions and to policy makers to develop strategies to improve the use of information for decision-making and ultimately the competitiveness of the country. For academic researchers this qualitative study can be used as a basis for futher research.

1.7. Definition of terms and concepts

The following terms and concepts are used in this research. Although some are discussed in more detail in the following chapters these are also included here for reference purposes.

Business intelligence (BI): Business intelligence comprises the organisational processes, systems and technology through which internal and external source data is gathered, integrated and transformed into information for analysis by decision-makers to make strategic, tactical and operational decisions to manage the organisation for improved performance in order to gain a competitive advantage.

Entrepreneur: According to Burns (2007:11) an entrepreneur "uses innovation to exploit or create change and opportunity for the purpose of making profit. They do this by shifting the economic resources from an area of lower productivity into an area of higher productivity and greater yield, accepting a high degree of risk and uncertainty."

Formal BI: In organisations with formal BI specific systems and technology is used to produce information and support analysis for decision-making together with the associated organisational processes.

Growth SMME: A growth SMME is an enterprise owned by an enterpreneurial owner-manager(s), in other words, an owner-manager(s) that is interested in expanding his/her(their) firm either in size, revenue and/or asset value by reinvesting

available resources in order to expand the enterprise. A growth SMME is therefore not a survivalist SMME.

Informal BI: In contrast to formal BI, informal BI does not rely on formal processes or specific systems or technology to produce information for decision-making and analysis. The most common form of informal BI is spreadsheets.

Information and communication technology (ICT): ICT is defined as modern technology that is used to aid the electronic capture, processing, storage and disseminating of information, whether in numerical, textual, audio or visual format (Carter, 1991; Duncombe and Heeks, 1999).

Knowledge-based SMME: Knowledge-based SMMEs are defined as small, medium and micro-enterprises that have systemic, knowledge-based resources as its prime competitive tools (Duhan *et al*., 2001). Such enterprises offer products and services based on the knowledge and experience held within individuals and systems with the competitive advantage arising from being able to leverage this knowledge and experience. Knowledge-based SMMEs continually gather information, develop skills and use experience to enhance their products and services (Levy and Powell, 2005:267-268).

Lifestyle SMME: The owner-manager of a lifestyle SMME either does not want to or does not have the capability in terms of expertise or resources to grow the business (McMahon, 1998). Whilst a lifestyle SMME may not be survivalist it is also can not considered a growth SMME.

Owner-manager: An owner-manager is a person who establishes and manages an enterprise for the principal purpose of furthering his/her personal goals. The enterprise is the primary source of income and consumes the majority of the owner's time and resources and she/he exercises significant control over the day-to-day

operations of his/her firm (Burns, 2007:11; McMahon and Stanger, 1996). Although the more conventional term is owner-manager in this thesis owner-manager will be used to indicate that the person is both an owner and manager and not potentially just an owner or a manager. An owner-manager is not necessarily entrepreneurial.

Small and medium-enterprises (SMEs): The term SME excludes micro-enterprises, that is enterprises with 5 or fewer employees.

Small, medium and micro-enterprises (SMMEs): Although there is no agreed, global definition of small, medium and micro-enterprises in the literature, the classification of enterprises as small or medium is normally based on number of employees and on turnover. For the purpose of this research the stipulation of the South African National Small Business Act, No. 102 of 1996 (South African Government, 1996) as amended in 2003 (South African Government, 2003) is used. The act stipulates varying definitions for each industry sector in terms of turnover, and value of assets; headcount, however, remains constant with micro-enterprise having 5 or fewer employees, very small enterprises between 5 to 20 staff, small enterprises between 21 up to 50 employees, and medium enterprises between 51 to 200 employees.

Survivalist SMME: According to the Department of Trade and Industry (dti, 1995) a survivalist enterprise comprises "activities by people unable to find a paid job or get into an economic sector of their choice. Income generated from these activities usually falls far short of even a minimum income standard, with little capital invested, virtually no skills training in the particular field and only limited opportunities for growth into a viable business. Poverty and the attempt to survive are the main characteristics of this category of enterprises." Thus the primary motivation of a survivalist SMME's proprietor is economic survival.

1.8. Structure of thesis

The purpose of Chapters 2 and 3 is to frame the research and provide guidance for the data gathering in the empirical study. The key terms under investigation in this research, namely SMMEs and business intelligence (BI), are defined and discussed in chapters 2 and 3 respectively. Chapter 2 provides an understanding of the role of information in SMMEs as well as the potential for ICT in its provision. SMMEs differ from large organisations, which have traditionally adopted BI, and these unique characteristics not only present SMMEs with challenges different to those of large organisations but also affect their investment in and use of ICT. In Chapter 3 the theoretical framework that will be used to guide data gathering in the empirical study is developed based on a selection of definitions of BI from academics, practitioners and vendors. The resulting framework is followed by a discussion of the components thereof.

In Chapter 4 the research paradigm and design are presented. The chapter starts by discussing the underlying epistemology of the qualitative approach used in this thesis followed by the justification for choosing this approach. The selected research design, namely the case study method, is motivated together with the unit of analysis and selection of cases. In Chapter 5 the research method is described including the use of semi-structured interviews as data collection method, the process and recording procedures used, and associated ethical considerations. The analysis and interpretation process applied is also presented and the chapter concludes by considering the trustworthiness and limitations of the study arising from the choice of paradigm, design and method.

The findings of the empirical research in SMMEs are presented and interpreted within the context of extant literature in Chapter 6. Chapter 7 summarises the findings, presents the implications thereof and concludes with recommendations for further research.

Chapter 2 SMMEs, Information and ICT

Guessing is cheap, guessing wrong is expensive
– Chinese proverb

2.1. Introduction

The purpose of the literature review in this chapter is to frame the research and provide guidance for the data gathering in the empirical study. One of the key terms under investigation in this research, namely small, medium and micro-enterprises (SMMEs), are defined and discussed after which the role of information and the potential for ICT in SMMEs is explored followed by the impact that the unique characteristics of SMMEs have on investment in ICT. SMMEs differ from large organisations, which have traditionally adopted BI, and these unique characteristics not only present SMMEs with challenges different to large organisation but also affect their investment in and use of ICT, which in turn could play a role in their use of BI. The chapter concludes with a summary.

2.2. Definitions of small, medium and micro-enterprises

Small and medium enterprises are an important part of all economies (Storey, 1994). Their contribution in economies is essential to most countries as they employ the majority of workers (Levy and Powell, 2005:373). The participation of SMMEs in the knowledge economy is thus important not only for their own competitive advantage in the marketplace but also for the competitiveness of their country as a whole. But what is less clear is what exactly is considered as small and medium enterprises respectively. According to Dewhurst and Burns (1993) there are two approaches to defining small and medium enterprises:

- Using the economic definition where enterprises must have a market share such that it does not significantly affect market prices or quantities sold nationally; or

- Based on the number of employees.

The first approach is based on the Bolton Committee's (1971) study of small firms in the United Kingdom (UK). The economic definition resulted in the so-called statistical definition to quantify the size of the small firm sector and allow for comparitive analysis over time. The statistical definition resulted in different definitions in different industries according to number of employees, turnover, ownership and physical assets. There were several criticisms of this approach, predominantly the inconsistency between the original economic definition that stipulated that there be no formal management structure and the subsequent statistical definition that included businesses with up to 200 employees. According to Atkinson and Meager (1994), a formal management structure is typically introduced when firms reach a size of between 10 to 20 employees. To overcome the criticisms against and associated complexities of the first approach, the second approach became more popular (Storey, 1994:13-14). The International Accounting Standards Board (IASB), for example, suggests a simple 50-employee guideline for SMEs in its International Financial Reporting Standard (IFRS) for Small and Medium-sized Entities (Van Wyk and Rossouw, 2009). For statistical purposes the number of employees is often used as sole criterion. For example, Australian businesses are classified according to the number of employees: a micro enterprise employs one to five, a small enterprise six to 20 and a medium-sized enterprise up to 199 employees (Australian Bureau of Standards, 2010). The UK Department of Trade and Industry uses slightly higher thresholds:

- Micro firms have 0 to 9 employees;
- Small firms have 0 to 49 employees (small firms include micro firms);
- Medium firms have 50 to 249 employees; and
- Large firms have over 250 employees.

Most definitions now classify enterprises as small or medium based on the number of employees as well as turnover and/or total assets, an approach closer to first approach used in the Bolton Committee's statistical definition. For example, the United Kingdom Companies Act 2006 Sections 382 and 465 states that after 30 January 2004 businesses need to meet two of each of the three following criteria to be either considered:

1. Small-enterprises have turnover of less than £5.6 million, a balance sheet total less than £2.8 million, and less 50 employees.
2. Medium-sized enterprises have turnover of less than £22.8 million, a balance sheet total less than £11.4 million, and fewer than 250 employees.

The European Commission (2010) uses a similar approach except that headcount is a requirement with either annual turnover or balance sheet total as the second qualifying criterion:

- Micro enteprises have less than 10 employees and less than € 2 million turnover p.a. or less than € 2 million as balance sheet total.
- Small enterprises have less than 50 employees and a turnover p.a. of less than € 10 million or balance sheet total of less than € 10 million.
- Medium-sized enterprises have less than 250 employees and an annual turnover of less than € 50 million or less than € 43 million total on the balance sheet.

The International Finance Corporation (IFC), one of the 5 World Bank Group institutions, defines SMMEs according to employment thresholds together with sales turnover and total assets (IFC, 2007):

- Micro enterprises have 10 or fewer employees, total assets and total annual sales are less than US$100,000.

- Small enterprises have up to 50 employees, total assets are less than US$3 million with less than US$3 million total sales per annum.
- Medium enterprises have up to 300 employees, total assets are less than US$15 million with total annual sales less than US$15 million.

It is worthwhile to note that in the USA, what is regarded as a small business, would often be regarded as a medium-sized or even large enterprise elsewhere. Although the Small Business Administration uses a sector- or industry-specific size standard (based on the North American Industry Classification System or NAICS code), the general rule of thumb is that businesses with fewer than 100 employees is considered to be small, while one with between a 100 and 999 employees is considered as medium-sized. However, even in the USA there isn't a constant definition: Bharati and Chaudhury (2006:88), for example, in their study of manufacturing firms in the Boston area defined micro-enterprises as having between 1 and 10 employees, small enterprises having between 11 and 100 employees and enterprises employing between 101 and 500 as medium.

The above definitions show that employment thresholds, turnover and assets used in the definition of SMMEs vary between countries. Even within countries there are different thresholds with manufacturing and labour-intensive sectors tending to higher thresholds. In particular the thresholds for definitions, particularly with regard to turnover and total assets differ vastly in developing countries such as South Africa compared to developed countries such as the UK and US. For example, the Ntsika Enterprise Promotion Agency (2001), established by the South African Department of Trade and Industry (dti, 1995) to provide wholesale non-financial support services for development of micro, small and medium enterprises, uses the following thresholds, which are considerably less than the thresholds used by the European Commission or the IFC:

- Businesses with less than ZAR 50,000 (approx. US$7,000) in turnover are considered micro-enterprises.
- Small enterprises are enterprises with between ZAR 50,000 and ZAR 5 million (approx. US$ 700K) turnover.
- Enterprises with turnover between ZAR 5 and 50 million (approx. US$ 7m) are medium-sized enterprises.

The South African National Small Business Act, No. 102 of 1996 (South African Government, 1996) as amended in 2003 (South African Government, 2003) defines a small business as "a separate and distinct business entity, including cooperative enterprises and non-governmental organisations, managed by one owner or more which, including its branches or subsidiaries, if any, is predominantly carried on in any sector or sub-sector of the economy." Furthermore, it stipulates varying definitions for each industry sector in terms of total annual turnover (in Rm), and total gross asset value excluding fixed property; the total full-time equivalent of paid employees, however, remains constant with:

1. Micro-enterprises have 5 or fewer employees;
2. Very small enterprises have between 5 to 20 staff;
3. Small enterprises have from 21 up to 50 employees; and
4. Medium enterprises have 51 to 200 employees (except agriculture with a limit of 100 employees).

There is a lack of a consistent, universal definition for SMMEs but the differences result from the different contexts within which different SMMEs find themselves. However, it does make comparisons between countries and regions more complex and affects the interpretation and comparison of research results because although the same term is used the context-based meaning can be different. The different thresholds used in definitions based on geographic location and sector must be taken into account when reading and interpreting literature on SMMEs. Furthermore,

the different types of SMMEs, survivalist and growth, informal and formal, as discussed in Chapter 1 also need to be taken into account when reading and interpreting literature. Against this background the next section examines the role of information and the potential of ICT in formal growth SMMEs globally.

2.3. Role of information and the potential for ICT in growth SMMEs

SMMEs require access to accurate and relevant information both at start up and for day-to-day operations in order to survive in the competitive business environment (Ramsey *et al.*, 2003). Although the definition of the concept 'information needs' is problematic there is consensus that information needs are "linked to specific situations and that needs arise when the present level of knowledge is limited to deal with a new situation" (Chiware, 2008:24). In Leckie *et al.*'s (2005) general model for information-seeking behavior of professionals[6] "information needs arise out of situations pertaining to a specific task that is associated with one or more of the work roles played by the professional" (Du Preez and Fourie, 2010:69). In a business context the meeting the information need thus enables the professional to make a decision (Thomas and Ballard, 1995).

According to Lin *et al.* (1993) there are two fundamental areas about which SMMEs need information: the enterprise's competitive environment, i.e., external information, and the organisational resources and capabilities that are already controlled by the enterprise, i.e. internal information. SMMEs rely heavily on external data in the start-up phase, partly because there is no internal data, and market research and knowledge of competitors and potential customers is vital to establishing a viable business.

[6] Case (2002:116, 128) considers Leckie *et al*'s model to be more general than the authors themselves imply who limit the model to professionals such as engineers, doctors and lawyers to encompass work-related information seeking based on the tasks arising from the work context. The implication is that Leckie *et al*'s model can be used to examine the information seeking of owner-managers of SMMEs as well.

Gordon and Key (1987) indicated that a common problem for SMME managers is a shortage of suitable information on which to base decisions and thus significant time is spent seeking information (Jorosi, 2006:105). In his survey of 216 SMEs in Botswana Jorosi (2006) found that SME managers spend significant time seeking external information, particularly with regard to customers, competitors, business trends and the economy, sources of funding, opportunities for linkages or partnerships, training opportunities, new technology and laws and regulations. The acquired information is used for making both important (strategic) and to a lesser extent day-to-day (tactical and operational) decisions. According to Robinson and Pearce (1983) effective decision-making, particularly strategic decision-making, is a significant contributor to an SMME's success. As Burns (2007:330) phrases it 'bad decisions,' i.e. the opposite of good ones, often stem from a lack of reliable information or an unwillingness or inability to understand and interpret the available information. A lack of information for decision-making isn't just problematic; it can threaten the very survival of the SMME. With respect to internal information inadequate systems result in poor, infrequent information that in turn contributes to poor financial control, which is often cited as a contributory cause of failure of SMMEs (Burns, 2007:331).

Although SMMEs are dependent on external information for their ongoing development (Levy and Powell, 2005:33) the capacity to use internal data to monitor the business' situation should not be underestimated. As SMMEs grow the demand for internally-sourced information increase not only to meet internal information needs but also external demands such as the progress of a customer order but also by internal demands to also analyze internally generated data (Arrieta *et al.*, 2007:147) in order to ensure the smooth running of the firm (Levy and Powell, 2005:36). Information is needed to obtain answers to four important categories of questions (Burns, 2007:182, Jorosi, 2006; Levy and Powell, 2005:36) in order to monitor, control, and plan operations and to make decisions:

1. 'How well is the buiness doing?', e.g. cash flow, revenue, and monitoring of business process performance.
2. 'Which product or service is more profitable?' e.g. knowing which customers are contributing to profitability provides a basis for targeting sales effort.
3. 'What if?', e.g. what would happen if demand fell by 20% or production is increased by 10%.
4. 'Where should I focus my limited resources?', e.g. optimisation of resource allocation and processes.

An increased demand for internal information requires more formal information systems to capture data and disseminate information (Claessen, 2005; Currie, 2004). ICT facilitates monitoring of the enterprise's internal and external environment (Blili and Raymond, 1993) by reducing internal uncertainty and maximizing decision-making efficiency and effectiveness through timely access to reliable information (Blili and Raymond, 1993). According to Levy and Powell (2005:73-4) SMME survival in particular depends on cost reduction that is achieved through increasingly efficient operations and the value of IS to achieve this is widely recognized. Apart from efficiency gains automation benefits derived from the application of ICT include increased management effectiveness through more informed decision making, and improved business performance by, for example, being able to enter into strategic alliances with other firms using e-commerce technology (Fink, 1998:244).

ICT is regarded as a critical resource that leads to organisational value (Kohli and Devaraj, 2004) and as such it can contribute to SMME growth and survival. According to Storey it is "beyond question that a key influence upon the competitiveness of enterprises of all types in a modern economy is their ability to utilize information systems" (Levy and Powell, 2005:vii) whilst Blili and Raymond (1993) state that ICT "has the power to give firms using it shrewdly a sustained competitive edge." Chau (1994) argues that small enterprises can improve their

organisational performance and increase their competitiveness with the use of appropriate ICT, particularly when designed to suit SMMEs' needs (Lin *et al.*, 1993).

In their study of SMMEs Sen and Taylor (2007) found corporate information competence is one of 9 critical success factors[7] (CSFs) for SMMEs where such competence is defined as "information management skills and systems to support business strategy and operations," or to put it more simply to "generate, gather, analyse, disseminate and use the appropriate information effectively, ensuring information security, validity and integrity." This finding by Sen and Taylor highlight the importance of information management skills and systems to both business strategy and operations in SMMEs.

ICT is important to strategy in small businesses (Pollard and Hayne, 1998; Fuller, 1996) with information systems and strategy feeding into each other. Systems are developed to satisfy the information needs of the SMME which are dictated by the SMME's strategy and future strategy is, at least in part, dictated by what ICT allows the firm to do (Chesney, 2003:2). As Beath and Ives (in Blili and Raymond, 1993:445) state the use of ICT may not only be a result of implementation of the SMME's strategy but may also contribute to forming that strategy in the first place through decision support systems. Given the growing need to capture data to provide information coupled with key role of ICT in this information provision start-ups are advised to plan for the introduction of IT in their second to third year of operations (Meyer and Crane, 2011:312).

It is clear that SMMEs need both internal and external information for stategic and operational purposes and that appropriate ICT can play an important role in providing this information. The next section will discuss the impact that characteristics specific to SMMEs have on their investment in ICT.

[7] The other 8 CSFs are product supply, market success, effective corporate communications, customer relations, company morale, efficiency of operations, financial stability and strategic management.

2.4. Impact of SMME characteristics on investment in and use of ICT

Apart from number of employees, revenue and assets, many authors have discussed the characteristics that further distinguish SMMEs from large organisations and that impact on their management and operations (Welsh and White, 1981; Storey, 1994:10-12; Pollard and Hayne, 1998). This section will discuss these characteristics and the impact thereof on SMME investment in ICT.

SMMEs often occupy areas of high risk that large firms avoid and are often the innovators in a society providing new products and services (Brouthers *et al.*, 1998). According to Welsh and White (1981), Storey (in Levy and Powell, 2005:vi) and Curran and Blackburn (2001) small enterprises are not scaled-down versions of large businesses. Their owners have a diversity of objectives, almost none of which correspond to enhancing shareholder value, which is supposed to 'drive' larger firms. The reasons for becoming an owner-manager are many but most often is as the result of an opportunity that is seen and exploited, necessity arising from unemployment, or as a lifestyle choice. Owner-managers have expertise in their profession or industry but not necessarily in management or administration of a business and tend to focus on that which they are most familiar with from their profession (Blili and Raymond, 1993:447; Chesney, 2003:6).

As Burns (2007:10) points out one does not have to own an enterprise to manage it; however, the majority of managers of small firms are also owners hence the term owner-manager. Ownership can take many forms: a sole proprietorship, partnership, close corporation, or a private or limited company but regardless of the form, owner-managers significantly control the daily operations of their enterprises and make all the decisions from daily operations to future investment (Gibcus and Van Hoesel, 2008; Bruque and Moyano, 2007; Brouthers *et al.*, 1998; Stanworth and Gray, 1992). These decisions are affected by their existing knowledge, attitude, perceptions, personal judgement, and communication skills (Carson and Gilmore, 2000) that in turn are affected by their personal characteristics and values (Hall,

2008; Burns, 2007:14-15; Dean *et al.*, 1998). In fact the culture in SMMEs is highly influenced by owner-managers' attitude, personality, values and behaviour (Denison *et al.*, 2004; Hill and McGowan, 1999; Brouthers *et al.*, 1998). The founding owner plays such an important role in a start up that one successful venture capitalist considers the founders and their determination to succeed to be more important than the initial business idea (Wang, 2011). Once the SMME has left the start-up stage, other employees such as department heads[8] may give input but decisions are still made by the owner-managers (Chesney, 2003:6; Gibcus and Van Hoesel, 2008). With centralised decision making and with fewer levels of management involved, decision making in SMMEs is simpler and less politicised than in larger organisations with more organisational complexity and decision makers upon which much of the theoretical models are based (Huang, 2009; Brouthers *et al.*, 1998) and allows for faster execution and implementation of decisions (Blili and Raymond, 1993).

Owner-managers are the main persons responsible for strategy in SMMEs yet they tend to have an immediate operational focus rather than longer term strategic focus (Chesney, 2006; Harris, 2003). Hagmann and McCahon (1993) reported that in their study of 300 SMMEs fewer than 30% undertook any form of strategic planning. Many SMME owners have an aversion to strategic planning, which in SMMEs tends to be described as "strategic awareness" (Gibb and Scott, 1985), "emerging visions" (Fuller, 1996), or "new visions of the future as a result of decisions taken" (Levy and Powell, 2005), in contrast to the formal deliberate strategy found in large firms. SMMEs often engage in intuitive, informal, and unstructured forms of business planning (Temtime *et al.*, 2003) and strategy is emergent and informal. In SMMEs formal strategic planning usually only occurs before or during the start-up phase and the plan is only revised when problems arise (Chesney, 2003:6). As SMMEs grow the emphasis tend to shift from the operational to the strategic: more established SMMEs are more likely to rely on formal sources of information and to have in-house ICT for information processing (Chiware, 2008:31) to inform strategic planning that

[8] In SMEs departments may be made up of as few as three employees.

seeks to improve their competitive advantage in the local and global marketplace. As an example Temtime *et al*. (2003) found in their study of SMEs in Botswana, a neighbouring country of South Africa, that as firm sizes increase (in either number of employees or sales volume), there is a tendency to move from operational and short-term planning towards longer-term strategic planning, possibly due to increased resource availability.

There are several constraints that act upon SMMEs when it comes to strategy and strategic planning, irrespective of the planning being formal or informal. The most critical is limited financial resources (Carson and Comrie, 1989; Blili and Raymond, 1993) that include access to credit (Hunter, 2004; Temtime *et al.*, 2003) as well as cash flow (Burns, 2007:15; Hunter, 2004). Limited resources constrain the strategies that can be developed. Limited financial resources translate into a lack of human resources in general (Hunter, 2004) and a lack of specialist expertise (Carson and Comrie, 1989; Blili and Raymond, 1993) particularly as it relates to ICT and strategic planning expertise (Temtime *et al.*, 2003; Brouthers *et al.*, 1998). Welsh and White (1981) referred to this condition of limited resources as 'resource poverty'. Coupled with a limited impact on the marketplace (Carson and Comrie, 1989) where SMMEs are reliant on a limited customer base and often cannot influence price, with limited economies of scale (Burns, 2007) it makes owning and managing a SMME a very challenging task indeed. SMMEs may be less likely, however, to have special interest groups such as trade unions attempt to exert control over their decision-making (Brouthers *et al*., 1998).

It is therefore not surprising that SMMEs are more likely to be reactive to their environment rather than pro-active thus preventing them from developing business strategies and objectives that allow them to anticipate and plan for the future (Chibelushi and Costello, 2009; Fink, 1998:244). Compared to large organisations SMMEs face greater uncertainty with regard to the external environment in which they operate (Storey, 1994:10-12; Blili and Raymond, 1993). A higher degree of

uncertainty makes day-to-day survival more difficult and often leads to short-term decision-making (Burns, 2007:16; Levy and Powell, 2005:26) where the strategic objectives, if there are any, are largely ignored. Short-term, reactive decisions tend to be intuitive, spur-of-the-moment decisions (Thong, 2001; Fink, 1998; Brouthers *et al*., 1998) based on emotion and non-objective factors that seek a quick pay-off (Burns, 2007:15, 330).

The relatively informal and reactive approach to strategy, strategic planning, information gathering and decision-making does not lend itself to the explicit definition required for systematic investment in ICT. SMMEs are more likely to take a short-term view of ICT investments and implementations (Riemenschneider *et al*., 2003:269). Investment in ICT is a corrective manoeuvre to mitigate threats (Levy and Powell, 2005:374) with the focus on immediate daily operations and for efficiency gains rather than improved effectiveness (Hunter, 2004). Yet ICT adoption is more likely to be successful if SMMEs plan in advance and have a strategy for adoption (Jamieson, 2007:308; Levy and Powell, 2005:374) where success is defined as an ICT implementation meeting the business' objectives.

Given the limited strategic planning for investment in ICT and the focus on deriving efficiency benefits, SMMEs are more likely to overlook the benefits of greater managerial effectiveness that can be derived by providing managers with information on the achievement of business goals (Levy and Powell, 2005) although it has been shown in the previous section that the availability of internal information for operational and strategic decision-making is beneficial to SMMEs. Duncombe (2004:16) concluded from his study of SMMEs in Botswana that owner-managers tended to prioritise investment in accounting packages rather than information value-adding applications. In line with the emphasis on operational efficiencies and decision-making the use of computers in SMMEs is geared to operational support rather than managerial decision-making (Duan and Kinman, 2000). Transaction processing systems such as accounting, sales order entry, billing, and cash

management (Igbaria *et al.*, 1998) and other administative tasks such as word processing (Temtime *et al.*, 2003; Chiware, 2008) are far more common (Lybaert, 1998; Martin, 1989; Fuller, 1996; Raymond in Blili and Raymond, 1993:445). These transaction-oriented applications tend to be "inexpensive to automate and maintain" (Temtime *et al.*, 2003) and produce periodic operational documents and reports (Raymond, 1985). However, these systems are not created equal either: Bharati and Chaudhury (2006:92) found that firms were more interested in information systems that support their core operational activities rather than support activities such as sales and procurement management as well as a prevalence of simple IS such as e-mail and software packages such as accounting.

Because of resource poverty SMMEs generally prefer products and services that are low cost, easy to implement, and easy to use when it comes to IS (Lian, 2005). IS suitable in such situations needs to be robust and available quickly, preferably as affordable off-the-shelf packaged software (Shin, 2003; Fink, 1998:244; Cragg and King, 1993). The use of packaged software also reduces the level of technical expertise required in-house, an important factor since many SMMEs have limited specialised IT skills in-house and thus cannot develop their own IS (Cragg and King, 1993; Mahmoud and Malhotra, 1986) and is recommended for SMMEs to increase the likelihood for a successful implementation (Chen, 1989). However, according to Heikkilä *et al.* (1991) reported that SMME managers are often dissappointed with the inability of software packages to be tailored to meet their needs. SMMEs therefore often have to rely on the advice of third parties such as software vendors and consultants to decide what ICT to purchase and how it should be used (Chesney, 2003:6). However, there is a price to pay since relying on external advisers, whose product and service quality may vary considerably, reduces the SMMEs' control over their information resources and increases their risk, particularly when these information resources are used for both operational and strategic purposes (Blili and Raymond, 1993).

As Welsh and White (1981) state in their seminal article SMMEs are not little large businesses. Therefore it is not surprising that the literature indicates that SMMEs do no adopt ICT in the same manner as large firms as a result of the fundamental differences between small and large organisations (Blau *et al.*, 1966; Blili and Raymond, 1993; Cohn and Lindberg, 1972; Dandridge, 1979; DeLone, 1981; Senn and Gibson, 1981; Welsh and White, 1981). Whilst many adoption models have been tested in large companies only (Levy and Powell, 2005) numerous efforts have been made to apply a number of ICT adoption models and constructs in the SMME sector, particularly the Diffusion of Innovation (Rogers, 2003) and the Technology Acceptance Model (TAM) (Davis *et al.*, 1989; Bagozzi *et al.* 1992) by, amongst others, Van Akkeren and Cavaye (1999), Mehrtens *et al.* (2001), Rashid and Al-Qirim (2001), Kula and Tatoghu (2003), Grandon and Pearson (2004), and Koh and Maguire (2004). These studies are largely application-specific, mostly focused on Internet and e-commerce adoption and/or country-specific. Fichman (2000) suggests that researchers should indeed develop mid-range theories that are "tailored to specific classes of technologies and particular adoption contexts," Costello and Moreton (2009) feel that the similarity of factors found in various adoption studies indicate that the technology to be adopted is irrelevant.

There is increasing criticism against adoption theory and adoption models. One of the objections is that the theoretical models are no longer adequate: they are outdated and unsuitable for new classes of technologies that go beyond operations (Ordanini, 2006:7). Others go further. McMaster and Wastell (2005) argue that the appropriation of IT takes place within a particular organisational and socio-political context and thus they contest generalised models such as embodied by the TAM as these, whilst containing a limited account of some of the key influences of technological innovation, fail to take into account the particular organisational context.

It is clear, however, that SMMEs are slow to exploit opportunities offered by new technology to support their growth and that the ICT adoption behaviour of SMMEs is influenced by a range of factors that can be ascribed to their unique characteristics (Fink, 1998:244), chief amongst these being their limited resources, financial and otherwise together with the enterprise's readiness, availability of advice as well as the influence of the owner-manager's education and experience and his/her perceived value of ICT (Costello and Moreton, 2009). ICT solutions suitable for large organisations are unlikely to suit SMMEs due these differences (Duan and Kinman, 2000; Duan and Xu, 2009). But SMMEs must contend with the same problems and decisions as large enterprises but with fewer resources (Lybaert, 1998:188).

This section has shown that SMMEs have characteristics that differentiate them from larger organisations, particularly with respect to investment in ICT. Research on large organisations, though useful, is not sufficient to understand SMMEs behaviour.

2.5. Chapter summary

The characteristics of SMMEs as reported in the literature—limited financial and human resources, a preponderance for intuitive decision making, a short-term operational focus rather than a longer term strategic focus particularly with respect to investment in ICT and use of IS—suggests that SMMEs are unlikely to invest in ICT to support decision making. At the same time the literature also indicates that SMMEs need information to support decision-making and that timely access to accurate information is vital for decision-making in SMMEs. The following chapter delves deeper into business intelligence as a means of information provision and support for decision-making.

Chapter 3 Business intelligence

"Bringing together the right information with the right people will dramatically improve a company's ability to develop and act on strategic business opportunities"
– Bill Gates, Business @ The Speed of Thought: Succeeding in the Digital Economy

3.1. Introduction

Ensuring that high-quality information is consistently available and disseminated to those who need it in an organisation is "among the most challenging tasks of the modern corporation and one of the most under appreciated contributors to high performance and competitive advantage" (Neilson *et al.*, 2010). This chapter starts by examining what business intelligence is, discusses what it encompasses and how it can contribute to accomplish this challenging organisational task.

3.2. Historical overview on the development of decision support

From a historical standpoint, business intelligence (BI) technology has been evolving over the last few decades. In the mid-1950s commercial enterprises began using computers for repetitive processing of data hence the orginal term data processing (DP). As the use of computers evolved transaction processing was used to denote the repetitive processing of business events and storing the associated data. Managers soon realised that summarised data had value with respect to decision-making. In the 1970s the first versions of analytical software packages appeared on the market referred to as management information systems (MIS). These systems supported structured decisions (Mallach, 2000:4-6). The 1980s saw the release of spreadsheet software that continues to be widely used. By the mid-1980s and early 1990s, executive information systems (EIS) (Turban *et al.*, 1995) were introduced that quickly grew in popularity. These systems promised to provide top management with easy access to both internal and external information relevant to their decision-making needs (Rasmussen *et al.*, 2002). The " easy access" was due to user-

friendly interfaces and powerful analytical functionalities. Similar factors accounted for the popularity of decision support systems (DSS) (Carlsson *et al*., 2002), which included amongst others exception reporting and an integrated data repository. DSS supported semi-structured and unstructured decision-making tasks (Chen, 1989:11).

Howard Dresner of Gartner Research is credited with the first use of the term business intelligence in 1989 to denote "a broad category of software and solutions for gathering, consolidating, analysing and providing access to data in a way that lets enterprise users make better business decisions." However, this was not the first time the term was used. In his 1958 article *A Business Intelligence System* Hans Peter Luhn (1958:314) defined a 'business intelligence system' as follows:

> *"Business is a collection of activities carried on for whatever purpose, be it science, technology, commerce, industry, law, government, defense, et cetera. The communication facility serving the conduct of a business (in the broad sense) may be referred to as an intelligence system. The notion of intelligence is also defined here, in a more general sense, as 'the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal."*

Luhn's definition includes the government military in his conception of "business" in "business intelligence" but the subsequent use of BI was also intended to distinguish it from government and military intelligence activities (Fleisher, 2003). Although the term BI was defined as early as the 1950s, according to Fleisher (2003:63) the meaning ascribed to it today was defined only in the 1990s and thus Dresner did introduce this new generally ascribed meaning through his definition that includes technology in his definition of BI.

In spite of Dresner's often-cited 1989 definition many authors point out that there is little agreement in the literature on a common definition of BI (Arnott and Pervan,

2005:71; Pirttimäki, 2007; Chee *et al*., 2009; Watson, 2009; Foley and Guillemette, 2010:2; Wixom and Watson, 2010, Turban *et al*., 2011). This is not unusual in a research field that is still being established (Negash, 2004; Pirttimäki, 2007; Jourdan *et al*., 2008:124). Pirttimäki (2007) remarks that definitions of BI vary depending on the perspective from which it is defined. According to Arnott and Pervan (2005) definitions tend to reflect the background and interest of those defining it. Foley and Guillemette (2010) found that researchers' definitions are such that it suits their particular study. Petrini and Pozzebon (2004) assert that studies of BI reflect two approaches: either managerial with a process-orientation or technological with an emphasis on the set of tools to be used. According to Watson (2009:491) this does not normally cause confusion because of the context in which the term is used.

Even if no confusion arises—and both Kimball *et al*. (2008) and Turban *et al*. (2011:8) assert that it does—establishing a common definition would contribute to advancing the field. Several authors have attempted to address the lack of a common definition for BI. In 2007 Pirttimäki conducted a conceptual analysis and in 2009 Chee *et al.* reviewed the state-of-the-art of BI where both articles examined a range of definitions from which they developed a consolidated definition. According to Pirttimäki (2007) BI as a concept is not unambiguous and is at the very least dualistic comprising:

- *"refined information and knowledge that describe the business environment, a company itself, and its state in relation to its markets, customers, competitors and economic issues; and*
- *process that produces insights, suggestions and recommendations (i.e. the refined information and knowledge described above) for the management and decision makers."*

He adds that the "information technology based systems used in analysing raw data and information and in storing and sharing valuable information and knowledge are

considered an important part of BI." Chee *et al*. (2009) reported that their study of definitions suggested "the technological aspect of BI … be considered as a BI system, whereas the process perspective is regarded as the implementation of BI systems. The product perspective is the result (i.e. actionable information) of analysis of business data which originated from various sources." It appears that there is agreement from their reviews that BI involves technology, process and product. And yet there are differences: the process for Chee *et al.* (2009) entails the implementation of the technology whereas the process according to Pirttimäki (2007) is about management and decision-makers attaining insight from the product. This difference warrants a more detailed examination of the various definitions of BI. The next section examines the various definitions of BI and concludes with an integrated descriptive framework for use in this study.

3.3. Descriptive framework of BI

The purpose of this examination is to analyse definitions and descriptions of BI by academics, practitioners and BI software vendors over the past decade in order to derive a descriptive framework that can be used when conducting research on BI. Two questions that need to be answered arise: what are the themes captured in BI definitions and descriptions? Are there sufficient commonalities in these themes in the definitions and descriptions of BI based on the different perspectives of the authors thereof to allow a single framework to be developed? In order to answer these questions this section is structured as follows: first, the methodology used to answer these questions is discussed. Second, the data analysis is presented together with the resulting descriptive framework. Third the researcher discusses the definitions and resulting framework.

3.3.1. Methodology

This section discusses the method, the selection of data, the procedures for analysis of the data and the trustworthiness thereof as well as the overall limitations.

3.3.1.1. Method

In order to determine the themes in the selected definitions and descriptions (hereafter definitions) of business intelligence found in the literature an interpretive method, qualitative content analysis, was used. Qualitative content analysis is "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh and Shannon, 2005:1278). Additionally, content analysis provides an empirical basis for monitoring shifts in definitions. The data collected and analysed in this study can be compared to similar data collected at some point in the future to determine if such a shift has occurred.

3.3.1.2. Data selection

Definitions published during the last decade (2001-2011) by both prominent and less influential authors in academia and industry as well as leading BI software vendors were selected using purposive sampling (Zhang and Wildemuth, 2009). Definitions of BI were identified by phrases such as "BI is …", "BI is defined as …", "BI refers to …", "a term that …" and similar introductory phrases or as an entry in a glossary. The definitions selected are listed in Table 1.

Table 1: Definitions of BI by academic, pracititioners and vendors from 2001 to 2011

Source	Definition of BI
English (2005)	"[q]uality information in well-designed data stores, coupled with business-friendly software tools that provide knowledge workers timely access, effective analysis and intuitive presentation of the right information, enabling them to take the right actions or make the right decisions."
Gangadharan and Swami (2004:140)	"refers to the use of technology to collect and effectively use information to improve business potency. … BI provides critical insight that helps organizations make informed decisions."
Gartner (2010)	"an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance."
Golfarelli *et al.* (2004:1)	"the process of turning data into information and then into knowledge. … BI was born within the industrial world in the early 90's, to satisfy the managers' request for efficiently and effectively analyzing the enterprise data in order to better understand the situation of their business and improving the decision process."
Howson (2008:2)	"allows people at all levels of an organization to access, interact with, and analyze data to manage the business, improve performance, discover opportunities, and operate efficiently."

Source	Definition of BI
IBM (n.d.)	"connects people with information in an easy-to-use way so they can make better decisions. With BI software you can: • Set targets, see results and understand what drives the numbers. • Identify trends that may be benefits or threats. • Take action with a common context for decision-making across every department. • Identify and analyze opportunities and trends."
Ing (2007) [SAS Institute]	"getting the right information to the right people at the right time to support better decision making to gain competitive advantage."
Inmon and Nesavich (2008:227)	"The activity of converting data into information"
Jones (2010:1)	"refers to the skills, technologies, applications, and practices involved in bringing that understanding to light ... intended to help guide better decision making."
Kimball and Ross (2002:393)	"A generic term to describe leveraging the organization's internal and external information for making better business decisions."
Lönnqvist and Pirttimaki (2006:32)	"An organized and systematic process by which organizations acquire, analyze, and disseminate information from both internal and external information sources significant for their business activities and for decision-making."
March and Hevner (2007:1032)	"refer[s] to inferences and knowledge discovered by applying algorithmic analysis to acquired information. A data warehouse is a repository of intelligence from which business intelligence can be derived."
Markarian, Brobst and Bedell (2007) [Informatica, Teradata, and MicroStrategy]	"An interactive process for exploring and analyzing structured, domain-specific information (often stored in a data warehouse) to discern trends or patterns, thereby deriving insights and drawing conclusions."
Moss and Atre (2003:4)	""an architecture and a collection of integrated operational as well as decision-support applications and databases that provide the business community easy access to business data."
Negash (2004:178)	"BI systems combine data gathering, data storage, and knowledge management with analytical tools to present complex internal and competitive information to planners and decision makers."
Okkonen *et al.* (2002:7)	"the process of gathering and analysing internal and external business information. ... In addition, business intelligence is defined as the process which supports operational and tactical business decision-making."
Oracle (2009)	"BI systems pull data from across the enterprise and present information to users in a meaningful way to improve decision-making."
Pirttimäki (2007)	"an intelligence process that includes a series of systematic activities, being driven by the specific information needs of decision makers and the objective of achieving competitive advantage."
Ponniah (2010:18)	"a broad group of applications and technologies. First, the term refers to the systems and technologies for gathering, cleansing, consolidating, and storing corporate data. Next, business intelligence relates to the tools, techniques, and applications for analyzing the stored data" (18) / "Generally used synonymously with the information available in an enterprise for making strategic decisions" (558).
Popovič, Turk, and Jaklič (2010:8)	BI systems: "information systems providing quality information for analytical decision-making as a source for guiding the business towards achieving organizational goals."
Sabherwal and Becerra-Fernandez (2011:6)	"providing decision-makers with valuable information and knowledge by leveraging a variety of sources of data as well as structured and unstructured information" for "improvement in operationl performance, improvement in customer service, identification of new opportunities"
Schiff (2008:5) [SAP Business Objects]	"allows organizations to better understand, analyze, and even predict what's occurring in their company. BI helps your organization turn data into useful and meaningful information and then distribute this information to those who need it, when they need it – thereby enabling them to make timely and better-informed decisions. It allows organizations to combine data from a wide variety of sources and see an integrated, up-to-date, 360-degree view."
Siegel and Shim (2000:59)	"using cost and related data to better understand activity behavior, define problems, draw conclusions, make recommendations, and take actions."

Source	Definition of BI
Smith, Ariyachandra and Frolick (2010:23)	"It describes the entire infrastructure (e.g. data warehouses) and analytical tools (e.g. OLAP) required to integrate and analyze the growing accumulation of organizational data. It encompasses all the processes and systems needed for gathering, storing, analyzing and accessing data to improve organizational decision making"
Thierauf (2001:66)	"centers on computerized methods and processes to improve strategic, tactical, and operational (including financial) decisions using data, information, and knowledge from multiple sources as well as applying experience and assumptions to develop an accurate understanding of the dynamics surrounding decision making."
Turban, Sharda, Delen and King (2011:8)	"an umbrella term that combines architectures, tools, databases, analytical tools, applications and methodologies. … By analyzing historical and current data, situations, and performances, decision makers get valuable insights that enable them to make more informed and better decisions. The process of BI is based on the transformation of data to information, then decisions, and finally to actions."
Tustin and Venter (2007:1)	"denotes the tools and systems that play a key role in the strategic planning process of a business. It entails a process of transforming data into valuable and actionable knowledge to gain a competitive advantage."
Vitt, Luckevich and Misner (2002:13)	"An approach to management that allows an organization to define what information is useful and relevant to its corporate decision making. Business intelligence is a multifaceted concept that empowers organizations to make better decisions faster, convert data into information, and use a rational approach to management."
Williams and Williams (2007:2)	"Business information and business analyses within the context of key business processes that lead to decisions and actions and which result in improved business performance."
Wixom and Watson (2010:14)	"a broad category of applications, technologies, and processes for gathering, storing, accessing, and analyzing data to help business users make better decisions."

3.3.1.3. Data analysis

Although some researchers use only word counts and key word in context (KWIC) content analysis can extend beyond such simple procedures. The strength of content analysis lies in its reliance on the coding and categorising of collected data. A category, similar in nature to a theme, is "a group of words with similar meaning or connotations" (Weber, 1990:37). The themes and categories are constructed through coding and researchers can choose from a variety of approaches. The two main approaches to code data are an emergent approach, which is the more conventional grounded theory approach, or an a priori directed approach. In emergent coding no prior themes are established and themes emerge through repetitive scrutiny and comparison of the data. With a priori coding themes are established prior to the analysis based upon literature and the themes are then applied to the collected data. Revisions are made as necessary based on the categories that emerge from the data. The a priori generating of themes from previous studies is especially useful at the inception of data analysis (Berg, 2001).

This study used a directed content analysis approach and the steps followed to analyse the selected data are discussed next.

Step 1: *A priori* coding scheme themes. The themes identified by Pirttimäki (2007) and Chee *et al.* (2009) in their analyses are used in the initial coding scheme:

- technology ("BI system," "information technology based systems");
- process – implementation ("implementation of BI systems");
- product ("information and knowledge that describe the business environment," "result (i.e. actionable information)"); and
- process – consumption ("process that produces insights, suggestions and recommendations," "analysis").

Further analysis of the definitions reveals additional themes for inclusion in the initial coding scheme:

- source ("raw data and information," "business data which originated from various sources");
- process – production ("analyzing");
- user(s) of the product ("for the management and decision-makers"); and
- goal (decision-making or decisions inferred from "decision-makers", action inferred from "actionable").

These themes were used as the initial coding scheme but the researcher explicitly allowed for revision, such as the elimination of any themes that aren't supported by the data in accordance with Miles and Huberman (1994) or combining or refining themes as well as the emergence of additional themes from the inductive analysis of definitions.

Step 2: Identify coding units. Coding units in the definitions are identified based on themes. When using themes as the coding units, the researcher is primarily looking for the expressions of ideas (Minichiello *et al.*, 1990). In the context of this inquiry an instance of a theme might be expressed in a single word, a phrase or even a sentence. Thus a coding unit was defined as a string of text that expresses a theme.

Step 3: Code the text. Next each coding unit was assigned to the category to which it fits best. Whereas categories need to be mutually exclusive in quantitative content analysis because indistinct variables would violate the assumptions of some statistical procedures (Weber, 1990) qualitative content analysis allows a unit of text to be assigned to more than one category simultaneously (Tesch, 1990:138). This is useful because assigning a particular unit of text to a single category can be difficult. However, if a coding unit does not fit any of the pre-defined themes or categories it is left unassigned. After all definitions have been coded in this manner, recurring unassigned coding units are grouped together and a category is created by identifying a word or brief phrase stating the meaning shared by all instances of the grouped coding units. Last, each coding unit is again compared against the categories to confirm that each coding unit is categorised correctly and to check coding consistency. In this study a matrix was used to record the assignment of coding units.

Although all coding units were exhaustive, that is each definition was fully coded into coding units, the categories to which coding units were assigned were not mutually exclusive: in instances where an explicit distinction wasn't made as to whether the process referred to the production or consumption of the product the coding units were reported under both categories, process – production' and ' process – consumption.' Similarly, when it wasn't possible to infer without doubt to which theme the definition referred the coding unit was categorised in both groups. No coding units were found to categorise under ' process – implementation' and this category was eliminated. However, there is support for the categories ' source,'

'user(s)' and 'goal'. The context of the coding unit within the definition was used to determine the theme or category; this led, for example, to instances where "information" is listed under 'source' and "knowledge" under 'product'.

Step 4: Describe and interpret coded data. Qualitative content analysis "uncovers patterns, themes, and categories" (Zhang and Wildemuth, 2009). The end result is a descriptive framework of BI based on the researcher's interpretation of the results of the coding process. This is a goal of the study and is thus used for reporting the results (Patton, 2002). According to Zhang and Wildemuth (2009) interpretation represents the researcher's personal and theoretical understanding of the phenomenon under investigation. Thus, in addition to the descriptive framework, the researcher's interpretation is presented together with the analysis results to allow the reader to understand the basis for the interpretation (Patton, 2002).

3.3.1.4. Trustworthiness

Dependability and credibility are two methods to establish the trustworthiness of qualitative research. The coder's knowledge and experience have a significant impact on the credibility of research results (Zhang and Wildemuth, 2009). The researcher worked as a consultant for management consulting firms advising and implementing data warehousing (DW) and BI solutions in a number of client organisations over a 5-year period. She subsequently joined academia as a lecturer with DW/BI being one of the subjects taught at postgraduate level over a 7-year period and as such she has significant knowledge of the field. The credibility of the research results is further supported by the fact that each of the categories included in the framework is refered to in multiple definitions.

All content analysis involves the development of codings schemes or systems that is, as an interpretive method, a subjective process. The consistency of coding is an important feature of the dependibility of the coding. Constant comparison of the coding was performed to ensure that no drift occurred and to check for coding consistency. Due to space limitations the coding matrix is not included but it is

available upon request from the corresponding author in order to allow the reader to judge the dependibility and confirmability of the categorisation.

3.3.1.5. Limitations

No research is without limitation and this study is no exception. Even though a number of measures were employed to avoid significant limitations there were still limitations incurred in this study. According to Mouton (2001:166) the limitations of content analysis include the authenticity of the data sources and the representativeness of the texts analysed that limits the overall external validity of the results. Although these limitations apply to quantitative content analysis it is important to note that there may well be sources of error arising from data selection effects in qualitative content analysis as well. However, the resulting descriptive framework is more representative than a single definition from a particular viewpoint.

3.3.2. Result

Analysis of the selected definitions supports the three complementary components of BI, namely, systems/technology, process, and product, in the definitions by Pirttimäki (2007) and Chee *et al.* (2009). Support was found for both the process components encompassing the processing of data in order to produce the information product as well as the process through which this information product is used by decision-makers. The source data is mostly internal with some mention of external data and mostly structured and some unstructured. The ‘goal’ category was renamed to ‘decision’ as this is the predominant goal found in the data. The decisions supported by BI are predominantly strategic but also tactical and/or operational, which is mentioned by Pirttimäki (2007) but not Chee *et al*. (2009).

As can be seen in Appendix A not all definitions covered all the categories, which is to be expected with definitions from multiple viewpoints, but there is sufficient representation to warrant the following themes and categories being included in the integrated framework:

- source;

- systems/technology;
- process – consumption;
- product;
- process – production;
- user(s); and
- decision.

The themes and their relationship to each other can be depicted diagrammatically as shown in Figure 1. The framework is depicted diagrammatically to support both researchers and practitioners as discussed by Kosaka (2004). Coding units for each theme from the definitions are included and can be used as descriptors in qualitative research. The framework does not contradict either Dresner's nor Luhn's much earlier definitions according to which BI supports users in order to make more effective, more timely, and/or more informed decisions in order to gain (or maintain) competitive advantage in the marketplace through the effective deployment of organisational processes and systems/technology to transform data sources into suitable information that can be interactively consumed.

The descriptive framework may at first glance appear to be a trivial contribution due to its similarity to many diagrams depicting BI architecture in vendor literature. A key distinction, however, is that instead of the technology playing a central role as in BI architectures, in this framework technology and systems are enablers providing the user(s) with needed information to make decisions and according to Herschel and Yermisch (2009:133) BI will not be able to live up to its promise as a vehicle to improve sensemaking if BI is seen as a set of tools and technologies. Although most of the definitions refer to decisions or decision-making no definition explicitly refers to sensemaking.

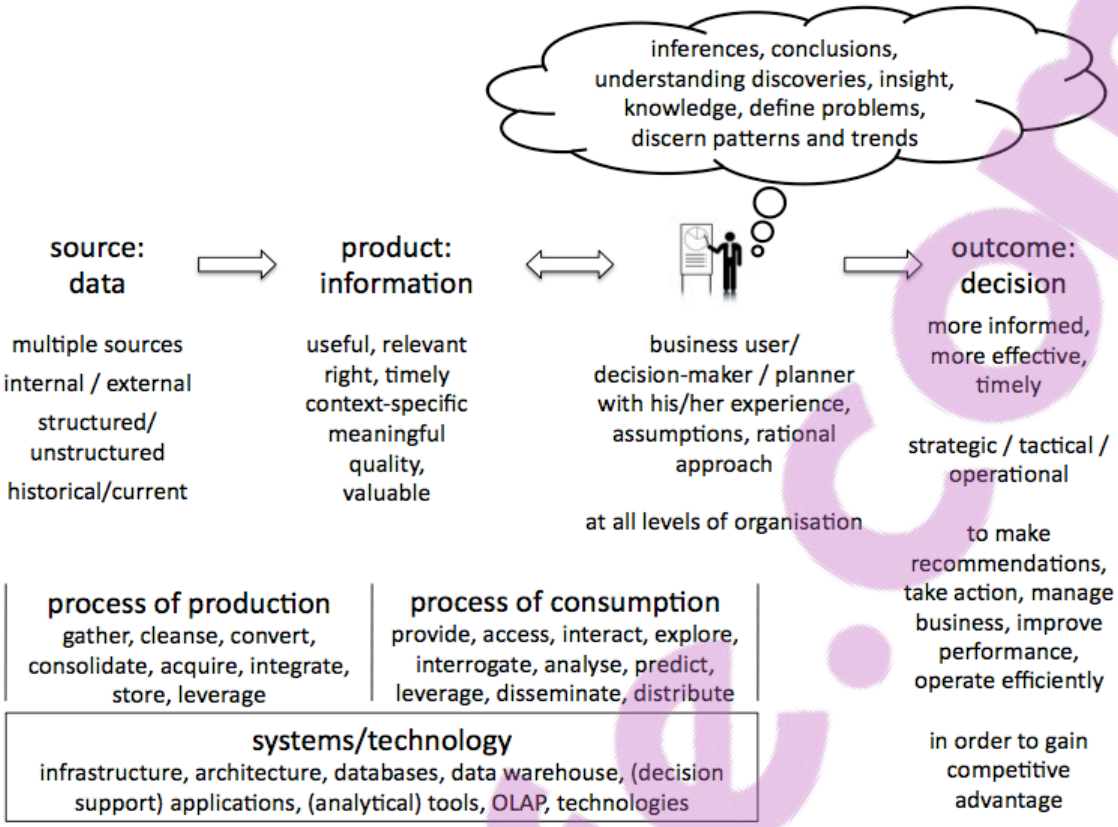

Figure 1: BI descriptive framework of themes and categories with descriptors

The focus of sensemaking is "not to decide what to do, but to understand what we have just done" (Boland, 2008:57). According to Boland (2008:61) "research that adopts a decision-making perspective does not discuss the sensemaking process involved in framing the decision" because the approaches of the two contradicts each other (the contradiction is discussed in detail by Boland). A number of the definitions refer to the users' interpretation of the information product ("define problems, draw conclusions," "discern trends or patterns," "discover opportunities") by applying his/her "experience", "skills" to derive "insight" and "understanding" in order to make a decision, which in essence is making sense of what happened in order to inform what needs to happen next through the decision and subsequent action (or inaction). Both of these perspectives are relevant to BI but until the conflicting perspectives as outlined by Boland can be reconciled, an undertaking that is outside the scope of this study, both aspects cannot be accommodated in the definition without inconsistency. Given the emphasis that is clearly placed on

decisions or decision-making in the definitions the researcher incorporated this perspective in the derived framework whilst also taking note of the role of sensemaking by the users.

Only two of the defintions (Schiff, 2008; Pirttimäki, 2007) mention that BI satisfies an information need, yet it is the need for information that drives a user to seek information (Choo, 2006:230-231). As was mentioned in section 2.3, in Leckie *et al.*'s (2005) general model for information-seeking behavior of professionals information needs originate in specific tasks that is associated with one or more of the work roles played by the professional (Du Preez and Fourie, 2010:69). In order to ensure that BI initiatives deliver value to an organisation and thus justify the investment, BI initiatives should focus on meeting the professionals' information needs (Williams and Williams, 2007:39,59) as it relates to the work roles and tasks pertaining to informing decision-making for managing the business, operating efficiently, optimising business performance and gaining a competitive advantage.

There are two fundamental areas about which organisations need information for informed decisions: the competitive environment, and the organisational resources and capabilities already controlled by the enterprise (Lin *et al.*, 1993). As mentioned in section 3.2, confusion arises when specific components are emphasized, as often occurs with respect to the system component. Another source of confusion in the literature centres on the difference—or lack thereof—between BI and competitive intelligence (CI). Some authors see BI and CI as synonymous (Vedder *et al.*, 1999; Jourdan *et al.*, 2008); others see BI and CI as two separate but related concepts (Fleisher, 2003) whilst a third group sees CI as a subset of BI (Foley and Guillemette, 2010; Negash and Gray, 2008; Arrieta *et al.*, 2007; Pirttimäki, 2007; Keyes, 2006:159).

Lönnqvist and Pirttimäki (2006:32) argues that North American literature uses CI more to emphasize the external environment and external sources whereas in

European literature BI is considered to be an umbrella concept that include CI and other intelligence-related terms (e.g. competitor intelligence, market intelligence). The North American-focused Strategic and Competitive Intelligence Professionals (SCIP, N.d.) define CI as the "necessary, ethical business discipline for decision making based on understanding the competitive environment." Sauter and Free (2005), also North American, give a more detailed definition of CI as "the process of monitoring the competition or environmental factors, capturing essential measures of activity, organizing the measures, and presenting that information so that it helps decision makers detect and respond to changes in the environment before competitors." Another North American-based author, Fleisher (2003), considers BI and CI to be separate concepts where BI is a technologically driven process using internal data to help an organisation better understand itself. However, this apparent geographic division isn't quite as clearcut as the Canadian-based Brouard (2007), for example, sees both BI and CI as synonyms.

The emphasis of CI is on external competitive data—although the use of internal data is not excluded—and a system(s) may or may not be used to process the structured, semi-structured and/or unstructured data to produce the CI product to support decision-making (Sauter and Free, 2005). According to authors that differentiate between BI and CI, whilst BI has much in common with CI, it has a different emphasis: it is not primarily concerned with the gathering of predominantly unstructured environmental data, whether about the market or competitors; although BI does not rely exclusively on internal organisational data, the external data that is incorporated is generally sourced from partners in the value chain, not competitors or the market, and tends to be structured rather than unstructured (Ponelis, 2009). This is one of the main reasons for separating BI and CI: the sources and nature of the data gathered to produce BI and CI require distinctly different skill sets: a BI professional needs technical IT skills in order to gather, cleanse, and integrate source data, a process referred to as extraction, transformation and loading (ETL), as well as database skills to design the storage of the information product for

analysis. A CI professional, on the other hand, needs extensive analytical and strategic thinking skills and should be familiar with various strategic plannig tools and techniques. What these professionals have in common is extensive knowledge of the specific industry in which they operate. BI vendors are focusing on delivering real-time data to support organisations' need for shorter decision-cycles in ever increasingly competitive environments. In addition, BI vendors' research and development is working on incorporating semi-structured and unstructured data into their software although there are several challenges, for example, dealing with the large variety of formats in terms of physical storage and the retrieval of information through searching (Inmon and Nesavich, 2008:13). These efforts increase the possibility of using BI systems and technology to support CI as defined above to in turn support informed decisions in organisations. Several vendors already offer automated CI gathering and text mining for analysis of unstructured and semi-structured documents.

In the selected definitions only Negash (2004) refers explicitly to "competitive information" although arguably one needs competitive information "in order to better understand the situation of [the] business" (Golfarelli *et al.*, 2004) and to make strategic decisions. In 7 of the 30 definitions reference is made to internal, organisational data (Kimball and Ross, 2002; Okkonen *et al.*, 2002; Golfarelli *et al.*, 2004; Lönnqvist and Pirttimaki, 2006; Oracle, 2009; Ponniah, 2010; Smith, Ariyachandra and Frolick, 2010) whilst three also include external data in their definitions of BI (Kimball and Ross, 2002; Okkonen *et al.*, 2002; Lönnqvist and Pirttimaki, 2006). Futhermore, in only one definition is a distinction made between structured and unstructured data with both included in the definition (Sabherwal and Becerra-Fernandez, 2011). As such the selected data do not overwhelmingly support the inclusion of CI as a subset of BI but if one assumes, however, that decision-making can require unstructured, external competitive information, which is CI as defined by SCIP and Sauter and Free (2005), then most of the BI definitions imply that CI is indeed included in BI. As such the researcher concurs with the

European approach that CI is a subset of BI that aims to support decision-makers through provision of integrated competitive information for and decision-making and thus that the BI descriptive framework includes CI. The convergence in systems and technology further supports this view.

There is also confusion and debate about the relationship between BI and knowledge management (KM) with the lack of clarity also depending in part on how the concepts are defined (Herschel and Yermish, 2009). Nonaka and Takeuchi (1995:124) consider KM to be the management of the dynamic processes of knowledge transformation where tranformation cycles through explicit to tacit knowledge. The internalisation of explicit knowledge into tacit knowledge is referred to "learning by doing."

After considerable consideration Herschel and Jones (2005) conclude that BI should be seen as a subset of KM. Both concepts "promote learning, decision-making, and understanding" but KM is broader than BI as it encompasses both tacit and explicit knowledge whilst BI focuses on explicit knowledge (Herschel and Yermish, 2009). According to Wilson and Heeks (2000) knowledge is enhanced through "the process of assessing and applying information and assimilating new information into a pre-existing knowledge base." This process is depicted in the descriptive framework as the process of consumption and the process of knowledge building of the decision-maker (illustrated by the thought cloud). The inclusion of knowledge building processes in the descriptive framework illustrates the mutually dependent nature of BI and KM: BI supports knowledge creation and KM in turn informs BI through data sought, processes of production chosen, etc. Furthermore, the decisions taken will create new knowledge that in turn may eventually change the organisations future processes, products and services (Herschel and Yermish, 2009). This process of knowledge building can also be understood as the "learning by doing" that develops SMME capabilities and competencies (Caldeira and Ward, 2003; Storey, 1994). Both BI and KM are influenced by organisational culture and values (Herschel and

Jones, 2005) and BI's effectiveness is subject to organisational culture and KM can therefore enhance the efficacy of BI (Herschel and Yermish, 2009).

Based on the above discussion BI must be driven by the information needs of the user within her/his organisational context. BI should ultimately result in more effective, more timely, and/or more informed decisions leading to actions that gain (or maintain) competitive advantage in the marketplace. BI is therefore concerned with the effective deployment of technology required to enable organisational processes that contribute to an organisation's competitiveness and sustainable development by supporting decision-making information needs. The following section discusses the themes identified in the BI descriptive framework in more detail.

3.4. Discussion of BI descriptive framework themes

The theme identified in the BI descriptive framework in the previous section is discussed in more detail below as follows:

- sources;
- systems/technology and the process of production; and
- the processes of consumption and decision-making.

3.4.1. Sources

BI systems are populated by internal and to a lesser extent external data that is primarily of a structured nature. Sources of internal data are typically the systems that process an organisation's transactions called operational systems designed to ensure optimal performance for processing individual transactions whilst ensuring the integrity of the data. BI systems are designed to optimize performance for the retrieval of large sets of transactions for aggregration. Operational source systems include financial systems, manufacturing systems, supply chain systems, customer relationship management (CRM) systems (Venter and Tustin, 2009), and individually generated/stored data often kept in spreadsheets. Depending on the duration of

historical data required for pattern and trend analysis archival sources of data could also be used (Ponniah, 2010:35-37) but these aren't usually accessible from within the operational systems. Although operational systems are capable of producing reports that may be adequate depending on an organisation's needs and situation there are drawbacks. For example, operational reports are often too detailed and need to be recaptured to produce the required summary reports (Levy and Powell, 2005:77), some reports are produced less frequently than may be useful (monthly as opposed to weekly or even daily) and operational systems often do not allow for the integration of data nor offer sufficient analytical functionality to support desired analytic interaction. Yet without operational source systems BI systems cannot function optimally and thus the availability of data is a critical success factor for BI implementations (Jordan and Ellen, 2009).

External sources of data depend on the organisation's context and requirements but the most frequent source is the supply chain: suppliers and customers who share planning and forecast data, which is mostly structured. Other external sources can also consist of market research, competitor or competitive data that result from internet searches, weblog (blogs) and other discussion forums (Venter and Tustin, 2009), popular magazines and trade publications, external advisors, another SMME, ICT stores, and exhibitions. Data from such sources is generally time-consuming and costly to gather and process (Venter and Tustin, 2009:114). The fact that ICT cannot yet be used in all instances to do so is another reason for ICT to be positioned in an enabling role in the BI framework. However, the quality, consistency, and continued availability of the internal and external source data are vital for BI to be sustainable (Vitt *et al.*, 2002:170). The process of producing the BI product component from the source data is discussed in more detail in the following section.

3.4.2. Systems and technology and the process of production

If an organisation is interested in utilising systems/technology to support decision-making there are a number of informal and formal options with regard to the enabling technology.

3.4.2.1. Informal BI

Although BI does not require technology, appropriate systems can increase the extent and speed of the processes of production and consumption. The most common and simplest system used for BI for structured data is the spreadsheet. Spreadsheets are often found in organisations (Chan and Storey, 1996; Levy and Powell, 2005; McGill and Klobas, 2005) for use across the analytical spectrum (Bradley, 2011; Kelly, 2008). In one example spreadsheets are used to allocate production resources and combine raw materials in an optimal mix in wood panel manufacturing (Buehlmann *et al.*, 2000).

Although valuable, popular, widely available, and easy to use, spreadsheets are limited and have inherent drawbacks with regard to both processes of production and consumption: manual intervention is required to consolidate and update data, creation and maintenance of complex formulas and macros is cumbersome, multiple versions of data is frequently a result, and functionality—particularly analytical functionality—is limited. Rather than being a formal BI solution the extensive use of spreadsheets in an organisation is seen as evidence of an analytical culture and is a good indicator that a more formal BI solution may be needed. Other indicators are recapturing of data in spreadsheets to integrate data and/or conduct analysis, a lack of timely reports and so-called 'different versions of the truth' where either different systems or data manipulated independently in spreadsheets produce conflicting information or both.

Apart from the limitations of functionality offered by spreadsheets, there comes a point where informal BI is limited by its capacity to effectively process the amount of generated information. Limitations around compatibility can also arise when required

to interact with external parties such as key customers and suppliers (Duncombe, 2004). Formal BI solutions that address these limitations can be implemented onsite or as on-demand solutions. Duncombe (2004:1) found that the formalisation of information systems is important to SMMEs because "it leads to improvements in the internal and external business processes that influence enterprise growth and development."

3.4.2.2. Formal BI

Formal solutions can either be hosted within the organisation (onsite) or outside of the organisation with a service provider (offsite) on an on-demand basis. Each of these options is discussed in a section below.

Onsite BI

Onsite BI systems can either be developed bespoke by in-house IT staff and/or by consultants or as purchased as packaged software (Duan and Xu, 2009) that is customised based on the needs and data of the enterprise. Although major vendors in both the core operational systems (enterprise resource planning or ERP) and BI space traditionally weren't focused on selling their solutions into the SMME market this has changed over the last few years (Sabherwal and Becerra-Fernandez, 2011:56). As large enterprises became saturated with BI solutions a new market was needed. Vendors such as SAS Institute, SAP and IBM, are now seeking to capture the SMME market with targeted solutions that offer BI on top of ERP solutions. There are reports of successful onsite BI implementations such as that of SAP's solution aimed at the SMME market, Business One, in a family-owned business with 37 employees (Wailgum, 2008). Accounting packages that traditionally target the SMME market such as *Pastel* and *AccPac* also now offer BI modules that integrate with their operational packaged software.

The implementation of an onsite BI system is "significantly different from a traditional operational system" (Duncan, 1995). It is an infrastructure project that provides a

foundation for information within an organisation. Infrastructure projects have a high initial cost and the return on this investment is long-term rather than immediate.

On-demand BI

On-demand BI or BI as a service falls under the umbrella of what is commonly referred to as software as a service (SaaS). Gartner (Hostmann, 2009) defines SaaS as:

> *"software that's owned, delivered and managed remotely by one or more providers. The provider delivers an application based on a single set of common code and data definitions, which are consumed in a one-to-many model by all contracted customers anytime on a pay-for-use basis, or as a subscription based on usage metrics".*

According to Eckerson, *The Data Warehouse Institute*'s research director (quoted in Swoyer, 2007) on-demand computing is the future of both software and BI because it lowers capital costs and turns fixed costs into variable costs. Since these characteristics of on-demand computing suit most SMMEs they are considered a major source of demand for BI as a service and driving the growth in the market (Hostmann, 2009).

A very basic description of on-demand BI is as follows: on a regular basis (monthly, weekly or daily depending on requirements) the data from an organisation's operational transactional system is extracted and transmitted via the web to the servers of the service provider. Before this is possible the service provider will have had to determine how to transform the data to suit their data structures and/or configured their system(s) to upload the data in the format received from the organisation. Once uploaded the organisation will have access to analyze their BI via one or more web-based tools. Some workloads are evidently better suited for this approach than others with more data sensitive areas, such as ERP and

transaction processing and, by implication BI, perhaps not quite yet ready for offsite storage and processing (Broughton, 2010). Currently such BI services-based offerings account for less than 5% of the overall BI platform market revenue (Hostmann, 2009). The expectation is that BI as a service will mirror the growth in the consumption of operational transactional systems, such as CRM, human resources (HR), and expense management, as services.

The main drivers for BI as a service are obtaining BI capability without major upfront investment, and reduced need for in-house BI and IT skills relative to in-house deployments. In addition, the advantages of BI as a service include an increased mobility, report sharing and collaboration, shorter deployment time since only a web browser is needed for access, and access to a broader range of BI capabilities (if supported by the service provider) (Sheikh, 2011). Some of the concerns include that it is not as cost-effective with potentially highly unique or complex requirements. There may also be hidden costs such as setup costs and cancellation fees. Given the need for transmission, the reliability and accessibility is dependent not only on the BI service provider but also on the telecommunications infrastructure. It can also be costly to transfer large amounts of data. An organisation needs to verify the ability and stability of the vendor to ensure continuity in service provision and in order to cover every eventuality an airtight service level agreement (SLA) is needed which requires potentially costly legal advice. The security of data may be at risk, both during transmission to and from the service provider and during storage. Compliance with data and privacy legislation should also be ensured.

BI as a service is suitable for organisations with limited capital available for IT infrastructure, limited access to IT staff and BI technology, and with relatively simple BI requirements that do not require significant data transfer (Hostmann, 2009) but the drawback is the perceived loss of control particularly over the security of data and the continuity of service (Broughton, 2010; Swindler, 2010), a loss of control that can easily turn into reality if sufficient safeguards aren't in place to address the risks.

Irrespective of whether onsite or on-demand options are chosen there are several issues that arise during BI implementations that are foreign to operational or transactional systems implementations that must be taken into account. These issues include the availability of data, the quality of data derived from source systems, data integration and consistency challenges, cross-functional needs, and organisational politics (Yeoh *et al.*, 2008). The next section examines how the information produced from BI systems and technology is used in the processes of consumption and decision-making.

3.4.3. The processes of consumption and decision-making

Decision-making, the process of making a reasoned or rational choice among alternatives (Mallach, 2000), is not a separate function of management: it is intertwined with management functions such as planning, co-ordination, monitoring, and control, all of which can require that decisions be made. For example, at the start-up stage, the incumbent manager must make a decision as to which of several possible strategies to follow. Such a decision is often referred to as a strategic decision because of its long-term impact on the organisation. Managers also make many less significant decisions, referred to as tactical and operational decisions, all of which contribute to the organisation's ongoing success.

Strategic decisions typically relate to strategic planning, organisational objectives and policies and are generally, but not always, made at upper management levels. These decisions affect the entire organisation, or a major part of it, for a significant period of time (Mallach, 2000:43). Tactical decisions affect how a part of the organisation operates for a limited period of time and are generally made by middle managers made within the context of prior strategic decisions (Mallach, 2000:43). Tactical decisions have some structured aspects but cannot be structured completely (Mallach, 2000). Often the problems are similar to known problems for which rules and heuristics are already known (Hall, 2008). Most decisions in organisations are of this type. Operational decisions affect particular activities taking

place in the organisation but tend to have limited impact on the future. Lower-level managers or non-managerial personnel on the front line generally make these decisions (Mallach, 2000:43). Operational decisions tend to be structured in that a well-defined decision-making process exists and rules and heuristics can be used (Hall, 2008; Mallach, 2000) that can even be automated by means of ICT (Taylor, 2007). Although the scope of the decision (strategic, tactical and operational) and the nature of the decision (unstructured, semi-structured and structured) aren't totally correlated as a general rule they tend to correspond (Mallach, 2000:44) as shown in Table 2 below.

Table 2: Characteristics of strategic, tactical and operational decisions (Mallach, 2000)

Scope of decision	Operational	Tactical	Strategic
Typical level	Lower management Non-management	Middle management	Senior management
Nature of problem	Routine / Known / Established	Similar	Undefined / Emergent
Nature of decision	Structured	Semi-structured	Unstructured

Each of these types of decisions requires information exhibiting different characteristics (Mallach, 2000:44). Operational decisions require information that is highly accurate, very detailed, reflect what happened or is currently happening, internally sourced, narrow in scope and quantitative whereas on the opposite end strategic decisions often rely on information that is less accurate, aggregated, predominantly externally sourced, broad in scope and often qualitative (Mallach, 2000:44). BI can provide support for all these type of decisions (Taylor, 2007) either through full or partial information provision or analytical capability or both.

Based on the diverse information requirements of different decision types different BI tools have been optimised to provide the differently characterised categories of information with BI tools divided into categories based on the functionality each offers to answer different types of questions and satisfy different information needs of a user with respect to decision-making, depicted in Figure 2. It is important to

note that "categories are not mutually exclusive … information system categories often overlap and change as new applications combine new capabilities with old ones" (Alter, 1999:160).

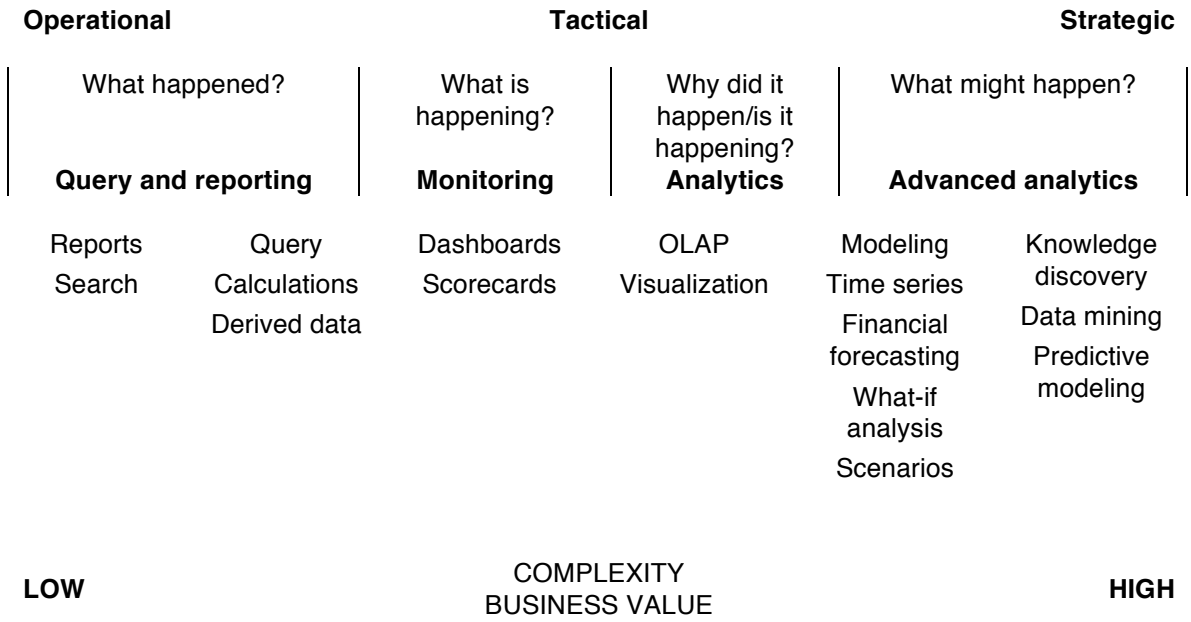

Figure 2: Continuum of BI functionality (adapted from Ponelis, 2009)

Based on the recommendations of Lin *et al.* (1993) and Chen (1989) one would expect that the simplest needs, i.e. reporting needs would be satisfied first before progressing to analytical needs and again, satisfying analytical needs before progressing to predictive needs and in most organisations BI capabilities, once adopted, evolve from simple standard reports and queries showing what happened to more advanced analytics such as multi-dimensional analysis that examine why it happened to data mining that predicts what might happen in future (Ponelis, 2009; Dyché, 2007). Hashmi and Cuddy (1990) found that information systems are largely developed incrementally in SMMEs and this approach supports the growth path of BI from query and reporting systems through forecasting to data mining.

The later stages of the continuum offer the most business value and competitive advantage (Swift, 2000) but is also more complex. According to Williams and

Williams (2007:13) delivering this business value via BI is a matter of determining how an organisation can use BI to improve management processes such as planning, controlling, measuring, and/or monitoring to enable management to increase revenues, reduce costs, or both, and improve operational processes such as customer order processing, purchasing, and/or acccounts receivable processing in order to increase revenues, reduce costs or both.

The type of decisions that need to be made largely determine the information that is needed (Choo, 2006:230-231) but the information sought to satisfy this need is also a function of individual preferences that result from training, education and/or experience, values and the decision at hand (Choo, 2006) and is therefore highly contextual. The individual preferences affect how a problem is perceived and defined, what information is gathered and how the information is analysed. One person may prefer to solve problems logically and objectively by gathering and analysing as much information as possible, whereas another person may prefer a more intuitive approach and evaluate issues more subjectively and personally (Hall, 2008; Mallach, 2000:59). The context in which the individual is situated is also relevant to the structuring of the problem and the information sought (Hall, 2008:91) as is the extent of learning that takes place from experiences.

Although there are differing individual preferences and different contexts within which decisions are made, the models of decision process in literature exhibit the same basic stages of Simon (1960) and Mintzberg *et al*. (1976) organisational decision-making models: understanding what is happening, searching for feasible alternatives, and making a rational choice between the alternatives (Boland, 2008). Table 3 shows the corresponding phases of each of the decision-making models. Information is needed to frame the problem or event, to define preferences and establish criteria for evaluation, and to identify courses of action and assess the project outcomes thereof (Choo, 2006:248). Information seeking tends to stop when a good enough solution is found or when alternatives are sufficiently developed for

evaluation, an approach referred to as satisficing. Satisficing is a result of bounded rationality, a term coined by Simon that refers to humans' limited cognitive capacity that restricts their ability to evaluate all possible alternative options.

Table 3: Stages of decision-making models of Simon (1960) and Mintzberg *et al.* (1976)

Simon's (1960) Intelligence-Design-Choice (IDC) model	Intelligence phase • Classify problem • Define problem	Design phase • Generate alternatives • Evaluate alternatives	Choice phase • Negotiate alternatives • Select alternative • Determine action
Mintzberg *et al.* (1976) strategic decision-making model	Identification • Recognise change • Gather information	Strategy development • Search for solutions • Design new solutions	Select final strategy • Screen alternative solutions • Evaluate alternatives • Select optimal strategy

Brouthers *et al*. (1998) found that decision makers in SMMEs tend toward a more qualitative approach to the processing of information and more opportunistic decision-making based on intuition rather than a rational, analytical approach. In their qualitative study of IT investment decisions in Finnish SMMEs Rantapuska and Ihanainen (2008) found that tacit knowledge plays an important role in decision-making process of the SMMEs and implies that rational, explicit information may be overemphasised in models of IT decision making when it comes to SMMEs. As a result it has been argued that new models are needed with respect to decision-making in SMMEs (Gilmore and Carson, 2000; Brouthers *et al*., 1998), a call to which Gibcus and Van Hoesel (2008) responded.

Gibcus and Van Hoesel (2008) conducted a qualitiative inductive study and developed a model of enterpreneurial decision-making in SMMEs. The first stage is the emergence of idea that is triggered by internal and/or external information sources or a combination thereof leading to an informal decision. Once there is an informal decision, the owner-manager elaborates on the idea by considering alternatives and consulting with advisers and banks that culminates in a formal decision after which the implementation process begins. In their second study they

found that once the informal decision is made, the formal decision is more often than not a foregone conclusion; the owner-managers already had a vested interest in bringing it to fruition and the elaboration stage seeks the best course of action for implementation. It is best summarised in the words of Richard Branson (2011), an internationally renowned entrepreneur and owner-manager of several successful businesses: “Throughout my career I have made decisions using my instinct, but I have also worked very hard at making those decisions work.” Althouh there is an overlap between the stages identified by Gibcus and Van Hoesel (2008) and the decision-making models based on large organisations of Simon (1960) and Mintzberg *et al*. (1976) the decision-making process in SMMEs is more condensed. In addition the strict assumptions of rationality, availability of information and the recognition of relevance thereof did not hold for the SMMEs included in their two studies: the owner-managers as decision-makers tended to be less rational and more emotionally invested in their decisions and had less access to relevant information.

BI comprises the organisational processes, systems and technology through which internal and external source data is gathered, integrated and transformed into information for analysis by decision-makers to make decisions at strategic, tactical and operational levels to manage the organisation for improved performance in order to ultimately gain a competitive advantage. Organisations implement BI for a variety of reasons, chief among them improved data support, improved decision support and savings (Scholz *et al*., 2010). Improved data support is evidenced by, amongst others, reduced time spent on seeking data from sources and reduced time spent on integrating data from disparate sources. Improved decision support is evidenced by the availability of more accurate, more current and more integrated data that can be used to ultimately increase revenue, improve company results and competitive performance. Savings can be measured in terms of direct cost savings such as reduced personnel costs in both the IT and other departments due to time saved and indirect cost savings through identification of cost cutting opportunities.

Faster, more accurate reporting, overall improved information quality, integrated information, and improved analytic capability contributes to improved decision-making (Thompson, 2004:1) and "will likely lead to higher levels of efficiency, higher and better quality outputs, better marketing decisions and therefore, arguably, lessened risk of business failure" (Hill and Scott, 2004:55). BI augments such improved decision-making by providing information in an efficient manner (Turban *et al*., 2011). However, BI cannot do this in isolation: in order to fully exploit BI an organisation must be ready to adopt BI systems and technology but also to assimilate its use into its organisational processes and managerial thinking (Williams and Williams, 2007:15), similar to all other ICTs (Goldstuck, 2007).

Teece *et al*. (1997) suggest that firms need a new set of objectives when they decide to adopt new ICT or implement a new information system and this is particularly true when it comes to BI. In order to reap the benefits of BI, organisations need to rethink how information is being used in their organisation and to envision opportunities to use new information in new ways (Williams and Williams, 2007:100). The process of adoption and assimilation is far more involved than is the case with the more traditional transactional or operational systems. To ensure that BI is strategically aligned requires that an organisation understand its strategic drivers and goals, determine the business questions that needs to be answered by BI to achieve the stated goals, identify the tools, methods, and analytical frameworks to inform decisions and measure performance, and deliver the information it needs to take actions to improve performance and support the stated goals (Williams and Williams, 2007:16-17). An investment in BI will be wasted unless it is connected to specific business goals, decisions, and actions that result in improved performance (Williams and Williams, 2007:4) and therefore every decision support system project should start with a clear understanding of the decision(s) that the proposed system will inform (Mallach, 2000:37) and the information needs to be met. Furthermore,

without the support of those who will be using the system, any BI initiative is unlikely to succeed since it will not be used to support decision-making (Ponniah, 2010).

Measuring information systems and technology success is a complex issue (Gibson *et al*., 2004) because the definition of the concept of information system success is problematic (Caldeira and Ward, 2002) and it is difficult to isolate the impact of the systems and technology from other factors that impact organisational performance (DeLone and McLean, 2003). As Pirttimäki *et al*. (2006:88) state, "[t]he measurement of the effects of BI activities would be desirable but it has proven problematic." They explain the challenge of measuring the effects or benefits of BI as follows:

> *"The BI process produces information and knowledge, which have to be utilised before the effects are seen. The effects, if they occur, are intangible by nature, e.g. improved decision-making ability. It is difficult to quantify these intangible phenomena. These intangible effects may eventually have financial consequences. However, distinguishing between the specific benefits received due to BI and the achievements of ordinary decision-making is challenging."*

As a result of BI's unique implementation challenges discussed earlier and the difficulties of measuring the benefits of BI and one could expect that it would be a more complex task to use a model such as the DeLone and McLean IS success model (DeLone and McLean, 2003) to measure BI success. Yet without being able to demonstrate the benefits of BI it is difficult to convince those owner-managers that are reluctant to invest in ICT to do so since it is the degree to which an innovation such as BI is perceived to be better than the idea or implementation that precedes it that impacts directly on the likelihood of its adoption (Rogers, 2003). Although Scholz *et al*. (2010) developed an instrument that can be used to measure the benefits and challenges of implementing BI although it has not been widely used.

Having established what BI comprises and aims to achieve the next section illustrates the link between the descriptive BI framework and SMMEs and the resultant research questions.

3.5. BI in SMMEs?

The descriptors in the descriptive BI framework developed in this chapter agree with the Sen and Taylor's (2007) description of corporate information competence as described in Chapter 2, which is considered a critical success factor for SMMEs. BI can thus arguably meet SMMEs information needs as discussed in section 2.3. above. Furthermore, Kara *et al.* (2005) found a positive correlation between market orientation and performance in small service businesses in the USA and BI plays a critical role in providing actionable information to enhance market orientation (Venter and Tustin, 2009). Vendor focus on the SMME market may make BI a feasible option for SMMEs given their reported proclivity for packaged software. New developments in technology also offer another option with web-based BI services offered on-demand. Formal BI solutions, whether onsite and on-demand, can provide the information needed for decision-making far more efficiently than informal BI.

Making informed decisions is important for any organisation, but is especially crucial for SMMEs as valuable time and money cannot be wasted on incorrect decisions when economic belts are already tightened. BI should impact positively on decisions and the resulting actions since better understanding of the problem at hand typically leads to better decision-making and more informed choices are better and result in more satisfying decisions, all other things being equal (Hall, 2008:93). Yet past research indicated that ICT for supporting management decisions are less common in SMMEs than, for example, operational transaction processing systems, due to several inhibiting factors: a short-term, operational rather than a longer-term strategic focus, and a proclivity for intuitive rather than the analytical decision-making of rational management on the part of SMMEs. Thus the question arises: do South

African SMMEs in fact use BI to support their decision-making and if so, how, and if not, why not?

3.6. Chapter summary

BI systems and technology transform predominantly internal source data and provide interactive access to integrated information for analysis and manipulation in order to support fact-based operational, tactical and strategic decision-making in organisations to ultimately improve overall competitive advantage. Given the need for information in SMMEs BI could play an important part in enabling decision-making in SMMEs. However, very little research is available on the uptake of BI systems in South African SMMEs, which suggests that may not have occurred on a significant scale. Thus the question arises: do South African SMMEs in fact use BI to support decision-making and if so, how, and if not, why not? The next chapter explains the underlying research paradigm and approach as well as the research methodology that is used to answer these research questions.

Chapter 4 Research paradigm and design

"Not everything that can be counted counts,
and not everything that counts can be counted."
— Albert Einstein

4.1. Introduction

The research design is the blueprint for the collection, measurement and analysis of data in a manner that combines relevance to the research questions and economy of procedure (Mouton, 2001). It is the logic that links the research questions to how the empirical data will be collected, how the data will be analysed, and finally, to the conclusions that are drawn from the data and the recommendations made based on the conclusion (Yin, 2009; Bloomberg and Volpe, 2008; Rowley, 2002:18). Emerging technologies researchers usually have an exploratory and applied focus (Barnes, *et al*., 1992), which is also the case in this inquiry. Although this increases the relevance for managers and other stakeholders, there is a tendency to pay too little attention to research design. This study aims to be both relevant but at the same time to ensure adequate grounding in research design.

Creswell (2009) points out that the research design is dependent on the chosen research paradigm and that the chosen research design in turn determines the research method and data collection approach. Following this chain of dependencies Chapter 4 discusses two of the main research paradigms followed by the justification for the choice of research paradigm for this study and concludes with the chosen research design.

4.2. Research paradigm

This section discusses two of the main researh paradigms, positivism and interpretivism, and motivates the choice of paradigm for this research[9]. It also addresses the role of prior theory in this study and the role of the researcher against the background of the chosen paradigm.

4.2.1. Positivist vs. interpretivist research paradigms

Two of the main paradigms underlying research are positivist and interpretivist. On the one hand, positivism is based on a realist ontology that assumes observation is theory neutral and the role of scientific research is to make generalizations to account for what was observed. On the other hand, interpretivism is based on a life-world ontology that argues all observation is both theory- and value-laden and investigation of the social world is not, and cannot be, the pursuit of detached objective truth (Leitch *et al.*, 2010).

Epistemologically, the viewpoint of the interpretivist paradigm is that our knowledge of reality is a social construction by human actors (Burrell and Morgan, 1979), that is, the world is largely what people perceive it to be (Cavana *et al.*, 2001). Access to reality is attainable only through social constructions such as language and shared meanings (Myers, 1997). The main aim of interpretive research is to understand, rather than to predict and as a result, dependent and independent variables are not predefined (Kaplan and Maxwell, 1994).

The interpretive research paradigm is characterised by a need to understand the world as it is from a subjective point of view and seeks an explanation within the frame of reference of the participant rather than the objective observer of the action. Since the researcher uses his/her preconceptions to guide the research process, value-free data cannot be obtained. This subjectivist position denies the

[9] Critical research aims "to critique the status quo, through the exposure of what are believed to be deep-seated, structural contradictions within social systems, thereby to transform these alienating and restrictive social conditions" (Orlikowski and Baroudi, 1991:5-6). Because the research questions are not emancipatory in nature, critical of tradition or technological determinism, and do not have a non-performative intent, critical resaerch is not included in this discussion.

appropriateness of the natural science paradigm for studying the social world, stating that the social researcher cannot separate him/herself from the phenomena being studied, and therefore, can at best be relative and never completely objective. Subjectivists attempt to understand social phenomena by explaining how individuals create and recreate their social world through deliberate action. As Blaikie (2000:115) phrases it:

> *"Interpretivists are concerned with understanding the social world people have produced and which they reproduce through their continuing activities. This everyday reality consists of the meanings and interpretations given by the social actors to their actions, other people's actions, social situations, and natural and humanly created objects."*

At an axiological level, the interpretivist paradigm is more concerned with relevance than rigour: the relevance of the research question(s) to practice is of primary importance. Consequently, the criteria used to assess the findings generated by research within the interpretive paradigm differ from those applied within the positivist paradigm (Lincoln and Guba, 1985). While the value of the latter is judged by the degree to which results can be generalised to the wider population, the value of the understanding that emerges from an interpretive study is determined by the degree to which it fits and works with the perspectives of participants (Glaser and Strauss, 1967). As a result theory testing pervades positivist research whereas interpretive research emphasises theory building (Carson *et al.*, 2001:9).

Methodologically, interpretivist research is usually qualitative because the researcher is interested in understanding how the social world is interpreted, understood and experienced. Qualitative research is about producing holistic understandings of rich, contextual and generally unstructured, non-numeric data (Mason, 2002). Qualitative research engages in conversations with the research participants in a natural setting as opposed to in a laboratory (Creswell, 2009). Interpretivist research does not

necessarily rely on total immersion in a setting and methods such as interviews that seek to discover people's individual and/or collective understandings and reasoning processes (Mason, 2002:56). When analysing data, the qualitative researcher attempts to make sense of or interpret the phenomena in terms of the meaning the participants place on them (Creswell, 2009) using a variety of qualitative data analysis methods such as content analysis, constant comparison and pattern matching. The interpretive research paradigm as described above is summarised and contrasted with the positivist paradigm in Table 4 below.

Table 4: Positivist and interpretivist research paradigms (adapted from Fitzgerald and Howcroft (1998:160), Carson *et al.* (2001:6))

Paradigm level	Positivist	Interpretivist
Ontological level	Realist	Relativist
Epistemological level	Objectivist	Subjectivist
Axiological level	Rigour	Relevance
Methodological level	• Predominantly quantitative • Confirmatory (theory testing) • Deduction • Laboratory • Nomothetic	• Predominantly qualitative • Exploratory (theory building) • Induction • Field • Idiographic
Methods/techniques used	Primarly formalisedstatistical and mathematical methods	Primarily qualitative

Roode (2005:25) is of the opinion that "problems rarely allow us to study them within a single paradigm, and a multi-paradigmatic approach is often indicated or even required." Such studies using mixed methods that combine quantitative and qualitative methods either concurrently or sequentially (Creswell, 2009) are used increasingly more often in small firms research but the construction of explanations or interpretations that combine the results from such a multi-paradigmatic approach are more difficult than when a single paradigm is employed (Curran and Blackburn, 2001). Locke *et al.* (2000:108-109) advises that the mixing of paradigmatic models is less than prudent for postgraduate students as the researcher needs to master both the instruments and the world views of two very different schools of thought and accordingly, the research does not adopt a multi-paradigmatic approach. The next section justifies the use of an interpretive research paradigm to answer the stated research questions.

4.2.2. Justification of interpretivist paradigm and qualitative methodology

According to Lee (1999), the dominant positivist approach has adversely affected the relevance of information systems research. He argues that interpretive studies, amongst others, are needed to develop a deep understanding of professional practice. At the same time, interpretive research is "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1993:4-5). This view is echoed by Lee (2004), who comments on the need to not only consider the technical aspects but also the social aspects and their continuing interaction with respect to the introduction and use of information systems in organisations.

Van Maanen (1979:539) argues that it is necessary to portray more closely "the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world" in organisational research. Bygrave (1989) contends that the emerging nature of research in small enterprises is best suited to a qualitative approach that encourages the development of both the practical and theoretical understanding and the generation of new and alternative theories and concepts. Specifically, he argues that "inspired induction (or more likely enlightened speculations) applied to exploratory, empirical research may be more useful than deductive reasoning from them" (Bygrave, 1989:23). Gill and Johnson (1991) are of the opinion that the study of small enterprises cannot be approached from the exterior standpoint the positivist approach demands. Hill and Scott (2004:52) recommend that research in SMMEs use an epistemological approach that "dictates a minimisation of distance between the researcher and the entrepreneur."

The difficulties of understanding owner-managers' thinking in order to understand how they arrive at decisions are well known (Hills and LaForge, 1992). Hill and Wright (2001) contend that although research in SMMEs for the most part "has its roots in positivist thinking, such approaches do not yield a rich understanding of the

key issues" that affect SMMEs' decision-making (Hill and Wright, 2001: 435). Gilmore and Carson (2000) advocate a qualitative research approach, which falls within the interpretive research paradigm, when conducting research on the decision-making processes of SMME owner-managers. In addition, Rozyn (2007) recommends that studies without a qualitative component cannot be used as a basis to recommend actions to owner-managers nor to inform policy, both of which are objectives of this study. This is not to devalue positivist research but suggests that alternative approaches can supplement and strengthen the research since quantitative approaches cannot reveal the whole story (Crotty, 1998).

To answer the stated research questions that seek to understand SMMEs from the perspective of the key SMME decision-maker, the owner-manager, within his/her particular context, grounding within an interpretive rather than a positivist paradigm is more suitable and at the same time enhances the relevance of the research. Within the interpretative research paradigm it is necessary to consider the role that prior theory plays in the study as is explained in the following section.

4.2.3. Role of prior theory

Researchers attain theoretical sensitivity, that is an awareness of subtleties of meaning in the data, the attribute of having insight, the ability to give meaning to data, the capacity to understand, and the capability to separate what is pertinent from that which isn't, from a number of sources including literature and professional and personal experiences (Strauss and Corbin, 1990). Miles and Huberman (1994:17) stress the importance of "prestructured research" for new qualitative researchers working in areas where some understanding has already been achieved. Accordingly, the researcher explored the emerging literature on business intelligence and the wider literature on small, medium and micro-enterprises in order to generate the problem statement and research objectives that would contribute to extant knowledge, frame the research and develop the descriptive framework presented in Chapter 3 to direct the exploratory empirical study (Hartley, 1994:217). During the review of the literature, the researcher tried to purposefully limit the

preconceptions taken into the field and no specific theories or propositions were developed prior to meeting with participants. However, as Eisenhardt (1989) concedes, it is impossible for researchers to start with a "clean theoretical slate." One's perceptions of the phenomena under investigation are influenced, both explicitly and implicitly, by exposure to extant literature prior to conducting empirical research. Methodological decisions involve assumptions about the nature of the phenomenon in question (Lincoln and Guba, 1985) and as such the influence of prior knowledge is an unavoidable aspect of conducting research.

Having in this section justified the research paradigm and discussed the role of prior theory in this study, the following section justifies the research methodology used within the chosen interpretive research paradigm.

4.3. Research design

This section contains the justification and specification for the research design. As discussed earlier with respect to the role of prior theory, it is "impossible to embark upon research without some idea of what one is looking for" (Wolcott, 1994:157). Therefore, the researcher decided on the research design and method to be used to collect the data prior to entry into the field.

4.3.1. Qualitative case-based research

Both qualitative research and case studies can be conducted from an interpretivist point of departure (Myers, 2009). According to Perry *et al*. (1999), the case-based research methodology tends to be used to answer research questions within the interpretevist paradigm rather than the positivist paradigm. Whilst Galliers (1992) rightly asserts that traditional hypo-deductive research has the widest applicability in information systems research, both he and Myers (1997) also advance the case for the qualitative perspective provided by the use of, amongst others, case studies. When seeking understanding, as in exploratory research, case studies are the most appropriate method (Myers, 2009; Levy and Powell, 2005).

The above views are supported by Arnott and Pervan (2008:667) who also advocate the use of case studies, in particular interpretive case studies, to increase the relevance of research since case studies "can illuminate areas of contemporary practice in ways that studies such as laboratory experiments and surveys cannot." Moreover, case-based research supports the relevance of the study since case studies are considered more persuasive to SMME owner-managers than theoretical discussions (Storey in Levy and Powell, 2005).

Although the influence of prior theory should be limited, it was necessary to confirm that the proposed research design is suitable by examining the research designs used in comparable studies. The most pertinent study is that of Hill and Scott (2004) who used in-depth discussions with 11 SMME owner-managers to explore the role of BI and e-business in marketing decision-making in knowledge-based and high-tech startups in Northern Ireland in order to make recommendations for the successful implementation of BI and e-business systems in these firms. Levy and Powell (2005) preferred the case study approach for their thorough study of SMMEs in the United Kingdom where they sought to understand the role of information and information systems by using interviews with supporting documentation where applicable and available for data collection. In their study exploring the infusion of ICT use in eight Australian and German SMMEs, Fink and Disterer (2006) adopted a qualitative case study method within an interpretivist philosophy using semi-structured on-site interviews to collect data. Deakins and Freel (1998) used qualitative evidence from four case studies to examine the process of entrepreneurship and entrepreneurial learning in SMMEs.

Although there is a dearth of literature on the role of BI in SMMEs, the proposed research design has been utilised in a number of studies seeking to explore and understand specific aspects of SMMEs that is similar in nature to this study. Given the lack of a sufficiently large body of literature to draw on for the study of BI in SMMEs in the South African context, an investigation in the form of qualitative case

studies is justified (Yin, 2009; Eisenhardt, 1989). The following section examines the unit of analysis for the case studies.

4.3.2. Unit of analysis

The unit of analysis is the basis of each case. The unit of analysis may be an individual such as a person who has had an experience of interest to the study, an event such as a decision or an implementation process, or an organisation or part thereof (Rowley, 2002:19). Hill and Wright (2001) state that in order to understand SMMEs and to effect changes in such firms, researchers should strive to see the world from the perspective of the key SMME decision-maker, the owner-manager. As central decision-maker the owner-manager's "strategic position serves as 'focal' point, around which all business activities are centralized, including those of information search and assimilation" (Lybaert, 1998:188). Since the research question focuses on a process, the use of information for decision-making, in an organisation, the SMME, by the person involved, the owner-manager as the predominant decision-maker, the unit of analysis is a combination thereof. The next section describes the case selection.

4.3.3. Case selection

Eisenhardt (1989:537) states that the "random selection of cases is neither necessary, not even preferable" and relevance to the research questions rather than representativeness is the criterion the selection of cases (Carson *et al.*, 2001). The underlying principle in selecting appropriate cases is preference for cases that are information rich with respect to the topics under investigation. Cases were selected using purposive sampling described by Patton (2002) as follows:

> *"The logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research, thus the term purposeful sampling."*

Purposive sampling was suited to developing a comprehensive understanding of the role of information and BI in owner-managers' decision-making. Due to the central role of the owner-manager, sufficient access to at least one of the owner-managers was another important consideration in the selection of cases.

According to Curran and Blackburn (2001:58) the "distinctiveness of small business research is nowhere more apparent than in the fieldwork stage." As Hill and Wright (2000) rightly states access to suitable enterprises can be difficult and beset with all sorts of problems. Unique challenges include accessing the subjects of the research and the methods used for data collection. Research into the impact of technology on SMMEs is often limited by the difficulties involved in persuading the right enterprises to participate in the study (Jeffcoate *et al.*, 2002) who are expected to give up their valuable time without understanding the value that the research has to them (Myers, 2009:81). Owner-managers often cannot or will not take the time needed to participate or do not see the relevance of research to themselves or both.

Due to limited resources on the part of the researcher, and to ensure that the enterprises chosen were subject to the same environmental factors, selection of cases were limited to the Gauteng province, one of the three provinces where formal SMMEs outnumber informal SMMEs in South Africa. Hill and Scott (2004:52) report that prior research suggested that it was useful to "work with companies with strong commonality" in interpretive research. In this study knowledge-based SMMEs were selected. Knowledge-based SMMEs are defined as small, medium and micro-enterprises that have systemic, knowledge-based resources as its prime competitive tools (Duhan *et al.*, 2001). Such enterprises offer products and services based on the knowledge and experience held within individuals and systems with the competitive advantage arising from being able to leverage this knowledge and experience. Knowledge-based SMMEs continually gather information, develop skills and use experience to enhance their products and services (Levy and Powell, 2005). Given the above definition and descriptions, it is important to note that knowledge-

based SMMEs can be but are not necessarily engaged in ICT as their primary business. The expectation is that these knowledge-based firms would be more likely to use information for decision-making and have knowledge and experience of BI given the importance of intangible and systemic resources. Owners of affiliated or franchise businesses may be influenced by the parent company in terms of decision-making processes, technology used, etc. and therefore only independent, non-affiliated, non-franchisee businesses were selected to avoid this influence.

Following the advice of Hartley (1994:216) that contacts in industry, academia and friendship can be helpful to establish organisations a list can be drawn from, an approach also used by Chibelushi and Costello (2009), contacts to potential cases, which was obtained from the following sources:

- personal networks and word-of-mouth referrals; and
- businesses at the Innovation Hub, a science park associated with the University of Pretoria.

As discussed earlier, in interpretive research the number of participants is relatively small (Holloway, 1997). Even with relatively a small number of cases evidence from multiple cases are "often considered more compelling, and the overall study is therefore regarded as being more robust" (Yin, 2009:53) and provide a valid basis for understanding (Levy and Powell, 2005). Although there is no ideal number of cases, several authors have made recommendations. Eisenhardt (1989:545) believes that between four and 10 cases often works well. Crabtree and Miller (1992) advocate a sample size of six to eight subjects for homogenous samples. Due to the expense of case studies and the large amounts of data produced together, along with the consequent difficulties of analysis, Curran and Blackburn (2001) indicate that case studies in small business research are often fewer than ten.

The plan was to select between six and eight enterprises of various classifications in

the Gauteng area. Since not all the enterprises contacted for inclusion might have agreed to participate in the research, thirteen SMMEs were contacted. The initial request for participation was sent by e-mail to owner-managers of the firms and included a brief overview of the purpose of the research and the involvement that would be required from the participant. Four firms did not respond, and of those that responded two were not suitable – one was now a large enterprise having more than 200 employees and the other was a franchise. The result was that owner-managers of seven suitable SMMEs agreed to participate in the research. The profile data of the selected cases is provided in Table 5.

Table 5: Profile data of selected cases

Case [10]	Nature of business	Legal form	Year establi-shed	Emplo-yees[11]	Scope of operations
A	ICT services and software	Private company	2000	10	National
B	E-learning platforms and content	Close corporation	2000[12]	13	Regional
C	Management consulting	Sole proprietorship	1995	1	International
D[13]	Environmental consulting services	Private company	1999	5	National
E	ICT services and software	Private company	2001	130	International
F	ICT services and software	Close corporation	2002	9	National
G	Graphic design	Close corporation	2009	1	International

Given that personal networks were used amongst others to identify cases two of the seven owner-managers knew the researcher. The participants may have had difficulty adjusting to the researcher in the role of interviewer and their responses may have been influenced or affected as a result. This phenomenon is referred to as participant reactivity (Maxwell, 2005), similar to the Hawthorne effect that can occur when observing participants in a study. Whilst the extent of participant reactivity cannot be determined participant reactivity is unavoidable in research where participants are aware of being part of a study, whether answering a

[10] For ethical reasons cases used in this research are referred to as Case A through G.
[11] Employee count includes owner-manager(s).
[12] Current owner-manager bought business in 2006.
[13] Omitted from further analysis because the owner-manager did not share sufficient information and the case is therefore not sufficiently information rich.

questionnaire, being interviewed or being observed. Given that qualitative interviews are “conversations in which a researcher gently guides a conversational partner in an extended discussion” (Rubin and Rubin, 2005:4), the interviewer attempted to replicate an extended conversation with a prior acquaintance. Given the confidential nature of data gathered trust is important to promote truthful sharing and therefore the researcher assumes that any influence of prior relationships had a greater positive rather than negative effect on the quality of data gathered in these instances.

Characteristic of the exploratory nature of research conducted within a qualitative paradigm, the research was designed to allow the researcher to build descriptions of the context within which case-enterprises use information for decision-making and to provide the flexibility to uncover and explore issues that emerged as interesting and potentially relevant to the research questions during data collection. The following sections contain detailed discussion of the research method used to gather the data.

4.4. Chapter summary

This chapter discussed the research design, or the blueprint, for the study. First the choice of qualitative case studies within an interpretive research paradigm was justified and the role of prior theory was explained. The use of the case study method was outlined together with the unit of analysis and the selection of cases. The following chapter details the research method including data collection as well as limitations and trustworthiness that arise from the chosen research paradigm, design and method.

Chapter 5 Research method

"Collecting data is much like collecting garbage.
You must know in advance what you are going to
do with the stuff before you start collecting it."
— Mark Twain

5.1. Introduction

After having outlined the research paradigm within which this study was undertaken togther with the research design this chapter outlines the research method and data collection approach utilised within this paradigm to answer the research questions is discussed followed by the processes for analysing and interpreting the data. The chapter concludes with a section that considers issues of trustworthiness with respect to the research conducted.

5.2. Data collection

The objectives of data collection were to understand how the participant became a small, medium or micro-enterprise owner together with the subsequent developmental history of the business, and obtain insight into the use of information and BI for decision-making by the owner-manager in the SMME. The interview is an established data collection instrument and a primary source of information in qualitative research (King and Horrocks, 2010; Kvale and Brinkmann, 2009, Easterby-Smith *et al.*, 1991:71) and in case studies (Yin, 2009:106) and since this study uses qualitative case studies about "human affairs and behavioral events" the interview is an appropriate data collection method (Yin, 2009:106).

There are different types of interviews. In a structured interview the interviewer uses an interview schedule that lists a set of standardised questions to be asked during the interview. The interviewer is restricted to the questions, their wording and the order in which the questions are listed and does not have the freedom to deviate

from the interview schedule. Although this improves the consistency of data gathering across interviews it does limit the ability of the researcher to explore additional topics throughout the interview. In essence, the structured interview is similar to a survey that is delivered face-to-face. With unstructured interview there is no predeterimined list of questions that guides the interviewer. Whilst such interviews makes it possible to cover a broad range of topics it is possible to stray from the topics of interest and cross-case comparisons can become problematic. Interviews that attempt to bridge this gap by incorporating elements of each are called semi-structured interviews. Instead of an interview schedule an interview guide is used in semi-structured interviews. Semi-structured interviews were used as the data collection method in each of the case studies. The assumption is that owner-managers will be able to provide data relevant to this inquiry.

The interview guide used in semi-structured interviews comprises a list of themes or probe questions based on the conceptual framework that have bearing on the research questions that the interviewer should raise during the interview if the participant does not do so himself/herself (Welman *et al.*, 2005:166). At the same time the interviewer can pursue certain themes or questions in greater depth and also address any new areas as they emerge during the interview which offers the opportunity for "serendipitous learnings that emerge from the unexpected turns in discourse that your questions evoke" (Glesne and Peshkin, 1992:65).

The interview guide was designed to capture "the process, content and context" (Carter, 1999) with regard to the use of BI for decision-making in the SMMEs selected as cases. The interview guide comprised three major categories. First, the context of the SMME such as the historical development of the SMME, the nature of the business, products and services offered, and number of employees amongst others. Second, demographic information regarding the owner-manager was gathered including educational background, prior managerial experience, and motivation for starting the business. Given the lack of agreement on a definition for

BI among experts discussed in Chapter 2, it is unlikely that owner-managers would have a common understanding of BI. As a result the last category uses the components of BI as identified in the descriptive framework in Chapter 2 as used as themes in order to elicit how individuals make sense of their experiences and actions in the enterprise. The interview guide with the themes and probe questions is included in Appendix B.

In semi-structured interviews the interviewer can also adjust the questions to participant's level of knowledge of the issue. Although all the respondents are asked about the same themes, the interviewer may adapt the formulation of the probe questions, including the terminology, to fit the background and educational level of the participants (Welman *et al.*, 2005:166-167, Patton, 2002) and adjust the questions according to the language the participants use, one of the advantages of semi-structured interviews over structured interviews. Interviewees may lack the correct terms for concepts they are using but this does not imply a lack of understanding or application of the concepts. It is therefore important that researchers do not use unfamiliar technical language (Perren *et al.*, 1998:359).

The order in which the topics are discussed may also be varied depending on the way in which the interview develops. Additional questions may be required to explore the research question and objectives given the context or nature of events within a particular organisation. When, for example, a question has already been answered in answer to a previous question it need not be posed again. As the interviews are semi-structured the interviewer may pose emerging questions not listed in the interview guide to explore answers for clarification or to elicit more detail with respect to an answer but such questions will be guided by and strictly within the scope of the research objectives. The semi-structured interview is more a guided conversation than a structured enquiry (Yin, 2009:106). Using the descriptive framework allows for the probe questions to be more direct and effective, and helps the researcher to recognize when something important has been said (Carson *et al.*,

2001). This approach also provides guidance to keep the interviews focused and facilitate cross-case analyis (Carson *et al.*, 2001:101) yet also provides room to explore new and relevant issues that emerge during the interview.

Although the flexibility of semi-structured interviews offers many advantages to using interview for data collection, there are also disadvantages: leading questions, poor listening skills, not asking probing questions, not judging the answers or asking questions that interviewees do not understand. The data collection process is critically dependent upon the competence of the researcher, which implies that the researcher undertaking data collection, the interviewer, needs to be able to ask well-structured and relevant questions and be able to listen and interpret the answers (Rowley, 2002). The researcher acquired extensive experience as an interviewer and note-taking in business organisations during her employment with IT consulting firms where she was tasked with assessing readiness for adoption of business intelligence solutions and determining business needs and gathering requirements from end-users, typically at Director level. She also acquired extensive technical skills with regard to the enabling systems and technology including designing databases, integrating data from disparate sources, and compiled training manuals and trained end-users on BI tools.

Regardless of prior experience, it remains beneficial to explicitly document techniques to improve the reliability of data collection through interviews. The interviewer should encourage participants to speak freely to express their views by (Carson *et al.*, 2001:76, 79-80; Levy and Powell, 2005:7, Myers, 2009:134):

- Not interrupting the flow of the interviewee's reponse regardless of relevance.
- Using an active listening technique of feeding back dialogue using the participants words and phrases (mirroring) combined with the researcher's own words to check his/her understanding and using encouraging further elaboration using phrases such as 'Could you please elaborate?', 'Can you

give me an example?', and ' You mentioned that [repeat in interviewee's words] … Can you tell me more about that?'

- Asking non-directive questions and posing questions to avoid bias in response.
- Avoiding undue prompting.
- Not engaging in conversations of argeement or disagreement.
- Trying to remain detached but receptive.
- Maintaining eye contact.

In addition to the researcher's skills and awareness as interviewer, ethical issues need to be considered since the participants are human subjects. The following section considers the ethical aspects.

5.3. Ethical considerations

Given the nature of this research the researcher expected that SMMEs' owner-managers would be reluctant to share information. As a result all information shared by SMMEs participating in the study, even the fact that they are participating in the study, must be kept strictly confidential as revealing their nature and use of information can be used by competitors to gain a competitive advantage. Without such an assurance agreement to participate could not be secured. As a result no publication associated with the research, including this thesis, should be attributable to individuals or an SMME.

In accordance with University of Pretoria's Code of Ethics for Research (Rt 429/99) an application for approval of data collection from human subjects as informants was submitted to the *Faculty Committee Research Ethics and Integrity of the Faculty of Engineering, Built Environment & IT* which approved the interview guide unconditionally with reference number EBIT/40/2010. This encompasses the procedure for obtaining informed consent from each of the participants.

5.4. Data collection process and data recording procedures

It is recommended that qualitative researchers make explicit the process involved in their collection and analysis of data since by failing to do so, researchers employing qualitative methods "do little to encourage theory development or progress current knowledge and understanding about small firms" (Shaw, 1999). This section explicates the data collection process and recording procedures with the following section unpacks the data anaysis and interpretation process.

Background information on the enterprises was gathered through sources in public domain, namely, company websites, the Companies and Intellectual Property Registration Office (Cipro), a division of the South African Department of Trade and Industry (dti) as custodian of information on companies[14], close corporations and co-operatives, and through subsequent interviews. Background information on owner-managers was also gathered from the public domain using company websites, public profiles on professional networks (e.g. LinkedIn), the press and through the subsequent interviews.

The face-to-face interviews were conducted over a four-week period during January 2011. Each interview lasted about one hour. Notes were taken during all of the interviews including notes of the observations made by the interviewer/researcher during the qualitative interview (Welman *et al*., 2005:199, 211). Permission to audio-record the interviews were given by three interviewees and supported by notes in case of equipment failure (audio-recording, although preferable, was not required since participants who would prefer not to be recorded may be reluctant to converse freely (Myers, 2009:134)). Interviews were conducted face-to-face to establish rapport, build trust, and to identify any non-verbal cues that warranted further questioning. All interviews were conducted at the participants' place of work, normally a quiet office, except in two instances where the participants with home

[14] On 1 May 2011 CIPRO and the Office of Companies and Intellectual Property Enforcement (OCIPE) merged to form the Companies and Intellectual Property Commission (CIPC).

offices requested that interviews be conducted in coffee shops.

Prior to starting the interview most of the participants were interested to know why they had been chosen to participate in the research. As a result the first 5 to 10 minutes of the interview was spent discussing the interviewer's background, her reasons for conducting the research, and what she aimed to achieve. This discussion allowed the interviewer to explain the purpose of the study and to discuss the informed consent, namely, that any data gathered would be kept confidential and anonymity is assured, that participation is voluntary and that the participant can withdraw at any point (the cover letter and informed consent form are included in Appendix C). At this point the interviewer also requested permission to record the conversation for transcription, that an account of the interview will be provided to verify accuracy and that notes will be taken (notes were taken as back-up in case of equipment failure where audio recordings were permitted).

All of the participants were forthcoming and shared a great deal of their background, experiences and insights with regard to owning and managing their businesses during the interview. The interview concluded with interviewer/researcher thanking the participant for his/her time and interest in participating the study. The audio recording (where permitted) was stopped and the interview ended. Based on the interviewee's responses, the interviewer asked if s/he is willing to provide copies of the documentation. None of the SMMEs were prepared to share copies of their data or reports or data not in the public domain. The accuracy of interview data collected and subsequently confirmed with interviewees to avoid misunderstanding or misinterpretation as described in the next section that describes the analysis and interpretation of the interview data.

5.5. Data analysis and interpretation

The qualitative interview data was analysed using four levels of analysis (Levels 1 through 4) adapted from Cope (2005) with an additional level that considers the data

collection and recording process itself as the first level of analysis (Level 0). Each of these levels is described in more detail below.

5.5.1. Level 0: Interviews

Similar to Shaw (1999) the process of inductively analysing data commenced as soon as the researcher started collecting data, that is during the interviews. Lofland *et al.*'s (2006) and Silverman's (2006:92) view is that when one undertakes qualitative research, one tries to make sense of the reality one encounters when collecting data whether through interviewing or observation. This describes well the overlap of data collection, analysis and interpretation activities that occurred during this exploratory study: during the interviews the dual roles of interviewer and researcher co-existed with the researcher engaged in analysing and interpreting the perspectives of the participants whilst simultaneously being the interviewer.

5.5.2. Level 1: Transcription and capturing of notes

After the completion of the data collection, Level 1 analysis comprised the analysis of the transcripts and notes. First the interviews that were audio-recorded were transcribed and all notes were captured electronically by the researcher. Each recorded interview was transcribed in a sequential order with notes to ensure reliability of the data (Peräkylä, 1997). Transcription of interviews falls somewhere on a continuum between naturalism, where each and every utterance is transcribed in as much detail as possible, and denaturalism, where "idiosyncratic elements of speech (e.g., stutters, pauses, nonverbals, involuntary vocalizations) are removed" (Oliver *et al.*, 2005). Since this study is interested in the 'informational content' (MacLean *et al.,* 2004) a denaturalistic transcription style was followed and the "idiosyncratic elements" ignored. During the course of transcription and capturing of notes, it happened that data on occasion seemed to some extent unclear or incomplete and the respondents were contacted to seek clarification.

Level 1 analysis comprised reading each transcript and set of notes several times. The researcher made detailed notes in the margins, highlighting potentially significant issues and experiences (Patton, 2002). This served to familiarise the

researcher with the data (Easterby-Smith *et al*., 1991:108-109) and to begin the process of organising and structuring the data. This increased the researcher's awareness of the "patterns, themes and categories" (Patton, 1987) in the data.

5.5.3. Level 2: Case study narratives

During Level 2 analysis the researcher compiled a case study narrative for each case (Hartley, 1994). The case study narrative is a readable, descriptive picture that makes all the information necessary to understand the case as it pertains to the inquiry accessible to the reader (Patton, 1987). Case studies can be presented chronologically, thematically or both. In this research the case study narrative was both thematic and chronological because the narrative explains the use of data, systems and information in relation to decision-making within the context of the owner/mangers' and the SMMEs' development. The transcripts and notes were developed into coherent and manageable write-ups structured according to the descriptive framework in order to enable analysis across the seven cases. Write ups are "intelligible products that can be read, edited for accuracy, commented on and analysed" (Welman *et al*., 2005:211). This interpretive summary of the interview was sent to participants for confirmation that the narrative the researcher captured was consistent with what participants believed they had provided during the interviews and to eliminate any misunderstandings on the part of the researcher.

The use of both transcripts and notes raises a question: can comparable conclusions be drawn from the information from four interviews that were recorded, listened to and transcribed and the remaining three interviews that were written up from notes taken during interviews or are these two different methods of data collection? All interviews were semi-structured and the same probe questions were asked in each interview. When answering the questions, the participants were allowed to speak uninterrupted and were interrupted only for clarification of the issue(s) being discussed. In the case of non-recorded and non-transcribed interviews, detailed notes were taken during the interviews and only issues completely unrelated to the study were omitted. In essence, all interviews were processed in an identical

manner. The only difference was that in four, the record was kept digitally and in three, it was kept as only as hand-written notes. After transcription when the details were coded, the noise in the data, in the form of text unrelated to any theme of the research, was filtered out. In the second case, the noise was filtered out during the interview itself when the notes were taken. Thus despite being different at one stage, the nature and intent of data collection was identical in all the cases and the findings that emerge from each of these two processes are comparable.

5.5.4. Level 3: Cross-case analysis

The third level of analysis is concerned with cross-case comparisons to seek out what is common and what is particular in the cases (Stake, 1994) by means of content analysis. Content analysis involves identifying coherent and important themes and patterns in the data: the researcher looks for "quotations or observations that go together, that are examples of the same underlying idea, issue, or concept" (Patton, 1987:149). This process involves the identification of general and unique themes from all the cases using repetitions, that is topics that reoccur, and the constant comparison method, that is identifying similarities and differences between cases (Ryan and Bernard, 2003) within the categories of inquiry and themes of the descriptive framework. The descriptors in the descriptive framework serve as qualitative codebook. The outcome of this level of analysis is the objective findings based on the collected data.

5.5.5. Level 4: Interpretation and extant literature

In order to develop a deeper understanding of the adoption of BI in SMMEs, Level 3 analysis involved the "clustering" together of findings (Hycner, 1985) without the use of any relevant theoretical literature. In this level of analysis these findings are discussed in the context of extant literature, a process that Eisenhardt (1989) describes as "enfolding literature." The outcome of this level of analysis is the subjective interpretation of the findings that discussed in the context of extant literature.

5.6. Trustworthiness and limitations of the study

In quantitative research the standards for judging research are reliability, validity and generalisability. In qualitative research the emphasis is judging how well the researcher was able to provide evidence that the descriptions and analysis represent the reality of the participants and situations studied (Bloomberg and Volpe, 2008; Creswell, 2009). Some qualitative researchers are comfortable using the same terminology as in qualitative research whereas others prefer to use alternative terminology to better reflect the different nature of qualitative research. Dependability (reliability), credibility (validity) and transferability (generalisability) are used to establish the trustworthiness of qualitative research (Bloomberg and Volpe, 2008). Just as a quantitative study is required to be reliable in order to be valid, a qualitative study must be dependable in order to be credible, and credible in order to be transferable. In the remainder of this section the strategic employed in this research to enhance each of these aspects is discussed.

5.6.1. Dependability

Dependability assesses the quality of the data collection and analysis (Lincoln and Guba, 1985). According to Carter (1999) analysing Miles and Huberman (1994) criteria for assessment of qualitative research, dependability is shown by explaining that the research systematically studied what it claimed to study. Dependability also requires interpretive awareness, that is, the recognition and implications of the researcher's subjectivity (Sandberg in Weber, 2004:iii). According to Gorman and Clayton (2005), findings and can be said to be dependable (reliable) if the researcher's subjective role is outlined, the researcher explained the data collection and recording process in detail, and used multiple sources of data where possible as has been described in this chapter. To address possible participant reactivity indicated earlier, the researcher continuously reflected on how and in what ways she may be influencing participants.

5.6.2. Credibility

Credibility refers to how well the researcher's portrayal of participants matches the participant's perceptions (Bloomberg and Volpe, 2008). In other words, are the researcher's findings supported by the data collected from the participants (Lincoln and Guba, 1985)? Although care has been taken to ensure accurate transcription and capturing of notes and that the results reflect the situations it is attempting to describe and analyse by asking participants to review the initial capture of notes as well as the results, one of the strategies in which to enhance credibility, much of the evidence relies on data from a single individual within each enterprise which is a limitation of this study. Due to the nature of the data gathered it was not always possible to triangulate between sources within a case and the integrity of the data gathered relies on the truthfulness of participants and it is possible that their responses did not describe what actually happens. The interviewer made a conscious attempt to create an environment for open and honest dialogue during each of the interviews; prior interview experience was helpful in this regard. As Easterby-Smith *et al.* (1991:81) discuss, interest and commitment on the part of the interviewer "often produces far better results than clinical detachment" and recommend that interviewees be offered the opportunity to comment on transcripts or written-up field notes or a summary of the results and/or conclusions. Triangulation was achieved through corroboration of background data gathered from the public domain during interviews, both to verify and serve as indicator of truthfulness, multiple probe questions to confirm data provided, interviews with more than one owner-manager where possible, and participant review of the case study narratives and the results arising from analysis and interpretation as explained earlier.

In addition, as mentioned earlier, the interpretive paradigm and qualitative method challenges researchers to examine and evaluate their assumptions and biases toward the research being conducted as these could influence both the collection and analysis of the data. This is another strategy through which credibility can be improved. Through self-reflection the researcher attempted to be aware of possible

bias and personal prejudicies. With respect to the data analysis, the interpretation of data is influenced by the researcher's background and assumptions. There are some strategies that can be employed to overcome the researcher's bias such as confirming the results with participants (Creswell, 2009), outlining the researcher's subjective role (Gorman and Clayton, 2005) and documenting all assumptions. The use of this strategy is documented throughout this chapter by making explicit the researcher's prior knowledge and experience and by indicating expectations and assumptions. The research process and results have also been subjected to peer review through submission and presentation at academic conferences and functions as a form of peer debriefing after the data analysis and interpretations have been made (Given, 2008:200).

5.6.3. Transferability

Storey contends that the diversity of SMMEs reflects the diversity of human beings, which makes generalizations hazardous (Levy and Powell, 2005:viii). The goal of qualitative research is not to produce findings through statistical generalisations that apply to all other situations. However, the likelihood is that the situations described in the study can be applied in some and transferability is about the degree to which the study has made it possible for the reader to apply the findings in the situations investigated to such other situations (Bloomberg and Volpe, 2008; Lincoln and Guba, 1985). Walsham (1993) considers the validity of extrapolation from cases depends on "the plausibility and cogency of the logical reasoning used in describing the results from the cases, and in drawing conclusions from them." Descriptions in the form of case narratives allow the reader to judge the transferability of the interpretation and results. Purposive sampling also allows for the selection of a range of cases with sufficient information richness that makes such descriptions possible.

In this section the criteria for evaluating the trustworthiness of a study was discussed together with the implications thereof and the strategies employed to increase the trustworthiness of this particular study.

5.7. Chapter summary

This chapter discussed the method, procedures and processes for the collection, measurement and analysis of the empirical data were described and explained. Issues of trustworthiness that arise in qualitative research, namely dependibility, credibility and transferability, were addressed and the limitations that arise from the paradigm, design and method choices highlighted. The following chapter documents the findings that resulted from the execution of the research design and interprets the findings within the context of extant literature.

Chapter 6 Research results

"The big work behind business judgment is in finding and acknowledging the facts and circumstances concerning technology, the market, and the like in their continuously changing forms. The rapidity of modern technological change makes the search for facts a permanently necessary feature."
– Alfred P. Sloan, Jr., My Years with General Motors

6.1. Introduction

Having collected the data and prepared the transcripts and field notes in accordance with levels 0 and 1 of analysis outlined in Chapter 5, this chapter presents the results of the third, fourth and fifth levels (levels 2, 3 and 4) of analysis, that is the case narratives, the findings from the cross-case analysis as well as the subjective interpretation thereof.

6.2. Case study narratives

In this section the third level of analysis, level 2 comprising the case study narratives, is presented. Brief descriptions of the selected individual cases are listed in Table 6. One case, Case D, was omitted from further levels of analysis because the owner-manager did not share sufficient information and thus the case narrative is also not included. Each case narrative commences with the profile of the owner-manager interviewed followed by the description of each of the selected SMME to contexualise and describe sources of data, systems and technology used as well as the processes for producing information and its use.

Table 6: Brief descriptions of the selected cases

Case[15, 16]	Legal form	Year est.	Employees[17]	Nature of business	Scope of operations
A	Private company[18]	2000	10	IT services and software	National
B	Close corporation[19]	2000[20]	13	E-learning platforms and content	Regional
C	Sole proprietorship	1995	1	Management consulting	International
E	Private company	2001	130	IT services and software	International
F	Close corporation	2002	9	IT services and software	National
G	Close corporation	2009	1	Graphic design	International

6.2.1. Case A

6.2.1.1. Owner-manager profile

Holding a doctorate degree in engineering Werner[21] established a close corporation (CC) in the early 1990s whilst employed as a university professor to provide information security consulting services to the private sector. With the workload increasing steadily, Werner and a partner founded a private company in early 2000 to develop their first commercial product. In his late fourties Werner is currently the managing director of the private company.

6.2.1.2. SMME description

Company A specializes in the specification, design and development of new information and communication systems, both developed and sold by the company and developed on contract according to client specifications. They also offer

[15] For ethical reasons as discussed under the *Ethical Considerations* section and to facilitate discussion, cases used in this research are referred to as Case A through G.
[16] One of the selected SMMEs, Case D, was omitted from further analysis because the owner-manager was unable to share sufficient information.
[17] Employee count includes owner/manager(s).
[18] A private company is a separate legal entity and is required by the South African Companies Act 1973 (No. 61 of 1973) to perform certain rights and duties. The owners of a private company are shareholders and the number shareholders is restricted by the Act to a maximum of 50.
[19] A close corporation or CC is similar to a private company in that it is a separate legal and tax entity with perpetual succession but it has simpler administration and legal procedures. Owners of a close corporation are called members and membership is restricted to between 1 and 10 natural persons who each has a member's interest in the CC expressed as a percentage. Under the South African Companies Act 2008 (Act No. 71 of 2008) that came into effect on 1 April 2011 no new CCs can be registered but the Act provides for the continued existence of currently registered CCs; however, existing CCs need to comply with the new reporting and filing requirements stipulated in the Act.
[20] Current owner-manager bought business in 2006.
[21] For ethical reasons as discussed under the *Ethical Considerations* section all the names of owner-managers have been changed.

consulting services. Located in a science park in Pretoria the organisation has three owners and employs several software engineers.

Word-of-mouth marketing is difficult because the company operates across different industry different sectors. Printed as well as electronic brochures were produced as part of creating a professional image but Company A mostly markets itself using *Google Adwords* and is satisfied with the results. Clients are mostly other start-ups and small businesses, which implies there is a high risk for cash flow disruption. Since resources are invested in the company it is not cash flush and exposed to prevailing economic conditions. Given the importance of cash flow the company cannot afford staff to be underutilised and thus the owner-managers spend significant time seeking work and making sure existing work is performed effectively and efficiently. Furthermore, the clients are also less sophisticated in terms of understanding the product and associated processes and thus need to be educated on these, adding to the firm's costs.

The company uses *Trac*, an enhanced wiki and issue tracking system for software development projects, for its project management needs; every task is issued a *Trac* ticket and employees meet each Monday to discuss the week's tickets. Open source software *CVS* is used as a version control system (configuration management) for source code and customer relationships are managed using wiki pages. Company A uses *Pastel*'s accounting software and payroll. The current implementation of *Pastel* requires 5 days off-line time a month to send files to bookkeeper for updating. Although the company has bought the latest version of *Pastel* to comply with recent legislation on electronic invoices it has not yet been implemented. In terms of the company's own software, Werner indicated that the firm prefers to use open source systems and adapt it to their needs as has been done with *Trac*.

Company A uses the internet and the nearby university's multimedia centre as sources of external data for market research, for example, to determine the number

of cell phones in Korea, and to identify potential clients. The owner-manager mentioned that overall he prefers less direct personal interaction with potential clients such as e-mail instead of face-to-face and telephonic interaction and mentioned that it is often the case with engineers. Therefore the company would like to have access to information on tenders even though tenders are expensive for SMMEs because of the large overheads associated with unsuccessful tenders. The owner-manager feels that the information available to manage the enterprise is sufficient but mentioned that the interpretation of information, particularly financial statements, can be problematic in addition to monthly interruption in access to internal financial data.

6.2.2. Case B

6.2.2.1. Owner-manager profile

After studying linguistics and theology Thomas embarked on an academic career that culminated in a position as senior researcher at a major research university in South Africa. During this time he completed a doctorate in theology followed by a professional masters degree in IT. He left academia to start his own import business in 2003. In 2006 he and a partner acquired an existing concern in e-learning solutions. Currently in his late 40s he combines an academic career as a research fellow at a South African university in information studies with his position as Chief Executive Officer (CEO).

6.2.2.2. SMME description

Firm B is located in the Gauteng province and inherited two franchisees in other provinces in the country, one covering the Western Cape, Eastern Cape and Northern Cape provinces and one in the Free State province. The firm provides interactive technology-based solutions to high schools located mainly in the Gauteng province by developing and supporting integrated, accredited and curriculum-based products and services for a variety of subjects that supports both schools and their learners who can proceed at their own pace through the learning material.

Growth is based on expanding the number of clients and product offerings. Part of the existing concern acquired in 2006 was a franchise for learning content for primary schools; the owner-managers are in the process of selling this so that they can focus on their existing business in high schools and also expand their own business into primary schools, which is more profitable because more money is spent in this segment. The firm is also embarking on a partnership with an initiative that seeks to educate children across the African continent. In terms of the future the firm is focusing on mobile learning and hopes to sell tablet devices with touch screens and networking capabilities with pre-loaded content with Wi-Fi capabilities for updates and live question-and-answer sessions to schools and scholars. To this end the firm recently signed a contract to be agents in South Arica for high school content in mathematics, biology and physical science developed by a Polish company; the content still needs to be mapped against the local curricula.

At the time of the interview the business targets high schools that pay a monthly fee per scholar to Firm B for a server to be placed at the school with content that is owned and maintained by Firm B on the schools' premises. This fee also covers support and updates. In order to improve future cash flow the fees per learner are lower the longer the contractual term. Updates to the server are either done remotely or with DVDs for larger updates due to limited bandwidth. The firm backs up data from the server when online which is stored in the cloud. This allows Thomas to monitor usage and follow up pro-actively if usage is limited to avoid contracts not being renewed. When taking over the business in 2006 the platform used was *Microsoft Windows* but the owner-managers changed to the open source platform *Ubuntu*, a Debian-derived Linux operating system that was developed by a team under the South African entrepreneur Mark Shuttleworth.

The firm uses *Teambox*, a web-based solution that combines social collaboration tools with online project management, for management of projects and tasks within the firm. Thomas prefers *Teambox* over *MS Project*, which he considers to be too

structured. Another reason for using *Teambox* is that it is integrated with their chosen e-mail platform, *Google Apps*, also a web-based solution, that will alert him to overdue tasks. Teambox is a central repository for all documents related to a particular school such as spreadsheets that lists the support tasks that employees need to complete.

Firm B uses *Pastel* accounting software and uses the services of an auditor external to the company. The auditor also acts as financial advisor and sits with the owner-manager on a weekly basis to analyse *Pastel* data. Over the past year the owner-managers have used a financial advisor that uses *Pastel* data and *Teambox* data in a custom-developed *Excel* spreadsheet for analyses such ratios of employee cost to turnover, etc. a monthly basis. The financial advisor also suggests and monitors targets. Bank balances are checked on a daily basis in order to monitor cash flow to know whether salaries can be paid since the business isn't cash flush. The owner-manager indicated that he would prefer to have access to financial analysis and trends on a more regular basis although he isn't focused on finances and prefers to focus on developing new initiatives. He indicated that time is a limiting factor as he does not have sufficient time to investigate the available systems and technology or even to test those that are recommended to him by trusted parties.

Although the firm is one of 23 approved providers by the Gauteng Education Department this route is very ineffective and the process is not transparent. Sales and marketing thus targets schools directly through executive breakfasts to which schools are invited, cold calling to offer demonstrations and stalls at exhibitions, the latter being the least effective. However, it is difficult to forecast sales because the client base consists predominantly of state-funded schools that are subject to the central and provincial governments' policies that are subject to change. Sales to other organisations are contracted out but the owner-manager works closely with the person responsible for this and does sales forecasting on spreadsheets.

6.2.3. Case C

6.2.3.1. Owner-manager profile

Whilst employed at a major financial institution in South Africa Seeff developed business simulation software together with a major consulting house to teach loan officers in branches how businesses are run to enable them to make more informed decisions about loan applications. Seeing a gap in the market he left the financial institution in 1995 to consult independently as primarily a training consultant but also general business consulting around issues arising from the training. After growing to 4 employees Seeff realised that he didn't want to manage people and preferred to work independently directly with his clients and allowed the business to downsize naturally. Now in his mid-fifties he is a sole owner. Working from a home office he travels regularly to provide consulting services to his national and international clients.

6.2.3.2. SMME description

Firm C conducts strategic capability analysis to position its client organisations for the future through, amongst others, business simulations for training and scenario planning as well as coaching and leadership development programmes. Clients are international and in a variety of industries. Because Seeff is the sole employee he is quite busy balancing his tasks; he spends on average 3 weeks per month working and 1 week on new business development and developing new materials. He partners with a network of trusted associates, each with their own separate businesses, to grow his client base.

The past year was the first year that Firm C suffered somewhat financially. One of the reasons is that he prices his contracts as total cost to company and thus need to absorb any cost increases such as in air tickets to his international clients for example, which reduces his margins and thus his profit. He considers personal relationships with his clients to be of paramount importance and says that in an individual-owner consulting business one should "establish relationships and the profit will come later. You also need to be good enough to ensure you have a follow-

on project." Thus as a contract progresses he works to make sure that he is responsive to what is happening in the company in order to ensure follow-on business.

He finds new business through word-of-mouth referrals, both through current and previous clients as well as his network of associates, and serendipitously, for example, at a cycling event. However, he states that it is more difficult to get new business and of late he also had to pro-actively look for work. According to him the reasons include financial pressures in existing and potential client organisations with clients' budgets shrinking as well as increased competition in the marketplace. As a result the owner-manager identified how to better adapt and address issues he identified at client organisations, chief amongst these being performance management, and is developing materials to address this need. He also tries to reuse project materials if it isn't exclusive to a particular client in order to increase the return on investment of his time that went into developing the materials.

Seeff uses technology to improve the functionality of his business simulations but does not want it to be "too high-tech so as not to miss the point"; he considers some of his competitors—that he refers to as "click-and-play competitors"—are overdoing the technology aspect and not focusing enough on the scenarios and events that are fed into the simulations. He considers the fact that he incorporates unlikely but possible events into his simulation to be his differentiator in the market. However, he has decided that his business simulation offerings do not work as well with the younger generation (Generation Y) and that it would be too difficult and thus not cost-effective for him to attempt to operate in that market and decided not to try to enter this market segment.

The owner-manager indicated that he does not have the discipline to use an accounting package and "don't want to enter data every day" but that he tracks everything that he wants to keep track of in his head and uses spreadsheets to

summarise contract data. On an annual basis he provides his auditor with these spreadsheets and as a result "legal compliance is always a challenge for me." He also sits with the auditor on annual basis when preparing tax returns to see what happened in past year and to consider adjustments for the next year. He indicates that he wants to be profitable but also wants to do work that he enjoys and finds stimulating; for example, he teaches at university in Atlanta for which the remuneration does not cover the expenses and his auditor suggested that he combines this with project, which he subsequently did.

In terms of external information, he needs to understand what his competitors are doing. Although there are many consultants in the market he operates in a relatively small segment of market and considers himself to have 3 to 5 direct competitors. When he works at clients where these competitors also also working he tries to find out what they are doing. He has also worked with his competitors when their offering is somewhat different to his own and he needed their offering as part of the project outcome. He also needs to "understand potential clients and understand the opportunity they present" to him and he conducts extensive research on a company prior to meeting a representative for the first time. He uses primarily publically available information, mostly from the Internet and "tries to read between the lines" to identify potential "touch points" since this allows him to engage with client more quickly. Last, he uses the media and "tries to read widely and listen carefully and think about things" in order to understand how this may change the business landscape and whether he can use it. He uses an e-mail program, *MicroSoft*'s *MS Outlook*, available on his phone and at his home office to make notes about things that catches his eye and he spends a day a month to review these notes and to follow up by conducting searches on the internet on those he thinks are issues, potential issues or applies to his clients or potential clients and could either be "events" in his simulations or "entry points" to new clients.

6.2.4. Case E

6.2.4.1. Owner-manager profile

As audit partners of a Big 4 accounting firm Jacques and Fred saw an opportunity to provide a brand independent service in the printing industry and started his company with 3 others in 2002. Currently in their mid-fourties they are the CEO and chief operational officer (COO) respectively of their medium-sized company with an international reach.

6.2.4.2. SMME description

Company E offers independent managed print services to local and international clients of all sizes. The head office is located in Pretoria, South Africa, with site-specific offices located in several Southern African Development Community (SADC) and North American locations. Having developed vendor-neutral methodologies in-house the firm focuses on partnering with clients to manage their printed output in order to reduce their clients' printing costs, improve employees' productivity and reduce the associated environmental impact. Company E takes over an organisation's entire fleet of output devices in order to demonstrate to the organisation what it spends on document output. Based on the results Company E redeploys the devices for better utilisation and manages the hardware and consumables on behalf of the client. In order to ensure profit Company E uses several operational reports to manage output and consumables. These operational reports result in "masses of data" and these are integrated into dashboards that are produced through manual manipulation for use by their onsite teams as well as their clients. The company has also contracted a software development house to develop a custom solution to be used for managing clients' devices. The solution encompasses asset and consumable management, supplier management, service desk management and associated operational reporting.

According to both the owner-managers interviewed, the relationship with clients and creditors alike is very important because of the potential impact on cash flow. As a result clients are provided with a report that breaks down each invoice in order to

eliminate queries and subsequent delays in payment. In the past spreadsheets was used to produce paper-based invoices but the company is moving toward using *Talend*, a set of web-based open source tools for integration and data management, to produce electronic invoices. Both owner-managers indicated that initially they felt they knew "in their heads" what was going on in the business but as their number of clients increased it became impossible to keep track and manage the business with recourse to stored data. Although the business is large enough to allow them to delegate their tasks they are still very hands-on, particularly the COO, and they have busy schedules that do not allow much time beyond managing existing business and seeking new business.

Given the unique nature of their business the company needs to engage in educating clients about the benefits of their service offering. However, given that their emphasis is cost saving the current economic conditions are in their favour. New business opportunities are found through networking where Company E is often sub-contracted by other IT houses or consulting firms and by submitting tenders. At the time of the interview Company E did not have a dedicated sales force.

6.2.5. Case F

6.2.5.1. Owner-manager profile

After graduating in 2002 with a Bachelor degree in multimedia Gustav together with 3 fellow graduates started a website design business as they "weren't sure what to do." Now in his late twenties he is both a member of the close corporation as well as a manager and multimedia programmer in the CC.

6.2.5.2. SMME description

Having started with web design and small websites, Firm F now specialises in web applications. They currently have a diverse range of software solutions, including debt collecting software and a habits-based web-based recruiting tool, which they've developed upon request of outside experts with whom they partner to jointly sell the solutions into the marketplace on a commission basis. They are constantly developing these products based on client requests. Given the joint sales Gustav

remarked that intellectual property is “tricky” and that he doesn’t know “if we have that many contracts in place.” However, he indicated that problems can usually get resolved informally although no major problems have cropped up yet. The firm’s philosophy is results-driven and people can work however they want “as long as the results are fine at the end of the month.” If results are not fine, there isn’t a formal way of investigating where things went awry but is dealt with in an informal manner.

The CC has 4 full-time employees and 5 interns from nearby university for a total count of 9 workers. Although the owners are trying to grow their business by a few more people they want to keep it small and manageable to allow them to “make decisions quickly and adapt to the environment easily”. Even though it is a down economy they are busy. They could “easily find more work” as they are approached by clients based on word-of-mouth through informal networks, however, finding people who is a good fit with the enterprise and have the rights skills is a challenge. The firm is trying to cut down on accepting work as it comes in and transition to marketing and sales of their existing products but is finding it difficult to effect this change.

None of the owner-managers have formal business training that has the advantage according to Gustav that “they can figure stuff out and do things their own way” because they have a fresh perspective and no preconceived ideas. This is the reason why they prefer to employ students rather than people who have been in industry and thus their large contingent of interns. However, he indicated that although he had business management as a subject in his university degree course it wasn’t very effective:

> *“It [the business management course] is so unrelated to any of your experiences that I hardly took any of it in. It was mostly just read the textbook and pass the exams. Only once you start working you actually realise the stuff is quite useful and then it would actually be nice to go back and sit in the*

classes again because it is so much more relevant. So I think doing a business course at varsity doesn't actually help that much. I think that you need to get out into business and then come back and maybe do a specialised degree."

The firm also does not make use of formal consulting services but one of the partners for whom they developed software that they are selling jointly is a business consultant at large organisations and he occassionally advises them on an informal basis. According Gustav there is "a huge need for something that is cheaper and quicker than getting consultants in" and suggested automated tools with multiple choice questions that can give quick and relatively inexpensive feedback, particularly on business performance.

Firm F uses *Quickbooks* for accounting with some predictive analytics but since they do not have training in accounting they aren't always sure how to interpret it; they have an external accountant that gives them advice so that they can "get insight on what is going on." Since one of the owner-managers is responsible for bookkeeping and it takes a lot of his time they want to get a trained bookkeeper to take over bookkeeping. Gustav considers *Quickbooks* to be easier to use than the other systems although it is possible to change historical data without an audit trail and therefore auditors aren't in favour of the software.

The firm also uses *Google Docs* for their documents such as salary information. In terms of project management there is no single system: the owner-manager interviewed uses online software to manage project tasks but employees can use whichever system they are more comfortable with and two employees use a white board with sticky notes. Although a single system with integrated project information would be nice they've never found a system that has all the desired functionality. He added that often systems add "too much admin and actually outweigh the benefits of being able to see what everyone is working on."

In terms of decision-making the owner-managers try to keep all employees involved. Every Tuesday morning all the employees meet to talk about their current projects and what's happening. Any decisions that affect everyone are discussed during these meetings to obtain their input but on minor decisions the owner-managers will talk and decide "on the fly." The owner-manager admitted that their biggest gap is that they do not really have enough financial information easily at hand, for example, to see if salaries can be increased, they do not have projections of how well the company is doing to be able to decide and are trying to set up processes to share information better:

> *"It [internal information] is something we could definitely do with more of but we don't have the systems that make it available." … "to see areas are on which you can improve."*

The firm uses open source for their development because there is a bigger community of people to ask advice from on Internet forums and consider it to be "a lot easier than closed source." They do not use many *Microsoft* products because they are much more expensive although you do get a lot more formal support. The owner-manager commented that "for a small company it's a lot more cost-effective using open source software."

6.2.6. Case G

6.2.6.1. Owner-manager profile

After earning a postgraduate degree in Information Design in 2003 and several jobs as graphic designer at other design agencies, Rudi started his own strategic brand management agency with design as its core asset in his early thirties in 2009 in order to be independent and have more control over his life and his future after a position in a new initiative failed to materialize. He aims to offer his clients sophisticated creativity, specialist design solutions and a fresh perspective on

branding. Based in a design quarter he is currently the sole director preferring to contract-in services as required although he would like to grow his business in future.

6.2.6.2. SMME description

Having initially registered two CCs, Rudi found that this two-pronged approach didn't work "because it was difficult to keep everything going and keep track of everything" and he ceased operation of one of the businesses. Even with a single business he feels hard-pressed to attend to all his responsibilities a sole owner and employee: finding clients, performing work that includes creating the concept and executing it, managing cash flow and collecting money, and keeping up-to-date with industry trends through reading and training. As he said it is "definitely a struggle for designers who are trying to balance the business world with finding ample time for creativity." As a result he is prepared to use outside professionals that he can trust to improve efficiency:

> *"I've come to the realisation that I can't do everything [by] myself. I'm determined to find reputable and reliable professionals that can help me [to] accomplish more."*

At the time the interview took place Rudi used an accountant for tax preparation and a lawyer friend helps him with respect to signing of project outlines prior to commencing work for clients. He also uses web-based software extensively to increase his efficiency: *Campaign Monitor*, e-mail marketing software for web designers, Basecamp, an online project collaboration tool, *Freshbooks*, online invoicing, time tracking and billing software, and *Mozy*, an online backup service. Maintaining good personal relationships with clients is particularly important and *Freshbooks* helps in this regard as clients prefer to receive electronic invoices together with all supporting documentation. He previously used spreadsheet software to do this and finds that apart from improved client relations, *Freshbooks* saves him significant time. He decided on adopting the software after reading about

it on the Freelance Switch website[22] in another SMME owner-manager's blog. Clients also have direct access to project timelines, the 'To Do' list and files via *Basecamp* and this saves him significant time due to reduced queries that he would otherwise have to answer telephonically or via e-mail. Relying exclusively on web-based systems means that the CC is dependent on internet connectivity which presents a problem for the owner-manager: most telecommunications providers require two-year contracts that aren't updated to reflect price reductions or increased speeds over the contractual period.

Rudi is satisfied with the web-based applications that he uses and the information it provides him but would like to see more pro-active support and advice at the time the need arises, for example from trusted institutions such as the revenue service (SARS) with regard to taxation and the registrar of companies (previously CIPRO, now CIPC) with regard to registration and ongoing filing requirements. He would also like to have a better way of determining what work is available.

The findings from the cross-case analysis together with the discussion thereof within the context of extant literature are presented in the next section.

6.3. Cross-case analysis findings and discussion

This section presents the findings that arise from the cross-case analysis (Level 3) and discusses these findings in the context of extant literature (Level 4), which includes the subjective interpretation of the findings by the researcher. The newly established micro-enterprise (Case G) makes extensive use of relatively recent ICT solutions whereas well-established micro-enterprise (Case C) uses relatively simple ICT for management and administration purposes based on personal preference. This result supports the literature that the diversity of SMMEs reflects the diversity of human beings (Storey in Levy and Powell, 2005:viii). Even so commonalities and themes were evident across cases and several findings emerged with regard to the

[22] URL: http://freelanceswitch.com/

use of BI in knowledge-based growth SMMEs in South Africa. These cross-case findings are summarized in Table 7. The support for these findings are discussed in the context of extant literature in the following sections.

Table 7: Key findings from the qualitative case studies of 6 South African knowledge-based growth SMMEs

1. All owner-managers in the selected knowledge-based SMMEs are well educated in their domains but not necessarily in the management and administration of a business.
2. A consensus among all the selected SMMEs is that information and therefore data plays an important role in managing their enterprises.
3. All enterprises use information generated from internal and external data sources for decision-making and almost all would like to see improved access to existing data sources and/or access to additional data sources.
4. All the owner-managers relied on informal BI although the nature and number of sources, the systems and technology used as well as the processes of production and consumption varied.
5. Data integration, manipulation and analysis are predominantly manual using internally developed spreadsheets or custom-developed spreadsheets provided by external parties.
6. ICT is seen as a means to achieve business objectives and inexpensive, flexible solutions that are easy to implement and use are preferred, predominantly web-based applications (SaaS).
7. Owner-managers who are prepared to use ICT to improve the efficiency and effectiveness of their businesses do not have sufficient time to explore the available options.
8. Apart from owner-managers, clients and legislation drive the use of ICT.
9. SMMEs prefer advice from those they already have relationships with and trust such as accounting and tax professionals; these sources are also considered less expensive compared to formally engaging business consultants.
10. External assistance from trusted parties is sometimes required to assist with data analysis although owner-managers would prefer to do this by themselves and on a more regular basis.

6.3.1. Owner education

As one would expect in knowledge-based firms the owner-managers are well educated with all holding tertiary degrees as highest qualification: three doctorates (Cases A, B, C), two honours degrees (Cases E and G) and one bachelor degree (Case F). This in line with educational levels reported for BSM6 and BSM7 in the Finscope survey of South African small businesses (African Response, 2007). The results also support the statements by Blili and Raymond (1993) and Chesney (2003) that owner-managers have expertise in their respective professions and industries but not necessarily in management or the administration of a business.

In Case C the owner/manager had extensive experience as a manager in a large organisation but even so was not prepared for entrepreneurial management, a finding that confirms that of Deakins and Freel (1998) where the transformation from a senior manager in a large organisation to a SMME owner/manager is "fraught with difficulty for unprepared, but otherwise competent individuals." Even though the owner-manager's degree in Case F did include small business management-related subjects he indicated that at the time it was purely theoretical and was not very useful or helpful in his current situation as an owner-manager. These findings align with that of cognitive scientists, who found that a person does not collect unneeded facts and wait for a suitable moment in which to use them but rather seeks and makes use of facts when a problem presents itself (Calder, 2006:1362). Furthermore, Deakins and Freel (1998:153) found in their four case studies that "a large part of entrepreneurial learning is experiential." By providing improved and faster access to integrated internal information BI systems and technology can potentially increase the rate of entrepreneurial learning by providing faster and improved feedback to the owner-managers on their decisions and actions. It can also save time over the medium-term on the processes of production and consumption increasing the efficiency.

6.3.2. Perceived value of information for decision-making

All owner-mangers were unanimous about the importance of information and data to managing their enterprises; as a result they consider the sources and the processes of production and consumption with technology and systems as a means to an end. All the owner-managers interviewed expressed the desire to have improved access to data, both structured and unstructured, as well as data from internal and particularly external sources. This finding echoes that of Gordon and Key (1987) that a common problem for SMME managers is a shortage of suitable information on which to base decisions. However, this finding contradicts the more intuitive, less rational decision-making model of enterpreneurial decision-making in SMMEs developed by Gibcus and Van Hoesel (2008). Lybaert (1998:188) found that "SME owner/managers with a greater strategic awareness, with less firm experience prior

to their present position and with a greater desire for growth use more information" (Lybaert, 1998:188). One explanation for this finding may therefore be that these are growth SMMEs and thus may be more inclined to use information. It may also be that these owner-managers are less likely to rely on their intuition or instinct as it isn't as well developed yet due to their relative lack of knowledge and experience with regard to business management and administration or that they have a greater need to rationalise intuitive decisions. The participating owner-managers may also have a greater strategic awareness and thus be inclined to use and be more prepared to use information. It may be also be that the owner-managers in Gibcus and Van Hoesel's study made more intuitive, less rational decisions because they had less access to relevant information, had more business experience prior to the study or did not desire greater growth. Thus the results of the study suggest that owner-managers who rely on informal data sources, such as social networks, and informal decision-making do so not from a lack of willingness to use formal data sources as suggested by earlier research (Gibcus and Van Hoesel, 2008; Hill and Scott, 2004) but due to a lack of knowledge of, access to, and ready availability of such sources, particularly with regard to external data.

6.3.3. Use of business intelligence

Not all the owner-managers referred explicitly to BI during the interviews and none distinguished between BI and CI as was discussed in Chapter 3. From their perspective both structured and unstructured data, and internal and external data is needed to meet their information need. This finding supports the decision in Chapter 3 to include CI within the scope of the BI descriptive framework. All the owner-managers relied on informal BI as discussed in Chapter 3 although the nature and number of sources, the systems and technology used as well as the processes of production and consumption varied.

SMMEs tend to have more limited internal and external source data available from which to generate BI. An entry-level accounting package, for example, stores substantially less data than financial modules in an ERP system. The types of

operational accounting systems in place were standard: all the SMMEs interviewed use accounting software such as *Pastel* or *Accpac* although only one (Case F) indicated that they use available add-on BI modules even though the owner-managers weren't sure how to interpret the results. Except for the two sole owners (Cases C and G) all SMMEs had human resources and payroll systems. All SMMEs had a way to keep track of customer relationships although not in a formally developed system with one SMME, for example, using a wiki page for each customer (Case A) and another using a spreadsheet for each client contract (Case C). These systems are not integrated at either an application or data level. External data sources regarding industry-specific and/or competitor data are even more limited although there is evidently a great need for such information.

As an enterprise grows there is more internal data available that can be used as input to the decision-making process and thus one expects an increased need and potential for formalised BI systems and technology. The sole owners and owner-managers who work alongside employees appear to have a good grasp on what is happening in their businesses "in their heads" (Cases C, F and G) but this changes as SMMEs increase in size and complexity, namely for owner-controllers where an enterprise is large enough for the owner to be solely concerned with managing the business (Cases A and B) or for owner-directors who control their business through developed structures based on delegation of managerial functions (Case E). Even in the medium-sized organisation (Case E) that has significantly more data at its disposal data integration, manipulation and analysis processes are predominantly manual using internally developed spreadsheets or custom-developed spreadsheets provided by external parties. This finding corrobrates Venter and Tustin's (2009) statement—a statement not supported by research—that smaller organisations with fewer than 100 employees generally have less formal BI as well as Duncombe's (2004:19) finiding that even enterprises that have achieved a degree of formalisation retain a degree of dependency on informal information for decision-making. It would appear that SMMEs of all sizes find it challenging to make the transition from

informal to formal BI in order to make efficient use of progressively more advanced analysis as information needs, data volumes, sources and complexity increase. This may be explained by Duncombe's (2004:19) finding that a persistence of informal practices leads results in enterprises failing to build the internal competencies and skills necessary to deal effectively with formal information. This may also be due to a lack of applicable prior experience with formal BI, management training and/or to the time pressures that owner-mangers operate under since they may be too busy with operational issues to give attention to ICT selection when it comes to decision support.

In terms of the systems and technology used to produce and consume information the study revealed a preference for inexpensive, flexible solutions that are easy to implement and use as a result of 'resource poverty,' a result that confirms previous research with regard to packages being preferred over in-house software development (Cragg and King, 1993; Fink, 1998). In contrast to earlier studies, however, this study revealed a preference amongst SMMEs of all sizes for the more recently available open source, web-based applications over in-house packaged software. Geographic location can be an issue for the use of ICT. While developed countries have ready access to Internet connectivity, in many developing countries "the supply of resources such as electricity and data communications are erratic and sometimes non-existent" (Levy and Powell, 2005). An oft-cited reason for failure to exploit web-based opportunities in South Africa is "the lack of a fast and reliable Internet connection and the cost and reliability of telephone links" (Matthews, 2007). However, Internet connectivity, speed, quality of service and reliability, and affordability have increased significantly with the introduction of competitive ADSL and wireless broadband offerings making SaaS a much more attractive option although contractual obligations can be a constraint as in Case G. Several of the SMMEs use SaaS systems to manage and keep track of projects (Teambox in Case B, *Basecamp* in Case G) in addition to other systems such as document version control systems (CVS in Case A). Apart from data ownership and security risks,

none of which owner-managers mentioned, other issues are service availability, reliability and continuity that is affected by the service provider but also by the power supply. South Africa has experienced planned and unplanned power outages in the recent past (Eskom, 2009) and this may also impact the use of SaaS, however, this was not mentioned as an inhibiting factor for used of SaaS.

None of the owner-managers interviewed expressed desire for a specific BI system or technology even when there was a desire for improved information manipulation and analysis that may imply there is a lack of awareness of available options. According to Falkof (quoted in Andric, 2009), one of the biggest problems facing SMMEs is ICT: without ICT they cannot compete but it is also difficult to choose the right solution mainly because the decision-makers are not well informed on the different systems available. All but one of the owner-managers (Case C) expressed the view that they do not have sufficient time to explore available systems and technology unless there is a pressing need or they become aware of a technology for which they see an immediate benefit in their business.

6.3.4. External advice and support

Because of limited resources many SMMEs have no choice but to rely on external advisors for "significant knowledge transfer to make viable contributions to their business" but this has been problematic (Chibelushi and Costello, 2009). SMMEs do not always understand the role of consultants and the help of a good one isn't always enlisted (Yap *et al.*, 1992) and SMMEs are often unsure about the quality of advice they receive (Igbaria *et al.*, 1998) since the quality, motivation and independence may be difficult to determine (Maguire *et al.*, 2007). It is a challenge for SMMEs to identify trustworthy, affordable and proficient consultants and SMMEs are reported to prefer trusted, informal and inexpensive sources (at least in terms of immediate direct costs) such as personal contact networks that include friends, relatives, other SMME owner-managers, as well as through professional associations, Internet research, popular magazines and trade publications, and exhibitions (Chibelushi and Costello, 2009; Chiware, 2008; Gibcus and Van Hoesel,

2008; Huang, 2009; Hill and Scott, 2004). The SMMEs in this study were no different preferring advice from those they trust and have a relationship with such as friends, acquaintances and their accounting and tax professionals (Case A, B, C, F and G), possibly because it is easier to assess the quality and motivation of these advisers; these sources are also considered less expensive although the total cost wasn't considered, for example, if the advice turns out to be incorrect or inadequate or opportunity cost. This contrasts previous research that found that SMMEs are often reluctant to accept external advice (Storey, 1994; Storey and Westhead, 1996).

The results indicate that whilst owner-managers of the SMMEs selected in this study are highly educated individuals with expertise in their industries they do not necessarily have expertise in management and administration of a business. As such they need assistance, for example, to interpret financial data or conduct real-time analysis of their data. All the owner-managers, however, indicated that they would prefer to be able to do this for themselves on a more regular basis, confirming previous research that found that most owner-managers have a strong preference for autonomy and independence (Storey, 1994; Storey and Westhead, 1996). Thus timeous advice that empowers is more likely to be well received. This may be one of the reasons SMMEs may be hesitant to engage consultants is that they are not certain that adequate knowledge transfer will take place to justify the investment. As Soriano *et al*. (2002) state advisers' duty is not just to provide a report with recommendations or an implemented system but also to develop their client's ability to understand and learn from them and to train their clients to resolve similar problems in future in order to prevent a strong dependency on the adviser. Of course, certain advisers prefer this dependency since this will more likely ensure repeat business. Failing to realise that when an SMME, most often the owner-manager, continuously improves and learns from the consultant the possibility for an ongoing partnership with a secure revenue stream is more likely.

6.3.5. External influence on ICT use

Since the decision-making power in SMMEs is held by the owner-managers, the adoption of any technology into an organisation is heavily reliant on the owner-managers' acceptance of the ICT (Fink, 1998:244; Lybaert, 1998:188). For SMMEs good relationships with their clients and creditors are vitally important since most SMMEs are vulnerable to cash flow disruptions. Three of the six SMMEs (Cases A, E and G) need to be able to proactively share information with their clients, particularly line item detail on invoices—the lack of which is often used as excuse to query and delay payment negatively impacting cash flow—either on paper or electronically. This requirement influenced their choice of system, a finding that confirms that of Bharati and Chaudhury (2006:93) that clients, apart from the owner-managers, have the most influence on SMMEs' decisions to adopt ICTs. Apart from customers and top management legislation also impacts ICT decisions. For example, legislation regarding the requirements for issuing tax invoices (Value Added Tax Act 89 of 1991) and revenue service guidelines with regard to electronic tax invoices (*VAT404 Guide for Vendors* and *VATNEWS 20* issued by SARS) have affected SMMEs with one SMME needing to upgrade to a new version of their accounting software package (Case A) and another owner-manager being uncertain whether his SaaS solution that allows clients access to electronic tax invoices complies with the legislation (Case G).

Systems and technology to support decision-making is unlikely to be required by clients or legislation and thus the owner-managers would be the primary initiators for any BI system and technology. Thong and Yap (1995) suggest that managers who are highly innovative and have a positive attitude toward ICT together with a competent ICT background are more likely to be successful in adopting new ICT. Given that all the owner-managers interviewed are positive about using technology to ensure and improve their business management and administration a more formal BI solution may well be adopted except in Case C where the owner-manager is satisfied with his existing information provision. If there are no problems with data

and if everyone in the organisation is getting the information they need, there is no need to consider implementing further BI processes or systems and technology.

6.4. Chapter summary

The purpose of the empirical research was to engage with owner-managers as the key decision-makers in South African knowledge-based growth SMMEs to explore the use of BI in these enterprises to increase understanding as there is a lack of literature on the subject. All the selected owner-managers use information to manage their business and relies on informal BI as discussed in Chapter 3 although the nature and number of sources, the systems and technology used as well as the processes of production and consumption varies. Most of the participating owner-managers require assistance with advanced analysis and interpretation of their existing data as well as identification of potential additional sources of data. The participating owner-managers' accounts were compared to what has been reported in the extant literature and several issues reported in the literature were confirmed to also apply to the selected South African knowledge-based growth SMMEs. The results indicate that a shortage of suitable information on which to base decisions is also common amongst these SMMEs. The selected owner-managers have expertise in their respective professions and industries but not necessarily in management or the administration of a business. Any training and education needs to be relevant to the task-at-hand. The selected SMMEs in this study also prefer advice from those they trust and have a relationship with as has been reported in literature, including friends, partners and their accounting and tax professionals.

The results contradicted some issues reported in literature. In contrast to earlier studies this study revealed a preference amongst SMMEs of all sizes for the more recently available open source, web-based applications (SaaS) over in-house packaged software. Unlike some previous research the study also found that the selected owner-managers are prepared to accept external advice from trusted parties although they would prefer to be independent and autonomous.

SMMEs require simple, inexpensive yet customisable BI solutions that ideally can be scaled up as needed as the business grows without requiring significant resources. Given the nature of BI, owner-managers will be the main drivers for the introduction of formal BI systems and technology in their enterprises. The following section considers the implications of these findings and suggests avenues for future research based on the results presented in this chapter.

Chapter 7 Summary, implications and further research

"Science is the organized, systematic enterprise that gathers knowledge about the world and condenses the knowledge into testable laws and principles."
— Edward O. Wilson

7.1. Introduction

As outlined in the first chapter the purpose of this study was to engage with owner-managers as the key decision-makers in South African knowledge-based growth SMMEs to explore the use of BI in these enterprises given the lack of literature and determine whether the SMMEs use BI. The study had three objectives: first, to understand whether BI is used in SMMEs and if so, to describe the BI practices and technologies in the context of the particular SMMEs, and if not, to understand why not. The second objective is to indicate the implications for BI in SMMEs of the research results for SMMEs and their owner-managers, BI vendors, and policy makers in order to improve entrepreneurial practice, one of the two fundamental questions of entrepreneurship (Bygrave, 2007), and third, to make recommendations for future research. This chapter addresses these objectives based on the empirical research and literature review prior and subsequent to the empirical research by providing a summary of the findings presented in Chapter 6, discussing the implications, revisiting the significance and contribution of the research and providing recommendations for future research.

7.2. Summary of findings

Growth SMMEs play a significant role in a country's competitiveness and economic development with the efficiency of small and medium-enterprises used as a criterion in the IMD World Competitiveness Yearbook (WCY) calculation. ICT can play an important role in making SMMEs effective and increase the competitive advantage of SMMEs (Maguire *et al*., 2007) and the right use thereof it can enable SMMEs to

compete with larger firms but in order for ICT to be adopted in an SMME the owner-manager has to believe that the new ICT will bring advantages to the firm (Nguyen, 2009:177). The purpose of this study was not statistical generalisability, which is a problematic endeavour in both interpretive research and in SMME research as discussed in Chapter 1, but to explore the nature and use of BI in selected South African SMMEs.

Due to the interpretive approach the results this research produced are highly contextual. Even so, commonalities and themes were evident across cases, many of which confirmed earlier research. All the selected owner-managers use information to manage their business and relies on informal BI as discussed in Chapter 3 although the nature and number of sources, the systems and technology used as well as the processes of production and consumption varies. Most of the participating owner-managers require assistance with advanced analysis and interpretation of their existing data as well as identification of potential additional sources of data. The participating owner-managers' accounts were compared to what has been reported in the extant literature and several issues reported in the literature were confirmed to also apply to the selected South African knowledge-based growth SMMEs. The results indicate that a shortage of suitable information on which to base decisions is also common amongst these SMMEs. The selected owner-managers have expertise in their respective professions and industries but not necessarily in management or the administration of a business. Any training and education needs to be relevant to the task-at-hand. The selected SMMEs in this study also prefer advice from those they trust and have a relationship with as has been reported in literature, including friends, partners and their accounting and tax professionals. The results contradicted some issues reported in literature. In contrast to earlier studies this study revealed a preference amongst SMMEs of all sizes for the more recently available open source, web-based applications (SaaS) over in-house packaged software. Unlike some previous research the study also

found that the selected owner-managers are prepared to accept external advice from trusted parties although they would prefer to be independent and autonomous.

Whilst not all SMMEs will benefit from having the entire spectrum of BI systems and technology at hand, this study suggests that all SMMEs have information needs and that formal BI can play a positive role in meeting these needs in SMMEs receptive to formal BI as indicated by Tustin and Venter (2007) and as such it is worth considering the implications thereof.

7.3. Implications

Wolcott (1990:58) states that qualitative research can conclude with either recommendations or implications. Although recommendations are far more direct the limitations of qualitative research with regard to generalisability make recommendations hazardous and therefore the researcher presents the implications of the research results. The findings imply that owner-managers recognise the value of both information for decision-making and the role of systems and technology can play in supporting the production and access to information and actively use informal BI to this end. However, without the bespoke assessment of the potential together with guidance and support for using formal BI in their businesses they may well not use their existing data to support their decision-making to the extent that they could. The researcher expands on the implications of the findings and interpretations thereof for SMME owner-managers as well as other stakeholders.

7.3.1. SMME owner-managers

Ensuring that high-quality information is consistently available and disseminated to those who need it in any organisation is a challenging task and "one of the most under appreciated contributors to high performance and competitive advantage" (Neilson *et al*., 2010). According to Sen and Taylor (2007) it is "essential for small businesses in today's competitive environment to take a strategic approach to their information needs if they wish to develop and remain competitive." Furthermore, the ability to utilise technology and information systems is a key influence upon the

competitiveness of SMMEs (Bergeron and Raymond, 1992; Levy and Powell, 2005:vii) with even micro-enterprises hindered from growth and efficient functioning by an inability to use information technology effectively (Kamal *et al.*, 2011). Therefore, even though micro-enterprises may feel confident about having the necessary information at hand it may be worthwhile even for these enterprises to examine whether a more formal BI solution can be useful. Questions that an owner-manager can ask him-/herself include:

- Do I spend more time gathering, integrating and manipulating the data I need than I spend on analysis and interpretation?
- Does my enterprise have the data required or does it lack the data and/or system to capture and store the required data?
- Do I have different sources of information, such as operational systems and spreadsheets?
- Am I able to perform all the analyses that I would like?

The piecemeal approach to ICT and the lack of strategic planning in SMMEs are often criticised but it makes sense in an environment of high degree of risk and uncertainty in which most growth SMMEs operate, which by definition is part of being an entrepreneur (Jarvis *et al.*, 1995). SMMEs may well be forced to exploit their existing resources in the short-term to survive rather than invest with a view to the potential contribution of the long-term development of the enterprise (Anderson and Boocock, 2002, Levy and Powell, 2005). This lack of strategic planning as it pertains to ICT is often used as a reason why SMMEs do not invest in analytical systems (see discussion in 2.4). However, there are a variety of suitable options available for SMMEs with regard to formal BI solution. First, most accounting software packages have add-on BI modules and it is worthwhile to weigh the benefits versus the costs of adopting a BI module although this may be a more expensive option. There are also several web-based applications (SaaS) available that is flexible and does not require a significant financial investment. However, it does require time to evaluate the options and to set up if selected. The upfront investment of time, however, can

decrease time spent on gathering, integrating and manipulating data and recapturing of data in spreadsheets and reducing the reliance on external parties for information provision and thereby improve the efficiency of decision-making.

According to Gordon and Key (1987) owner-managers can improve their decision-making skills through suitable educational programmes, consultants, systems and technology to support decision-making or a combination of these. As is discussed in the next section it is a challenge for SMMEs to find suitable educational programmes and consultants but formal BI presents a viable option for decision support.

7.3.2. Public and government support agencies, business advisers, BI vendors and practitioners and other stakeholders

An enabling and supportive environment can increase competitiveness and accelerate economic development. ICT plays a role, as does the human capacity to exploit such ICT (Frederick and McIlroy, 1999). According to Maguire *et al*. (2007:38) SMMEs "would benefit from assistance in the development of new models, tools, techniques, and methodologies to make the best possible use of the opportunities provided by ICT" and this also appears to be true with respect to the systems and technology as well as the processes of production and consumption of BI. The challenge for vendors, policy makers, government agencies, business advisers, trainers and other stakeholders is to explore interventions to improve BI in existing SMMEs that, contrary to expectations, is evidently needed in the knowledge-based SMME sector and to establish measures to embed BI in SMMEs from business inception.

One of the measures that should be taken is to support owner-managers of SMMEs in their search for information and the use of systems and technology to do so (Lybaert, 1998:188). Given the SMMEs' preference for web-based applications SMMEs may be more inclined to investigate SaaS offerings such as *Roambi* and *LITEBI 3* that, amongst others, offer dashboard visualisations that give users "unified views and access to multiple types of data, including unstructured [data]" (Stodder,

2011). These applications can address the shortcomings of spreadsheets and empower users to extract more business value from their data without ongoing external assistance to do so and without requiring deployment of packaged BI software that are considered to have "too much stuffed" into them that make them expensive and complex to deploy (Stodder, 2011) by many large firms. As mentioned in Chapter 6, improved and faster access to integrated internal information can potentially increase the rate of entrepreneurial learning by providing faster and improved feedback to the owner-managers on their decisions and actions. Exploring the potential value of a living lab is also worthwhile since the South African Council of Scientific and Industrial Research (CSIR) is already using living labs in demand-driven research. In a living lab the participating users are seen as co-creators of new services and products that are typically linked to the creation or application of ICTs or ICT-enabled services (LLiSA, 2009).

Vendors of packages already implemented in SMMEs that have BI modules such as *Pastel* and *AccPac* can also promote their BI offering. Heikkilä *et al*. (1991) in their exploratory study found that small businesses are often disappointed with their software packages; in particular, small businesses with less than 20 employees found packages too difficult to use whereas business with more than 50 employees are dissatisfied with the adaptability of software packages to their particular needs. Cragg (2002) found that firms with between 20 and 100 employees that developed bespoke systems or customised packaged systems, whether transactional or analytical, outperformed firms that purchased packaged systems without or with little customisation to meet their specific needs. Thus vendors would need to be mindful to offer tailored support and be wary of not being seen as biased and thus not a trustworthy source of advice although this is not the preference as reported in this study. Irrespective of the BI system and technology chosen it must be tailored to suit the needs of the particular SMME, as opposed to being given a generic BI solution or package. It is incumbent on vendors and advisers in the SMME sector to showcase suitable formal BI solutions to SMMEs in order to expose them to its potential in their

enterprises. However, it may also be useful to include examples of queries, reports and analytics that may be useful to SMMEs that they may not have considered given their limited background in business management and administration and thus provide value to the enterprise and support enterpreneurial learning.

Following Bharati and Chaudbury's (2006) suggestion offering outreach through a demonstration laboratory that showcases systems and technology together with relevant case studies of successful SMMEs combined with best practices can improve awareness and understanding amongst owner-managers of the potential of BI as well as suitable options available to them, a measure suggested by Ozigbo and Ezeaku (2009) to increase ICT diffusion in Africa. Sharing expertise and best practices is often considered to be more valuable than the systems or technology itself (Steinberg, 2003:48). Because SMMEs "tend to be followers in adopting management IS except for a few innovative owners" (Levy and Powell, 2005:374) case studies of successful use of formal BI use with demonstrated benefits could therefore be helpful and inspiring to SMMEs when considering selecting formal BI systems and technologies.

Although not specific to SMMEs, Mulligan's (2002:647) research indicated that organisations benefit from having additional systems and technology options only when managers can make informed decisions regarding its selection. Such decisions about selection can be informed through external advice, mentorship and/or training. Matthews (2007) indicates that external ICT expertise and advice can be difficult to access for SMMEs because such sources of support are underdeveloped in many countries, including South Africa, where more attention may be given to larger companies. The findings together with literature (e.g. Deakins and Freel, 1998) suggest that traditional consulting services may be neither optimal nor sufficient yet Duan and Xu (2009:976) intimate that professional support can enhance strategic planning in SMMEs and Thong *et al.* (1997) concluded that IT projects in SMMEs are more likely to succeed in the presence of high external

expertise. The lack of support services and/or the relatively higher unit cost can hinder SMMEs' efforts to improve, because consulting firms are often not able to provide appropriate cost-effective solutions for SMMEs (Abor and Quartey, 2010). Whilst consulting services targeting SMMEs specific are increasingly available in the South African market (for example *Amalgam IT Partners, Genesis Management Consulting* and *Space Age Technologies*, which offer "virtual chief information officers"), none of the SMMEs interviewed were aware that such services are available.

Both the literature and this study suggest that traditional formal training in entrepreneurship and small business management may not be as effective or desired as previously thought (Hill and Stewart, 2000) and that formal education has to focus more on teaching people how to learn rather than just passing on information (Frederick and McIlroy, 1999). Because learning in small organisations is highly context-specific (Anderson and Boocock, 2002:6), it is necessary to assist owner-managers in adjusting and applying best practices to their contexts and targeted one-on-one training can increase understanding, empower owner-managers and promote trust and meet specific needs to support experiential learning as was also suggested by Ozigbo and Ezeaku (2009). Measures and interventions must aim to enable owner-managers to learn and help themselves rather than imposing prescribed solutions. Deakins and Freel (1998) suggests incubator experience as a pre-cursor to entrepreneurship as well as mentoring support for new and early-stage entrepreneurs to guide entrepreneurs' reflection and learning from their experiences.

Another possibility is to create a one-stop service: an enterprise development centre that provides both entrepreneurship management education to existing business owner-managers as well as consulting services tailored specifically to SMMEs' specific needs in general and the contracting SMME in particular when the need arises. In Nigeria the Lagos Business School established an Enterprise

Development Centre that offers training to owner-managers of existing businesses that are 3 months or older over a 5 month-period in addition to offering consulting services (Wylie, 2011) that is closer to mentoring than traditional consulting. Much of their entrepreneurship education at the Lagos Business School is aimed at helping students find solutions to the barriers to enterprises in Nigeria, which is summarised with the acronym Misfit: lack of access to markets, infrastructure, support services, finance, information and technology. Although the education offered is formal and not one-on-one, the shorter duration makes the time commitment and completion more likely and increases the likelihood of addressing immediate needs since all participants are already operating businesses. Although supervised business school students providing tailored consulting services may offer benefits to both SMMEs and the students it must be carefully considered and if decided upon, carefully managed for quality and continuity. Constantly changing advisers is less likely to promote the trust important to SMMEs and thus the enterprise centre could then not be seen as a trusted third party.

In South Africa the Small Enterprise Development Agency (SEDA) established the SEDA Technology Programme (STP) as part of the national government's strategy to conslidate and rationalise small enterprise support interventions across government departments and agencies to improve delivery of business support services. Focus areas of the STP include increasing the "accessibility to, and utility of, technologies and management support for small enterprises, through structured platforms such as technology business centres" and the facilitation of "the acquisition and transfer of technology to small enterprises, particularly those operating in the second economy" (Seda, N.d.). Seda also offers a management skills development programme that includes planning and decision-making. It would be ideal to incorporate BI into these programmes. The annual Old Mutual Legends programme operated by Fetola is a business development initiative that supports accelarated growth in handcraft, tourism, small-scale manufacture, services and other high-

potential sectors (Fetola, 2012). Inclusion of training on information and decision-making as well as the potential of BI in such a forum is ideal.

Establishing a collective intermediate centre for competitive intelligence and technology watch as suggested by Izquierdo and Larreina (2005) may go some way to address the deficit of external competitive, market and competitor data as well as legislative and regulatory changes affecting SMMEs. Such a centre can undertake benchmarking surveys similar to those in large organisations to allow SMMEs to not only know who their competitors are but also to measure themselves to see how they compare to their competitors on a number of dimensions. This is potentially a role science parks such as the Innovation Hub in Gauteng can fulfill in South Africa.

Based on the participating owner-managers responses, it seems that owner-managers do not seek external advice or training unless they have a pressing need and then possibly only from an existing trusted source. Therefore a pull strategy rather than a push strategy may be more successful to promote formal BI use and it will be necessary to increase awareness of such services to increase the use thereof. Awareness of services such as these amongst SMME owner-managers can be increased by marketing not only to SMMEs directly but also to accounting and tax professionals through their professional bodies as well as through personal bankers from financial institutions' small business divisions since most formal, registered SMMEs make use of these services (African Response, 2007) and presumably trusts these business partners. This is supported by the SME Survey (2008) that found business owners look to their accountants (72%) or financial institutions (59%) for business expertise with comparatively few who make use of business consultants (33%) and mentoring or coaching (9%). Furthermore, given the prevalence of word-of-mouth and informal networks in the SMME sector, it is can be considered a secondary channel through which successful use of more formal BI can be communicated. Since most SMMEs cannot afford to hire external consultants (Maguire *et al*. 2007; Soriano *et al.*, 2002) and given the unique needs of SMMEs,

one approach could be for government to subsidise services available to SMMEs through, for example, enterprise development centres located at universities or science parks.

The study indicates that government support for knowledge-based growth SMMEs as outlined above in addition to support for survivalist small and micro-enterprises could be beneficial and have a positive impact on the sector. Measures and interventions must aim to enable owner-managers to learn rather than imposing prescribed solutions. Ultimately the adoption of BI is dependent on the SMMEs themselves, in particular the owner-managers as key decision-makers, but interventions and measures as discussed above can go some way to support better information for decision-making by increasing the level of awareness of SMMEs by bringing them into contact with BI systems and technologies and informing them about the availability and capability of BI solutions suitable for a variety of information needs. Any such interventions should not aim to introduce formal BI but to improve information access for decision-making by focusing on the work roles and tasks that give rise to the need for the information as outlined in Leckie's model since systems and technology is an enabler as was discussed in sections 3.3.2. and 3.4.3. .

7.4. Contribution and significance revisited

The previous section indicates the implications of this study; this section provides an overview of the contributions of this research to the body of knowledge and to practice. As discussed in Chapter 1 SMMEs that have not always been accorded the same importance as large organisations with respect to ICT research in general and BI in particular, especially in developing economies. The identification of this gap was the first contribution but the main contribution to knowledge by this research was to shed greater light on the use of BI in knowledge-based growth SMMEs in South Africa. Through analysis and interpretation of the findings together with prior literature, a series of implications was identified that can potentially improve entrepreneurial practice amongst similar SMMEs to increase the competitiveness of

this vital sector of the economy and providing a basis for further research. By employing an interpretive approach this thesis answers the call of Grant and Perrin (2002) to move beyond the positivist "paradigmatic cage" in entrepreneurship research. Relevance of the research objectives and question(s) to practice is important in interpretive research and this study sought to be relevant to SMME owner-managers, support agencies, vendors as well as to academic researchers. Entrepreneurship as an intellectual field is still maturing and will increasingly be characterised by a set of codified theories, models, methods, and measures to direct ongoing research (Grégoire *et al.*, 2006:335). The researcher hopes that the results reported here can make a contribution, however modest, to the theory building process and improve insight amongst all stakeholders.

A further contribution is the descriptive framework for BI developed as part of the review of literature in order to provide guidance for the data collection and analysis. It is hoped that the integrated descriptive framework of BI developed in this study can contribute to providing a common understanding and counter the confusion—real or perceived—arising from multiple definitions for BI found in the literature and thus contribute to advance the research field that, similar to entrepreneurship, is still being established (Negash, 2004; Pirttimäki, 2007; Jourdan *et al.*, 2008:124). The framework positions systems and technology as supporting or enabling provision of information to meet decision-making information needs, needs that can be modelled using information seeking models such as Leckie *et al.*'s (2005) general model for information-seeking behavior of professionals. In addition to being used as a framework for qualitative research the BI descriptive framework can be helpful in discussing or clarifying business intelligence course content in academia, for clarification of job descriptions in the practitioner setting and from the vendor perspective to focus on the systems and technology required to support the data, information and decision processes.

7.5. Suggestions for further research

Opportunities for further research arise from addressing methodological limitations, expanding the scope of the study and from the findings. A future study can therefore adopt a more rigorous, positivist approach to data collection from a larger number of SMMEs using propositions or hypotheses generated from the findings of this study. Conducting follow-up studies to explore the development of information use and decision-making in the selected SMMEs would further increase understanding if participation can be secured. Exploring the role of BI in other growth SMMEs such as in the manufacturing and retail sectors would broaden understanding of supporting decision-making needs and the role of BI in meeting these needs. The research scope can also be expanded to other developing countries.

The findings from this research and the implications also suggest a number of avenues for further research and work. An action research methodology (Baskerville, 1999) can be used to apply BI interventions within SMMEs to investigate different solutions in more depth similar to Kamal *et al*. (2011). Such research can determine whether formal BI solutions can be successfully implemented to inform decision-making in SMMEs and to improve competitiveness and the benefits derived from such an implementation, identify shortcomings in existing formal BI solutions in terms of SMME needs, if any. Such interventions can also be used to develop case studies since case studies are considered more persuasive to SMME owners-managers than theoretical discussions (Storey in Levy and Powell, 2005:viii) as well as best practices that can be shared with SMMEs through various channels such as enterprise development centres and programmes discussed above.

The framework and descriptors of the BI descriptive framework can be expanded and refined by comparing further definitions to the framework. The Delphi method, which facilitates the gathering of subjective judgements that are moderated through group concensus (Linstone and Turoff, 1975; Day and Bobeva, 2005), can also be

used to consult a panel of experts to validate the framework including the coding and to expand the framework.

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Appendix A: Coding of BI definitions to *a priori* themes and emergent categories

Source	Primary affiliation (at time of publication)	Definition or description of BI	Source	Techno-logy	Process: product-ion	Product	Process: consum-ption	User(s)	Decision
English (2005)	Practitioner	"[q]uality information in well-designed data stores, coupled with business-friendly software tools that provide knowledge workers timely access, effective analysis and intuitive presentation of the right information, enabling them to take the right actions or make the right decisions."		in well-designed data stores, coupled with business-friendly software tools		[q]uality information	provide … timely access, effective analysis and intuitive presentation	knowledge workers	enabling them to take the right actions or make the right decisions
Gangadharan and Swami (2004:140)	Academic (x2)	"refers to the use of technology to collect and effectively use information to improve business potency. … BI provides critical insight that helps organizations make informed decisions."		use of technology	to collect	information	effectively use	provides critical insight	to improve business potency / make informed decisions
Gartner (2010)	Practitioner (market research)	"an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance."		includes the applications, infrastructure and tools	and best practices	information	that enable access to and analysis of		to improve and optimize decisions and performance
Golfarelli *et al* (2004:1)	Academic (x2) Practitioner	"the process of turning data into information and then into knowledge. … BI was born within the industrial world in the early 90's, to satisfy the managers' request for efficiently and effectively analyzing the enterprise data in order to better understand the situation of their business and improving the decision process."	data / enterprise data		process of turning… into	information	efficiently and effectively analyzing	and then into knowledge / managers' request / in order to better understand the situation of their business	and improving the decision process
Howson (2008:2)	Practitioner	"allows people at all levels of an organization to access, interact with, and analyze data to manage the business, improve performance, discover opportunities, and operate efficiently."					allows … access, interact with, and analyze data	people at all levels of an organization / discover opportunities	to manage the business, improve performance, and operate efficiently
IBM (n.d.)	Vendor	"Business intelligence software … connects people with information in an easy-to-use way so they can make better decisions."		Business intelligence software		information	connects … with … in an easy-to-use way	people	so they can make better decisions
Ing (2007) [SAS Institute]	Vendor	"getting the right information to the right people at the right time to support better decision making to gain competitive advantage."				the right information	getting / at the right time	to the right people	support better decision making to gain competitive advantage
Inmon and Nesavich (2008:227)	Practitioner (x2)	"The activity of converting data into information"	data		activity of converting	information			
Jones (2010:1)	Practitioner	"refers to the skills, technologies, applications, and practices involved in bringing that understanding to light ... intended to help guide better decision making."		technologies, applications	skills, … practices involved		skills / practices involved	skills, … practices involved / in bringing that understanding to light	intended to help guide better decision making
Kimball and Ross (2002:393)	Practitioner (x2)	"A generic term to describe leveraging the organization's internal and external information for making better business decisions."	the organization's internal and external information		leveraging		leveraging		for making better business decisions

Source	Primary affiliation (at time of publication)	Definition or description of BI	Source	Techno-logy	Process: product-ion	Product	Process: consum-ption	User(s)	Decision
Lönnqvist and Pirttimaki (2006:32)	Academic (x2)	"An organized and systematic process by which organizations acquire, analyze, and disseminate information from both internal and external information sources significant for their business activities and for decision-making."	from both internal and external information sources		organized and systematic process / acquire		organized and systematic process / disseminate / analyze		for their business activities and for decision-making
March and Hevner (2007:1032)	Academic (x2)	"refer[s] to inferences and knowledge discovered by applying algorithmic analysis to acquired information. A data warehouse is a repository of intelligence from which business intelligence can be derived."	to acquired information	A data warehouse is a repository of intelligence	by applying algorithmic analysis	business intelligence	derived	inferences and knowledge discovered	
Markarian, Brobst and Bedell (2007) [Informatica, Teradata, and MicroStrategy]	Vendor (x3)	"An interactive process for exploring and analyzing structured, domain-specific information (often stored in a data warehouse) to discern trends or patterns, thereby deriving insights and drawing conclusions."		(often stored in a data warehouse)		structured, domain-specific information	an interactive process for exploring and analyzing	to discern trends or patterns, thereby deriving insights and drawing conclusions	
Moss and Atre (2003:4)	Practitioner (x2)	"an architecture and a collection of integrated operational as well as decision-support applications and databases that provide the business community easy access to business data."		an architecture and a collection of integrated operational as well as decision-support applications and databases	provide	business data	easy access	business community	
Negash (2004:178)	Academic	"BI systems combine data gathering, data storage, and knowledge management with analytical tools to present complex internal and competitive information to planners and decision makers."	data	analytical tools	combine gathering, storage, and knowledge management	complex internal and competitive information		planners and decision-makers	
Okkonen *et al* (2002:7)	Academic (x4)	"the process of gathering and analysing internal and external business information. ... In addition, business intelligence is defined as the process which supports operational and tactical business decision-making."	internal and external business information		gathering		analysing		supports operational and tactical business decision-making
Oracle (2009)	Vendor	"BI systems pull data from across the enterprise and present information to users in a meaningful way to improve decision-making."	data from across the enterprise	BI systems	pull	information	present … in a meaningful way	to users	to improve decision-making
Pirttimäki (2007)	Academic	"an intelligence process that includes a series of systematic activities, being driven by the specific information needs of decision makers and the objective of achieving competitive advantage."			an intelligence process that includes a series of systematic activities		an intelligence process that includes a series of systematic activities	being driven by the specific information needs of	the objective of achieving competitive advantage
Ponniah (2010)	Practitioner	"First, the term refers to the systems and technologies for gathering, cleansing, consolidating, and storing corporate data. Next, business intelligence relates to the tools, techniques, and applications for analyzing the stored data" (18) / "Generally used synonymously with the information available in an enterprise for making strategic decisions" (558).	corporate data	systems and technologies / tools, techniques, and applications	for gathering, cleansing, consolidating, and storing	stored data / information available in an enterprise	for analyzing		for making strategic decisions
Popovič, Turk, and Jaklič (2010:8)	Academic (x3)	BI systems: "information systems providing quality information for analytical decision-making as a source for guiding the business towards achieving organizational goal."		information systems	providing	quality information			for analytical decision-making as a source for guiding the business towards achieving organizational goal

Source	Primary affiliation (at time of publication)	Definition or description of BI	Source	Techno-logy	Process: product-ion	Product	Process: consum-ption	User(s)	Decision
Sabherwal and Becerra-Fernandez (2011:6)	Academic (x2)	"providing decision-makers with valuable information and knowledge by leveraging a variety of sources of data as well as structured and unstructured information" for "improvement in operational performance, improvement in customer service, identification of new opportunities."	a variety of sources of data as well as structured and unstructured information		by leveraging	with valuable information and knowledge	providing	decision-makers	improvement in operational performance, improvement in customer service, identification of new opportunities
Schiff (2008) [SAP Business Objects]	Vendor	"allows organizations to better understand, analyze, and even predict what's occurring in their company. BI helps your organization turn data into useful and meaningful information and then distribute this information to those who need it, when they need it – thereby enabling them to make timely and better-informed decisions."	turn data from a wide variety of sources		into	useful and meaningful information	then distribute … to those who need it when they need it / analyze, and even predict	allows organization to better understand, … what's occuring in their company	thereby enabling them to make timely and better-informed decisions
Siegel and Shim (2000:59)	Academic (x2)	"using cost and related data to better understand activity behavior, define problems, draw conclusions, make recommendations, and take actions."	cost and related data					to better understand activity behavior, define problems, draw conclusions	make recommend-ations, and take actions
Smith, Ariyachandra and Frolick (2010:23)	Academic (x3)	"It describes the entire infrastructure (e.g. data warehouses) and analytical tools (e.g. OLAP) required to integrate and analyze the growing accumulation of organizational data. It encompasses all the processes and systems needed for gathering, storing, analyzing and accessing data to improve organizational decision making"	the growing accumulation of organizational data	the entire infrastructure (e.g. data warehouses) and analytical tools (e.g. OLAP) required / systems needed	to integrate / encompasses all the processes needed for gathering, storing	data	analyze / encompasses all the processes needed for … analyzing and accessing		to improve organizational decision-making
Thierauf (2001:66)	Academic	"centers on computerized methods and processes to improve strategic, tactical, and operational (including financial) decisions using data, information, and knowledge from multiple sources as well as applying experience and assumptions to develop an accurate understanding of the dynamics surrounding decision making."	using data, information, and knowledge from multiple sources	computerized	methods and processes		methods and processes	applying experience and assumptions to develop an accurate understanding	to improve strategic, tactical, and operational (including financial) decisions
Turban, Sharda, Delen and King (2011:8)	Academic (x3) Practitioner	"an umbrella term that combines architectures, tools, databases, analytical tools, applications and methodologies. … By analyzing historical and current data, situations, and performances, decision makers get valuable insights that enable them to make more informed and better decisions."	historical and current data, situations, and performances	combines architectures, tools, databases, analytical tools, applications	methodologies / transformation	historical and current data, situations, and performances	By analyzing	decision makers get valuable insights	that enable them to make more informed and better decisions
Tustin and Venter (2007:1)	Academic (x2)	"denotes the tools and systems that play a key role in the strategic planning process of a business. It entails a process of transforming data into valuable and actionable knowledge to gain a competitive advantage."	data	tools and systems that play a key role	a process of transforming	into valuable and actionable knowledge			in the strategic planning process of a business / to gain a competitive advantage
Vitt, Luckevich and Misner (2002:13)	Practitioner (x3)	"An approach to management that allows an organization to define what information is useful and relevant to its corporate decision making. Business intelligence is a multifaceted concept that empowers organizations to make better decisions faster, convert data into information, and use a rational approach to management."	data		convert … into	information is useful and relevant	define what … is useful	an approach to management / a rational approach to management	empowers organizations to make better decisions faster

Source	Primary affiliation (at time of publication)	Definition or description of BI	Source	Techno-logy	Process: product-ion	Product	Process: consum-ption	User(s)	Decision
Williams and Williams (2007:2)	Practitioner (x2) - consultants	"Business information and business analyses within the context of key business processes that lead to decisions and actions and which result in improved business performance."				Business information and business analyses within the key context of business processes			that leads to decisions and actions and which result in improved business performance
Wixom and Watson (2010:14)	Academic (x2)	“a broad category of applications, technologies, and processes for gathering, storing, accessing, and analyzing data to help business users make better decisions.”	data	broad category of applications, technologies	processes for gathering, storing,		accessing, and analyzing to	help business users	make better decisions

Appendix B: Semi-structured interview guide

Name of interviewee:

Date of interview:

Part 1: Organisation and owner-manager profile

1. How and why did you start your business?
2. How long has the business been in operation?
3. What is the legal status of your business?
4. How many people do you employ on a full-time and part-time basis respectively?
5. What products and/or services do you provide?
6. Would you say that the competition in your industry is intense?
7. How do you see the future for your business? [any plans for expansion?]
8. What is your educational background?
9. Prior to starting this business what was your managerial experience?

Part 2: Business intelligence

10. What information do you use when making decisions that affect your business?
11. Where do you obtain information to meet your decision-making needs?
12. How do you analyse your data? Do you do any data manipulation?
13. Does anyone assist you in any of these processes?
14. Do you share information with your employees or others outside of your enterprise? Who? How?
15. Overall, are you satisfied with the information that you have access to?
    a. what additional data would you like to have access to that you don't currently have access to?
    b. In an ideal world, what additional functionality would you like to have?
16. What systems and technology do you use in your business [in addition to those already mentioned]?

Appendix C: Informed consent letter and form

Dear prospective participant

For many SMEs IT is not about leading edge technology and 'blue-sky' research but rather the adoption of technology that will enhance their efficiency, effectiveness and competitiveness. The objective of the research is to develop guidelines for such adoption of IT to support decision-making in South African SMEs. Current research in the field is focused on large firms, predominantly in developed countries; this research towards a doctoral degree at the *University of Pretoria* addresses both these limitations.

Your contribution: In order to understand the unique context and decision-making needs of SMEs and how best to benefit from IT, I need to conduct a face-to-face interview with the owner-managers of several SMEs in South Africa. If you agree to participate, you will be asked a number of questions about yourself as the owner-manager, your business, the external environment in which you operate and the use of information and technology as it relates to managing and running your business. The interview will take a maximum of 2 hours of your time. The interview will be audio-recorded and transcribed to written notes; please advise me if you do not want the interview recorded.

Feedback: The transcript (or notes if you do not consent to an audio recording) will be made available to you when completed in order to confirm accuracy, for any clarifications or corrections, and to verify anonymity. You may also choose to receive a report of the completed research. No further information will be sent to you unless requested to do so.

Confidentiality and anonymity: The confidentiality of the interview is assured. At the completion of this research, all written documents and tapes will be stored

electronically in the University of Pretoria's digital research repository, which is password protected and secure. Any publications associated with the research will not be attributable to individuals or organisations.

Voluntary participation: Your participation in this study is voluntary. You can withdraw your consent and discontinue participation at any time during the interview or elect not to answer any question posed during the interview.

University approval: The research has been approved by the Faculty Committee Research Ethics and Integrity of the Faculty of Engineering, Built Environment & IT under reference number EBIT/40/2010.

Contacts: For more information, if you have any questions or concerns about this study or the study procedures, please contact myself at xxx-xxx-xxxx or at s93165740@tuks.co.za or my supervisor Professor Johannes Britz on +x-xxx-xxx-xxxx or at britz@uwm.edu.

I would be very grateful if you would contribute to this research project by agreeing to be interviewed. If you are prepared to participate please complete and sign the attached informed consent form.

Thank you for your time.

Shana Ponelis

Informed consent form

To be signed by each research subject, and kept on record by the researcher.

1 Title of research project: *The adoption of business intelligence in small and medium enterprises in South Africa*

2 I, ……, hereby voluntarily grant my permission for participation in the project as explained to me by *Shana Rachel Ponelis*.

3 The nature, objective, possible safety and health implications have been explained to me and I understand them.

4 I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be published but will not be not be attributable to individuals or organisations.

5 Upon signature of this form, you will be provided with a copy. You may also keep the accompanying cover letter.

Signed: _____ Date: _____

Thank you for your willingness to participate in this study. If you would like to receive the aggregated results of this research please provide the e-mail address to which it can be sent:

6 I certify that I have explained to the above individual the nature and purpose of this research study, have answered any questions and have witnessed the above signature.

Researcher: _____ Date: _____