AOSIS

Proposed framework for innovative business intelligence for competitive advantage in small, medium and micro-organisations in the North West province of South Africa

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Background: Innovative business intelligence enjoys popularity amongst mainly large organisations, particularly in the private sector. However, very limited studies have validated the impact of business intelligence in small, medium and micro-organisations (SMMEs), especially in a developing economy.

Aim: To devise an innovative business intelligence as a competitive advantage model and to establish the impact of innovative business intelligence as a competitive advantage, as measured by success or growth and innovation in SMMEs in North West province, South Africa.

Setting: Primary research was conducted amongst SMMEs owners or managers and employees in the North West province, South Africa.

Methods: The final sample consisted of 12 SMME owners or managers and 394 other employees of SMMEs. The study used mixed methods and adopted a survey design. In-depth interviews and a structured questionnaire were used for data collection.

Results: The study established that management support and internal environment commitment support the implementation of innovative business intelligence. Training and employee motivation are insignificant in enhancing innovative business intelligence as competitive advantage.

Conclusion: Management of SMMEs must define clear goals and objectives, as well as support and provide education mechanisms for new technology advancement. The technology-acceptance model (TAM) of adoption is merely one of the key techniques SMMEs can employ to improve the implementation of business intelligence as a new technology instrument to promote quality decision-making and profitability.

Keywords: business intelligence; innovation; competitive advantage; SMMEs; internal environment.

Introduction

Small, medium and micro-organisations (SMMEs) ought to stay alert in operating their businesses in today's dynamic environment of increased competition, greater flexibility of innovation, information technology (IT) and unbridled expectations from consumers (Gale & Kroeze 2011). Business intelligence should ideally be acknowledged for enhancing quality decision-making by converting organisational data into useable information (Chen & Lin 2021). In today's dynamic environment, gaining competitive advantage is a result of technological innovation and its application in the business environment. The significance of SMME organisations is acknowledged by many African countries, as well as developed countries such as the United Kingdom and the United States of America (Watkins 2012). In today's highly complex and ever-changing market conditions, SMMEs strive to survive and succeed, and the ever-changing market conditions demand SMMEs to make timeous decisions that are effective and specific to fit the circumstances and business model of the business.

This study is premised on innovative business intelligence and its effect on the competitive advantage of SMMEs in a selected district in the North West province of South Africa. There is a need for research to explore innovative business intelligence as a competitive advantage for

SMMEs, given that there is limited empirical evidence on innovative business intelligence as a major influence on the competitiveness of SMMEs. The goal of this research is to look into the relationship between the three constructs, which include the influence of business intelligence on SMMEs operations, the mediating effect of innovation and the attainment of competitive advantage.

The impact of SMMEs is essential because SMMEs play an important role in developing economies (Chimucheka & Mandipaka 2015). Innovative business intelligence is essential for SMME growth and gaining a competitive advantage. Subsequently, a closer look will be taken at the background to this study and the problem statement that motivated this paper.

Problem background

Business intelligence is the collection and transformation of raw data into useful information for managerial decision-making (Evelson 2015). This can lead to the prevention of productivity loss, gaining agility in the marketplace and aiding an organisation in monitoring its performance substantially (Chen et al. 2019). Recent articles on business intelligence suggest that business intelligence is a useful tool for decision-making (Runciman 2015). In support of this, Yusof and Yusof (2013) mentioned that business intelligence does enjoy popularity amongst mainly large organisations, particularly in the private sector. From the aforementioned, it is prudent to assert that business intelligence enables SMMEs to integrate information (data) for decision-making. By harnessing business intelligence, SMMEs can recognise previously unknown occurrences and patterns of business processes for future decision-making.

However, Cheung and Li (2012) opine that the current demand for business intelligence adoption has no restrictions on organisational size. Abzaltynova and Williams (2013) support Cheung and Li in that SMMEs indeed now have the same need to implement business intelligence adoption, similar to larger organisations. Therefore, research has to be done on SMMEs, specifically those in the Ngaka Modiri Molema district.

Current theories suggest the resource-based view (RBV) and its derivative, the dynamic capability view (DCV), where SMMEs must develop resources that are unique to their consumers, difficult to copy and distinguishable from competitors (Barney 2012; Hoffman 2018). Thus, SMMEs who can develop their business intelligence capabilities will enhance their competitive advantage.

The challenge facing SMMEs is how to harvest new information. Guarda et al. (2013) elucidate that business intelligence is defined as a management strategy rather than a technology. This is evident in today's business environment, as indicated by Rungani and Potgieter (2018). Numerous SMMEs find it challenging to be sustainable in today's ever-changing market conditions. The World Bank reported in

2016 that nearly 140 million SMMEs in 130 countries were employing 65% of the overall labour force (World Bank 2016), and this led to supporting the growth of SMMEs becoming a major priority, especially during the COVID-19 pandemic of 2020. The South African government, during this catastrophe, supported SMMEs by lowering interest rates as well as with an array of financial, technical and research support initiatives, as reported by Coad et al. (2020).

Contributing to this discourse, the Small Enterprise Development Agency (2016) pointed out that SMMEs require information that will allow decision-making to predict the behaviour of competitors, suppliers, consumers, technology, acquisitions, product and services and the business environments. Chen et al. (2019) indicate that comprehensive studies of business intelligence report that it enables organisations to make quality decisions as SMMEs face strong, competitive, dynamic and volatile environments. Small, medium and micro-organisations therefore have to consider the effort it requires to gather information in order to improve their decision-making.

Nasab, Selamat and Masrom (2015) and Salehi et al. (2020) contend that the implementation of business intelligence adoption is vital in obtaining information and simultaneously contributing towards an increased knowledge base for managers. The Global Entrepreneurship Monitor (GEM) (2014), cited by Bosma and Levie (2010) and Kalane (2015), equally concurs that SMMEs experience a lack of information, which causes a failure to viably oversee initiated business plans. Consequently, the adoption of innovative business intelligence will most likely improve the competitiveness of SMMEs.

This study contributes to the connection between innovative business intelligence and competitive advantage in SMMEs in developing economies. Whilst there are previous studies that have examined the subject of business intelligence in South Africa (Venter & Tustin 2009) and explained the application of innovation (Abualloush, Bataineh & Aladwan 2017) and competitive advantage (Guarda et al. 2013), there are insufficient studies that have investigated the association of the constructs in an SMME environment. This study is going to deliberate on this research gap.

This study aims to give SMMEs insight into how to implement innovative business intelligence adoption strategies, as this is pivotal for achieving organisational competitiveness. Adopting business intelligence is critical for decision-making in highly competitive, ever-changing market conditions, and the findings of this research will broaden the scope of SMMEs' knowledge as there is a lack of academic material related to this field of study and specific to the geographical area where this study was undertaken. It is also intended to devise an innovative business intelligence model that can be used by SMMEs to gain competitiveness in their operations. The theoretical contribution of the study rests in the development of a conceptual framework adapted from models developed by Venter and Tustin (2009),

Ahmad (2015), Mukuche (2015) and Eidizadeh, Salehzadeh and Esfahani (2017). The study sought to develop a model that links business intelligence, innovation and competitive advantage, specifically for SMMEs.

In summary, the following problem statement is formulated for this study. Many SMMEs fail during the early stages of their existence, and a reason for this could be their lack of information. Do they regard innovative business intelligence as beneficial to their decision-making? Businesses, irrespective of their size, are aware of the concept of innovative business intelligence. Are there any observable positive outcomes for those that practise innovative business intelligence to ensure that there are proper information management strategies in place?

Research purpose and objectives

Patidar (2013) stated that research objectives are the goals to be achieved in conducting research. Goals set out what is hoped to be achieved at the end of a study. The aim spells out the main purpose of a study, because objectives are the means used to achieve those desired outcomes.

The aim of this study is to develop a framework for utilising innovative business intelligence as a competitive advantage for SMMEs in the Ngaka Modiri Molema district of the North West province in South Africa.

The above aim raises the following core study objectives:

- to determine how business intelligence influences innovation in SMMEs
- to ascertain how business intelligence influences competitive advantage in SMMEs
- to establish how innovation influences competitive advantage in SMMEs.
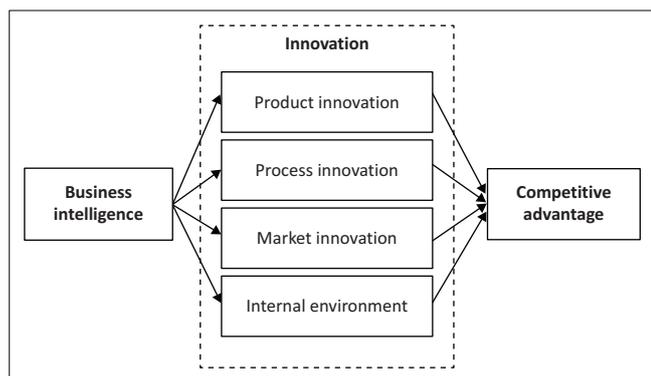
Literature review

Business intelligence is a business product that is used in decision-making (Habjan & Popovic 2007). Business intelligence can be used by different industries, such as manufacturing, healthcare and telecommunications (Ahmad 2015). In addition to this, Jokel, Aminy and Klasson (2019) assert that business intelligence systems provide a wealth of data from historical, present and forecasted views of an organisation's operations. Furthermore, business intelligence systems are referred to as decision support systems (DSS) (Jokel et al. 2019). Central to the above descriptions is that business intelligence is a process that converts raw data into useable information, which may then be transformed into strategic actions to help key managers make more informed, actionable decisions (Evelson 2015). The role of innovative business intelligence in SMME success and survival is well acknowledged, and it is generally accepted as having a positive impact on SMMEs (O'Donnell et al. 2002). Innovative business intelligence strategies guide SMME managers to sustain existing market structures whilst also reinventing

their products to better satisfy consumer needs. Marshall (2021) asserts that innovative business intelligence is a requirement for SMMEs' success and growth because it is a core mandate that underpins small business organisations. Therefore, innovative business intelligence is important in organisational learning as a necessary attribute that leads to the survival and competitive advantage of SMMEs.

A reported number of studies, such as that of Ahmad, Ahmad and Hashim (2016) and Karabegovic et al. (2018) have been conducted on business intelligence where the potential benefits of adopting business intelligence in different sectors of the economy were reviewed. In the electronics industry, as reported by Eckerson (2003), SMMEs manage to accrue a substantial amount of money by selling smaller quantities of out-of-stock items by adopting business intelligence solutions. In the automobile manufacturing sector, an increase in return on investment was realised by using information on financial business intelligence with a quick repossessed vehicle loan. Sahay and Ranjan (2008) assert that business intelligence can reduce inventory expenses by applying on-time accurate information on supplier shipments. Business intelligence can also lead to more reliable and faster reports, on improved decision-making and increased income because of a cut in IT expenses and increasing the quality of client relationships. Dumitrita (2011) stated that other benefits of business intelligence are rising revenue, lowering cost, improved internal communication and leveraging the investment in enterprise resource planning (ERP) (Skyrius 2015).

Xu and Hwang (2007), Aghdaie, Sanayei and Etebari (2012) and Meihami and Meihami (2014) all used the technology-acceptance model (TAM) by adoption of user satisfaction, ease of use and the quality of information on business intelligence. Other interesting work focused on business intelligence and innovation, which used TAM and drivers of innovation (DOI) (Ahmad 2015; Chang, Tai & Hsu 2010; Chen et al. 2012; Eidizadeh et al. 2017). All of these studies mentioned indicate that the adoption of business intelligence and innovation can enhance the competitive advantage of SMMEs.

Eidizadeh et al. (2017) mentioned innovation as a mediating role in the connection between business intelligence and competitive advantage and performed a relatively small formal study on the drivers of innovation, particularly the internal environment's effect on an organisation in terms of competitive advantage. The study by Mukuche (2015) emphasises that it is critical for insurance organisations to set clear business intelligence objectives that are aligned with the organisation's objectives and people, because roles should be established at the onset of every project. Another study on business intelligence by Ahmad (2015) recommends that organisations' internal resources, such as business intelligence, perceptions and governance of business intelligence, enhance the successful deployment of business intelligence. Results from a study by Venter and Tustin (2009),

Innovation

Product innovation

Process innovation

Business intelligence

Market innovation

Competitive advantage

Internal environment

FIGURE 1: Graphical presentation of the conceptual framework of this study.

a study conducted in South Africa, demonstrate that organisations lack capitalising on business intelligence opportunities; that the coordinating of business intelligence functions are affected; and that those on the general management level reported low levels of satisfaction with the quality of business intelligence, as well as the collection, analysis and dissemination of information. A further study on factors such as internal environment issues, which also affect business intelligence deployment in an organisation, is strongly suggested. Figure 1 illustrates the conceptual framework.

Research hypotheses

H1: Business intelligence has a positive influence on innovation.

H2: Innovation has a positive impact on competitive advantage.

H3: Business intelligence has a positive influence on competitive advantage.

Methodology
Research paradigm

The research paradigm that is pertinent to this study, in line with the research aims, is pragmatism, which combines the postpositivist and constructivist paradigms. The goal of the postpositivist paradigm is to develop objective knowledge through a credible research method that improves research findings' correctness, validity, dependability and generalisability (Schulze & Kamper 2014). In the constructivist paradigm, the researcher is a full participant in the research process (Saunders, Lewis & Thornhill 2016; Schulze & Kamper 2014). The constructivist method subscribes to the position that knowledge is socially produced and is dependent on the interaction between the researcher, research objects and the natural environment in which the study is done from an ontological perspective (Creswell et al. 2016; Wahyuni 2012).

Research design

To strengthen the validity of the findings, the study used a descriptive research design with a single cross-sectional approach. The approach can be divided into two ways for presenting and describing data, that is, in graphical and numerical ways (Creswell et al. 2016; Devlin 2018; Saunders et al. 2016).

Research approach

Mixed methods research (quantitative and qualitative approaches) was adopted as a framework and individual interview data and quantitative survey data were acquired for this study (Bryman & Bell 2014; Christensen, Johnson & Turner 2014; Creswell et al. 2016). Quantitative research is based on the postpositivist paradigm and uses statistical tools to determine the correlations between the variables that shape the phenomenon under investigation (Maree 2012). The constructivist worldview underpins the qualitative approach, which is based on describing links between study items and the context within which the research is done (McCusker & Gunaydin 2014).

Research participants

This study used the nonprobability sampling method for both the qualitative and quantitative components to gather the primary data required. On in-depth interviewing, data saturation was a high priority in this study, which meant the researcher could not stop collecting data until participants started repeating information, further data collection became redundant or the information provided added no value to the research issue. The 12 interviews in this study attained technical saturation, meaning no new information emerged from the interviews. A list of SMMEs was received from the Provincial Department of Finance for the North West's Central Supply Database in order to determine the sample size for the questionnaire survey. The sample size was calculated using the Raosoft and Survey Monkey sample size calculators, which take into account four parameters when calculating the sample size: margin of error, confidence level, population and response distribution.

The sample size calculators were set to have a margin of error of 5%, a confidence level of 95% and a response distribution of 50% by default, and a population size of 2747 was added. The sample size was then calculated and both tools indicated that the minimum number of respondents was 400 SMMEs in order to obtain a representative sample. Care was taken to ensure that no respondents from the quantitative survey population participated in the in-depth interviews.

Research instruments

To facilitate the analysis of the qualitative data, the computer software package ATLAS.ti was used to examine the qualitative data, the coding of the data into themes and subthemes in order to establish the key factors describing the impact of

innovative business intelligence on SMMEs' competitive advantage. The quantitative data were examined using a consolidation of descriptive and inferential statistics. Lomax and Vaughn (2012) explain descriptive statistics comprise techniques that allow for the tabulation and summarising of the descriptors of the research focus for a given study. This study adopted descriptive statistics for analysing the structure of the sample, using the latest SPSS version. These figures include frequencies, means and standard deviations.

Ensuring reliability and validity

Both quantitative research and qualitative research require high levels of reliability and validity. The study employed reliability and validity in qualitative studies to ensure the study's precision, exactness and trustworthiness (Assarroudi et al. 2018). The study followed a rigorous and precise protocol throughout data collection, analysis and interpretation to make the study reliable and valid (Elo et al. 2014). Internal consistency was assessed using the Cronbach's alpha coefficient, total item correlations and composite dependability. Cronbach's alpha and the composite reliability should be above 0.6, whilst total-item correlations should be above 0.5 (Fraering & Minor 2006). The seven measures utilised in this investigation were adapted from prior studies, each of which had a Cronbach alpha value of 0.60 or higher, showing that the scales were trustworthy and appropriate for this study (Leonidou et al. 2010).

The study used triangulation to assure validity by validating the interview data using many sources of information (Kern 2018). Validity is concerned with the integrity of the conclusions that can be generated from research (Bryman 2015; Cooper 2005). The instrument's content validity was evaluated by management academics in this study.

Statistical analysis

The computer software package ATLAS.ti was used to examine the qualitative data. The Statistical Package for the Social Sciences (SPSS) and the Analysis of Moment Structures (Amos) software packages were used. To check the accuracy of the measurement scales, a confirmatory factor analysis (CFA) was conducted and tested using structural equation modelling (SEM). To check the model fit, indicators that include the normal fit index (NFI), standardised root mean square residual (SRMR), goodness-of-fit index (GFI) and the comparative fit index (CFI) were used to explain the pattern of association between variables.

Ethical considerations

When performing a research study, research ethics refers to the code of conduct or expected societal norms of behaviour of individuals and relationships (Akaranga & Makau 2016; Sekaran & Bougie 2016). In this study, several ethical considerations were observed. Firstly, the cooperation and formal voluntary consent of SMMEs were sought, including their right to terminate their participation at any point along the procedure. Secondly, full details of the nature of this study were communicated to potential respondents. Thirdly, anonymity was pledged, and respondents were not identifiable by the results as presented as findings. Fourthly, responses were protected by using pseudocodes and not recording any identifiable information, as well as keeping all collected data safely. In addition, this study was registered with the Ethics Committee of the North-West University (NWU) and the ethics policy was strictly adhered to. Ethical approval to conduct this study was obtained from the Economic and Management Science Research Ethics Committee (EMS-REC) North West University (reference number: NWU-00028-21-A4).

Research results
Demographic details of respondents and small, medium and micro-organisations organisations

Eight of the 12 owners or managers who took part in the study were male and four were female. Their educational backgrounds include three diploma holders, six tertiary degrees and three postgraduate degrees. In terms of the duration of the organisation, one participant stated that the organisation had been in operation for more than 2 years; one stated that the organisation had been in existence for more than 3 years; and 10 stated that their organisations had been in existence for more than 4 years. This implies that the participants are well experienced and that their responses are of great value to this study.

Women accounted for a higher percentage of the respondents (53.3%), whilst men accounted for only 46.7% of those who participated in the survey. A large majority of respondents (41.1%) were between the ages of 29 and 39 years, followed by those between the ages of 40 and 50 years (26.4%) and (9.1%) above 50 years. The highest percentage of respondents (35.8%) graduated from high school, followed by 26.4% with a bachelor's degree and 24.4% with a tertiary institution diploma. In the Ngaka Modire Molema district, a total of 2.5% had been in existence for a year; 10.2% had been in existence for 2 years now. A total of 21.1% of SMMEs had been in existence for 3 years now; 28.7% had been in business for 4 years now; and 37.6% had 4 years and more in business. This implies that the majority of the organisations had been in business for more that 2 years, which indicated that most of them were likely to have more information about innovative business intelligence as a competitive advantage.

Qualitative research results

The results of a qualitative data analysis performed with the ATLAS.ti software are presented. The coding method, as shown in Table 1, demonstrates the relationship or association between the themes and their codes, as they all come from innovative business intelligence as a competitive advantage for SMMEs.

Contribution of business intelligence influence

The first issue to emerge from all interviews, as shown in Table 1, was the influence of business intelligence, which was divided into four categories: (1) business intelligence advantages, (2) business intelligence problems, (3) business intelligence nature and (4) business intelligence skills. ATLAS. ti used auto-coding on the transcript to illustrate participants' understanding and opinions about essential elements that drive business intelligence amongst SMMEs in the Ngaka Modire Molema district of the North West province. Similarly, to represent the codes entered in ATLAS.ti, the business intelligence topic was separated into categories and subcategories. Business intelligence adoption with top management support, such as staff enthusiasm and proper education and training for user interfaces, has delivered good outcomes according to the business owners interviewed, as evidenced by the long survival of their organisations. These participants explained that business intelligence training resulted in speedier decision-making, increased employee satisfaction and improved decision-making quality over time.

Contribution of innovation influence on competitive advantage

When looking at the impact of innovation on SMMEs in the Ngaka Modire Molema district, five categories of innovation emerged: (1) organisational innovation, (2) product innovation, (3) process innovation, (4) market innovation and (5) internal environment innovation. The impact of innovation varies depending on which SMMEs are involved. Some companies employ innovation quite well for the majority of their product processes, whilst others use it very infrequently. According to the participants, the challenges of innovation are a lack of

TABLE 1: Layout of the themes, categories and codes.

Theme	Category	Code
Business intelligence (BI)	Business intelligence benefits	BI benefits – fast decision-making BI benefits – increased employee satisfaction BI benefits – quality decision-making
	Business intelligence challenges	Lack of managerial support Lack of interest Lack of technological expertise Limited financial resources
	Business intelligence nature	BI nature – collaborative business intelligence BI nature – online analytical processing BI nature – operational intelligence
Business intelligence	Business intelligence skills	BI skills – adequate BI skills – inadequate
Innovation	Organisational innovation	Adequate funding Inadequate funding Collaboration with suppliers Use of BI systems
	Process innovation	Improve internal communication Increase research and development Management support Motivate employees
	Product innovation	All departments involved Produce innovation recently
Innovation	Market innovation	Offer unique products Understand market Use BI systems
Innovation	Internal environment functions	Lack internal communication Strong internal communication
Competitive advantage	Competitive advantage	Business intelligence Customer relationship management Employee training and development Online promotional strategies Price discounts Unique product designs

funding, management backing and employee competence. Because of the high costs of process research and development, as well as market innovation, the cost of innovation can be very high. The GEM Report (2017) indicates that one of the key causes of organisational failure and discontinuity in South Africa is a lack of organisational innovation.

According to the findings, the research and development department tries to be innovative in their organisations in a variety of ways. Although the participants are inventive in various ways, such as product, process and market innovation, as evidenced by their comments, what is crucial is that such innovation contributes to their organisation's success and competitive advantage. Some participants, on the other hand, seek incentives for presenting new ideas and a welcoming climate for innovators in their organisations, which contradicts this conclusion. Therefore, this is a call on those SMME owners or managers who are not innovative to try to be so in order for their organisations to prosper and remain competitive.

Competitive advantage

Participants' responses were obtained on items they deemed necessary for SMMEs' effective competitive advantage in the Ngaka Modire Molema district, in the North West province. Six categories of competitive advantage emerged: (1) price discounts, (2) business intelligence, (3) online promotional strategies, (4) employee training and development, (5) customer relationship management and (6) unique product designs. In light of this, the majority of SMME owners or managers believe that customer relationship tactics or methods will help to promote customer service, loyalty and brand recognition. Some participants acknowledged that continual personnel development and training are good management techniques. This will require ongoing employee training, encouraging the sharing of ideas or information during training sessions and providing monitoring. Price discounts were also found as a successful management tactic for gaining a competitive advantage.

The qualitative data analysis and presentation of the findings revealed that the participants' statements on innovative business intelligence as a competitive advantage had parallels and differences. However, it was clear from the in-depth discussions that all stakeholders' involvement, participation and support are critical for the long-term expansion of SMMEs in the Ngaka Modire Molema district.

The following appears to emerge from the data analysis:

- The participants believe that there is a link between innovation and business intelligence and that if the two are combined, SMMEs will gain a competitive advantage.
- The success of business intelligence implementation is aided by top management support and collaboration amongst all stakeholders.
- Providing incentives and motivation to employees improves employee–customer relationships as a competitive advantage strategy, and information exchange is critical for the organisation's success.

Quantitative data analysis and interpretation

Structural equation model

In the initial structural model (Structural model A), it was hypothesised that business intelligence has a direct positive influence on internal environment, market innovation and product innovation, which in turn have a direct positive influence on process innovation. Figure 2 depicts that the model does not fit the data well. The model has two paths that are insignificant.

The model fit was assessed using the following indices produced by SPSS Amos, namely the standardised root mean residual (SRMR), the GFI, the CFI and the normed fit index (NFI). The fit indices in Table 2 show that this model does not fit the data well. The model has two paths, which are insignificant: internal environment –> process innovation and product innovation –> process innovation.

In the hypothesised model, Figure 1, it was hypothesised that business intelligence has a direct positive influence on market innovation, process innovation, product innovation and internal environment, which in turn have a direct positive
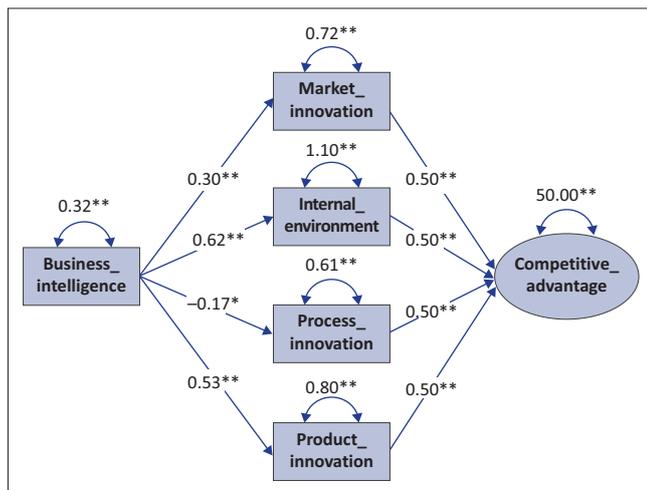
**, reflect positive goodness of fit; *, negative goodness of fit.
FIGURE 2: Structural model A.

TABLE 2: Recommended benchmarks for structural equation modelling.

Fit index	Proposed framework (theoretical)	Revised framework (with extra significant paths and with insignificant paths from the theoretical framework having been removed)	Interpretation (based on the benchmarks suggested by Moss [2009])
Standardised root mean square residual (SRMR)	0.249	0.052	Should be < 0.08; therefore, the revised SEM fits the data well.
Goodness-of-fit index (GFI)	0.702	0.968	Should be > 0.9; therefore, the revised SEM fits the data well.
Comparative fit index (CFI)	0.209	0.923	Should be > 0.93; therefore, the revised model is on the border line and fits the data better than the theoretical SEM.
Normed fit index (NFI)	0.022	0.927	Should be > 0.9; therefore; the revised SEM fits the data well.

SEM, structural equation modelling.

influence on competitive advantage. Figure 3 depicts the regression path estimates for the structural model.

All paths are significant. Figure 3 reflects that the model is a better fit for the data. As shown in Table 2, the model computed acceptable model fit indices of SRMR = 0.052, GFI = 0.968, CFI = 0.923 and NFI = 0.927. Business intelligence has a significant direct influence on product innovation (path estimate = 0.53, $p < 0.05$) and internal environment (path estimate = 0.27, $p < 0.05$). Market innovation (path estimate = 0.50, $p < 0.05$), and process innovation (path estimate = 0.50, $p < 0.05$) have a significant positive influence on competitive advantage. Business intelligence is shown to have indirect relationship with market innovation and process innovation.

The model reveals new relationships. Product innovation (path estimate = 0.42, $p < 0.05$) has a significant positive influence on internal environment. Going further, product innovation (path estimate = 0.38, $p < 0.05$) has a significant positive influence on market innovation. On its part, market innovation (path estimate = 0.42, $p < 0.05$) is shown to have a significant positive influence on process innovation.

Through *hypothesis H1*, it was conjectured that business intelligence has a positive impact on product innovation. This is in line with the contention of Eidizadeh et al. (2017) that business intelligence plays a central role in enhancing product innovation by providing information on changes in consumer taste and preferences. Given the analysis result, the hypothesis is therefore accepted, and the conclusion is that business intelligence positively impacts product innovation.

Business intelligence has a positive influence on process innovation, and it was speculated that business intelligence has a positive impact on process innovation. This is supported by the assertion of Eidizadeh et al. (2017) that organisations that practise business intelligence exhibit high levels of innovation through quality information. In light of the above result, the hypothesis is therefore supported, and it is resolutely held that business intelligence positively influences process innovation. Business intelligence has a positive effect on market innovation, and it had been predicted that business intelligence has a positive impact on market innovation. In view of the above result, the hypothesis is therefore rejected. Business intelligence has a positive influence on the internal environment of the organisation, and it had been conjectured that business intelligence has a positive impact on the internal environment of the organisation. In view of the above result, the hypothesis is therefore accepted, and we deduce that business intelligence has a positive impact on the internal environment of the organisation. This is in line with Venter and Tustin (2009), who state that there is a need for internal environment awareness to enhance business intelligence implementation.

Through *hypothesis H2*, it had been speculated that product innovation has a positive influence on competitive advantage.

This is in line with Ahmad's (2015) contention that an increase in the differentiated product innovation is expected to enhance the propensity of high competitive advantage. From the research results, it can be concluded definitively that product innovation positively influences competitive advantage. Process innovation has a positive influence on competitive advantage. The structural model was designed so as to test the causal relationship process innovation and competitive advantage. The results show a strong causal link, which was statistically significant ($\beta = 0.50$; $p < 0.05$). This confirms *hypothesis H2* that process innovation has a positive impact on competitive advantage. This is supported by Eidizadeh et al. (2017) that innovation impacts gaining competitive advantage positively and significantly.

Market innovation has a positive impact on competitive advantage, and it was speculated that market innovation has a positive influence on competitive advantage. This is supported by the assertion of Eidizadeh et al. (2017) that organisations that exhibit high levels of market innovation concern are presumed to develop a market differentiation. In light of the above result, the hypothesis is consequently supported, and it is resolutely held that market innovation positively influences competitive advantage. Internal environment has a positive influence on competitive advantage, and it had been conjectured that internal environment has a positive impact on competitive advantage. In view of the above result, the hypothesis is therefore accepted, and it is deduced that business intelligence has a positive impact on the internal environment of the organisation. This is supported by Venter and Tustin (2009) and Ahmad (2015) that there is a need for organisational awareness (internal environment) to facilitate the implementation of business intelligence practices.

Through *hypothesis H3*, it had been conjectured that business intelligence has a positive impact on competitive advantage. In view of the above result, the hypothesis is consequently accepted, and it is deduced that business intelligence has a positive impact on competitive advantage. This is supported by Ahmad (2015) and Eidizadeh et al. (2017) that business intelligence has a positive and significant impact on gaining competitive advantage.

Conclusion and recommendations

This study aimed to propose a model of innovative business intelligence as a competitive advantage for SMMEs. Figure 4 depicts the steps and prerequisites for using innovative business intelligence to gain a competitive advantage. Small, medium and micro-organisations owners or managers are the players and coordinators in the implementation of innovative business intelligence as depicted in the framework. There is a significant and positive correlation between business intelligence and product innovation and internal environment. In turn, product innovation influences market innovation. Market innovation influences internal environment, process innovation and competitive advantage. This implies that SMME organisations with a high business intelligence tend to be more product innovative, as well as those with a positive internal environment commitment.

Based on the overall findings of this study, it can be said that all the identified factors in Figures 1 and 4 have a positive
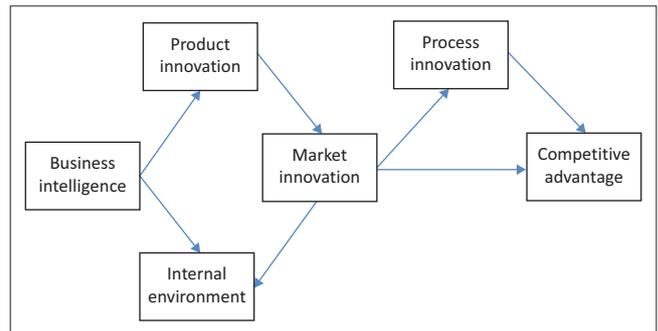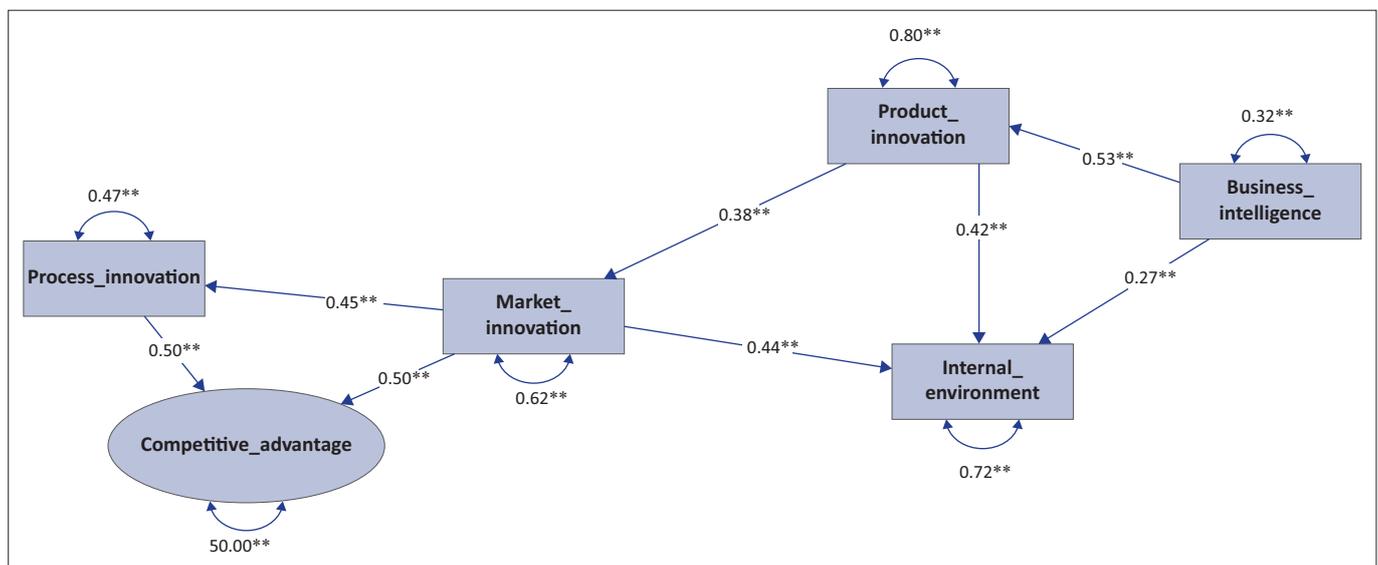

FIGURE 4: Proposed framework for innovative business intelligence.

**, reflect positive goodness of fit; *, negative goodness of fit.
FIGURE 3: Structural model B.

correlation coefficient ($p < 0.05$) and significant relationship and therefore influence innovative business intelligence as a competitive advantage as depicted in the proposed framework.

The framework was created following a thorough assessment of the literature as well as the outcomes. In the Ngaka Modire Molema district, the framework shows the process flow and sequence of innovative business intelligence as a competitive advantage for SMMEs. Each of the components, as well as their associated elements, indicates how they contribute to the survival and competitive advantage of SMMEs.

Limitations and directions for future studies

Finding the most up-to-date information on the subject from secondary data sources was difficult because of the importance of secondary data sources on innovative business intelligence as a competitive advantage, and there was also a scarcity of secondary data on business intelligence for SMMEs, as there is mostly secondary data on business intelligence as a technologically implemented rather than a management tool to enhance quality decision-making.

Apart from innovative business intelligence, future studies could focus on assessing whether other factors (such as concern for competitive shareholder interests) affect the use of business intelligence and consider implementing TAM and conducting a consultation of managers and directors of big corporations.

Contribution of the study

This study contributes to the application of innovative business intelligence as a competitive advantage for SMMEs. Furthermore, this research adds to the body of information on how to survive in a competitive environment. It is worth noting that SMME organisations play a significant part in the success and growth of the South African economy, including employment generation, small business enterprise development, market variety, promotion of local products and improvements in living conditions. This study aimed to highlight the importance of SMMEs in the development of the economy, as it will increase their employment rate and increase their involvement and participation in the economy. The long-term success of SMMEs is dependent on the implementation of sustainable and growing strategies through high-quality and timely decision-making.

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Competing interests

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Authors' contributions

G.G. contributed the writing of the original copy; M.P. and A.M.L. contributed to the editing and supervision.

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Data availability

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Disclaimer

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