Journal of Contemporary Management
Volume 20 Issue 1

Business intelligence as a competitive advantage for SMMEs in the North West Province of South Africa

DOI: https://doi.org/10.35683/jcman1033.205

GODKNOWS GOMWE
School of Management Sciences, North-West University, South Africa
Email: gomwe24@gmail.com
ORCID: https://orcid.org/000-0001-8409-5913

MARIUS POTGIETER*
School of Management Sciences, North-West University, South Africa
Email: Potgieter.Marius@nwu.ac.za
ORCID: https://orcid.org/0000-0003-0854-2165
*corresponding author

ALPHEAUS LITHEKO
School of Management Sciences, North-West University, South Africa
Email: 16513207@nwu.ac.za
ORCID: https://orcid.org/0000-0003-0841-8885

ABSTRACT

Purpose of the study: In an ideal world, business intelligence would be recognised for improving the quality of decisions made by transforming organisational data into information that can be used. Business intelligence has received a great deal of attention from academics as a technology but not as a management strategy to improve sound decision-making. As a result, this paper highlights potential barriers to business intelligence deployment in the North West Province of South Africa. The study was grounded on the technology acceptance model (TAM), which describes perceived ease of use (PEOU) and perceived usefulness (PU) in implementing business intelligence.

Design/methodology/approach: A non-probability sampling strategy was used to select a sample of 12 respondents for the qualitative data from the five municipalities of the Ngaka Modire Molema District in the North West Province of South Africa. The qualitative data was analysed using the Atlas.ti software

Findings: The results obtained indicate that SMMEs struggle to implement business intelligence as a strategy due to a lack of top management support, funding, staff motivation, education and training, and internal environment commitment, which are all required for the successful implementation of business intelligence as a competitive advantage.

Recommendations/value: The study recommends that the management of SMMEs should provide sufficient funding and resources for the business intelligence implementation process, as well as dispatch or hire skilled personnel to enhance the implementation.

Managerial implications: It is advised that top management should support, internal environment support, and increased technological development elements will facilitate the application of business intelligence in SMME organisations.

Keywords

Business intelligence, Competitive advantage, Decision support; SMMEs

JEL classification: M13, O32, Z10

1. INTRODUCTION

Understanding the information that organisations produce during their daily operations is one of the key components of developing competitive advantage. Small, medium-sized and micro-enterprises (SMMEs) must think that having the appropriate information available to the appropriate people at the appropriate time gives them a competitive advantage (Guarda *et al.,* 2013). Business intelligence is the process through which unstructured data is gathered and transformed into knowledge that can be used by managers to make decisions. This can result in the prevention of productivity loss, more market adaptability, and significantly better performance monitoring for an organisation (Chen *et al.,* 2019). Business intelligence has the ability to revolutionise data management in SMMEs while boosting output, gaining competitiveness, and enhancing organisational value (Guarda *et al*., 2013). 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) noted that business intelligence is popular, especially in the private sector and among mostly large organisations. It is reasonable to conclude from the foregoing that business intelligence enables SMMEs to combine information (data) for decision-making. Utilising business intelligence, SMMEs can identify previously unnoticed events and trends of business operations for upcoming decision-making.

However, according to Cheung and Li (2012), there are currently no organisational size constraints on the adoption of business intelligence. This notion is supported by Abzaltynova and Williams (2013) in their assertion that SMMEs now require the same level of adoption of business intelligence as larger organisations do. As a result, research on SMMEs, in the Ngaka Modiri Molema District is necessary. Prior to now, SMMEs had limited access to business intelligence tools, which were mostly designed for large organisations (Grabova *et al.*, 2010). As a result, business intelligence alternatives for SMMEs are limited (Guarda *et al*., 2013).

Furthermore, many SMMEs fail during the early stages of their existence and a reason for this could be their lack of information, as reported in the SMME business toolkit project of the Southern African Developing Community (SADC, 2019). Numerous studies on business intelligence have been conducted, such as that of Mudzana and Maharaj (2015) and Serumaga-Zake (2017), who researched the application of the Delone and McClean model in South Africa. This model is based on business intelligence user satisfaction with an information and technology (IT) view. Previous research on the theoretical link between business intelligence and SMMEs, such as the research of Grabova *et al*. (2010), Zhi and Guixian (2010), Ponelis and Britz (2011), Guarda *et al*. (2013), Ponis and Christou (2013) and Tarek and Adel (2016), is sparse. The popularity of big intelligence is increasingly exponential, and the problem remains as to how SMMEs can leverage it and add value to their organisations (Vidgen *et al*., 2017).

How to gather new information is a challenge for SMMEs. Business intelligence is characterised as a management approach rather than just a technology (Guarda *et al.* (2013). This is obvious in the commercial world of today, as indicated by Rungani and Potgieter (2018). Many SMMEs struggle to be sustainable in today's constantly shifting market environment. Supporting the growth of SMMEs has been a top goal, especially during the COVID-19 pandemic of 2020. The World Bank claimed in 2016 that over 140 million SMMEs in 130 countries employed 65 percent of the total labour force (World Bank, 2016). The South African government, during this catastrophe, supported SMMEs by lowering interest rates as well as an array of financial, technical and research support initiatives, as reported by Coad *et al*. (2020).

The Small Enterprises Development Agency (2016) contributed to this discussion by pointing out that SMMEs need data that will enable decision-making support to anticipate the behaviour of rivals, suppliers, customers, technology, acquisitions, product and service offerings, and the business environments. Chen *et al*. (2019) indicate that studies of business intelligence show that it empowers organisations to make high-quality decisions as SMMEs deal with challenging, competitive, volatile, and dynamic situations. Therefore, in order to improve their decision-making, SMMEs must consider devoting more effort to gathering information.

Business intelligence adoption, according to Nasab *et al*. (2015) and Salehi *et al*. (2020), is crucial for getting information while enhancing managers' knowledge bases at the same time. Bosma and Levie (2010) and Kalane (2015), as well as the Global Entrepreneurship Reports GEM (2016), suggest that SMMEs frequently lack the knowledge necessary to effectively manage a newly emerging organisation's strategy. Consequently, the implementation of business intelligence will probably increase SMMEs' ability to compete (Nasab *et al.,* 2015).

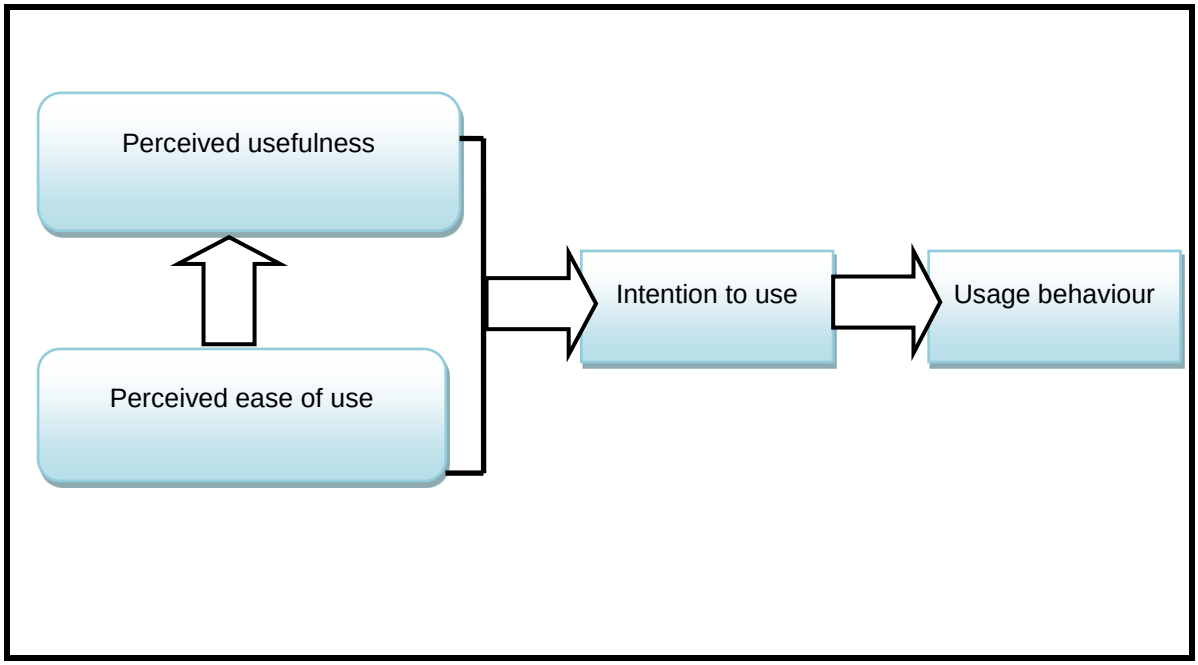
Businesses of all kinds, both large and small, must make sure that the right information management strategies are in place given the constantly shifting market conditions of today. Information is essential to the running of every organisation (Kerzner, 2017). However, Watson and Wixom (2014) caution that many decisions are made solely on instinctive understanding and that this lack of information is the source of this. This could result in organisational failure in today's constantly changing market conditions. All organisations should use business intelligence technologies.

This uncertainty served as the driving force for this study's motivation as well as its goal of educating SMMEs on how to apply business intelligence adoption techniques, which are essential for establishing organisational competitiveness. Since there is a lack of academic material in this area of research, the findings of this study will widen SMMEs' understanding (Guarda *et al.,* 2013). Adopting business intelligence is essential for decision-making in highly competitive, constantly changing market conditions. This is an effort to provide SMMEs in South Africa with improved information for decision-making.

2. LITERATURE REVIEW

The technology acceptance model (TAM), as shown in Figure 1, serves as the foundation for this study.

Figure 1: Technology acceptance model



Source: Davis (1989)

2.1 Technology acceptance model

The study makes use of Davis' (1989) proposed technology acceptance model (TAM) to explain business intelligence. TAM accurately represents business intelligence, which is why it was chosen. Studies on the adoption of new technologies in consumer behaviour (Martins *et al.,* 2011; Lim & Ting, 2012) and studies based on determining the factors that influence online shopping decision-making have both demonstrated its value (Ye & Zhang, 2014; Putro & Haryanto, 2015 & Lim *et al*., 2019).

Davis (1989) investigated technology's perceived utility, simplicity of use, and user acceptance. The investigation, perceived usefulness, and perceived ease of use were proposed as drivers of system usage in the study, which focused on other variables for anticipating and explaining system use.

In the literature on information systems (IS), the technology acceptance model (TAM) is commonly used to describe perceived ease of use (PEOU) and perceived usefulness (PU). These two qualities are important characteristics when trying to understand technology acceptance behaviour (Herzallah & Mukhtar, 2016). Furthermore, researchers discovered that the relationships between PEOU and PU and the intentions to use technology were strong (Herzallah & Mukhtar, 2016). However, the relationship between PEOU and user intentions was greater than the relationship between PU and user intentions (Liu *et al.,* 2005). Also, Herzallah and Mukhtar (2016) confirmed the avenues from PU to technology usage and PEOU to PU.

Perceived usefulness is commonly defined as the degree to which a person thinks that using a certain technology will enhance their respective job performance (Liu *et al*., 2005). According to Abduljalil and Zainuddin (2015), PU significantly affects each person's intentions to use technology. This data demonstrates that SMMEs have high rates of technological adoption and usage because of PU.

Information systems and business intelligence (PU) for SMMEs can be specifically analysed from the standpoint of possible benefits that might be produced via technology utilisation (Dobrev & Hart, 2015). Competitive advantages, operational efficiencies, cost savings, and increased productivity are some of these potential advantages.

In contrast to Godoe and Johansen (2012), who found a negative correlation between discomfort and PEOU, Utama (2017) discovered that perceived utility positively influenced consumers' attitudes toward technology adoption. An organisation's choice to implement a more reliable information system was driven by the requirement for business intelligence (Dawson & Van Belle, 2013). Additional evidence for this claim came from managers of

SMMEs who adopted technology because they believed it would benefit their business (Herzallah & Mukhtar, 2016).

One of the main factors influencing consumers' acceptance of teleconferencing technology for organisational meetings is perceived utility (Park *et al*., 2014). Research by Abduljalil and Zainuddin (2015) in Belgium and Libya indicated that perceived utility affects how small to medium-sized and micro-organisations behave when adapting in these nations. The adoption of website-based information technology for SMME users in the Indonesian region of Malang was anticipated by PU and the application of the technology acceptance model adoption for PEOU (Utama 2017).

PEOU measures how people feel about how easy or difficult they find certain types of Hayes' technology, including information systems or corporate intelligence, to use (Liu *et al*., 2005). Studies by Hayes (2012), and Kiełtyka and Smolog (2015) examined the impact of perceived ease of use (PEOU) on users' decisions to use business intelligence systems in small- to medium-sized and micro-enterprises.

PEOU was recognised as a factor influencing the use of business intelligence by SMMEs in South Africa (Nenzhelele & Pellissier, 2014). However, PEOU did not have a significant role in predicting business intelligence for SMMEs in the Romanian market, which is also a developing economy like South Africa (Tutunea & Rus, 2012).

TAM has been deemed adequate for assisting managers in comprehending the drivers and determinants of user acceptance, as well as formulating strategies to improve user acceptance of new technologies. This theory is deemed to be the most appropriate in illustrating business intelligence and competitive advantages in SMMEs.

2.2 Business intelligence framework

All the components that make up a business intelligence solution are referred to as the business intelligence framework. This framework consists of four elements:

2.2.1 Data sources

The operational and transactional systems of the business, such as the accounting, supply chain, and ERP systems, serve as data sources (Ong *et al*., 2011). Data from product usage design, manufacture, services, and support are delivered across the whole supply chain and/or product lifecycle (Rodzi *et al.*, 2015). This results in unprecedented amounts of data on the client side due to identification technologies, sensor diffusion, and the availability of pertinent data streams (Villegas *et al*., 2020). The major challenge is to apply business intelligence principles to a comprehensive decision support system that considers big and

unstructured data sources, process steering and design, as well as product and shop floor design. Multiple sources of data are integrated. Businesses utilise data integration to combine data from several sources in order to obtain accurate and reliable data (Liu *et al*., 2015). According to Ong *et al.* (2011), due to the heterogeneity and volume of data, data integration within organisations is more challenging.

The Big Data approach helps resolve anomalies, including missing data, conflict situations, and the discovery of hidden links through data redundancy. In order to obtain a format suitable for analysis, information extraction is necessary, particularly if the data sources are not in a format that can be used directly (Rodzi *et al*., 2015; Smuts *et al*., 2018 & Villegas *et al*., 2020). When making decisions, having clean data can increase the value of a result. Data integration aids in data cleansing, which may also be discovered during data extraction, which is necessary for organisations because they need to make many decisions, analyse data, and make forecasts (Smuts *et al*., 2018).

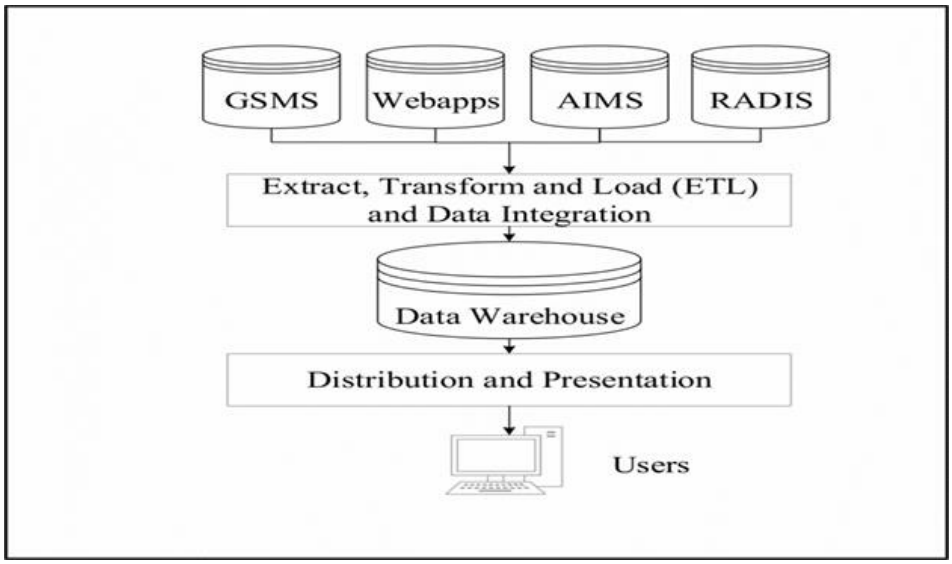
Wang (2015) suggests that data integration and extraction-transformation-load (ETL) cannot be implemented until user needs and the structures of data sources have been created. Organisations can choose the input and output to provide to end users at the conclusion of the process for their decision-making. Because data integration and ETL can produce a business intelligence solution for SMMEs that is based on high-quality data, proper preparation is essential. The benefits of the data integration component in the business intelligence framework are:

- This component is particularly significant in SMMEs because of its capacity to extract usable insights from data heterogeneity and abnormalities.
- Assisting in making the proper selection in a timely manner is critical.

However, due to the large number and complexity of data, data integration could be a difficult task (Rodzi *et al*., 2015). Smuts *et al*. (2018) suggest that data integration is the process of merging data from many sources and presenting it coherently. Data integration is likely to be challenging in the future if the organisation's data is inconsistent. Metadata and data sources are two elements that support data integration. The two approaches to integrating data are tool-based data integration and manual coding. Rodzi *et al*. (2015) postulate that merging data from numerous sources that may be confusing and incongruent with one another and data integration will widen its application and ability to handle diverse data sources.

The general framework architecture for business intelligence is shown in Figure 2. Data integration takes place before the data is placed in the data warehouse, as shown in the diagram. The ETL procedure will be discussed in greater depth below.

Figure 2: General framework architecture



Source: Rodzi *et al*. (2015)

The general method for data integration and ETL in mainframe systems is depicted in Figure 2. Multiple data sources are used in the data integration process. The data will subsequently be extracted and transformed in the staging area. The data is then loaded into the target data warehouse, which acts as a flexible manager for data access (Rodzi *et al.,* 2015; Wang, 2015 & Smuts *et al*., 2018).

2.2.2 Extraction-transformation-load (ETL) tools

Using ETL tools, data is moved from transaction systems, the internet, and other data sources into data repositories or warehouses (Olszak & Ziemba, 2012). ETL tools are specialised software programs that handle data cleansing, data loading, and data uniformity. Data is cleaned and prepared for decision-making in accordance with the organisation's defined international business standards (Kemper *et al.,* 2013; Rodzi *et al*., 2015). ETL is essential in business intelligence frameworks since SMMEs have enormous data sources. Standardising data is also necessary to ensure that business concepts are transparent and convey the same meaning to all members of the organisation (Pettersson & Arvidsson, 2012).

According to Liu *et al*. (2015), ETL may bring data from several source systems to a central repository while also fixing data errors and filling in blanks. Each data source will be controlled before extraction due to their variances. Just a few examples include Oracle 11, Microsoft SQL Server 2005, and Microsoft SQL Server 2008. You must have a thorough comprehension of the data format and the reason for having selected data in order to replicate only the data that is of interest. However, depending on the project's breadth, data extraction may be as

challenging as requiring programmers to use a proprietary programming language (Rodzi *et al*., 2015; Smuts *et al.,* 2018).

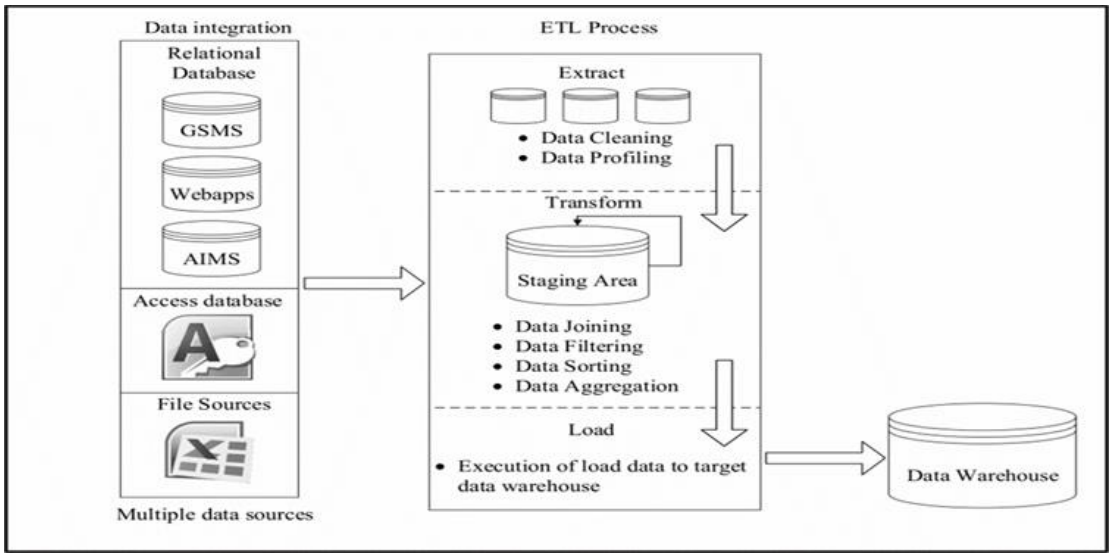
According to Wang (2015), data transformation performs validation and cleansing processes on the incoming data. This process aims to gather exact data that is thorough, accurate, clear, and consistent. However, the process of modifying data to be consistent with the intended data format may differ depending on the organisational requirement. Depending on the needs of the organisation, data is loaded into the end target at different intervals, such as hourly, daily, weekly, or monthly updates (Rodzi *et al.*, 2015; Smuts *et al*., 2018).

In order to arrive at meaningful decision-making at the end of the process, the ETL has been a crucial component (Wang, 2015). Additionally, it helps the management team acquire trustworthy, accurate, and consistent data for strategic organisation planning and decision-making. The correlation data integration and ETL components will ultimately be able to give valuable information in a timely and practical manner, aiding management in making decisions.

As a result, using business intelligence to accomplish organisational goals and objectives is advised. The purpose of implementing a business intelligence system is to give the management team access to real-time data so that they may assess current performance and take any necessary actions promptly. Furthermore, historical and present data is crucial for strategic corporate planning and decision-making (Rodzi *et al*., 2015).

Figure 3 illustrates the standard procedure for data integration and ETL in an organisational mains system. The data integration method makes use of numerous data sources. The data will then be converted and extracted in the staging area. The target data warehouse, which acts as a flexible manager for data access, receives the data after it has been imported. Next, each procedure will be described in detail, along with how it helps an organisation.

Figure 3: Data integration and ETL process



Source: Rodzi *et al.* (2015)

Each system in this process has its own platform, such as an operating system, communication protocol, or database management system. Databases and files from various systems are merged during this process. Initial extraction and incremental extraction are the two stages that make up the extraction process. The first step is the first extraction phase. Data from numerous sources has been used to fill the data warehouse entirely. However, the data warehouse must first be constructed before this procedure can be finished. The following phase is the progressive or complete extraction phase.

When employing incremental extraction, it only loads the information that has changed since the previous load. This technique requires much less time than comprehensive extraction. In order to do a complete extraction, the entire dataset is deleted and replaced with the full extract from the data sources. Because it updates the data warehouse with new and updated data since the previous extraction, this strategy can be especially helpful for SMMEs. Full extraction makes a replica of the prior extraction in the same format to help find changes. As a result, the data will be updated without losing any prior information. The data in the data warehouse can now be edited and analysed for management decision-making using a business intelligence tool (Rodzi *et al*., 2015; Smuts *et al*., 2018).

2.2.3 Data warehouse

The data storage part of a business intelligence architecture is the data warehouse, which serves as a crucial basis for most business intelligence systems. A data warehouse (DW) is a collection of old data produced through data integration and ETL processes. Data from several

operational and transactional systems are combined in an enterprise data warehouse (EDW) to give users a single view of the data (Yeoh & Koronios, 2010; Liu *et al*., 2015).

The gathering of data from diverse systems and storing it in formats that are compatible are the core advantages of data storage (Chen *et al*., 2012). Liu *et al*. (2015) suggest that enterprise data warehousing (EDWs) gathers data from numerous dissimilar systems and centrally stores it in a style that makes it easy for business intelligence tools to extract it. EDWs, which increase efficiency in many ways, enable this kind of complex analysis. Firstly, by merging heterogeneous data from a variety of internal and external data sources, EDWs increase the efficiency and scalability of reporting; and secondly, EDWs make sure that data is reliable and consistent for everyone.

By ensuring that data definitions are consistent, establishes a single source of truth, giving people the confidence they need to rely on the data for important decisions. Finally, EDWs can facilitate true, targeted quality improvement by allowing multidisciplinary teams from several departments to identify potential areas for improvement. In order to support these operational improvements, the organisation can then design and implement specific interventions (Horstmeier, 2014; Smuts *et al*., 2018).

In terms of business intelligence, measurement that results in information, insight, and action is the core of data warehousing. Data can be gathered, sorted, categorised, and organised to facilitate population-based searches, research, and analysis. Through assessment, comprehension and well-informed strategic business planning and decision-making are made possible (Wang, 2015; Villegas *et al.*, 2020).

2.2.4 Data access

The last part of the business intelligence system is data access. Users can interact with and analyse data with this feature. You will require middleware software or an application programming interface (API) to connect data analysis and visualisation tools to the DW. A business intelligence ecosystem requires hardware for handling and storing data, software platforms for producing end-user products, including reports, online analytical processing (OLAP) utilities, digital dashboards, and data mining tools (Yogev *et al.,* 2013). These fundamental technologies and tools work together to create a setting where firms may develop their operational and strategic capabilities, leading to better decision-making and improved business performance. Four components of business intelligence, data sources, extraction-transformation-load (ETL) technologies, data warehouses, and data access were discussed.

2.3 Critical success factors (CSF) in business intelligence implementations

A number of scholars have investigated the effective implementation of business intelligence, coming up with a vast array of critical success factors. The important success variables in business intelligence installations are:

2.3.1 Committed management support and sponsorship

The first and ultimately most crucial aspect was strong management support and sponsorship, in which executives were urged to assist in breaking down barriers to change. Indeed, Boyton *et al*. (2015) submit that the most difficult aspect of any business intelligence implementation is gaining organisational and management buy-in. In order to fully utilise business intelligence, organisations must tie their capabilities and anticipated outputs to their overall objectives. Business intelligence projects are valuable, and Yeoh and Koronios (2010) and Villamarín and Diaz (2017) will support them by removing political barriers and ensuring that they are in line with the organisation's strategic goals. Business sponsors will also make sure that the organisation's intelligence application functions in a way that is consistent with its strategic business objectives and that the return on investment (ROI) can be measured objectively (Hawking & Sellitto, 2015).

Furthermore, according to Yeoh and Koronios (2010), the best sponsor for a business intelligence initiative is influential senior management, who understands the full value of business intelligence and has credibility. Upper management should consistently emphasise the goals and dedication of the business intelligence project to the success of the organisation in order to win institutional support. A high-level corporate sponsor for the business intelligence project, as well as a high-level interdepartmental project team with a reputation for working effectively, will contribute to the successful implementation of a business intelligence solution (Hawking & Sellitto, 2015, Villamarin & Diaz, 2017).

2.3.2 Clear vision and well-established business case

The second CSF was described by Yeoh and Koronios (2010) as having a distinct vision and a strong business case, which included being linked to the organisation's strategic vision. It is essential that the business intelligence project meets business needs and that the use of business intelligence directly contributes to the organisation's overall goals (Villamarin & Diaz, 2017). This comprises making sure that information technology (IT) goals are in line with current business imperatives and objectives, as well as making sure that the IT team offers innovative and effective solutions to business issues. On the other side, Pérez-Pérez *et al*. (2015) promote ignoring the business case and concentrating on resolving a business issue.

Consequently, when a department finds a data-centric solution to a particular business difficulty, it usually only takes this one discovery to convince management to approve an extension of the deployment. In other words, success breeds success.

2.3.3 Business-centric championship and balanced team approach

Yeoh and Koronios (2010) recognised a business-centric championship and a balanced team dynamic as the third CSF. A team needs a champion, someone who is knowledgeable about both the technical side of things and the business. Wixom *et al*. (2011) highlighted the importance of business information technology hybrids or individuals that possess a strong blend of business and information technology (IT) skills. Business intelligence offers value when reporting and analytical skills are closely linked with business requirements. However, in many organisations, the IT staff members in charge of creating the apps lack the business expertise needed to understand the challenges the organisation is trying to address. As a result, lengthy application development cycles and systems that fail to meet user requirements are frequent (Yeoh & Koronios 2010). Organisations must use best practices, such as rotating work assignments and business intelligence competency groups, to match business intelligence reporting and analysis with user requirements. The need to identify key business and technical representatives at the outset of a business intelligence project and to maintain their motivation throughout the project was underlined by Hawking and Sallitto (2015).

2.3.4 Business-driven and iterative development approach

The fourth CSF was recognised by Yeoh and Koronios (2010) as an iterative, business-driven development process. Team success entails employing an agile methodology, having a defined scope, and having short-term deliverables. Through a process called prototyping, business intelligence engineers work with organisational users to create example screen mock-ups using an Excel spreadsheet or user-generated reports that show the kind of data needed to address certain business concerns. The effectiveness of this iterative process depends on the tight collaboration between users and information technology (IT) developers (Larson & Chang, 2016). Agile practices include collaborating with the project team, holding daily stand-up meetings, establishing tasks that are brief, and providing a deliverable, a physical product, such as a report (Madsen, 2012).

2.3.5 Business-driven, scalable, and flexible technical framework

The CSF is to have a business-driven, scalable, and adaptable technological architecture that enables simple system growth as information requirements increase while developing a business intelligence solution. Scalability, usefulness, repeatability, and adaptability are the

traits referred to as the *abilities* (Madsen 2012). To explain this further, each of these descriptions represents an essential part of the technical foundation needed for an effective business intelligence system.

According to Villamarian and Diaz (2017), scalability is the capacity of the hardware and software to continue operating as intended when the end user requests a change in size or volume. If a new transactional system is installed, the business intelligence platform design should be able to handle the change without causing any disruptions to the data warehouse. A business intelligence solution's usability is determined by how simple it is to use and comprehend. Repeatability is the ability to repeat a technique consistently and provide high-quality results. Finally, flexibility demands that all elements of the architectural framework for system upgrades, extension, and adjustments while still satisfying other requirements like performance and security. Although the information technology (IT) department is typically in charge of these technical skills, it is crucial that users of the business intelligence solution comprehend the value of this framework (Madsen, 2012).

2.3.6 User-oriented change management approach

A user-oriented approach to change management was identified as the sixth CSF by Yeoh and Koronios (2010). Process modifications are a necessary part of implementing an efficient business intelligence solution, and one of the most important ones is alerting employees to potential changes in how they do their duties (Villamarian & Diaz, 2017). Employees who understand the system, its capabilities, and how the business intelligence system may support organisational growth are crucial. Limiting the volume and complexity of change is necessary because organisations can only handle a certain amount of change at once (Fickenscher & Bakerman, 2011).

Because business intelligence is still a relatively new notion for many organisations, implementing a business intelligence program in an organisation is a unique issue. It is critical for managers considering this hard project to be able to handle complicated change. To execute change in business intelligence efforts, Clarry (2010) suggests adopting the ADKAR change model. Clarry (2010) explains that the ADKAR model focuses on the people dimension of change and has five major goals:

- Recognition of the need to change,
- Willingness to participate and support the change,
- Understanding how to change,
- Ability to implement the change on a step-by-step basis, and

- Reinforcement to maintain the change.

The ADKAR model can assist management in determining why changes are not succeeding and then guide them through the actions required to make the change a success. There are numerous methods for leading change. This calls for segmenting the change, identifying potential failure areas, and then addressing particular impact locations. Business intelligence is essential to facilitating these kinds of changes since they are often driven by organisational challenges, including competition, economic shifts, financial performance, and regulatory changes.

Personal issues, on the other hand, are frequently the source of employee resistance to change. Individual resistance to these organisational changes must be mitigated, according to business intelligence leaders. By understanding how people learn, providing the necessary training for everyone involved, and emphasising the importance of motivation at both the individual and organisational levels, the ADKAR model focuses on the people aspect of change management.

2.3.7 Sustainable data quality and integrity

Sustainable data quality and integrity are said to be the seventh and final CSF (Yeoh & Koronios, 2010). Making sure the source data is of high quality is essential because the main goal of a business intelligence system is to integrate data from numerous source systems to enable sophisticated analytics and enhance decision-making. In fact, Hawking and Sellitto (2015) listed data quality as one of the top 10 crucial difficulties to overcome in order to succeed with business intelligence. Businesses have been found to lose millions of dollars due to inaccurate and inconsistent data. Therefore, management must identify which data is essential before putting a data cleansing strategy in place. This procedure calls for knowledgeable business analysts who are committed to assuring the correctness of the source data and are familiar with its meaning. Data quality was cited by Thamir and Poulis (2015) as a key factor in determining the success of a business intelligence initiative. Analysis, summarisation, and the extraction of accurate data may be more challenging when dealing with large volumes of diverse transactional data. For useful information to be supplied to support decision-making, it is crucial that the data be consistent and effectively integrated.

3. METHODOLOGY

This study adopts the constructive paradigm, which stipulates that the researcher is a full participant in the research process (Schulze & Kamper, 2014 & Saunders *et al*., 2016). 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 (Wahyuni, 2012; Creswell *et al*., 2016). Knowledge is formed subjectively, through the constructivist paradigm, by analysing situational aspects that affect the research objects (Creswell *et al*., 2016). In order to grasp business intelligence and competitive advantage in SMMEs, in-depth interviews were done in accordance with this paradigm.

The study adopted a qualitative approach by studying several documents and Zoom meetings with SMME owners/managers aimed at finding solutions to the research problem of the study. The deliberate or judgemental sampling strategy was adopted in this study. Researchers use purposeful sampling, a qualitative sampling strategy, to select individuals who have the knowledge, experiences, and traits of the study subject (Williams & Needham, 2016). Purposeful sampling is useful for creating criteria for selecting participants who meet the study topic's qualifications and requirements (Devlin, 2018). Respondents were interviewed until data saturation was reached in the in-depth interviews. 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 (Creswell *et al*., 2016). The twelve (12) interviews consisted of eight males and four females. This study attained technical saturation, meaning no new information emerged from the interviews. The transcripts of the interviews were analysed using Braun and Clarke's (2006) six-stage approach. Data were analysed using Atlas-ti version 8.1. The study also considered ethical concepts of research such as voluntary participation, informed consent, the anonymity of responses, protection of participants' interests, and confidentiality being observed (Saunders *et al.,* 2016)

4. RESULTS

The interview statements and the study aim to provide answers to the phenomenon under study are among the themes developed from the data by Atlas-ti. The discussion in this study includes the research participants' comments as well as an analysis of the data acquired and a comparison with the literature. Quotations were used to create codes, which were then allocated to them. The coding method, as shown in Table 1, demonstrates the relationship or association between the themes and their codes, as they all come from business intelligence as a competitive advantage for SMMEs.

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 skills	BI skills-adequate BI skills-inadequate
Competitive advantage	Competitive advantage	Business intelligence Customer relationship management Employee training and development Online promotional strategies Price discounts Unique product designs

Source: Own compilation compiled

4.1 Discussion of results

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. The codes are descriptions of participants' perceptions when talking about a specific topic.

Similarly, to represent the codes entered in Atlas.ti, the business intelligence topic was separated into categories and subcategories. Business intelligence is employed by SMMEs in this study for a variety of reasons. This includes making quick decisions, making good decisions, and increasing employee satisfaction.

When it came to the topic of business intelligence's impact on SMMEs, the majority of those polled said that the business intelligence they had implemented had been successful thus far. Business intelligence adoption with top management support, such as staff enthusiasm and proper education and training for user interface, has delivered good outcomes, according to the business owners interviewed, as evidenced by the long survival of their organisations. The majority of business owners/managers believe that implementing business intelligence with top management support and collaboration has proven to be profitable for their organisations. These participants explained that business intelligence training resulted in speedier decision-

making, increased employee satisfaction, and improved decision-making quality over time. On the other hand, one business manager stated that:

"*Lack of finance is a major impediment to success business intelligence in SMMEs*"

The adoption of business intelligence will not be effective since, in his opinion, their business would continue to dwindle over time due to a lack of financial support to maintain the business intelligence software. While one stated that the adoption of business intelligence was unsuccessful due to financial constraints in providing a conducive environment for business intelligence setup. Another participant stated that:

"*Employees have no ideas and willingness to implement business intelligence*"

Which means that implementing business intelligence in their organisation is difficult. Many other flaws emerged as a result of these problems, including a lack of financial resources, a lack of management support, a lack of passion, and a lack of technological skill. The participants also agreed that the initial setup costs a lot of money. The needs for business intelligence capabilities are changing as a result of the high cost of initial setup, which is a concern for some organisations because employees do not always keep up with these shifting needs.

Participants reported that:

"*We support the implementation of business intelligence with strategic business plan*"

The techniques they employed in implementation were effective, indicating that the strategies utilised by most business owners/managers in operating their organisations are successful. This explains why the majority of SMME owners/managers in the Ngaka Modire Molema District have strategic business plans aligned with organisational goals and objectives for their SMMEs, as also propounded by Villamarin and Diaz (2017). Most business people want to use business intelligence to run their companies because they have realised that it is equivalent to a road map that leads to better decision-making.

This statement agrees with Shanks and Bekmamedova (2012) and Yogev *et al*. (2013), who said that using business intelligence might help managers analyse data from several sources for improved decision-making in order to improve their organisation's success and competitive advantage. This indicates that the majority of SMME owners/managers who make better and more informed decisions will have little to no difficulty running their businesses and achieving their mission, goals and objectives. This means that SMME owners/managers must make good decisions in order to improve their strategic business planning and secure the success and competitive advantage of their companies.

Finally, based on the responses on this subject, every SMME owner/manager should use business intelligence and develop a strategic business strategy for their organisations. Since the majority of SMME owners/managers are attempting to implement business intelligence for their organisations, and most of them are successful, business intelligence is a key aspect in boosting the survival and competitive advantage.

This is theoretically consistent with the theory of the technology acceptance model (TAM) adoption of new technologies, which states that perceived usefulness of information systems and business intelligence can be observed from the perspective of potential benefits that can be created through technology use, specifically for SMMEs (Dobrev & Hart, 2015). In this approach, SMMEs with successful strategic business plans can utilise business intelligence's perceived usefulness, which measures how convinced a person is that utilising a given technology would improve their performance as a strategy for survival and competitiveness. Therefore, based on the findings of this construct, SMME owners/managers in the Ngaka Modire Molema District of the North West Province can use business intelligence as an approach and one of the tools to assure the success and competitive advantage of their organisations.

5. RECOMMENDATIONS

The following recommendations are made to facilitate the implementation of business intelligence as a competitive advantage for SMMEs in the North West Province.

- Management support: Top management support is a critical component in the process of relationship building and management within the organisation. Management support is a foundation whereby teamwork is built and constructed, more so in an organisation tasked with the adoption of new technology business intelligence. Being open and honest, disseminating information, and transferring ownership and responsibility to organisational members is essential in building and managing change management. This, in turn, will encourage employees in the implementation of innovative business intelligence to become involved in and committed to the new technological adoption as supported by the technology acceptance model (TAM). The support and commitment of top management are critical for the sustainable implementation of business intelligence as a competitive advantage for SMMEs.

- Education and training: SMME owners/managers should work to improve their education and pursue business education and training, as this is the first step toward reaching the other predictive elements of SMME survival and growth. This will provide them with the knowledge they need to apply and implement new technologies (business intelligence). Programmes such as educational seminars and short courses on change management should

be an ongoing activity aimed at raising the level of understanding about business intelligence implementation. In general, the findings of this study show that there is a scarcity of comprehensive knowledge and understanding of the use of business intelligence as a decision-making tool. For SMMEs to succeed, expand, and be competitive, they must have a fair level of formal/business education and training.

- Employee motivation, research and development: According to the responses, there are no incentives for innovators, the innovator has no patent rights on his or her own innovative product, and the benefits are insufficient. How can someone innovate while his ideas are never recognised? Owners/managers of SMMEs must provide incentives for new idea recognition. Choi and Park (2014) supported the reward idea that top echelons should promote an organisational climate in which workers in their posts are recognised for their efforts towards innovation. Furthermore, due to budgetary constraints, SMMEs have limited research and development capabilities, making it critical for their businesses to implement business intelligence, which may help them overcome the hurdles of adopting new technology developments.

- Funding: the government should help SMME owners/managers by giving them funds in order to encourage them to run effective and sustainable organisations. To do this, the government can establish centres in various localities where prospective and existing business owners/managers can not only secure sufficient funds for their organisations but also receive assistance from business professionals on how to start and maintain a successful business. Venter and Tustin (2009) supported that insufficient investment is significant for business intelligence implementation. This is significant because if these business owners/managers run successful and long-term organisations, they will be able to provide more jobs for the growing number of job seekers, thereby assisting in the resolution of the country's high unemployment rate and contributing to the country's GDP.

6. CONCLUSION

In general, the study's findings showed that SMMEs that implement business intelligence are more likely to survive and expand, but the findings also revealed that some SMMEs are finding it difficult to implement owing to the expense and lack of understanding involved with new technology adoption. The successful deployment of new business intelligence in SMMEs requires management support and internal environment commitment, both of which are dependent on effective stakeholder collaboration. This collaborative and partnership approach is critical in helping SMME businesses gain a competitive advantage. The study concludes that implementing new business intelligence would not only help SMMEs gain a competitive

advantage but will also help the South African economy develop as the GDP and level of living increase. As SMMEs grow, so do job opportunities.

REFERENCES

Abduljalil, K.M. & Zainuddin, Y. 2015. Integrating technology acceptance model and motivational model towards intention to adopt accounting information system. *International Journal of Management, Accounting and Economics,* 2(5):346-359. [https://doi/20.1001.1.23832126.2015.2.5.1.6].

Abzaltynova, Z. & Williams, J. 2013. Developments in business intelligence software. *Journal of Intelligence Studies in Business*, 3(2):79-91. [https://doi.org/10.37380/jisib.v3i2.68].

Bosma, N.S. & Levie, J. 2010. Global entrepreneurship monitor 2009: Executive report. London. Springer.

Boyton, J., Ayscough, P., Kaveri, D. & Chiong, R. 2015. Suboptimal business intelligence implementations: Understanding and addressing the problems. *Journal of Systems and Information Technology,* (17):307-320. [https://doi.org/10.3390/app10093208].

Braun, V. & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2):77-101. [https://doi/10.1191/1478088706qp063oa].

Chen, H., Chiang, R.H. & Storey, V.C. 2012. Business intelligence and analytics: from big data to big impact. *MIS Quarterly*, (20):1165-1188.

Chen, N., Liu, W., Bai, R. & Chen, A. 2019. Application of computational intelligence technologies in emergency management: a literature review. *Artificial Intelligence Review*, 52(3):2131-2168. [https://doi.10.1007/s10462-017-9589-8].

Cheung, C.F. & Li, F.L. 2012. A quantitative correlation coefficient mining method for business intelligence in small and medium enterprises of trading business. *Expert Systems with Applications*, 39(7):6279-6291. [https://doi.org/10.1016/j.eswa.2011.10.021].

Choi, H.J. & Park, J.H. 2014. The relationship between learning transfer climates and innovation in public and private organisations in Korea. *International Journal of Manpower*, 3(35):956-972. [https://doi.org/10.1177/02750740211010464].

Clarry, J.W. 2010. Innovation and the patenting of knowledge in Japanese corporations. In Innovation and Change in Japanese Management: 177-198. London: Palgrave Macmillan.

Coad, A., Nightingale, P., Stilgoe, J. & Vezzani, A. 2020. The dark side of innovation. *Industry and Innovation, Editorial,* 28(1):102-112. [https://doi.org/10.1080/13662716.2020.1818555].

Creswell, J.W., Ebersohn, L., Eloff, I., Ferreira, R., Ivankova, N.V., Jansen, J.D., Nieuwenhuis, J., Pietersen & Plano Clark, V.L. 2016. First steps in research. 2nd ed. Pretoria: Van Schaik Publishers.

Davis, F.D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 2(25):319-340.

Dawson, L. & Van Belle, J.P. 2013. Critical success factors for business intelligence in the South African financial services sector. *South African Journal of Information Management*, 15(1):1-12. [https://doi/10.4102/sajim.v15i1.545].

Devlin, A.S. 2018. Environmental psychology and human well-being: effects of built and natural settings. Cambridge: Academic press.

Dobrev, K. & Hart, M. 2015. Benefits, justification and implementation planning of real-time business intelligence systems. *Electronic Journal of Information Systems Evaluation*, 18(2):105-119. [https://doi.org/10.2478/bsrj-2019-0001].

Fickenscher, K. & Bakerman, M. 2011. Benefit realization. *Physician Executive*, 37(6):70-76.

GEM. 2016. Global entrepreneurship monitor: 2014 global report. [Internet: https://www.babson.edu/Academics/centers/blankcenter/globalresearch/gem/Documents/GEM%202014%20Global%20Report.pdf; date of access: 15/03/2018].

Godoe, P. & Johansen, T. 2012. Understanding adoption of new technologies: technology readiness and technology acceptance as an integrated concept. *Journal of European Psychology Students*, 3(1):37-51 [http://doi.org/10.5334/jeps.aq].

Grabova, O., Darmont, J., Chauchat, J.H. & Zolotaryova, I. 2010. Business intelligence for small and middle-sized enterprises. *ACM SIGMOD Record*, 39(2):39-50.

Guarda, T., Santos, M.F., Augusto, M.F., Silva, C. & Pinto, F. 2013. Process mining: a framework proposal for pervasive business intelligence. In 2013 8th Iberian Conference on Information Systems and Technologies: (Portugal, 2013/01/01) (1-4). IEEE.

Hawking, P. & Sellitto, C. 2015. Business intelligence strategy: a utilities company case study. *International Journal of Enterprise Information Systems*, 11(1):1-12. [https://doi/10.4018/ijeis.2015010101].

Hayes Jr, T.P. 2012. Predicting information technology adoption in small businesses: an extension of the technology acceptance model. *Academy of Information & Management Sciences Journal*, 15(1):146-161 [https://doi/10.12821/ijispm050201].

Herzallah, A.T.F. & Mukhtar, M. 2016. The impact of perceived usefulness, ease of use and trust on managers' acceptance of e-commerce services in small and medium-sized enterprises (SMEs) in Palestine, *International Journal on Advanced Science Engineering*, 6(6):79-87 [https://doi:10.18517/ijaseit.6.6.1377].

Horstmeier, P. 2014. Why your healthcare business intelligence strategy can't win without a data warehouse. Health Catalyst, *ProQuest thesis*, (23):78-86.

Kalane, L. 2015. Reasons for failure of SMEs in the Free State. Free State: University of the Free State (Doctoral thesis).

Kemper, H.G., Rausch, P. & Baars, H. 2013. Business intelligence and performance management: introduction in business intelligence and performance management (3-10). London: Springer.

Kerzner, H. 2017. Project management: a systems approach to planning, scheduling, and controlling. New Jersey: John Wiley & Sons.

Kiełtyka, L. & Smoląg, K. 2015. Analysis of business intelligence solutions in the SME sectors. In Applied Mechanics and Materials (123-128). Stafa-Zurich: Switzerland.Trans tech Publications Ltd.

Larson, D. & Chang, V. 2016. A review and future direction of agile, business intelligence, analytics and data science. *International Journal of Information Management*, 36(5):700-710. [https://doi.org/10.1016/j.ijinfomgt.2016.04.013].

Lim, W.M. & Ting, D.H. 2012. E-shopping: analysis of the technology acceptance model. *Modern Applied Science*, 6(4):9-21

Lim, W.M., Lim, A.L. & Phang, C.S.C. 2019. Toward a conceptual framework for social media adoption by non-urban communities for non-profit activities: insights from an integration of grand theories of technology acceptance. *Australasian Journal of Information Systems*, 23(54):67-78. [https://doi/10.3127/ajis.v23i0.1835].

Liu, S.H., Liao, H.L. & Peng, C.J. 2005. Applying the technology acceptance model and flow theory to online e-learning users' acceptance behavior. *E-learning*, 4(6):8-14.

Liu, Y., Yang, Y., Wei, J. & Wang, X. 2015. An examination on RFID innovation diffusions in Chinese public intelligent transportation services. *International Journal of Mobile Communications*, 13(5):549-566. [https://doi.org/10.1504/IJMC.2015.070971].

Madsen, L.B. 2012. Business intelligence to health information technology curriculum. Southern Polytechic State University.Atlanta. Georgia. (Phd Physics).

Martins, C., Oliveira, T. & Popovič, A. 2011. Understanding the internet banking adoption: a unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management*, 34(1):1-13. [https://doi/10.1016/j.ijinfomgt.2013.06.002].

Mudzana, T. & Maharaj, M. 2015. Measuring the success of business-intelligence systems in South Africa: an empirical investigation applying the DeLone and McLean Model. *South African Journal of Information Management*, 17(1):1-7. [https://doi:org/10.4102/sajim.v.19i1.751].

Nasab, S.S., Selamat, H. & Masrom, M. 2015. A Delphi study of the important factors for BI system implementation in the public sector organisations. *Jurnal Teknologi*, 77(19):34-49.

Nenzhelele, T.E. & Pellissier, R. 2014. Competitive intelligence implementation challenges of small and medium-sized enterprises. *Mediterranean Journal of Social Sciences*, 5(16):92-92. [https://doi/10.5901/mjss.2014.v5n16p92].

Olszak, C.M. & Ziemba, E. 2012. Critical success factors for implementing business intelligence systems in small and medium enterprises on the example of upper Silesia, Poland. *Interdisciplinary Journal of Information, Knowledge, and Management*, 7(2):129-150. [https://doi/10.28945/1584].

Ong, I.L., Siew, P.H. & Wong, S.F. 2011. A five-layered business intelligence architecture. *Communications of the IBIMA*, 20(11):11-29.

Park, N., Rhoads, M., Hou, J. & Lee, K.M. 2014. Understanding the acceptance of teleconferencing systems among employees: an extension of the technology acceptance model. *Computers in Human Behavior,* 4(39):118-127.

Pérez-Pérez, Y.M., Rosado-Gómez, A.A. & Puentes-Velásquez, A.M. 2018. Application of business intelligence in the quality management of higher education institutions. *In Journal of Physics*: conference series, 1126(1):12-53. [https://doi/10.1088/1742-6596/1126/1/012053].

Pettersson, D. & Arvidsson, P. 2012. Usage of business intelligence: testing the technology acceptance model on a BI system. Sweden: Uppsala University. (Masters in Business Studies).

Ponelis, S. & Britz, J. 2011. The role of business intelligence in information-intensive small businesses: initial results from an interpretive study. *MWAIS 2011 Proceedings*, 9(23):345-361.

Ponis, S.T. & Christou, I.T. 2013. Competitive intelligence for SMEs: a web-based decision support system. *International Journal of Business Information Systems*, 12(3):243-258. [https://doi.org/10.1504/IJBIS.2013.052449].

Putro, H.B. & Haryanto, B. 2015. Factors affecting purchase intention of online shopping in Zalora Indonesia. *Journal of Economics, Management & Trade*, 3(39)1-12. [https://doi/10.9734/BJEMT/2015/18704].

Rodzi, N.A.H.M., Othman, M.S. & Yusuf, L.M. 2015. Significance of data integration and ETL in business intelligence framework for higher education. In 2015 International Conference on Science in Information Technology. (Yogyakarta, Indonesia, 2015/10/27).

Runciman, D. 2015. Digital politics: Why progressives need to shape rather than merely exploit the digital economy. *Juncture*, 22(1):11-16.

Rungani, E.C. & Potgieter, M. 2018. The impact of financial support on the success of small, medium and micro enterprises in the Eastern Cape province. *Acta Commercii,* 18(1):1-12.

Salehi, V., Salehi, R., Mirzayi, M. & Akhavizadegan, F. 2020. Performance optimization of pharmaceutical supply chain by a unique resilience engineering and fuzzy mathematical framework. *Human Factors and Ergonomics in Manufacturing and Service Industries,* 30(5):336-348.

Saunders, M., Lewis, P. & Thornhill, A. 2016. Research methods for business students. 7th ed. Pearson Education Limited.UK

Schulze, S. & Kamper, G. 2014. The use of mixed methods as reflected in two eminent South African educational research journals. *Journal for New Generation Sciences*, 10(1):130-147. [https://doi/http://hdl.handle.net/11462/603].

Serumaga-Zake, P.A. 2017. The role of user satisfaction in implementing a Business Intelligence System. *South African Journal of Information Management*, 19(1):1-8. [https://doi.org/10.4102/sajim.v19i1.736].

Shanks, G. & Bekmamedova, N. 2012. Achieving benefits with business analytics systems: an evolutionary process perspective. *Journal of Decision Systems*, 21(3):231-244. [https://doi.org/10.1080/12460125.2012.729182].

Small Enterprise Development Agency (SEDA) 2016. Strategic Plan. (2015/16-2018/19) [Internet: https://www.thedti.gov.za; date of access: 07/09/2016].

Smuts, M., Scholtz, B. & Wesson, J. 2018. Issues in implementing a data integration platform for electric vehicles using the Internet of Things. In IFIP International Internet of Things Conference (160-177). Cham, Springer.

Southern African Development Community. 2019. SADC Industry. [Internet: https://www.sadc.int/themes/economicdevelopment/industry/; date of access: 2019/09/12).

Tarek, B.H. & Adel, G. 2016. Business intelligence versus entrepreneurial competitive intelligence and international competitiveness of North African SMEs. *Journal of International Entrepreneurship*, 14(4):539-561. [https://doi/10.1007/s10843-016-0194-8].

Thamir, A. & Poulis, E. 2015. Business intelligence capabilities and implementation strategies. *International Journal of Global Business*, 8(1):34-47. [https://doi/10.1007/978-3-319-58097-5_3].

Tutunea, M.F. & Rus, R.V. 2012. Business intelligence solutions for SME's. *Procedia economics and finance*, 3:865-870.

Utama, A.G.S. 2017. SISMIOP Acceptance behavior user responses by usage of technology acceptance model (TAM) at realization of land and building tax (PBB) in Banyuwangi. In 1st International Conference on Islamic Economics, Business, and Philanthropy. Surabaya. Indonesia. (Surabaya, Indonesia: 2017/05/17).

Venter, P. & Tustin, D. 2009. The availability and use of competitive and business intelligence in South African business organisations. *Southern African Business Review*, 13(2):88-117.

Vidgen, R., Shaw, S. & Grant, D.B. 2017. Management challenges in creating value from business analytics. *European Journal of Operational Research*, 261(2):626-639. [https://doi.org/10.1016/j.ejor.2017.02.023].

Villamarín, J.M. & Diaz Pinzon, B. 2017. Key success factors to business intelligence solution implementation. *Journal of Intelligence Studies in Business*, 7(1):48-69. [https://doi/10.37380/jisib.v7i1.215].

Villegas-Ch, W., Palacios-Pacheco, X. & Luján-Mora, S. 2020. A business intelligence framework for analyzing educational data. *Sustainability*, 12(14):5745.

Wahyuni, D. 2012. The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of Applied Management Accounting Research*, 10(1):69-80.

Wang, C.H. 2015. Using quality function deployment to conduct vendor assessment and supplier recommendation for business-intelligence systems. *Computers & Industrial Engineering*, 6(84):24-31.

Watson, H.J. & Wixom, B.H. 2014. The current state of business intelligence. *Computer*, 40(9):96-99.

World Bank Group, 2016, World development report 2016: Digital dividends, World Bank, Washington, DC.

Williams, T.L. & Needham, C.R. 2016. Transformation of a city: gentrification's influence on the small business owners of Harlem, New York. *Sage Open*, 6(4):21-58.

Wixom, B., Ariyachandra, T., Goul, M., Gray, P., Kulkarni, U. & Phillips-Wren, G. 2011. The current state of business intelligence in academia. *Communications of the Association for Information Systems*, 29(1):16-27.

Ye, L.R. & Zhang, H.H. 2014. Sales promotion and purchasing intention: applying the technology acceptance model in consumer-to-consumer marketplaces. *International Journal of Business, Humanities and Technology*, 4(3):1-5. [https:// doi/10.17706/ijeeee.2018.8.2.66-73].

Yeoh, W. & Koronios, A. 2010. Critical success factors for business intelligence systems. *Journal of Computer Information Systems*, 50(3):23-32. [https://doi/10.1080/08874417.2010.11645404].

Yogev, N., Even, A. & Fink, L. 2013. How business intelligence creates value: an empirical investigation. *International Journal of Business Intelligence Research*, 4(3):16-31. [https://doi.org/10.4018/ijbir.2013070102].

Yusof, E.M.B.M. & Yusof, A.R.M. 2013. The study on the application of business intelligence in manufacturing: a review. *International Journal of Business Intelligence Research*, 4(1):43-51. [https:// doi/10.4018/jbir.2013010104].

Zhi, Z. & Guixian, Z. 2010. Notice of retraction: developing a framework for business intelligence systems in southwest of China. In 2010 3rd International Conference on Computer Science and Information Technology, 7:182-184.