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Reforming competitive advantages and supply chain effectiveness in South African State-Owned Enterprises

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ABSTRACT

Purpose of the study: The study aims to examine the influence of competitive advantage and supply chain effectiveness in South African SOEs in Gauteng province.

Design/methodology/approach: A quantitative design was adopted in which a survey questionnaire was administered to 863 supply chain practitioners working in SOEs in South Africa Gauteng province. Data were analysed with the aid of Statistical Package for Social Science (SPSS 28.0) and Smart PLS (3.0). In addition, Smart PLS was used to analyse the relationship between constructs and to test the hypotheses.

Findings: The current findings revealed that knowledge management and behaviour integration are determinants of competitive advantage that influence supply chain effectiveness in South African SOEs.

Recommendations/value: To enhance the efficiency and effectiveness of South African State-Owned Enterprises (SOEs), it is recommended to focus on key parameters and dimensions such as Knowledge Management (KM), Behaviour Integration (BI), Competitive Advantage (CA), and Supply Chain Effectiveness (SC). Conducting comprehensive research on these aspects will enable a better understanding of how South African SOEs can leverage CA on SC as drivers of performance.

Managerial implications: The study indicated that South African SOEs can interconnect their business activities through CA and SC. Furthermore, the study adds to the current body of evidence regarding the relationship between KM, BI, CA and SC in South African SOEs.

Keywords: knowledge management; behaviour integration; competitive advantage; supply chain effectiveness

JEL Classification: L32

1. INTRODUCTION

SOEs occupy an important position in the economy of most countries and are one of the fundamental motives for developing countries to establish (Madumi, 2018). In South Africa, SOEs play an important role in state activities and service delivery to the people. The creation of the SOEs allows state management and intervention of the country's economy. Private-owned enterprises are unable to provide products and services that accommodate all people living in South Africa. Therefore, the government must intervene to address the inefficiencies through the creation of SOEs (Bushe, 2019). In other words, the state serves the interest of the public by providing scarce products and service delivery to society (Lin et al., 2020). SOEs are solutions to market failure problems, which are unavoidable for developing countries. SOEs are established to improve the quality of life of South African citizens (Matsiliza, 2017). The creation of the SOEs allows state management and intervention of the country's economy.

Disappointingly, selected SOEs in South Africa in Gauteng province are insolvent due to mismanagement and corruption and thus need government financial support (Mafukata & Musitha, 2018). Various scholars have hinted at their unsuccessful performance, which causes problems such as poor internal management systems, leadership, political interference, and not abiding by the code of ethics when doing business (Thairu & Chirchir, 2016; Anike *et al.,* 2017; Bushe, 2019). However, South Africa views SOEs as an apparatus of social-economic development involved in a wide variety of operations, some of which are spread beyond the country's borders (Bezuidenhout *et al.,* 2018). The failure of SOEs is normally triggered by poor economic growth associated with the high rise of unemployment and poverty levels in many developing countries (Levenstein, 2018).

Failure among the selected South African SOEs has negatively affected economic growth and public finance, while the bailout of collapsing SOEs affects the welfare of the country (Marimuthu, 2020). The funds used to bail out these SOEs could have been used to address precarious community services (health, housing, and education). Instead, these funds are channelled to maintain failures caused by their mismanagement (Madumi, 2018). In this context, the study seeks to find tangible information on competitive advantages and supply chain effectiveness in South African SOEs. To collect tangible information, the study reflection is expanded on the basis of problem statement, literature reviews, classic theory, research variables, conceptual framework, research methodology, research approach, discussion of results, conclusions, and references.

2. PROBLEM STATEMENT

Despite the fact that SOEs play an important role in the economies of many developed and developing countries, the majority fail to be sustainable (Molocwa *et al.,* 2018). A study by Xin *et al.* (2019) has indicated that most SOEs fail to contribute efficiently or effectively towards economic growth or delivering of public services. South African SOEs are failing due to mismanagement, debt burdens, underinvestment, depreciation of assets, corporate governance quagmires and corruption, to mention but a few (Dash *et al.,* 2018). However, the state keeps injecting them with bailouts to enable service delivery to the people (Carlson & Bussin, 2020). The enormous debts that SOEs have incurred are a serious threat to the economy, and most are failing to deliver products and services they are mandated to provide (Mutize & Tefera, 2020).

Although researchers have studied these antecedents, which are knowledge management, behavioural integration, competitive advantage, and supply chain effectiveness separately in different settings and contexts, very little has been addressed on the issue of establishing competitive advantages through supply chain effectiveness in South African SOEs. In recognition of the scarcity, the study seeks to fill this research gap and perhaps reveal significant relationships between the proposed relationships.

By filling this gap in academic literature, the study will contribute new empirical literature, findings, and concepts that may encourage more research into related antecedents that lead to competitive advantage and supply chain effectiveness. Furthermore, the study will help motivate SOEs to reassess their level of knowledge management, behavioural integration, competitive advantage, and supply chain effectiveness in order to compete in the market environment. These findings will also aid in the improvement of South Africa's economy through the effectiveness and competencies of the SOEs. An important incentive and motivation to conduct the study is the fact that researchers haven't given this subject much attention in the context of South Africa.

3. LITERATURE REVIEW

The literature review outlines the bureaucratic theory of management and the four concepts of the article, which are knowledge management, behavioural integration, competitive advantage and supply chain effectiveness applied to the study.

3.1 Bureaucratic theory of management (BTM)

The BTM, also known as Weber's theory of bureaucracy, was named after Max Weber, a German sociologist, in 1947. The SOEs' structure is the focus of the theory, which divides and forms a strong edge of control and authority within an SOE (Dash *et al.,* 2018). The theory suggests the development of standard operating procedures as an aim of thinking and behaviour that ensures employees act in a way that is in line with the SOE's objectives and goals (Veronesi *et al.,* 2019). The theory consists of eight principles: written rules; a system of task relationships; specialised training; a hierarchy of authority, clearly identified duties; fair evaluation and reward; paperwork and maintenance of ideal bureaucracy that provides effective means for accomplishing the goals. The business environment must be both stable and predictable around the bureaucracy while abiding by the rules and procedures set by SOEs (Deslatte, 2020).

Weber's bureaucracy is the basis for the SOEs' systematic formation and is designed to ensure economic effectiveness and efficiency (Gamay & Ancho, 2019). It is a mode of thinking and behaving that ensures that project members act in a way that is consistent and appropriate with an SOE's project goals, mission, and objectives (Dash *et al.,* 2018). The BTM is an ideal model for management, and its eight principles can make SOEs stable and bring their strength into focus (Serpa & Ferreira, 2019). Managers are given the authority to enforce and interpret rules and controls by means of their position in the SOEs. Obedience is not tolerated in a person; instead, it is used to implement the authority of an office; thus, authority abides to a specific position rather than to individuals (Rusli & Sukri, 2019). The military, government bureaus, business enterprises, politically elected offices, and colleges or universities are examples of legal authority structures (Ferreira & Serpa, 2019).

The BTM is based on strict rules, regulations, and specialisations which guide management (Lapuente & Suzuki, 2020). However, the pursuit of the bureaucracy theory is too radical and rigid, which can lead to inflexibility of management when SOEs adopt new methods of management (Abers, 2019). Some of the criticisms of it involve delay in the decision-making process, misuse of power, discouragement of creative and innovative ideas, formal recording wastes money and effort, is rigid and inflexible in its communication, which are the biggest disadvantages of BTM in SOEs (Ingber, 2018). Unfortunately, SOEs are thus extremely dependent on regulation and policy compliance, which restricts employees from becoming innovative and makes them feel like members instead of individuals, which can demotivate employees in the long run (Adams & Klobodu, 2017). Moreover, employees may start to get annoyed at various rules and requirements over the course of time, with the risk that they may

boycott or abuse these rules (Sjoberg *et al.,* 2017). It is, therefore, important that bureaucratic SOEs inform employees in advance about the way the enterprise functions and what is required of them as employees.

However, the BTM is often linked to government agencies and large enterprises (Ishak *et al.,* 2020). Nevertheless, the great benefit of the BTM is that large enterprises can become structured, goal-driven and operate effectively. The BTM established eight principles, which allow for high efficiency and consistency of work by all employees (Wæraas & Dahle, 2020). Management can maintain control and adjustment when necessary for improvements, especially in SOEs where legislation plays an important role in delivering a consistent output (Davidovitz & Cohen, 2020). Therefore, for SOE managers to maintain control of the enterprise, it is essential to adopt the eight principles of the BTM.

3.2 Knowledge management (KM)

KM is important to SOEs because it enhances an employee's skills and experience needed to perform the work, although it may not have to exist in physical form (Akram *et al.,* 2020). It is important for SOEs to find ways to acquire knowledge to expand and preserve their key competencies. SOEs also view knowledge as a driving force in a modern economy (Dong *et al.,* 2017). It is vital for SOEs to find ways to gain access to available knowledge and construct new knowledge (Muthuveloo *et al.,* 2017). Obtaining KM mostly enables SOEs to provide better customer services (Manesh *et al.,* 2020). When knowledge is shared within the SOEs, it becomes cumulative and embedded with SOE processes, services, and products (Barley *et al.,* 2018). The goal should not be to store one employee's experiences but to combine a variety of knowledge to create new awareness (Dweiri & Shatat, 2021).

Network and communication channels within SOEs should encourage knowledge-sharing and collaboration among employees (Alshanty & Emeagwali, 2019). However, even though knowledge is not tangible, it can still be measurable. KM defines SOEs and reflects their organisation's capacity, technology, structure, culture and acquisition-oriented through storage, distribution, collection, application and creation of information gained through experience and competencies (Khan *et al.,* 2019).

3.3 Behaviour integration (BI)

BI consists of three distinct features: the exchange of information, joint collaboration behaviour, and decision-making (Chiu *et al.,* 2021). It is of great importance to differentiate it from the more familiar social integration, which aims at member cohesion and team spirit (Wang & Le, 2020). For transparency, subordinates must be able to coordinate, exchange

critical information and adapt to a changing working environment (Nai *et al.,* 2020). Therefore, information exchange formulates information sharing, which, when shared between members, leads to effective performance by minimising a negative effect through management change (Awaya & Krishna, 2020). Information sharing is critical when there are conflicts due to the loss of a common understanding of vital information (Zahra *et al.,* 2020). However, relying on a memory system no longer works, and it is difficult to build new ones while team members are still new or team members are unaware of who knows what information to begin with (Lacerenza *et al.,* 2018; Zahra *et al.,* 2020).

The exchange of information is the second dimension within BI, which implements communication between members (Enache, 2020). Communication plays an important role in team development and monitoring members' own structures when adaptation is essential (Lauff *et al.,* 2020). When faced with challenges from their normal processes due to enterprise change in structure, adaptive teams should change from implicit coordination to explicit coordination, which uses communication to request and gather operational information (Baumann & Bonner, 2017). However, when information is not communicated effectively, it causes confusion among teams. Information that is not communicated with employees is insufficient, mandating that communicating ideas among subordinates is a primary gain for the enterprise (Stacho *et al.,* 2019).

The third and final dimension of BI, joint decision-making, imposes that once shared, an idea must be accepted or rejected by the group (Venugopal *et al.,* 2020). Every idea can be debated when decisions are made by a team where all members understand and assess the importance of the idea (Joseph & Gaba, 2020). The team increases the chances of implementing the best option together rather than when options are provided individually (Castañer & Oliveira, 2020). Once the team has collaborated, joint decision-making can lead to positive effects (Bouazzaoui *et al.,* 2020). However, all three steps of BI are faced when new members are introduced to a team (Bakari *et al.,* 2017).

3.4 Competitive Advantage (CA)

From an SOE's point of view, competitive strategy is the achievement of CA by an enterprise in its market environment (Kaleka & Morgan, 2017). CA is an enterprise approach used to gain an advantage over its business competitors by focusing on skills-based, innovative strategic thinking, execution, critical thinking, positioning, the art of warfare and innovation (Salunke *et al.,* 2019). For SOEs to be successful, they must implement a competitive strategy as one of the core business units (Danso *et al.,* 2019). CA offers SOEs an advantage over their competitors by attracting customers and defending their market position (Papadas *et al.,*

2019). Therefore, SOEs can establish a sustainable and profitable position against industrial competitors (Songling *et al.,* 2018).

For SOEs to be considered, they must choose a different set of activities that differentiate them from their competitors by delivering a unique mix of value (Morioka *et al.,* 2017). CA is a long-term plan that helps SOEs sustain market dominance over rivals in the industry by deliberately choosing a different set of activities to deliver something unique and of value to customers (Kryscynski *et al.,* 2021). The important key is that each strategy is based on a unique set of internal processes, a strong alignment between a strategy that translates into successful performance (Peter *et al.,* 2019). For SOEs to accomplish a certain competitive strategy, they must also implement a proper human resource strategy to execute the chosen competitive strategies (Trullen *et al.,* 2020).

Human resource strategy systematically coordinates all SOE employees' attitudes and behaviours in a way that helps a business accomplish its competitive strategy (Starr-Glass, 2021). SOE's business strategy and business context must be unique since an effective human resource strategy influences it (Sullivan *et al.,* 2018). Therefore, SOEs can introduce a reward system, which would deliberately create and support a human resource strategy (Ales, 2020). They should not copy a reward system used by other organisations but rather find ways that would benefit them by following a fit approach (Islam *et al.,* 2020). Due to the different patterns, goals and strategies, SOEs should prioritise their uniqueness when applying their competitive strategy (Jones *et al.,* 2018). Therefore, they could sustain their competitive intensity by fully utilising their core competency and resources over business market competitors (Khan *et al.,* 2019).

3.5 Supply chain effectiveness (SC)

SC enhances the activities associated with the success of achieving the objectives that established an SOE (Mabrouk *et al.,* 2021). In today's competitive market, SOEs are encouraged to develop a paradigm to understand how to sustain CA and achieve SC (Chen, 2019). Effectiveness is a powerful and vital supply chain concept which can result in the rapid development and competitiveness of an SOE's survival (Daneshvar *et al.,* 2020). Therefore, the evaluation of SC is based on the selection of appropriate criteria (Ehsani & Mehrmanesh, 2021). However, it cannot be measured by a single approach only, as it is a multi-approach concept (Hudayberganov, 2020).

The term SC, in most cases, is used to contrast with development effectiveness (Viswanath, 2020). SC tends to focus on the direct result of work interventions for which there is

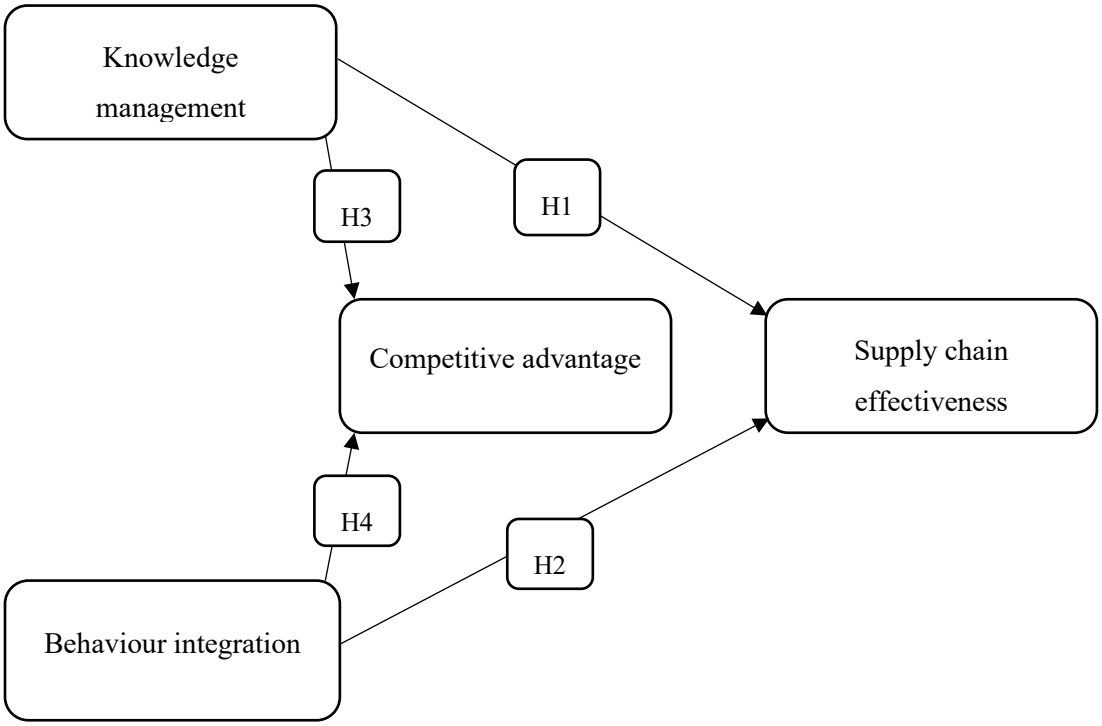
accountability in SOEs, in contrast with development outcomes based on work interventions (Clune & O'Dwyer, 2020). It usually focuses on the internal systems, which are biased towards producing development outputs and outcomes (Mosteanu *et al.,* 2020). In this sense, SC can also be measured on how well SOEs manage themselves internally to maximise their development outcomes and how well they behave in relation to a business declaration (Núñez-Merino *et al.,* 2020).

Therefore, a consensus is that if employees are effective, it will logically lead to SC (Gölgeci & Kuivalainen, 2020). However, SOE's goal-setting and clear communication should be implemented to align all departments on their goals (Mascareño *et al.,* 2020). If departments pursue their own goals without coordinating with other departments and without aligning with an SOE goal, then SC will be greatly affected (Dubey *et al.,* 2020). Therefore, SOE employees can improve SC by achieving their goals if those goals are aligned with enterprise goals (Ansari *et al.,* 2021). Clear communication and goal setting enable SOE employees to understand the goals set and the direction to work towards achieving SC (Cvitanovic *et al.,* 2020).

4. CONCEPTUALISED FRAMEWORK AND RESEARCH HYPOTHESES FORMULATION

A framework was conceptualised specifically to study the relationships among the four variables, knowledge management and behavioural integration, as predictors, while competitive advantage is a mediator and supply chain is the outcome variable. Figure 1 shows a framework of the constructs and hypothesised relationships investigated in the study.

Figure 1: Conceptual framework



Source: Own compilation

4.1 Knowledge management and competitive advantage

The main objective of every SOE is to improve its CA, but it can never be possible without efficient KM (Mahdi *et al.,* 2019). The KM evaluates SOE industries in terms of knowledge that the enterprises should have to survive among competitors (Mahdi *et al.,* 2019). In addition, SOEs should be able to point out what knowledge they must gain to compete with their competitors by removing the gap that exists between enterprises (Wijaya & Suasih, 2020). Al-Nawafah *et al.* (2019) suggest that SOEs should generate knowledge within themselves by establishing a supporting environment that fosters employees to generate new integrated knowledge. In support, a study by Iranban (2017) states that if SOEs can analyse a knowledge deficiency of information towards rivals, then the enterprise should gain that knowledge. On the other hand, if they surpass competitors in terms of knowledge, then there should be an ideal situation for them to take advantage of to sustain their CA (Lestari *et al.,* 2020).

An investigation done by Choi *et al.* (2020) found that intellectual KM can be translated into SOE resources through employees who have acquired, inferred, and utilised it towards improving CA. In addition, Abbas and Sağsan (2019) stress that knowledge acquisition is

beneficial not just for individual employees but also for SOEs. Similarly, Asada *et al.* (2020) advocate that adequate KM leads to positive attitudes towards SC improves the morale of the employees and helps employees identify with organisational goals. A recent study by Saeed *et al.* (2019) confirms that knowledge gained through training can benefit SOE's employees by helping them make better decisions, develop effective problem-solving skills, increase self-confidence, and achieve self-development. KM can also help employees handle stress, frustration, conflicts, and tension through recognition of personal goals while improving interaction skills (Durst & Zieba, 2019).

The importance of gaining a CA over competitors is a top strategic management subject in SOEs (Ngah & Wong, 2019). Gloet and Samson (2020) found that knowledge-based employees act through knowledge, stating that SOEs are the most significant strategic resource because this kind of assertion generates possible competitive advantages. Ginting (2020) further suggest that SOEs that have more knowledge are surely more successful. Therefore, those who use their knowledge in the right way can gain a CA (Manesh *et al.,* 2020). A current study done by Malik and Ali (2021) found that when new knowledge creates value, it can create value, be distributed through the enterprise and incorporated into good and improved technological means, which can lead to CA. Although SOEs KM is an important factor of CA, having knowledge assets of value through the enterprise cannot show that other departments can get the same advantage of the same knowledge (Demir *et al.,* 2021).

SOEs should familiarise themselves with how to create, distribute and utilise knowledge through their processes and procedures to attain sustainable CA (Di Vaio *et al.,* 2021). Another important factor is that SOE managers should be able to identify the kind of knowledge they seek to improve enterprise activities (Mat Noor *et al.,* 2021). However, the role of KM as a fundamental principle of CA has been accentuated in the field of strategic management (Khakpour & Hasani, 2021). Illustrated in the above statements, the following alternative hypotheses are constructed:

H1: Knowledge management exercises a positive influence on competitive advantage in South African SOEs.

4.2 Behaviour integration and competitive advantage

BI aims to uplift collaboration among SOE managers and employees, which can result in a well-functioning team, good decision making and clarity on what needs to be established (Budur *et al.,* 2021). SOE employees can experience fewer hassles and are more uplifted when they integrate with managers (Venugopal *et al.,* 2020). This result has received support

from Severo *et al.* (2020), who confirmed that SOE employees with a poor relationship with managers are most likely to display fragmented and inconsistent behaviour towards other employees. However, through emotional connections, SOE employees could be able to notice each other's emotions, which can create a wide experience of positive feelings and emotional stimulation, both of which could improve CA (Ik & Azeez, 2020).

SOE managers and employees improve performance-related outcomes, which include strategic decision quality, economic performance, and human resource performance (Yánez Morales *et al.,* 2020). Luciano *et al.* (2020) even suggest that SOE employees who have experienced positive behaviour reliability with managers see the value of integrating other employees' skills and knowledge. In addition, with high behavioural integrity, they tend to exhibit a higher level of unity with other employees through clearer, more coherent, and more comprehensive information and enterprise goals (Choi *et al.,* 2020). As a result, De Clercq and Pereira (2020) suggest that creating an environment in which employees can focus their energy and time on productive work, teamwork, and cooperation can improve their competitive position. Thus, the influence of an effective BI among managers and employees can improve the competitive position of the SOEs (Ömüris *et al.,* 2020).

An investigation done by Alam and Islam (2020) found that CA exists when SOEs enjoy superior power control in their market environment. The attractiveness of SOE goods or services in the face of pressures or changes in demand can enhance value that limits competition (Bansal & Kumar, 2020). Thus, Bandarian (2020) emphasises that CA can reduce uncertainty regarding future profit streams by insulating the enterprise from fluctuations in demand and pressure from markets' low prices. Moreover, Zhang *et al.* (2020) found that the presence of CA lowers the variability of market shares as well as provisions of market monopoly. Nevertheless, sustaining SOEs CA can enhance continual value such that the value remains inferior to alternative offerings despite environmental uncertainty (González-Morales *et al.,* 2020). This, in turn, correlates with Kim *et al.* (2020) findings, which stated that SOEs with sustained CA increase the cumulative difference between actual performance and forecasted performance over a period.

The involvement of high BI energy, which consists of positive emotions, intellectual work processes and communal goal-oriented behaviours in SOEs, is likely to provide employees with a more positive experience at work (Sharma & Bhat, 2020). This point is supported by Motuma and Amaha (2020), who stress that job satisfaction entails an employee's attitude towards daily duties or the specific phases of the job. Although there might be many factors that influence BI and CA within SOEs, a current study by Crucke *et al.* (2021) found that

negative experiences diminish an employee's positive experience at work. Prior research by Butt (2019) indicates that based on the functional and symbolic roles of top manager's behaviour, an employee's evaluation and perception of this behaviour can be consequential for their work outcome. As explained in the above statements, the following alternative hypothesis is assembled:

H2: There is a significant relationship between behavioural integration and competitive advantage in South African SOEs.

4.3 Knowledge management and supply chain effectiveness

SC plays a key role in the structural dimension within SOEs in mobilising the creation of new knowledge (Xie & Li, 2017). Throughout a communication and information system, knowledge flow of information can be integrated (Aldieri *et al.,* 2020). SC can reduce barriers to communication and information that naturally occur among employees within SOEs (Nambisan *et al.,* 2019). Given that SOEs capitalise on an inclusive system that supports communication and information, it is critical for employees (Rupčić, 2020). Therefore, the technological aspects that are part of effective KM contain business collaboration, distribution of learning, recording knowledge, opportunity, discovery, intelligence and security (Yu & Chen, 2020).

Collaboration and distribution of teaching technology enable SOE employees to cooperate by abolishing the enterprise and environmental barriers which might have previously prevented the flow of knowledge (Dubey *et al.,* 2020). Knowledge mapping gives SOEs a trial source of knowledge and creates a catalogue of internal knowledge (Onyancha 2020). Knowledge that is either internal or external to SOEs is generated by knowledge discovery technologies, which permit them to track knowledge about their employees, suppliers, partners, and customers (Rawluk *et al.,* 2020; Zahra *et al.,* 2020). Business intelligence technologies are used to implement knowledge with regard to competition and the overall economic environment (Mathrani, 2021). Thus, intelligence technologies are greatly important, and SOEs should take mandated steps to ensure that technological structures are protected and used appropriately throughout the supply chain (Novak *et al.,* 2020). As demonstrated in the above statements, the following alternative hypothesis is assembled:

H3: There is a significant relationship between knowledge management and supply chain effectiveness in South African SOEs.

4.4 Behaviour integration and supply chain effectiveness

SC refers to full concentration on decision-making in response to task and operational activities within SOEs (Boadway & Dougherty, 2019). Therefore, the more daily responsibilities that managers delegate to their subordinates, the more responsibilities are decentralised (Hlynsdóttir, 2020). Thus, each employee's flexibility and latitude to make operational and tactical decisions, as opposed to the management construct of joint decision-making, is reflected in behavioural integration, which is aligned with SC (Veeresha, 2022). When employees are granted latitude, they feel a sense of responsibility, which intellectually stimulates team members within SOEs (Chilenga-Butao, 2020). Leaders that pay special attention to their subordinate's individual needs make it easy for the individual to take responsibility without direct supervision or intervention (Loïc, 2020).

Hence, managers tend to structure their teams in a way that encourages decentralisation of responsibilities among team members based on their leadership style (Sandybayev, 2019). Transformational leaders can empower their members by giving them greater autonomy by increasing their perceptions of the degree of authority they have (Atan & Mahmood, 2019). Therefore, following the exchange of information within BI, communication among members is encouraged (Du Plessis, 2020). Communication is vital for teams to update and develop knowledge structures. It is necessary to communicate ideas to individuals and gain understanding from others (Susilo *et al.,* 2020). Communication among team members can lead to joint decision-making, which has a significant effect on performance (Monteiro *et al.,* 2020). Illustrated in the above statements, the following alternative hypothesis is constructed:

H4: Behaviour integration exercises a positive influence on supply chain effectiveness in South African SOEs.

5. RESEARCH METHODOLOGY

The research methodology section provides an overview of the research approach, paradigm, sampling design, procedures for data collection, instrumentation and data analysis used in this study.

5.1 Research approach

Quantitative and qualitative approaches are the most common in research methodology, and researchers may combine these two approaches (known as mixed methods) to perform their research. The quantitative technique was used for this study. Quantitative research is defined

by Abdallah *et al.* (2019) as the systematic empirical analysis of observable phenomena using statistical, mathematical, or computational tools.

A quantitative approach was used as it is suitable for a large sample that is representative of the population, and data can be easily collected and organized using graphs and charts (Shekhar *et al.,* 2019). Furthermore, this method is appropriate since the study involved the testing of four hypotheses, implying the existence of relationships between four different variables.

5.2 Paradigm

Research paradigms are best defined as a systematic way of thinking or a philosophical framework for observing and comprehending traditional research in a specific discipline (Willoughby *et al.,* 2015). They are critical in establishing a global scientific standard of achievement that provides solutions to existing problems to a community of practitioners or researchers for a set period of time (Kube & Rozenkrantz, 2020). However, research paradigms serve a variety of functions within a research domain; thus, the study concentrates on positivism, realism and interpretivism paradigms, which are known to support both quantitative and qualitative research.

The positivism paradigm, commonly referred to as epistemology, was used for this study's objectives. According to Makombe (2017), positivism is a scientific philosophy that argues that it is impossible to understand the social world subjectively. This type of philosophy holds that reality exists apart from people. This strategy was chosen because it allowed for the collection of a significant amount of data, which was necessary for the study's intended use of a high sample size (Austin, 1983). Furthermore, the positivism paradigm is linked to quantitative for its conventional, objective, and scientific characteristics (Mohajan, 2020); as a result, it has offered statistical support for all of the study hypotheses proposed.

5.3 Target population and sampling

The study focused on supply chain practitioners working for South African SOEs in Gauteng province. In this study, purposive sampling was used to select respondents. Purposive (judgmental, selective or subjective) sampling is a form of non-probability sampling that enables researchers to rely on their judgment when choosing respondents to participate in the study (Ames *et al.,* 2019). A sampling frame consisted of a list of supply chain professionals employed in SOEs in Gauteng province. A sample size of 1000 questionnaires was distributed to SOEs in Gauteng province. A total of 137 were unusable, allowing a total of 863 to be used for screening purposes.

5.4 Procedures for data collection and measurement instruments

The study used a quantitative approach with a cross-sectional design to test the relationships between various constructs using numerical data. The sample consisted of supply chain practitioners from Gauteng province's state-owned enterprises. A survey questionnaire with adapted measurement scales was used to collect data. The questionnaire was made available both electronically and in hard copy. Measurement items on knowledge management were adapted from Gold *et al.* (2001), Behaviour integration adapted from Ling *et al.* (2008), competitive advantage questions were adapted from Singh *et al.* (2019) and supply chain effectiveness questions which were adapted from Aydiner *et al.* (2019). Response options were arranged in the five-point Likert scale configuration calibrated as follows: Scale: 1 = strongly disagree, 2 = disagree, 3 = moderately agree, 4 = agree, and 5 = strongly agree. In this study, a five-point Likert-type scale was used because it is less confusing and comprehensive and allows respondents to assess the strength of agreement or disagreement about a statement. A five-point Likert scale was used in this study because it was easy for respondents to understand the questions while completing the questionnaires. A total of 863 questionnaires were used to analyse data in the study.

5.5 Data analysis

In this study, the Statistical Packages for the Social Sciences (SPSS version 28.0) and Smart PLS (3.0) were used.

6. RESULT OF THE STUDY

The results section discusses the descriptive statistics of respondents, the measures for scale accuracy and the results of the hypothesis tests.

6.1 Reliability and validity results

To assess the reliability and validity of the research constructs, three tests known as Cronbach's alpha, composite reliability (CR) and average value extracted (AVE) were conducted. The results of these tests are reported in Table 1.

Table 1: Scale accuracy analysis.

Research constructs	Cronbach's alpha test	C.R.	AVE	Item-total
	α Value			
Knowledge management				

KM1	0.909			0.808
KM2				0.808
KM3		0.928	0.648	0.752
KM4				0.844
KM5				0.798
KM6				0.854
KM7				0.762
Behaviour integration				
BI1	0.939			0.801
BI2				0.812
BI3		0.949	0.702	0.804
BI4				0.836
BI5				0.867
BI6				0.870
BI7				0.831
BI8				0.875
Competitive advantage				
CA1	0.927			0.879
CA2				0.872
CA3		0.943	0.733	0.872
CA4				0.828
CA5				0.866
CA6				0.817
Supply chain effectiveness				
SC1	0.912			0.813
SC2				0.753
SC3		0.931	0.693	0.810

SC4				0.878
SC5				0.890
SC6				0.844
KM= knowledge management; BE= behavioural integration; CA= competitive advantage; SC= supply chain effectiveness				

Source: Own compilation

During the cleansing process or the scale purification, item-to-total correlations were computed and were expected to be above the minimum threshold of 0.5 (McQuitty, 2018). Using this criterion, all items were regarded as an item-to-total correlation of more than 0.5. To assess the reliability of each construct, the Cronbach alpha test and the composite reliability tests (CR) were computed. According to Hulland (1999), the recommended minimum value for the two tests is supposed to be above 0.7 in order for measurement scales to be classified as reliable. Table 1 shows that all the measurement scales had Cronbach alpha and composite reliability values above 0.7; therefore, it indicates a higher degree of internal reliability and consistency. Convergent validity was further checked using the Average Variance Extracted (AVE). AVE was calculated using the formula of Fornell and Larcker (1981), which recommends that the AVE value should be greater than 0.5. The AVE values of the research constructs are between 0.648 and 0.733 (as presented in Table 1). Since all AVE values were above the recommended threshold, all items were deemed to be converging well on their respective constructs. An inter-construct correlation matrix was used to check for discriminant validity. The study followed McQuitty's (2018) recommendation that correlation coefficients less than 1.0 are an indicator of adequate discriminant validity. The results are indicated in Table 2.

Table 2: Inter-Construct Correlation Matrix

RESEARCH CONSTRUCT	BI	CA	KM
BI	0.838		
CA	0.574	0.856	
KM	0.710	0.599	0.805
SC	0.525	0.606	0.558
KM= knowledge management; BE= behavioural integration; CA= competitive advantage; SC= supply chain effectiveness			

Source: Own compilation

Table 2 indicates a positive correlation across all constructs, and they are all below the required level of 1.0, which proves the adequacy of discriminant validity in the measurement scale (McFarland, 2020).

6.2 Smart PLS path modelling results

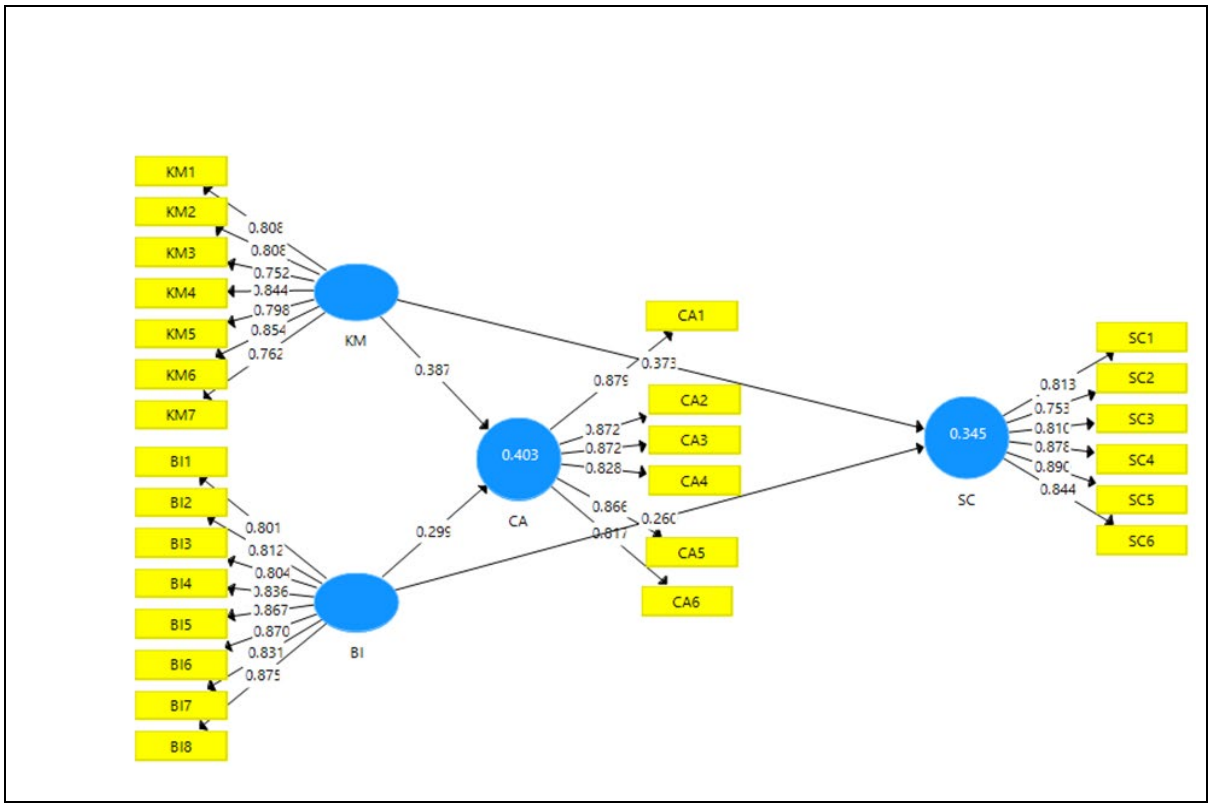
After approving the reliability and validity of the measurement instruments (reported in Table 1), the study proceeded to test the proposed hypotheses. The results of this analysis are reported in Table 3 and Figure 2. For the relationship to be supported, P-values should be below 0.01 (Jafari & Ansari-Pour, 2018). In support, Winship and Zhuo (2020) stated that T-statistics should be above 1 for a relationship to be deemed significant. All the proposed relationships were met, with P-values below 0.01 and T-statistics above 1, which means they can be considered accurate.

Table 3: Results of Structural Equation Model Analysis

Path	Hypothesis	Path coefficients (β)	P-Values	T-Statistics	Decision on hypotheses
KM -> SC	H1	0.373	0.000	9.069	Supported and significant
BI -> SC	H2	0.260	0.000	5.864	Supported and significant
KM -> CA	H3	0.387	0.000	10.117	Supported and significant
BI -> CA	H4	0.299	0.000	7.549	Supported and significant
KM= knowledge management; BE= behavioural integration; CA= competitive advantage; SC= supply chain effectiveness					

Source: Own compilation

Figure 2: **Structural Equation Model**



Source: AMOS (27.0)

6.3 Discussion of the results illustrated in Table 3 and Figure 2

Hypothesis H1 expressed the positive relationship between KM and SC. The results confirm that this relationship exists (t=9.069; p=0.000). The hypothesis supports the existence of a significant relationship between the two constructs. The result supports Severo *et al.* (2020), who confirmed that SOE employees with more knowledge are most likely not to display fragmented and inconsistent behaviour towards other employees. Therefore, in SOEs in South Africa, the data suggest that active KM practices can lead to an increase in SC.

The study proves that the relationship tested through Hypothesis H2 shows a positive relationship between BI and SC. The results confirm that this relationship exists (t=5.864; p=0.000). This means that SC would not be met without BI practices. Based on the results, it can be confirmed that BI directly impacts SC. Gagne *et al.* (2018) state that using BI enhances staff recruitment and retention and allows SOEs to benefit from increased motivation and greater business performance. As such, it is confirmed that BI has a direct impact on SC in South African SOEs.

The hypothesis H3 results show a positive relationship between KM and CA. The results confirm that this relationship exists (t=10.117; p=0.000). This means that CA would not be met without implementing KM. Based on the results, it can be confirmed that KM directly impacts CA. In Indonesia, Suharto *et al.* (2021) stress that there is a parallel relationship between KM and CA in the micro, small and medium enterprises service industry. Therefore, it can be confirmed that the KM function directly impacts CA in South African SOEs.

The results of hypothesis H4 testing confirm the relationship between BI and CA. The results confirm that this relationship exists (t=7.549; p=0.000). The hypothesis supports the existence of a significant relationship between BI and CA. As Yánez *et al.* (2020) noted, BI can improve performance-related outcomes through strategic decision-making, quality, economic performance, and human resource performance. Based on the results, it is possible to conclude that when enterprises align BI with CA, it is highly likely that South African SOE performance will improve.

7. CONCLUSION

The purpose of the current study was to explore the role of CA and SC in South African SOEs. In order to empirically validate the relationships proposed, a sample of 863 form supply chain practitioners working SOEs in Gauteng province was used. The study presented vital information relating to CA and SC that should be implemented in South African SOEs. The results confirm that factors such as KI and BI can positively improve CA and SC. The study also enlightens managers in SOEs on areas of improvement in the systems process and the application of beneficial strategies for enhancing CA and SC. The study also provided detailed results for the proposed hypothesis relationships. Despite the researcher's efforts to ensure that the study is without flaws, there are several constraints that must be highlighted in order for them to be addressed in the future. The study was grounded on the literature on BTM; however, there is no best theory applicable to this study. Future research should try to include other theories for this same model, such as the human relation theory and the scientific management theory, in order to compare the outcomes. A substantial expansion of the scope to all nine provinces in South Africa could have yielded a more informative reading of results as SOEs operate in all provinces. Furthermore, the lack of monitoring during the questionnaire completion process could be viewed as a significant drawback. It would have been more appropriate if the researcher had been able to lead the responders through the essence of the questions given or presented to them in order to acquire a holistic knowledge of the sentences and honest input from participants. One option is to use a mixed-method approach, in which respondents are interviewed rather than filling out a lengthy questionnaire. Furthermore, the

selection of South African SOEs in Gauteng may be debatable, given that South Africa has over 300 SOEs, both domestic and international. As a result, the study's results may have been limited due to the lack of inclusion of all South African SOEs operating nationally and internationally.

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