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The impact of human capital on supply chain management performance in state-owned enterprises in Gauteng, South Africa

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ABSTRACT

Purpose of the study: This article examines the impact of human capital on supply chain management in state-owned enterprises in South Africa.

Design/methodology/approach: A survey was conducted among members of South Africa's State-Owned Entities Procurement Forum to gather data for this article. Structured questionnaires were used to collect the data, and descriptive analysis was performed using SPSS software.

Findings: The findings revealed that human capital positively and significantly impacts supply chain management performance in state-owned entities. Three variables concerning human capital practices were practised, namely, organisational structure, skills and competence, and training and development. Based on the findings, supply chain management skills and competence were the strongest and highest predictors of supply chain performance in such entities.

Recommendations/value: It is recommended that effective human capital practices be aligned with supply chain management practices to enhance supply chain management performance. Moreover, the recommendation made here is that the head of supply chain management in a state-owned entity report directly to the accounting officer. Additionally, the head of supply chain management should be represented within various executive structures and the board of directors for this division to be strategic.

Managerial implications: For supply chain management performance to improve and increase in state-owned entities, organisations must hire employees with the appropriate skills and competencies. State-

owned entities should also invest in upskilling their supply chain management teams through continuous training and development. For such training and development to be effective, a skills gap analysis exercise must be undertaken, and all existing gaps must be addressed through practical career development plans.

Keywords

Human capital; South Africa; State-owned entities; Supply chain management.

JEL classification: J4

1. INTRODUCTION

Supply chain management (SCM) in state-owned entities (SOEs) has experienced significant challenges as well as substantial and rapid changes in recent years. In terms of experience, human capital directly impacts performance since it leads to the development of empathically acquired skills or expertise, which facilitates more knowledgeable actions and pragmatic decision-making (Gcds, 2017). As a result, SOEs are under pressure to fine-tune their structures and workforces while seriously considering repositioning the supply chain within their organisations (Cousins *et al.*, 2019). According to Chansamut (2022), changes in SCM and the environment in which it operates significantly affect the relevant superior skills required for excellence. Basheka (2019) and the National Treasury (2016) emphasised that in SOEs, SCM practitioners must possess the appropriate skill sets and competencies and engage in continuous training and development to address the profession's challenges. Simultaneously, the organisational structure in which SCM operates should be conducive to achieving governmental priorities. Ramsay (2001), as cited in Chaston (2015), asserted that: (1) the superior skills, capabilities and experience of individuals; (2) the historically superior codified knowledge of the supply chain; (3) the superior power which resources have over suppliers; (4) the lack of transparency in achieving superior procurement competence; and (5) the high cost of replication are potential sources of supply chain performance. Notably, just as having the right people, skills, capabilities, and knowledge is essential for SCM's successful performance, a properly designed structure is also vital (Cousins *et al*., 2019; Dlamini, 2013). Moreover, the position of SCM within the organisational structure is essential in determining its impact and success (Keränen, 2017). According to Ambe (2012), a function's physical placement or reporting relationship in an organisation determines its status and influence. Without qualified and capable employees dedicated to performing as they were trained, it would be difficult to successfully implement supply chain strategies and policies (Swart *et al*., 2015).

Furthermore, the organisational structures within which SCM operates in SOEs are not ideal. Most SCM practitioners do not have the appropriate skills, knowledge, and experience required for their current positions (Crosnier, 2022; Lopes de Sousa Jabbour *et al*., 2020). This skills shortage is further exacerbated by SOEs' inadequate investment in the training and development of their SCM practitioners. Crosnier (2022) ascertained that only 45 percent of SOEs provide formal career paths with learning development programmes. While research on SCM structure, skills, competence, and training and development has been undertaken by various stakeholders in South Africa, few studies have been conducted from the perspectives related to SOEs. In 2015, the National Treasury developed an SCM competency framework for deployment in the government and its various entities; however, the results are still not clear.

This study investigated the influence of human capital (SCM structure, skills and competencies, and training and development) on the performance of SOEs in South Africa from a resource-based perspective; this is an attempt by the authors to fill these gaps.

The question that defines this article can be stated as follows:

- What is the impact of human capital on the SCM performance of SOEs?

This study's objective is to add to the existing body of research on SCM concerning human capital (structure, skills and competence, and training and development) and the influence these aspects have on the implementation of SCM in SOEs and, subsequently, performance. The remaining sections of this article include the literature review, the research methodology, the findings, a discussion, and a conclusion.

2. LITERATURE REVIEW

This section provides an overview of SCM from an SOE perspective, provides a theoretical overview of a resource-based view (RBV), and outlines the article's conceptual framework and developments. Critical factors of human capital are also discussed in this section, such as organisational structures, skills and competencies, and training and development.

2.1 SCM in SOEs: definitions and concepts

SCM can be defined as the systematic, strategic coordination of traditional business functions and the strategies employed across these functions within a particular company, along with a review of business functions within a specific company and across businesses within the supply chain to improve the long-term performance of individual companies and the supply chain (Badenhorst *et al.*, 2013). The Council of Supply Chain Management Professionals

(CSCMP) (2013) defines SCM as encompassing the planning and management of all sourcing and procurement, conversion, and logistics management activities. Based on these definitions, it can be ascertained that SCM includes coordination and collaboration with channel partners, be they suppliers, intermediaries, third-party service providers or customers. It can also be applied across sectors, including SOEs. The generic term 'SOEs' denotes all types of commercial and non-commercial government entities in a country. In South Africa, SOEs span several industries, including utilities, transportation, and technology. There are about 715 SOEs in this country (Department of Public Enterprises, 2022). The South African government uses schedule classifications extensively, primarily for financial management and to comply with the Public Financial Management Act of 1999 (National Treasury, 2021). The role of SOEs is to ensure that essential services are offered on behalf of the state efficiently and effectively (Ovens, 2013). This mega role requires SOEs to take a strategic approach concerning SCM. Additionally, SOEs need to leverage their purchasing power and shift away from traditional procurement by adopting a more strategic approach to SCM.

SCM plays a significant role in the government's spending through SOEs. SOEs are expected to manage their operations like 'businesses', generate revenue and become more self-sustainable. However, this conflicts with their commercial interests and socioeconomic policies (Osuji & Obibuaku, 2016). When making procurements for their service delivery projects, SOEs are expected to comply with policies and regulations governing the SCM system of the country while, at the same time, deriving value for money and cost-effectiveness to improve their performance. According to the National Treasury (2015), poor compliance with SCM policies and regulations leads to fraudulent activities, such as tender irregularities, corruption, fruitless expenditures, the misuse of taxpayers' money, unauthorised spending, and the generally poor performance of SOEs. Therefore, SCM practitioners and crucial role players must conduct their functions in a transparent, fair, and open manner.

2.2 Resource-based view theory (RBV)

The Resource-Based View theory (RBV) is a group of theories that imply enterprises may preserve a competitive advantage by utilising internal resources that are significant, uncommon, imperfectly imitable, and incorporated for economic efficiency. According to Kaufman (2015), certain concepts within RBV became more prevalent in the 1980s and 1990s. When assessing scarce resources or factors that firms cannot reproduce, it becomes challenging to avoid tautology (i.e., proving value irrespective of the factor's effect on performance) (Hitt *et al*., 2016). Under the RBV, the recommendation can be complex; thus, one cannot prescribe items that corporations can execute efficiently, as such features are

imitable and are not considered RBV resources (Ferreira *et al.*, 2022). Academics present the practice-based view (PBV) as a more precise and superior alternative to operations management (Shahsavar *et al.*, 2021). Consequently, scholars aim to explain the whole spectrum of the firm and unit performance using transferrable practices (Cerar *et al*., 2022).

The theory concerning the RBV stipulates that the fundamental sources and drivers of SCM performance are primarily associated with the attributes of resources as well as valuable and costly-to-copy capabilities (Osorio-Londoño *et al*., 2021; Rafa & Kechid, 2021). The underlying principle of the RBV is that SCM structures in the same industry are differentiated through the uniqueness of their resources and capabilities (Filho & Moori, 2020). Ketoviv and Choi (2014:232) described capabilities as "the capacity of a set of resources to perform a task or an activity in an integrated manner". Conversely, resources are described as "inputs into a firm's production process such as capital, equipment, skills, finances, et cetera, controlled by a firm that enables the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Ketokivi & Choi, 2014:234). Resources include the combination of human capital, financial resources, technology and knowledge (Sumo *et al.*, 2016). Guajardo *et al.* (2012) classified resources into two categories: tangible (plant, machinery, land and buildings) and intangible (brand name, intellectual property, reputation, technological knowledge, and service levels). De Oliveira *et al*. (2018) cautioned that not all resources possess strategic value—those with minimal value can only break even.

In contrast, strategic value generates more revenue and competitive advantages (Zimmermann & Foerstl, 2014). Resources need to be inimitable, non-substitutable, unique and scarce, as these characteristics make it easier for firms to achieve consistently higher performance than their competitors (Mogre *et al.*, 2017). SCM resources and capabilities direct the manner in which the supply chain is conducted and, thus, determine its performance. This theory relates to the objective of the present article, which is to investigate the impact of skills, competence, training and development on SCM performance. According to Cousins *et al.* (2019), firms with strategic resources and distinctive capabilities have the potential to exploit opportunities and neutralise threats within their environment. The RBV theory, therefore, encourages a strategic approach to SCM. Also, there needs to be consistency between the organisation's competitive priorities (which the competitive strategy aims to satisfy) and supply chain capabilities (which the supply chain strategy aims to construct) (Chopra, 2018). Thus, SCM has the potential to enhance the organisation's overall performance. Briefly, the RBV aims to clarify a firm's sustained competitive advantage resulting from scarce, valuable, difficult or impossible to mimic or duplicate resources, which cannot readily be substituted.

2.3 Theoretical framework and hypothesis development

This section provides a schematic view of the critical variables of human capital practices, namely, structure, skills and competence, training and development, supply chain performance, and the development of the hypothesis.

2.3.1 Understanding human capital management

Human capital (HC) can be defined as an intangible resource specific to an organisation and includes its know-how (Tzounis *et al.*, 2017). HC exists in employees (as traits and soft skills related to problem-solving and opportunity-seeking) and in organisational tasks designed to engage talented employees and optimise workforce utilisation (Karami & Gustomo, 2020; Tzounis *et al*., 2017). Mafini *et al.* (2013) posited that HC is an asset with a flow of benefits that exceeds costs. HC, therefore, includes the processes, practices and systems that staff use to acquire or grant access to knowledge (Karami & Gustomo, 2020). According to Mayo (2016), unlike human resources (HR), HC perceives humans as assets instead of costs. In this study, HC focuses on organisational structure and SCM officials' skills, competencies, training, and development to enhance SCM performance. The following sections expand on each variable and its impact on SCM performance.

2.3.2 Organisational structure

In SOEs, the SCM structure is influenced by the government's SCM policies and regulations. In terms of Treasury Regulation 16A4.1 (National Treasury South Africa, 2010), an accounting officer or accounting authority must establish a separate SCM unit within the office of that institution's chief financial officer (CFO) in order to implement its SCM system. A study conducted by Accenture (2022) confirmed that SCM in SOEs is not a stand-alone department but is situated under the office of the CFO. This reporting structure has raised concerns amongst SCM practitioners, professional bodies, and related facilities, such as the State-Owned Entities Procurement Forum (SOEPF), since the arrangement appears to limit the elevation of SCM to the c-suite. Accenture's (2022) report revealed consensus amongst SOEs regarding the need for an SCM/chief procurement officer to report directly to the accounting officer or chief executive officer (CEO) to drive strategic agendas for SCM. The ongoing debate on where SCM should be placed within SOEs is fundamentally concerned with the former's strategic positioning, value extraction and internal collaboration.

The latter relates to how SCM can drive cross-functional strategies and effectively serve internal customers (KPMG, 2014). Thus, strategic positioning entails placing SCM at a level where its methods and practices align with the organisation's objectives. This can only be

achieved by having the head of SCM report to the CEO and the board of directors. According to KPMG (2014), SCM reporting in SOEs reflects how the function is perceived within the organisation and whether it is positioned to become a competitive differentiator that delivers more excellent value to customers and shareholders. Hence, the higher up SCM is within the corporate structure, the more significant the role it plays in supporting organisational objectives. In response to calls for change, most SOEs have begun to include SCM in their board subcommittees (e.g., Risk and Management, Audit or Finance committees). This, in turn, validates the strategic importance of SCM within the organisation. SCM professionals have a range of job titles: procurement officer; buyer; supply chain manager; supplier relationship manager; contract manager; category manager; and assistant buyer. These job titles define their roles and responsibilities within the reporting hierarchy. Therefore, the following hypotheses were established with organisational structure:

Hypothesis 1: Organisational structure has a positive and significant impact on supply chain performance

2.3.3 SCM skills and competencies

Implementing SCM strategies, practices, policies, and regulations requires competent, ethical, professional and skilled employees within appropriate structures (National Treasury, 2020). According to Foerstl *et al.* (2013), in order to meet the future requirements of SCM as a strategic contributor to SOEs' success, employees' skills must be developed over time, and they must be allocated tasks that have the most significant value to the organisation. Karami *et al.* (2020), for example, identified the scarcest skills, globally speaking, and classified them into soft and hard (job-specific) skills that are crucial for successful SCM implementation (i.e., a 'skill' being the ability either to perform a specific behavioural task or a cognitive process related to that task). Sun and Song (2018) defined skills as abilities garnered through practice or the accrual of knowledge. According to Hohenstein *et al.* (2014), the SCM skill required in an organisation increases in response to changes within the environment in which that organisation operates. The performance of SCM duties, such as strategic sourcing, procurement planning, determining the total cost of ownership, materials management, disposal management and strategic SCM, is essentially based on the human competencies of the staff (National Treasury, 2015). SCM skills have been found to influence the effectiveness of SCM performance and, consequently, the organisation's performance (Hohenstein *et al.*, 2014; Sun & Song, 2018).

According to Hohenstein *et al.* (2014), SCM leaders must continually assess the positioning of SCM within their organisations and the skills needed to enhance their competitive advantage.

Sun and Song (2018) divided strategic sourcing skills into four broad categories: technical skills; business development and management expertise; marketing; and sourcing specialisms. Hohenstein *et al.* (2014) segregated SCM skills into people, as well as technical and analytical/communications. Yong *et al.* (2020) identified ten skill sets that are crucial for SCM performance: interpersonal skills; the ability to make decisions; the ability to work in teams; analytical skills; negotiating skills; the ability to manage change; a customer focus; the ability to influence and persuade; the ability to strategise; and the ability to understand business conditions. Yong *et al.* (2020) noted five skill sets that SCM professionals should acquire: team building; strategic planning; communication; technical; and comprehensive financial skills. Lulie *et al.* (2014) divided SCM skills into the following categories: communication and teamwork, technology initiative and enterprise skills, and compliance and legal knowledge. According to Tan *et al.* (2022), individual SCM competencies positively influence SCM performance. Following the description of skills and competencies, the following hypothesis was developed:

Hypothesis 2: Skills and competence have a positive and significant impact on supply chain performance

2.3.4 Training and development of SCM teams

In terms of 16A5.1 of the Treasury Regulations (National Treasury, 2015), "the accounting officer or accounting authority must ensure that officials implementing the institution's supply chain management system are trained and deployed following the requirements of the Framework for Minimum Training and Deployment issued by the National Treasury". Without a well-trained and motivated workforce, the effectiveness of SCM in government remains only a dream (Koens & Thomas, 2015). Moreover, when highlighting SCM's challenges, it is worth noting that some SCM practitioners in government are not adequately trained to efficiently execute SCM tasks or apply/follow the correct processes. Therefore, training is crucial for developing an effective SCM system. Training can be divided into two categories, namely, on-the-job and off-the-job.

The former refers to the methods taught to employees within the everyday work environment, while the latter refers to training provided in addition to the actual working environment (workshops, seminars, conferences) (Manyathi, 2014). Training employees (on or off the job) is inseparable from personal development. According to Khoase *et al.* (2018), both training and development are used to close the gap between employees' current performance and expected future performance. The benefits of training and development include higher morale for employees, lower production costs, lower staff turnover, improved change management,

and improved availability and quality of staff. Furthermore, exercise is often considered an essential investment towards enhancing intellectual capital, which is vital for the organisation's competitive sustainability (Bulut & Culha, 2010). Training also enhances employees' knowledge, skills, ability, competencies, and behaviours. Subsequently, adequate training and knowledge-based learning are essential for developing and maintaining new SCM skills. According to Flöthmann *et al.* (2018), organisational learning provides strong direct and indirect effects that have two main implications: (1) it should serve as motivation for organisations to constantly improve their learning capabilities, and (2) these only tap the true potential for enhancing SCM performance if they first elevate individual competencies and organisational knowledge. Based on the description above, we developed the following hypothesis:

Hypothesis 3: Training and development have a positive and significant impact on supply chain performance

2.3.5 Supply chain performance

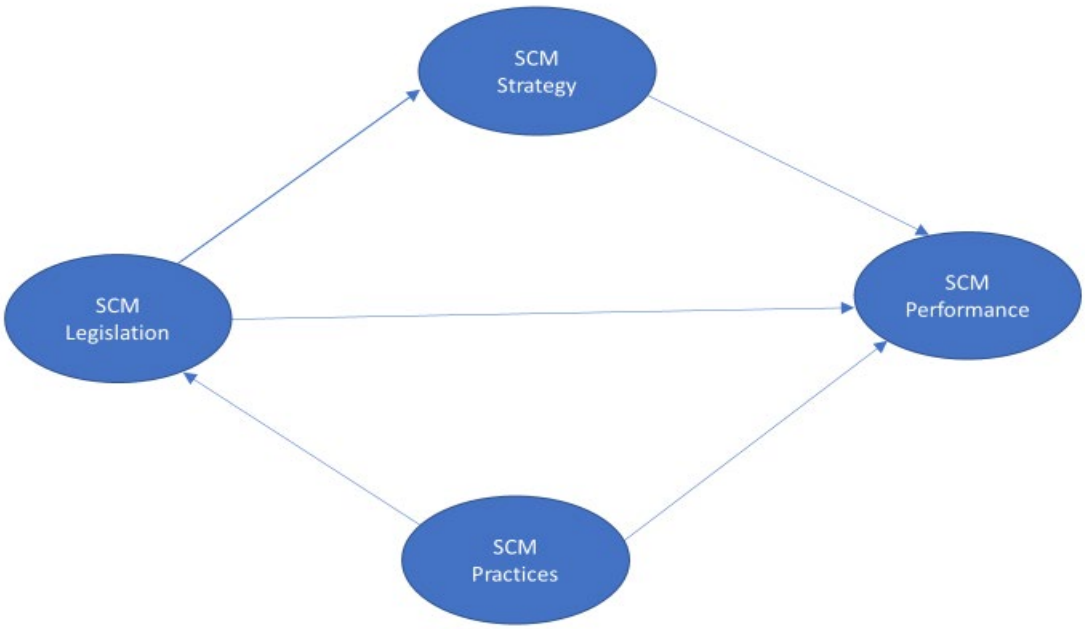
An organisation's success is highly dependent upon having an effective and efficient metrics system that aligns with the strategic objectives within the organisation (Lear, 2012). Thus, measuring SCM performance is essential for determining the performance of SOEs. According to Peristeris *et al*. (2015), this kind of interpretation is influenced by managing and integrating crucial elements (such as supply chain linkages and information) into SCM. SCM performance management is also a monitoring process that undertakes a retrospective analysis to determine whether the appropriate procedures and the desired objectives were achieved. Issues that may be reviewed include compliance with norms and standards, the cost efficiency of the SCM processes, and whether supply chain practices are consistent with the government's broader policy focus. Additionally, an SCM performance evaluation system represents a formal, systematic approach to monitoring and evaluating such performance. Supply chain performance measurement and management systems should directly support corporate goals and objectives. Also, a well-developed performance management system helps management distinguish between positive and negative SCM practices and results (Meehan *et al.*, 2016). Supply chain performance measures also serve as indicators of how well a supply chain system actually functions. Accordingly, measuring supply chain performance can facilitate a greater understanding and enhance performance (Bäckstrand *et al*., 2019; Knight *et al*., 2020; Van Hoek *et al*., 2020).

SCM performance measures cannot be determined in isolation but require a holistic approach that considers the organisation's corporate objectives. In this regard, SCM measures must

incorporate both financial and non-financial performance measures. Prior (2013) asserted that managers should focus on optimising their firm's operations and work collaboratively to generate mutual goals. According to Madigan (2021), the fundamental objective of SCM performance measurement is to translate supply chain strategies into action and implement a system that monitors and evaluates performance. Effective performance measures cascade down from the highest level of the organisation to the lowest ranks. All activities at the operational level should work towards the larger organisational strategy. Thus, effective performance management should cascade high-level corporate strategy through to the lowest level of officials within the company. To this end, SCM performance measures are divided into seven categories: cost; compliance; risk management; quality; time; reporting; and benchmarking.

This study sought to assess and make recommendations regarding SCM performance structure, workforce, skills, and competence. A conceptual framework offers a concise description of the phenomenon under investigation, accompanied by a graphic or visual depiction of the significant variables of the study (Meehan *et al.*, 2016; Osodo *et al.*, 2016). The proposed framework in Figure 1 assumes that the strategic positioning of SCM in an organisation, the skills and competence level of SCM personnel, and their training and development will enhance SCM performance in SOEs.

Figure 1: Conceptual framework



Source: Authors' own compilation

As depicted in Figure 1, the conceptual framework indicates the organisational structure, skills and competence, and training and development performance.

3. METHODOLOGY

This study employed a quantitative design approach. Quantitative research is a distinctive approach that entails collecting numerical data, regards the relationship between theory and research as deductive, generally prefers a natural science approach, and adopts an objectivist conception of social reality (Paul *et al.*, 2016). A quantitative design also clearly illustrates the object's structure under study, spells out its manifest behaviour, and scales consumer attitudes to pre-arranged objects (Maiden, 2021). The study population comprised senior SCM practitioners within SOEs in the South African province of Gauteng who are members of the SOEPF. According to the PFMA, there are 299 SOEs in South Africa, of which 63 are affiliated with the SOEPF. Their data further reflect that there are 3 005 SCM practitioners in those affiliated SOEs. The SOEPF was selected because it is the only procurement forum recognised by the South African government. Thus, the 3 005 persons with the title of supply chain manager, senior manager supply chain, executive manager supply chain, head of SCM and chief procurement officer (CPO) on the SOEPF database were sampled. We employed simple random sampling, which dictates that each population element has a known non-zero chance of being selected (Wilson *et al.*, 2021). This study employed a random probability with an employee sample size of 300 supply chain or procurement managers who are registered members of the SOEPF database.

A structured questionnaire was developed, primarily based on instruments used in other studies (operationalisation and the item measurement section). Thus, most of the questions contained in the questionnaire were five-point Likert-scale questions, ranging from 1 (strongly disagree) to 5 (strongly agree). The scale assumed that each statement on the scale had an equal attitudinal value, importance or weight in reflecting the subjects' attitudes (Nazarian *et al.*, 2017). The questionnaires were then converted into SurveyMonkey Internet-based surveys.

A wide variety of statistical software is available, each providing the user with something unique (Purwanto *et al.*, 2021). Researchers will select the kind of software that aligns with their research and also relies on several variables such as research topics, statistical skills, and coding expertise (Danurdara *et al.*, 2017). These elements may represent the leading edge of the data analysis, but as with any research, the quality of the gathered data is contingent on the study's execution (Brezavšček *et al.*, 2014). Consequently, it is crucial to remember that

even if a researcher has access to sophisticated statistical software and the skills to utilise it, the findings would be inconsequential if the data were not collected properly. Data analysis is one of the research methods performed once all the necessary data have been acquired to answer the problems under study (Hagen *et al.*, 2013). For a researcher's study results to contribute to problem-solving and to be scientifically justifiable, they must possess the knowledge and comprehension of numerous analytical procedures (Thomas *et al.*, 2019). Utilising analytical instruments with precision will determine the accuracy of the results. Consequently, data analysis tasks cannot be omitted from the study procedure.

Smart Partial Least Square (SmartPLS) is a statistical software with the same objective as AMOS, which assesses the links between variables, both among latent and indicator variables or manifest variables (Bond *et al.*, 2012). SmartPLS is a graphical user interface programme for variance-based structural equation modelling utilising the partial least squares path modelling approach (Trimurtini *et al.*, 2021). Many researchers and academics use SmartPLS for data analysis in their research activities.

As mentioned above, AMOS stands for ‘analysis of moment structures’ and is a statistical software (Purwanto *et al.*, 2021). More specifically, AMOS is an additional SPSS module utilised especially for structural equation modelling, route analysis, and confirmatory factor analysis (Danurdara *et al.*, 2017; Diamantopoulos *et al.*, 2012). Besides this, it is also known as software for analysing covariance and causal modelling (Brezavšček *et al.*, 2014). Additionally, AMOS is a graphical structural equation modelling tool (SEM) (Haudi *et al.*, 2022), and by using simple drawing tools, it is possible to create visual models in AMOS. Lastly, AMOS has the ability to run SEM calculations rapidly and present the results.

SPSS is a statistical tool developed by the IBM Corporation and utilised globally by researchers and academics. This statistical programme is user-friendly and may be used to execute various statistical tests (Bond *et al.*, 2012). This statistical programme performs both comparative and correlative statistical tests in the context of univariate, bivariate, and multivariate analyses using parametric and nonparametric statistical approaches (Purwanto *et al.*, 2021). In addition, it allows the researcher to examine the tests' assumptions, such as the normalcy test and outliers’ test. Aside from that, this statistical software allows for optimal frequency analysis.

Choosing the appropriate statistical analysis enables researchers to derive accurate and reliable data by explaining the accomplishment of their desired study aims. This article has been compiled based on results derived from the data collected using SPSS.

Telephonic follow-ups and emails were used to yield a higher response rate. The collected data were entered into a computer and analysed using the Statistical Package for Social Sciences (SPSS Version 21.0). The data were analysed descriptively by studying the mean, standard deviations, skewness and kurtosis. This was followed by Pearson's correlation and hierarchical regression analyses.

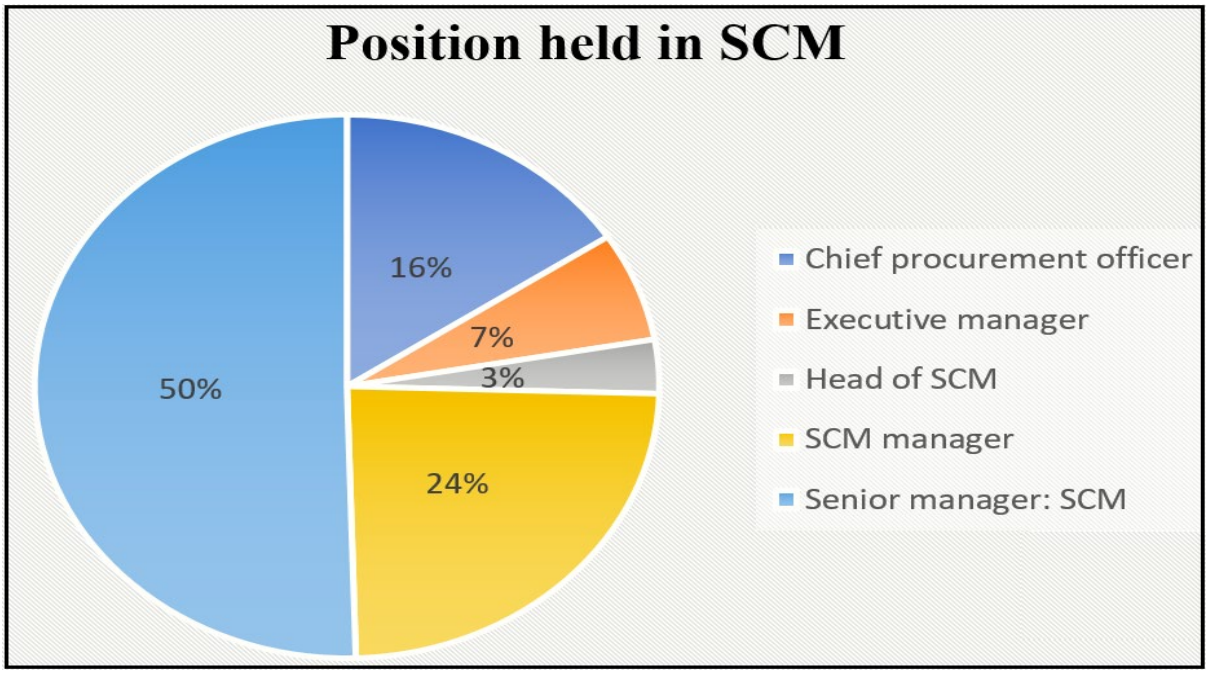
4. FINDINGS AND DISCUSSIONS

This section of the article presents the findings and discussions on the impact of human capital on supply chain performance in SOEs. We tested three variables of human capital practices: organisational structure, skills and competence, and training and development. A demographic profile of the respondents and a descriptive analysis of the impact of human capital on SOE SCM performance will be presented based on the results. Following this will be a correlation of studies to determine the strength of the human capital variables. This section concludes with a regression analysis to determine the relationships between the human capital variables and SCM performance.

4.1 Demographic profiles of the respondents

The respondents were asked to state their position or title in the SOE for which they work. Figure 2 presents the distribution of the respondents per position in percentages.

Figure 2: Distribution of respondents per position within the SCM (N = 216)



Source: Authors' own compilation

The results revealed that 50 percent of the respondents were senior supply chain managers, 24 percent were supply chain managers, 16 percent were chief procurement officers, 7 percent were executive managers, and 3 percent were heads of SCM. These results revealed that the titles of most senior managers in SCM in the SOE sector are varied.

4.2 Descriptive analysis

The respondents were asked to indicate the level of implementation of their workforce structure in their SOEs using a 5-point Likert scale (5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, and 1 = strongly disagree). The subsections of the implementation of the workforce structure comprised six statements. The mean scores were interpreted as follows: 0 to 1.5 meant that the respondents strongly disagreed, 1.50 to 2.50 inferred they disagreed, 2.50 to 3.50 meant they were not sure, 3.50 to 4.50 meant they agreed, and 4.50 and above meant they strongly agreed. Table 1 responds to the statements relating to the impact of human capital practices on SCM performance.

Table 1: Impact of human capital practices on SCM performance

Variables	Mean	Std deviation	Skewness	Kurtosis
Skills and competence	3.63	1.04	(0.68)	(0.00)
Training and development	3.62	1.09	(0.74)	(0.12)
Organisational structure	3.53	1.21	(0.60)	(0.57)
Supply chain performance	3.81	0.93	(0.74)	0.55

Source: Authors' own compilation

In establishing the impact of human capital practices on SCM performance in SOEs (the former being inclusive of the position of SCM in the SOEs' structure, skills and competence, and training and development), the responses (arranged according to the highest value of the mean score) for each variable were as follows: SCM performance (M = 3.81, SD = 0.93); SCM personnel are required to be highly skilled for the positions they occupy (M = 3.63, SD = 1.04); respondents' entities invest in training and development for SCM personnel (M = 3.62, SD = 1.09); and organisational structure (M = 3.53, SD = 1.21). The mean scores of the four variables were between 3.50 and 4.50, which is a strong indication that the respondents agreed with the statements provided. The skewness values for supply chain performance, skills and competence, training and development, and organisational structure ranged between -0.60 and -0.74, thereby falling within the -1 and +1 normality range recommended for these

coefficients (Cohen *et al.,* 2013). The kurtosis values were between 0.55 and -0.57, falling within the -1 and +1 normality range recommended for these coefficients (Dixon *et al.*, 2015).

4.3 Correlation analysis

Pearson's correlation was used to measure the degree of association between the variables under consideration (independent and dependent variables). Pearson's correlation coefficients range from -1 to +1. Negative values indicate negative correlations and positive values positive correlations. Thus, a Pearson coefficient of <0.3 indicates a weak correlation, a coefficient of >0.3 and <0.5 infers a moderate correlation, while >0.5 shows a strong correlation**.**

Table 2: Correlations between organisational structure, skills and competence, training and development and supply chain performance

Variables	Organisational structure	Skills and competence	Training and development	Supply chain performance
Organisational structure	1	.450**	.372**	.386**
Skills and competence		1	.559**	.571**
Training and development			1	.415**
Supply chain performance				1

Source: Authors' own compilation

The findings indicate a significant positive correlation between the organisational structure and supply chain performance (r = 0.386; moderate effect; p ≤ 0.05). This confirms Hypothesis 1: organisational structure has a positive and significant impact on supply chain performance. According to Gharakhani (2012), individuals believe that the components for each supply chain in the SCM structure and links are synchronised. A significant positive correlation was observed between skills and competence and supply chain performance (r = 0.571; strong correlation, p ≤ 0.05), confirming Hypothesis 2, namely that skills and competence structure positively and significantly impact supply chain performance. For SCM to be at a strategic level, the SCM workforce needs to possess certain skills and competencies. Therefore, SOEs must identify the skills and competency gaps and invest in closing those gaps.

A significant positive correlation was observed between training and development and supply chain performance (r = 0.415; moderate effect, p ≤ 0.05). This result confirms Hypothesis 3 that training and development have a positive and significant impact on supply chain performance. According to Mira *et al.* (2019), training and development enhance the skills and capabilities of employees, leading to improved performance and employees who are more

than competent in terms of the knowledge and skills needed to complete their tasks. According to Ambe *et al.* (2012) and Chigudu (2014), a full knowledge and understanding of SCM, appropriate structures, and professional personnel are crucial for successful policies and strategies.

4.4 Regression analysis

The authors further performed regression analysis to examine the statistical significance of the relationship between the independent variables (skills and competence, training and development, and organisational structure) (Dormann *et al.*, 2013). Hierarchical multiple regression analysis was used to examine hypotheses H1, H2 and H3 (Dormann *et al.*, 2013). The regression equation was:

$Y=\beta_0 + \beta_1X_1 + \beta_2X_2+ \beta_3X_3+ \beta_4X_4 + \alpha)$

In the present study, a three-step model was adopted. Where β_0 is the regression intercept, $\beta_1 - \beta_4$ are the regression coefficients, Y depicts the dependent variable (SCM performance), X_1 denotes skills and competence, X2 is training and development, and X_3 is organisational structure. Hierarchical regression was applied in a step-by-step/systematic manner. The independent contribution of each set of the predictor variables on the criterion variable (over and above the effect of the other independent variables) was entered first. Each predictor variable was deemed relevant for the model if it significantly increased the variance (ΔR2). A preliminary analysis was conducted to ensure no violations of normality, linearity and homoscedasticity assumptions. Table 3 presents the hierarchal results of the study.

Table 3: Hierarchical regression on human capital practices as predictors of supply chain performance

		B	*β*	T	sig	F	R	R^2	ΔR^2	R^2 *change*
1	**Model 1**	**1.962**		**10.358**	**.000**	**103.60**	**57%**	**32%**	**32%**	**32%**
	Skills competence	.510	.571	10.179	.000					
2	**Model 2**	**1.783**		**8.631**	**.000**	**54.77**	**58%**	**34%**	**33%**	**1.3%**
	Skills competence	.440	.493	7.341	.000					
	Training and development	.120	.140	2.081	.039					
3	**Model 3**	**1.634**		**7.611**	**.000**	**39.00**	**59%**	**35%**	**34%**	**1.6%**
	Skills competence	.395	.442	6.313	.000					

	Training and development	.098	.115	1.701	.090					
	Organisational structure	.111	.144	2.297	.023					

Source: Authors own compilation

Note: N = 216; *p <.05, **p <.01, ***p <.001, B = unstandardised regression coefficients, β = standardised regression coefficients, t = t-statistics, R square= R^2, Adjusted R square= ΔR^2, R square change

In order to determine the impact of each independent variable on supply chain performance, each variable was entered, one at a time, creating three models to explain variations in supply chain performance (for the results of the hierarchical regression, see Table 3). In Model 1, skills competence was entered, and the results indicated that 'skills and competence' accounts for 57 percent of the variation in supply chain performance. The R-square registered at 32 percent, thereby proving that Model 1 is statistically significant (sig = 0.000, $p < 0.05$, $F = 103.60$). Skills and competence are, therefore, significant predictors of supply chain performance in SOEs. For Model 2, training and development were entered. The results and the R-square increased to 34 percent, implying that skills, competence, training and development account for a 1.3 percent increase in the variation in supply chain performance. Model 2 is significant at (sig. = 0.000, $p < 0.05$, $F = 54.77$). In Model 3, the organisational structure was entered, and the R-square increased to 35 percent, implying that organisational structure accounts for the 1.6 percent increase in the variation in supply chain performance. Model 3 is, therefore, also significant (sig. = 0.000, $p < 0.05$, $F = 39.00$). The overall results indicate that skills and competence, organisational structure, training, and development all have a positive impact on supply chain performance, implying a positive increase in SCM performance. A unit increase in skills and competence increases SCM performance by 0.571 (Beta = 0.571); a unit increase in training and development increases SCM performance by 0.140 (Beta = 0.140); and a unit increase in organisational structure increases SCM performance by 0.144 (Beta = 0.144). The results, therefore, indicate that all three variables (skills and competence, organisational structure, and training and development) have a positive effect on supply chain performance, with skills and development having the highest/strongest impact.

Based on the findings and discussion, it can be deduced that human capital practices have an impact on the performance of SCM in SOEs. Among the variables of human capital investigated, skills and competence recorded the highest impact on SCM performance, followed by training and development, and lastly, organisational structure.

4.5 Discriminant validity

Validity tests are conducted to identify whether an instrument or measurement tool performed its intended measurement function. Validity can also be best described as the degree to which the results obtained from the analysis of the data represent the phenomenon. Ways of establishing validity are as follows: face validity; construct validity; predictive validity; convergent validity; and discriminant validity (Bryman *et al.,* 2015). According to Diamantopolous and Schlegelmilc (2012), discriminant validity refers to the degree to which a measure is unrelated to other measures of other concepts for which no theoretical linkages are anticipated. When study variables are unrelated, their pair-wise correlation values must be less than one for discriminant validity (1.0). According to Gatignon (2013), a correlation value of less than 0.7 between variables is sufficient to prove discriminant validity.

One of the strategies used to determine the discriminant validity of the study items was to assess if the correlations between latent components were less than or equal to 0.6. In this study, the discriminant validity of the measurement model was evaluated using Fornell and Larcker's (1981) criterion. The research utilised AVE values of <1, pair-wise correlation matrix coefficients of <1, and a comparison of AVE values with the highest SV. As shown in Table 4, the inter-correlation values for each pair of latent variables were all less than 1.0. The fact that they were all between 0.5 and 0.8 indicates the existence of a discriminant variable.

Table 4: Discriminant validity

Research Constructs	SCM policies and Regulations	SCM Performance	SCM Practices	Supply chain strategy
SCM policies and regulations	0.744			
SCM performance	0.809	0.842		
SCM practices	0.726	0.793	0.764	
Supply chain strategy	0.602	0.581	0.591	0.858

Source: Authors' own compilation

Note: n= 216, inter-correlation

Based on the criterion of Fornell and Larcker (1981), Table 4 demonstrates that the AVE values for the reflective components were less than the squared inter-construct correlations, reflecting discriminant validity

5. CONCLUSION

This study aimed to determine the impact of human capital practices on SCM performance in SOEs. A survey was conducted among SCM practitioners, and the findings were analysed descriptively. The results revealed that human capital management practices impact the performance of SCM in SOEs. Three human capital variables were examined: skills and competence, training and development, and organisational structure. The findings demonstrated that skills and competence as a factor was the highest significant predictor of SCM performance in SOEs in South Africa, which implies that an increase in the skills and competence of SCM practitioners will positively influence SCM performance. This is in line with the findings of Datta *et al*. (2011), who established that enhanced strategic SCM skills positively affect SCM performance measures.

This is one of the few studies that examined the linkages between supply chain strategy, SCM rules and regulations, SCM practices, and supply chain performance in South African state-owned enterprises. Therefore, this study facilitates and aids in the building of theory for future investigations. Subsequently, this study established the theoretical foundation for future empirical research in the nation. Essentially, this research contributes to an increased understanding of the role of supply chain strategies, SCM rules and regulations, SCM practices, and SCM performance in SOEs. The report lists CRM, strategic sourcing, cross-functional teams, strategic supplier partnerships, workforce structure, SCI, ESD, and IT as theoretical SCM implementation components for SOEs. Moreover, this study provides a beneficial performance evaluation paradigm for SCM managers in SOEs.

The second-highest predictor of SCM performance was training and development. An effective SCM in the public sector will remain unachievable without a well-trained and motivated workforce. This finding aligns with the work of van Esch *et al.* (2019), who asserted the importance of training and development for effective SCM performance. The predictor with the lowest mean was organisational structure. The findings confirm that the successful implementation of SCM depends on how it is structured within the organisation (Hazen *et al.*, 2016). These results matched recommendations made by Africa Charmen *et al.* (2012). Additionally, Accenture (2022) recommended that for SCM to add value to an organisation, its staff must be able to participate at a senior management level and be represented at the board level. Swart *et al.* (2015) warned that an organisation can have brilliant supply chain strategies; nevertheless, substandard performance on the part of SCM personnel will undermine those strategies. Van Esch *et al*. (2019) and the National Treasury (2015) asserted that, without the right people, supply chain strategies will neither be envisioned nor executed.

It is, therefore, recommended that effective human capital practices be aligned with SCM practices to enhance SCM performance. Also, the recommendation is that the head of SCM in an SOE should report directly to the accounting officer and be represented at various executive structures and on the board of directors for this division to be strategic. To enhance the skills and competencies of SCM staff, SOEs must invest in training and development, with affiliation to professional bodies being recognised as part of training and development and, thus, funded by SOEs. Furthermore, SCM practitioners must acquire the necessary new skills at the strategic level (financial skills; business acumen; and presentation, technical and interpersonal skills). Therefore, the government must reconsider the repositioning of SCM at a level where it will add value and generate cost savings. This can only be achieved if SOEs view training and development as an investment, not an expense. Such acquisition will be realised through improved SCM performance. Critical indicators include improved quality, cost savings, reduced risks, increased compliance, reduced lead time with suppliers/internal lead time, robust market analysis, and enhanced reporting. It is also important to acknowledge that SCM professionals' skills and knowledge have changed (Monczka *et al.*, 2016). Therefore, there is an urgent need to review the skills SCM professionals require and to equip them with the new, higher-level skills demanded by the industry (Basheka, 2010). Finally, in South Africa, the National Treasury (2015) asserted that an effective SCM system requires skilled professionals within appropriate structures who actively engage in continuous improvement, development, innovation and learning.

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