



# Skills for the post-COVID era of supply chain management education in South Africa: A review

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## ABSTRACT

**Purpose of the study:** The purpose of this study was to document and review the supply chain management skills that are required for supply chain management education in the post-COVID-19 era.

**Design/methodology/approach:** We opted to use the qualitative method and employed a systematic literature review design. The collected data were analysed by means of content analysis, and each selected article was coded using a qualitative data analysis software known as ATLAS.ti 8.

**Findings:** The identified skills were grouped under eight umbrella dimensions: management; total concept; negotiating; time and diversity management; software knowledge; demand forecasting; transport; and warehousing skills. These skills relate to soft and hard skills.

**Recommendations/value:** In the future, industry experts and academics need to collaborate so as to develop programmes collectively which include business needs that can be adapted into the university curriculum, thereby creating a link between academic and industry learning. Such collaborations will also assist in exploring new ways of working. The value of these findings revealed that these identified skills could be a catalyst for supply chain management practitioners and academicians to focus on a possibility-based approach to understanding the skills required for the post-COVID-19 era.



**Managerial implications:** The shift which the pandemic introduced has altered the pedagogic landscape in terms of the need for more specific and relevant skills. Thus, supply chain educators need to continually develop their skills in order to remain relevant in their field.

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### Keywords

Competitive; Consumers; COVID-19; Higher education; Materials

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**JEL Classification:** M119

## 1. INTRODUCTION

The concept of supply chain management (SCM) is encapsulating, which involves the management of the flow of goods and services and the processes that transform raw materials into final products and ensure delivery to end consumers (Janvier-James, 2012). This concept relates to the very essence of businesses in terms of product availability and service fulfilment. Moreover, primary importance is placed on supply-side activities so as to maximise/optimize customers' value and gain a competitive advantage within the marketplace. There has been a significant focus on the future of the supply chain, especially since businesses realise it is linked to globalisation, the expansion of e-commerce, changes in consumer demands, and the advent of new technologies (Kotzab *et al.*, 2018). This increased interest in supply chain management growth has prompted business operations to focus more on managing the complexity of the chain, which expands due to competition as well as environmental disruptions and maintaining relationships with suppliers (Thai, 2012). This dynamism in the environment further showcases a need for skilled individuals to adequately perform the functions of the current and future supply chain (Mageto & Luke, 2020). The three-cardinal points of the supply chain (SC) include procurement, logistics, and operations. However, the COVID-19 pandemic has highlighted something that is often underrated, namely, the importance of the supply chain. Supply chains were seriously affected globally during the pandemic and its spread, with a rapid shift in demand and panic buying, which resulted in most supply chain managers being unable to cope. However, few scholars agree on the required supply chain management skills (Tatham *et al.*, 2017). Therefore, at this time, there is a need to evaluate the relevant skills pertaining to SCM education that is required in the post-COVID-19 era.

In today's world, the micro and macro environments simultaneously threaten the survival of businesses and organisations. For example, the labour force survey released in 2020 indicated that the South African economy shed 2.2 million jobs resulting in an unemployment rate of 34.4 percent in the second quarter (StatSA, 2021a). With the rate of unemployment

continuing to be high, the skills shortage remains severe and continues to impact the competitive position of South Africa within the global community (Luke & Heyns, 2018). Furthermore, the tourism and travel industry, which contributes to South Africa's gross domestic product (GDP), has been facing substantial challenges ranging from operational issues within the airline industry (e.g., SAA and, more recently, Mango Airlines) prompted by the COVID-19 pandemic and scare. Moreover, the tourism sector, with its direct contribution of 1 billion rand in 2018 to the GDP, saw foreign arrivals drop by 7.1 percent in 2020, mainly due to the lockdown and travel restrictions (StatSA, 2021b).

The question is, 'What skills will be required in supply chain management education in the post-COVID-19 era?' The purpose of this study was to document and review the supply chain management skills that are required in supply chain management education in the post-COVID-19 era. Firstly, a review of the literature will be discussed, followed by the research methods, results, discussion, and recommendations.

## **2. LITERATURE REVIEW**

This section describes the varied literature related to the concept of this study. The discussions focus on COVID-19, its impact, and supply chain management skills.

### **2.1 COVID-19**

According to the World Health Organisation (WHO, 2021), the coronavirus disease is associated with a group of viruses that are classified in the family of Coronaviridae, which has the ability to contaminate humans and animals. The outbreak was triggered by the SARS-CoV-2 virus. This virus prompted a severe worldwide health crisis with economic costs and crippled most economies due to the restrictions and lockdowns, which caused a loss of profitability for businesses. Moreover, the risks to the environment have also increased as the virus has crossed national borders affecting industries and private entities as well as institutions of higher education. In addition, the coronavirus has exposed many failures and imbalances in our education systems (Schleicher, 2020). For example, access to computers and broadband used for online learning increased, which resulted in a burden and slowdown within the network and, subsequently, an imbalance between the resources and needs of the clients. Furthermore, institutions of higher education replaced face-to-face lectures with online learning and examinations. The question is whether the value which university education offers is still sustainable and beneficial in terms of the quality of education and graduates' performance in the workplace. The next section discusses the impact of COVID-19 as pertaining to the social restrictions and the university environment.

### **2.1.1 Impact of COVID-19 on the social and university environments**

As relating to the social environment, the global pandemic has also affected people's attitudes towards life in general. Accordingly, from social distancing to travel restrictions and other transitions, even the educational system was not left unscathed. Face-to-face lectures were highly limited to necessity; instead, online lecturing and zoom meetings have become the norm. Technologically, every facet of any organisation needs to remain relevant and offer better services to its clients as a matter of urgency. Hence, technology has set the pace for growth opportunities in businesses. During the lockdown, universities were faced with stagnation in managing the challenges presented by COVID-19, prompting some government offices to procure remote learning systems (Mhlanga & Moloi, 2020). However, the trend in the macro-environment continues to fluctuate and is rather unmanageable as the future has become more unpredictable; hence, the university's curriculum needs to adapt to these situations.

According to Mofijur *et al.* (2021), the social crisis created by the COVID-19 pandemic can increase inequality, discrimination, and unemployment if not appropriately addressed. For example, measures such as travel bans prohibited and discouraged people from freely moving from one point to another. Subsequently, businesses opted to lay off people as the situation became dire, with few consumers visiting restaurants, shopping centres, and hotels. Moreover, employee layoffs increased uncertainty and stress as people reduced their spending on certain items, which triggered more closures of businesses and a further loss of income (Ghosh, 2020).

Within the university environment, financial sustainability has become a growing issue that even affects its umbrella body, the higher education sector. It has become difficult to cope with certain operations due to the decline in sponsorships and donations, thereby creating an avenue for universities to implement other revenue-generating activities, such as a drive for more research funding (Crowther, 2018). University operations have no choice but to change/transform in line with this new global paradigm; thus, most universities have shifted to an online platform as technology now dictates the pace of their curriculum. To date, most universities have adopted the online learning approach to fulfil their mandate to their client base. Internally, there are also challenges related to the client's inability to navigate through the walls of technology or adequately use these online platforms (Soegaard, 2021). Hence, this presented another gap by exposing the need to train employees as well as students on the new-normal rollout of learning platform tools. It is, therefore, vital that the curricula change

in line with the present times. As always, SCM needs the right curriculum, people, and skills to realise its future in education and harness the skills needed (OECD, 2018).

The COVID-19 pandemic has impacted supply chains and presented more uncertainty for businesses and consumers alike. This has prompted researchers and practitioners to support an improvement in the traditional methods used for managing the supply chain. This can be accomplished by building a more resilient network that can cope with future occurrences (Rennie, 2020; Winn, 2019). However, Ferguson and Drake (2021) maintained that many supply chain educators might not be skilled to include presentations on resilience and supply chain risk in their courses as the topic is beyond their research background and expertise.

## **2.2 Supply chain management skills**

A range of skills has been listed in certain supply chain research, such as SCM technical skills, business administration skills, and behavioural skills (Mageto & Luke, 2020). A study conducted by Murphy and Poist (1991) highlighted a list of skills in the business and management area. The authors suggested that skills in the logistics field reserved for senior management enable the combination of cross-functional and logistics functions. Some scholars also posited that senior management staff are expected to have good management skills with a grounding in logistics skills in order to operate in this new pedagogic paradigm. Murphy and Poist (2007) cited that future skills must encompass supplier relationships and management knowledge, which include an emphasis on customer relationship management. Onar *et al.* (2013) carried out investigations on 15 universities, which included some graduate programmes, and discovered that supply chain managers require about 31 skills. These findings determined that hard SCM skills are more in demand for SC professionals than soft skills. Similarly, a study was conducted by Luke and Heyns (2019) to ascertain the SCM skill sets needed by South African organisations to identify educational interventions within the supply chain curriculum. The survey result was perceived as important for logistics and supply chain employees. However, the findings suggested that industries actually need more hard skills than soft skills, which have been ignored in the current supply chain education curriculums. Moreover, the study highlighted that academic studies in this area should embody skills such as logistics analytics, logistics awareness, interpersonal skills, and general management skills. In contrast, Mageto and Luke (2020) argued that senior managers are required to be fully equipped with soft skills in their work environment so as to better navigate collaborations with internal and external operations. It was also noted that soft skills include communication and a pragmatic approach to logistics.

As pertaining to analytical skills, a critical skill for managers is to optimally execute supply chain works (Goh *et al.*, 2016) in coordination with the growing importance of Big Data and analytics in SCM environments (Ittmann, 2015). Analytical skills are especially important to supply chain managers as they supervise the production, transportation, and sale of goods on a global or domestic scale. To identify the most cost-effective way to perform their jobs, they must employ advanced technical and people skills to meet their intended objectives (Formichella, 2021). Also, exceptional leadership and communication skills are required to effectively collaborate with employees in varied sectors and partnerships. With this knowledge, a comparative assessment of the necessary skills as related to the SCM curriculum both before and after the COVID-19 pandemic is illustrated in Table 1.

**Table 1: A comparative assessment of skills demand concerning the SCM education system prior to and after the COVID-19 pandemic**

S/N	SCM Skills in the Educational System	Skills	PRE-COVID-19 Skill Demand in Industries	POST-COVID-19 Skills Demand	Current Challenges	Suggestions to Accommodate Changes
1	Ability to see the big picture	i. Holistic view of the process	Ability to see the big picture	Risk management skills	Risk readiness is decreasing, but volatility and uncertainty are increasing. Slow to implement risk strategies	Understand when disruption occurs and analyse the network
		ii. Ability to plan, organise and control	Ability to plan	Organisation and time management	Uncertainty/disruptions such as COVID-19 have impeded prior plans	Planning is the key to achieving targets
		iii. Interactive skills	Communication skill	Communication skills	The need to train educators on the use of interactive technologies to achieve societal objectives	Being connected through technology puts less pressure and cost on businesses. Technology must be promoted for efficiency and optimal performance
2	Total cost concept	i. Overview of the process	Knowledge of the industry	Industry management	Need to equip educators in SC industry knowledge	Training is important
		ii. Quality demand skill	Quality management	Strategic thinking	The need to strategically initiate actions that contribute to a positive positioning	Businesses aim to make a profit and satisfy end consumers; hence, having a

						good strategy is important
		iii. Motivation skill	Motivation skill	Flexibility skills	The need to adjust to change as it evolves (e.g., the move to online learning during the COVID-19 inception)	Ability to manoeuvre and enforce changes with speed
3	Demand forecasting	i. Ability to forecast	Demand forecasting	Manufacturing	The need to seek empirical evidence on initiatives that can drive competitiveness in this industry, especially with 4IR	More companies will move production regionally. Understand production control and cost of location
		ii. Quantitative analysis	Quantitative /statistical skills	Data analysis and evaluation	The growing criticality of Big Data and analysing these data through analytics	Understand the power of reading data to provide informed evidence to relevant institutions of government
		iii. Computer skills	Spreadsheet ability	Technical skills (Excel, ERP systems)	Need to navigate one's ability on the job for relevance in society	Upskilling and reskilling are vital in the post-COVID-19 era.
4	Transport and warehousing management	i. Strategic skills	Transport/warehousing management	Resilience ability	This is a critical skill needed in the post-COVID-19 era. It demands agility, reengineering of business models, and adopting risk culture and collaboration	Understand the need to bounce back after SC disruption using its dimensions
		ii. Social skills	Green logistics	Sustainability	Climate change poses a great threat to the environment	Include sustainability teaching in the curriculum
		iii. Awareness skills	Supply chain design	Supply chain design	The need for practical views and knowledge concerning SC design	Understand this ability as a dimension of building resilience
5	Software knowledge skills	i. IT skills	IT skills/software knowledge	Networking skills	Low technology usage affects SC efficiency	Essential to train workers

		ii. Transformative skills	Analytical thinkers	Analytical thinking	Lack of transformative learning	Analysing spending patterns in institutions could help identify repetitive purchases to establish a contract with suppliers, thereby enhancing buying power
		iii. Critical skills	Change management	Critical thinking	The need to encourage participation in critical discussions and link educational experiences to the societal and global economy	Understand the essentials of analysing and proffering solutions when needed
6	Time and diversity management	i. Diversity management skills	Leadership skills	Leadership and social influence	Need to manage a team for maximum productivity by being involved; working optimally to retain customers	Lead by example
			Decision-making	Decision-making	Empowering employees to make good decisions	COVID-19 has increased the need to act decisively under pressure and take charge
			Problem-solving	Problem-solving	Challenges always emanate, prompting society to lean on research evidence to solve them	Creating optimal solutions every time
7	Negotiating Skills	i. Ability to deliberate	Negotiating skills	Sourcing skills	The need to source funding for research, which is a core function of Higher Education	COVID-19 has exposed financial draughts in every business sector; creating an avenue to source funds is critical
		ii. Ability to multitask	Cross-functional coordination	Cross-functional coordination	The need to be versatile and informed	Revolves around having a bit of knowledge in other areas of study
		iii. Engagement skills	Customer focus	Teamwork	The need to expose and empower educators to collaboratively work towards effective teaching and learning	“More is better” as a spirit of collegiality is the key to greater achievement in institutions

Source: Own compilation compiled and adapted from Leonard (2020), Luke and Heyns (2019), Mokoena, 2019, and the World Economic Forum Report (2018).



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Table 1 illustrates the skills demanded in the supply chain management educational system both before and after COVID-19, the current challenges associated with the skills, and suggestions to accommodate changes in the skill set. A number of skills relevant to SCM were identified from the literature, including those aligned with business administration. However, there is a need to conduct a review of the skills required in the post-coronavirus pandemic era. The research method we utilised to conduct this investigation will be discussed in the next section.

### **3. RESEARCH METHODOLOGY**

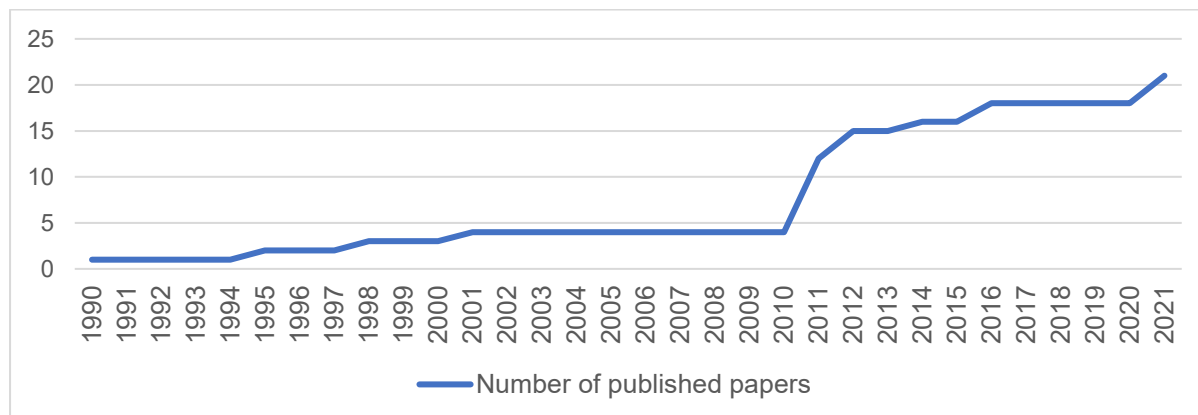
Cooper and Schindler (2014) explained that a research design depicts a step-by-step process for performing research. In this study, a qualitative research methodology was employed. Also, since the purpose of the study was to identify the SCM skills needed after COVID-19, a systematic literature review (SLR) technique was selected to explore scholarly articles relevant to SCM skills. This method presents a guide that is transparent and open for searching important research on SCM skills (Chiang *et al.* 2021). The methodology process commenced with researching techniques reported in published articles on supply chain management, so as to collect the most appropriate technique for each systematic review step. This was done to produce a flow diagram using the PRISMA checklist. The search from the publishers' databases resulted in 245 articles. The final articles included (22) in this study were selected based on identifying the articles from the databases (245), screening the articles by title (207), reviewing the abstracts for article eligibility (39), and performing full-text reviews to conclusively select the articles (22) for the analysis.

### **4. DATA ANALYSIS**

The articles for this study were identified by searching publisher databases in an effort to present a complete list of SCM skills research. The exact databases explored were as follows: Science Direct; Emerald; EBSCOhost; IEEE Xplore, ProQuest; Springer; Taylor and Francis; Wiley Online; Scopus; and JSTOR. Having been used by most SCM scholars, these databases provide the most comprehensive list of peer-reviewed articles for an SLR methodology (Lima-Junior & Carpinetti, 2017). These authors argued that these aforementioned sites provided more dependable articles and materials for the investigated concept. The keywords used in the searches were 'SCM skills', 'logistics skills', 'SCM skills required post-COVID-19 era', and 'skills requirements'. While conducting the review, scholarly approved articles were selected from the 1990s to the present, as this period manifested substantial growth involving research pertaining to logistics and SCM as a discipline (Langley

& Infosys, 2019). The articles were chosen from several categories, such as business, management, operations, and management science. During the process of selecting the articles, the abstract was first read to determine the article's relevance in line with the objective of the research, after which the article was included if it was deemed important. The number of published papers is shown in Figure 1.

**Figure 1: Number of published supply chain management skill papers**



Source: Own compilation

The selected articles were systematically evaluated before being finally included. Most of the articles from the initial selection were exempted at the abstract evaluation stage. Whenever the abstract review provided less information, diagonal reading was implemented. This aided in ensuring that only papers that actually contributed towards answering the research question were included. The data collected from the 22 selected articles were reviewed through thematic synthesis. Furthermore, the thematic analysis was used to merge multiple articles' findings during SLR. It describes the review process of the full articles that were selected, the code generation, and each article that was coded regarding SCM skills by utilising a qualitative data analysis software known as ATLAS.ti 8. This software is used to analyse qualitative data and permits the uploading of full-text documents to manage codes from the content analysis and collate them into groups. In an effort to reinforce consistency, the codes were critically observed, and this process led to 12 initial codes. Thereafter, code matching was performed so as to group the codes accordingly. Finally, full-text searches of the identified articles were conducted, downloaded, and revised accordingly with the research process depicted in Table 2.

**Table 2: Research process**

Step 1	Description
Step 1 Formulate research objectives	Review the supply chain management skills that are required in supply chain management education in the post-COVID-19 era.
Step 2 Identify, select, and review articles	Databases Science Direct, Emerald, EBSCOhost, IEEE Xplore, Springer, Wiley Online and JSTOR  Search period 1990 to date/present: define the period of growth in research relating to SCM skills and logistics skills  Inclusion criteria SCM skills and logistics management skills  Exclusion criteria
Step 3 Analysis	Analysis technique Content analysis

Source: Bastas and Liyanage (2018)

Table 2 illustrates the steps that the authors used to conduct the investigation. This includes formulating the research objective, searching, selecting, and reviewing the articles and performing the content analysis for the study. The results are outlined in Section 6.

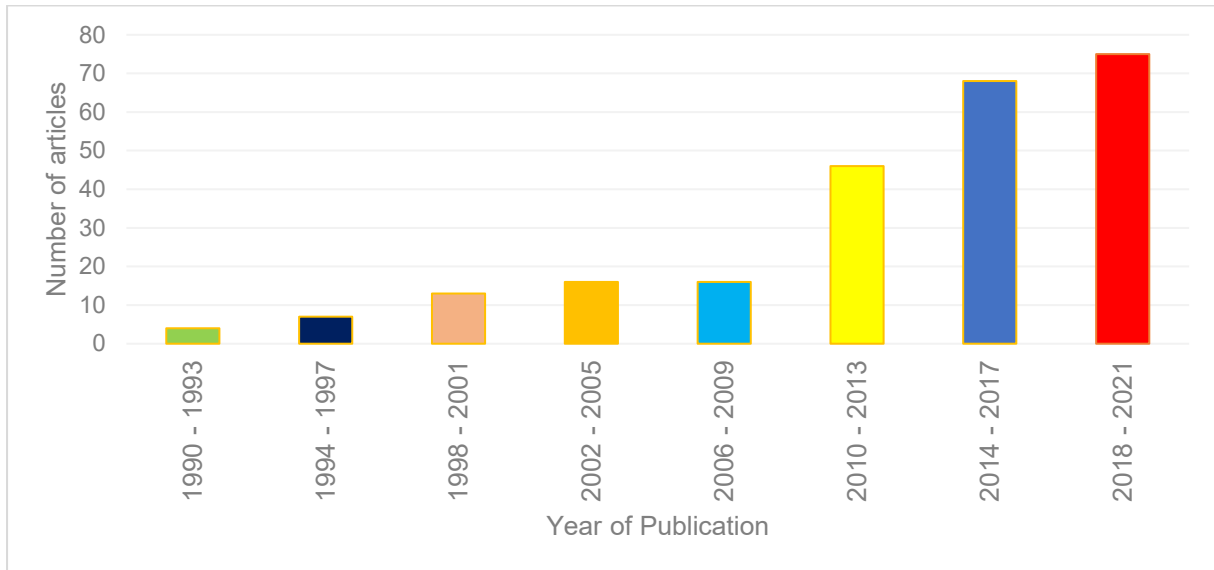
## 5. ETHICAL CONSIDERATIONS

This article followed all ethical research standards without any direct human contact.

## 6. FINDINGS AND DISCUSSION

A total of 22 complete text articles published between 1990 and 2021 (Figure 2) formed part of the analysis. Figure 2 reveals that 18 out of the 22 articles (81%) reviewed were published between 2013 and 2021, revealing a steady growth trajectory in supply chain management skills research.

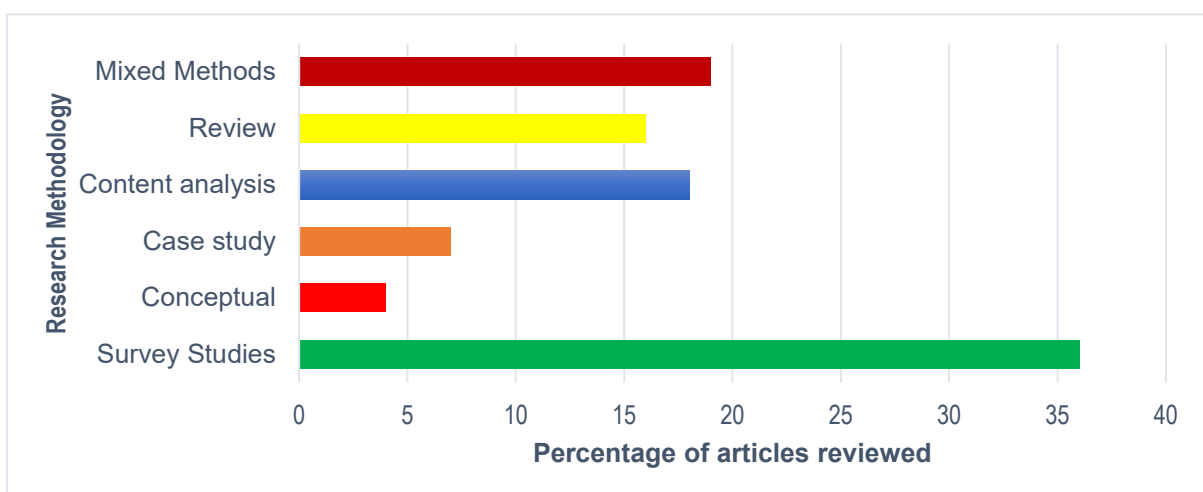
**Figure 2: Number of articles reviewed and publication years**



Source: Own compilation

Diverse research methodologies were used to review the various articles reviewed as depicted in Figure 3. The highest-represented technique was the survey method at 36 percent, followed by the mixed methodology at 19 percent and content analysis at 18 percent. The review technique was employed in a few articles at 16 percent, and case study methods at 7 percent, while the conceptual research technique was the least utilised in the reviewed studies at 4 percent.

**Figure 3: Different research methodologies used in the reviewed articles**

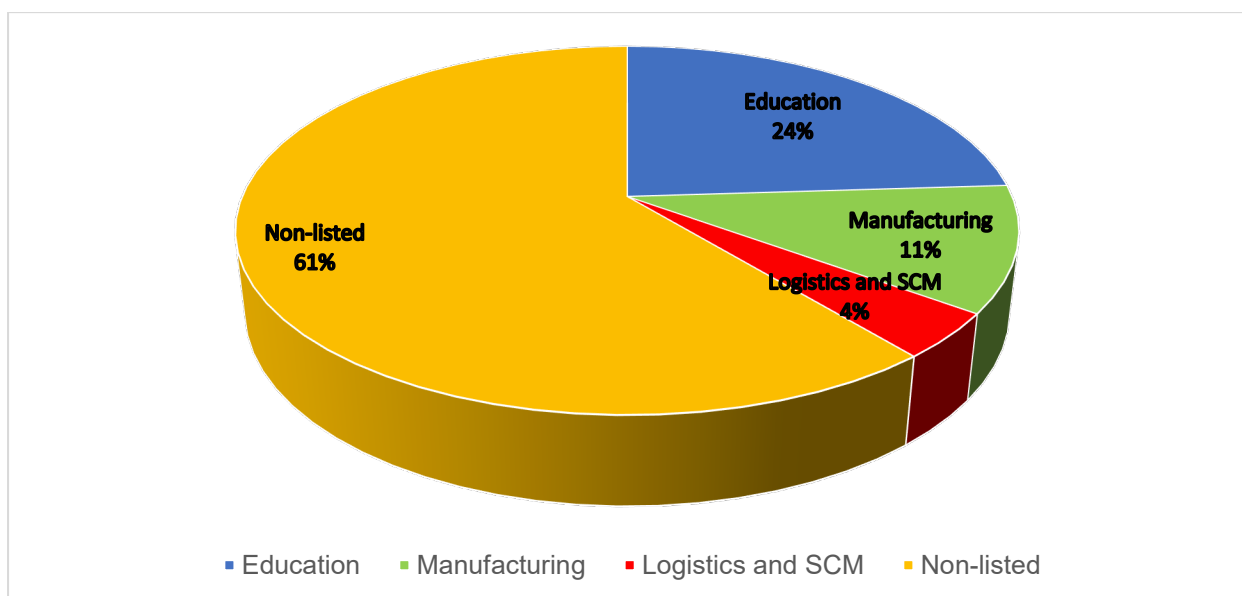


Source: Own compilation

The sectors from which the findings of the diverse studies were applied are depicted in the pie chart below. A little less than half of the reviewed articles were carried out in the education,

logistics and SCM industry, and manufacturing sectors. A high percentage rate of 61 per cent of the studies did not disclose the sectors in which the studies were conducted. This oversight of excluding sectors in published research papers indicates that there is a research gap, especially since different contexts may require diverse skills as pertaining to supply chain management. According to the results, the identified skill themes relative to management were: total concept; negotiating; time and diversity management; software knowledge; demand forecasting; transport; and warehousing skills.

Figure 4: Percentage distribution of the studies by industry or sector



Source: Own compilation

From the review of the SCM skills, it can be observed that many skills exist that supply chain managers are expected to possess, albeit the authors were not able to establish the actual skill itself. Kotzab *et al.* (2018) highlighted that SC managers are expected to acquire skills to continuously learn to adapt to SCM industry dynamics as the environment evolves and transforms radically through information technology. Additionally, it is a desirable trait for SC managers to belong to a professional body (Kotzab *et al.*, 2018). This may suggest that a set standard of skills and knowledge must be possessed by SCM managers. Modern-day SC managers are always expected to be creative thinkers, an attribute that enables quick planning and innovative strategies. Moreover, according to Mageto and Luke (2020), cost reduction and enhanced supply chain customer service levels can be achieved by acquiring planning and creative skills.

## 7. RESULTS

COVID-19 may have created the added impetus for supply chain managers and educators to acquire new skills so as to accelerate their knowledge base. The COVID-19 pandemic has not only prompted educators to conduct online teaching but also encouraged them to devise and explore their own in-depth hypotheses that could upskill education. In short, the pandemic has shown that if individuals in the educational sector want to move forward in the future, change and advancing their skills are inevitable. McKinsey Global Institute posited that by the year 2030, 14 per cent of the world's workforce would need to change their occupation or engage in new skills due to automation and artificial intelligence (McKinsey, 2017). However, beyond the immediate challenges presented by COVID-19 to human life and working operations in the organisation, what might skills in the post-pandemic world look like? The future of supply chain educators does not differ from before in terms of skills; however, upskilling would enable them to better position their ability amid these shifts and attain fulfilment. Supply chain educators should also place profound importance on communication. Leaders must know how to communicate with teams at different supply chain levels. It is also vital to understand how the supply chain education curriculum might change in the future so that universities can emerge stronger from the crisis of the pandemic. In essence, universities should introduce new skills and training that can boost performance and create an engaged workforce, as the learning landscape has shifted in ways that lean on new skills and methods of teaching. It would appear that COVID-19 seems to be establishing a shift in the employment landscape where large-scale reskilling has become a prerequisite. Upskilling oneself also entails the ability to withstand disruptions during times of crisis. It is also beneficial to upskill, especially for supply chain educators, as the field is applied to a variety of sectors and positions with transferable skills and knowledge.

## 8. RECOMMENDATIONS FOR FUTURE SCM EDUCATION

Going forward, industry experts and academics need to collaborate to develop programmes, which include business needs and can be adapted into the university curriculum, thereby creating a link between academic and industry learning. It will also assist in exploring new ways of working. SCM educators must teach students the three-cardinal points of the supply chain (SC), which include procurement, logistics, and operations. Moreover, SCM educators must assume a collaborative role to facilitate the execution of strategies with private institutions. Additionally, upskilling is an essential aspect of fully equipping oneself with the knowledge needed, especially in the post-COVID-19 era. Subsequently, there might be a

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higher enrolment of undergraduates and postgraduates into the departments of SCM; thus, curriculums need to be adjusted to support lifelong learning.

## 9. CONCLUSION

The objectives of this study were to document and review the supply chain management skills required in supply chain management education in the post-COVID-19 era. Numerous skills have been identified in the literature, and it is critical to note that an actual name for the skills has not been agreed upon by researchers. This poses difficulties for researchers to align studies from different countries. Therefore, supply chain scholars must harness all these different concepts and align these to develop a common perspective on supply chain management skills to guide practitioners appropriately. It has been observed that the new skills required post the COVID-19 era are mostly soft skills as emerging technology advances and pushes for fast and quick responses to situations and practices. The implication for supply chain educators is significant (assuming that the pandemic is here to stay), and the shift it brought about has transformed the educational landscape, requiring more than what was needed previously in terms of scarce relevant skills. Finally, a comparative assessment of skills demands concerning supply chain management education before and after the COVID-19 pandemic was presented and grouped into eight broad groups. In the future, a comparative study can be performed between other African countries or regions, as this may offer additional insights as opposed to single industry research. Another future research direction can focus on comparing supply chain managers' skills required in the manufacturing and service industry.

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