ARTIFICIAL INTELLIGENCE AND THE BUSINESS REVOLUTION: A SYSTEMATIC LITERATURE REVIEW OF TRANSFORMING SUPPLY CHAIN MANAGEMENT PRACTICES IN SOUTH AFRICA

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ABSTRACT

The integration of Artificial Intelligence (AI) within supply chain management (SCM) has precipitated a significant transformation in business processes, particularly in emerging economies like South Africa. This systematic literature review explores the extent of AI's influence on SCM practices across various industries within the South African context, underpinning the potential of AI to improve operational efficiency, strategic decision-making, and innovation. This review thoroughly followed the PRISMA guidelines. The findings reveal that AI significantly contributes to the advancement of SCM by improving accuracy in demand forecasting, optimising resource allocation, and facilitating real-time decision-making. This review synthesizes current research, offering a comprehensive overview of AI's transformative potential in SCM within South Africa. It also suggests areas for future research, particularly in addressing the challenges of AI implementation and exploring its impact on sustainable SCM practices. The implications for both practitioners and policymakers include prioritising digital infrastructure development, ethical AI integration, and encouraging public-private partnerships to support AI-driven innovations in supply chain networks. Future research should prioritise the development of practical methods that specifically target the demands and obstacles of incorporating AI into supply chains in South Africa, with the aim of promoting fair and sustainable growth.

Keywords: Artificial Intelligence (AI); Business Transformation; South Africa; Supply Chain Management (SCM); Technology Innovation.

JEL Classification: M11

1. INTRODUCTION

Supply chain management plays a central role towards the contribution of economic development in South Africa. The country's supply chains are key in enabling the transportation of products and services, which is necessary for economic expansion (Mashiloane et al., 2018). Although the importance of supply chain management is acknowledged, there are challenges that hinder the progress of optimal performance in many industries, such as manufacturing (Mashiloane et al., 2018). Improving the effectiveness of the supply chain becomes critical for South Africa to position itself as a significant participant in international commerce (Goedhals-Gerber, 2016). However, the use of supply chain management strategies leads to increased efficiency, competitiveness, and customer satisfaction in the global market (Mafini, 2016). South Africa's supply chain management business presents a multitude of challenges and opportunities. Difficulties in the public sector include inadequate planning, non-compliance with policies, ineffective monitoring and evaluation, and decentralised procurement systems (Mhelembe & Mafini, 2019). The automotive industry in South Africa is under pressure to reduce costs and improve service delivery, despite developments in supply chain management operational practices (Ambe & Badenhorst-Wess, 2013).

2. LITERATURE REVIEW

Artificial Intelligence influence on global business

Artificial Intelligence (AI) is having a significant influence on global business processes, namely in the field of supply chain management practices in South Africa. The incorporation of artificial intelligence (AI) technology is causing a significant shift in the way businesses function and make choices, resulting in significant improvements in efficiency, productivity, and competitiveness (Mbonyinshuti et al., 2021).

Artificial intelligence (AI) is being employed to forecast demand, optimise inventory management, and improve decision-making processes, resulting in improved overall performance of the supply chain (Mbonyinshuti et al., 2021).

Artificial intelligence (AI) is influencing the strategic goals of organisations in the global market by facilitating improved data analysis, automation, and predictive modelling, so allowing them to obtain a competitive advantage (Soni et al., 2020). The impact of AI extends beyond specific industries and permeates multiple sectors, catalysing business transformation and promoting innovation (Ratten, 2024b). Through the utilisation of AI technologies, organisations may utilise large sets of data to make well-informed decisions, optimise operations, and adjust to rapidly changing market situations(Ratten, 2024a).

AI role on business processes within South African industries

Artificial Intelligence (AI) has a significant impact on company operations in South African sectors, namely in revolutionising supply chain management practices. Artificial intelligence (AI) contributes to the improvement of the accuracy of demand forecasting, optimising inventory management, and strengthening decision-making processes in supply chains (Sodhi & Tang, 2021). The utilisation of AI technology, businesses in South Africa have the ability to optimise their operations, decrease expenses, and improve the overall efficiency of their supply chain (Sodhi et al., 2021).

AI improves business performance by using green supply chain management practices that prioritise sustainability and environmental cooperation with suppliers (Mafini & Loury-Okoumba, 2018). AI technologies empower organisations to make decisions based on data, improve operational performance, and minimise environmental impact in the manufacturing industry (Mafini et al., 2018). The incorporation of artificial intelligence (AI) into supply chain operations has prospects for achieving high levels of efficiency and implementing environmentally friendly practices in many industries in South Africa (Mafini et al., 2018).

AI-driven transformations examples in other emerging economies

Artificial Intelligence (AI) has been a contributory factor in transforming company operations in developing countries, providing valuable knowledge that South Africa might incorporate to improve its supply chain management strategies. AI-driven solutions have automated daily operations, such as customer service in hotels and restaurants, resulting in improved efficiency and improved customer experiences (Huang & Rust, 2018). South Africa has the potential to adopt comparable artificial intelligence (AI) systems to optimise customer service procedures and improve operational effectiveness in the hospitality and service sectors. As AI contributes to the attainment of Sustainable Development Goals (SDGs) by improving efficiency and production, however it can potentially worsen disparities (Vinuesa et al., 2020). South Africa has the potential to utilise AI technology in order to synchronise its supply chain management practices with sustainability objectives, thereby advancing environmental accountability and social influence. The incorporation of artificial intelligence (AI) into their operations, South African enterprises are able to promote both economic expansion and environmental preservation. AI-powered platforms have effectively been employed for improved designs and analytics in manufacturing processes, enabling scalable and efficient production (Cheng, 2023). South Africa is able to gain advantages by implementing AI-driven manufacturing frameworks to optimise supply chain processes, improve efficiency, and assure quality control. In adopting AI technology into the

manufacturing sector, South African firms are able to attain operational excellence and improve their competitiveness in the global market.

Research Objective: To critically examine and synthesise existing research on the integration and impact of Artificial Intelligence (AI) in transforming supply chain management practices within South Africa.

Research Question: How does the integration of Artificial Intelligence (AI) transform supply chain management practices in South Africa, and what are its key impacts on operational efficiencies, innovation, and strategic outcomes?

3. METHODOLOGY

The objective of conducting a systematic literature review (SLR) methodology in this study is to thoroughly gather, assess, and combine existing academic articles on the integration and effects of Artificial Intelligence (AI) in transforming supply chain management practices in South Africa. This methodology is instrumental in ensuring an exhaustive exploration and an unbiased assessment of the literature, which encompasses a broad spectrum of studies across various facets of AI applications in supply chain management. A systematic literature review (SLR) is important for thoroughly evaluating the quality and applicability of the discovered studies, particularly within the South African context.

By employing PRISMA, the primary research objective is to critically analyse and synthesise the current research on the impact of AI integration on supply chain management in South Africa. The review specifically focuses on the effects of AI integration on operational efficiencies, innovation, and strategic outcomes. Utilising PRISMA not only emphasises the thoroughness of the academic investigation but also provides valuable and practical insights into transforming supply Chain management practices in South Africa. See Figure 1 below.
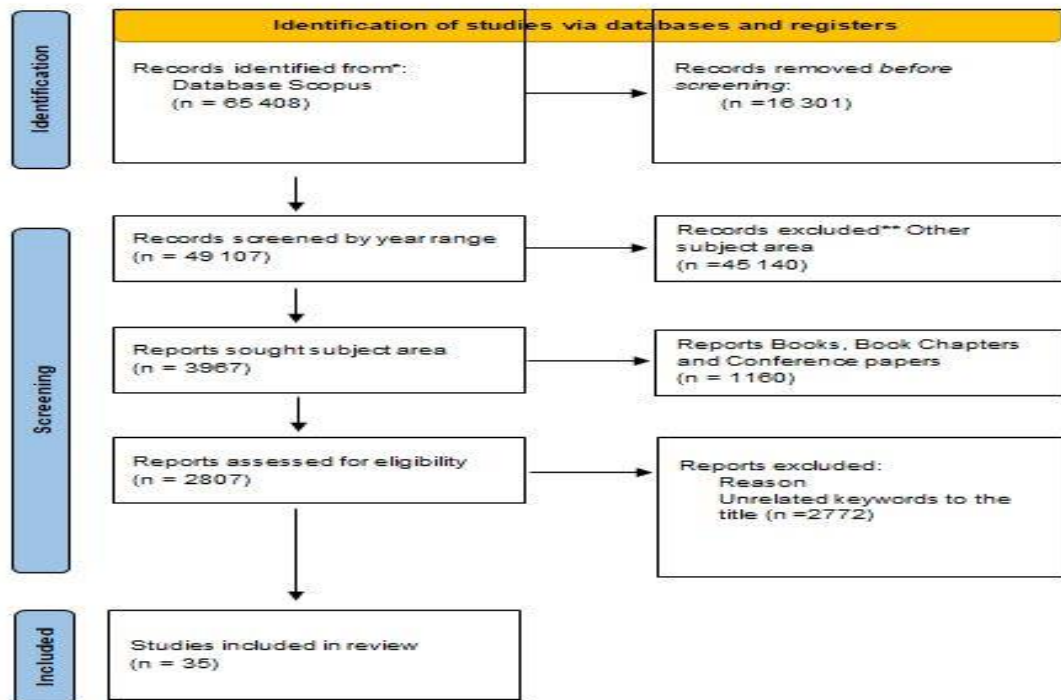

FIGURE 1
PRISMA FRAMEWORK

Source: Rethlefsen et al. (2021)

We utilised the Scopus database for the literature search in accordance with the PRISMA methodology during the identification step. The researcher selected the Scopus database due to their institutional access. Keywords and their combinations considered during the identification stage for the search included Artificial Intelligence, Business Innovation and Supply Chain Management.

A first search was performed using all keywords to gain an overview of publications using these terms. 65 408 items were acquired in all. During the identification stage, the output must be reviewed before proceeding to the screening stage.

We deleted publications published before 2013 because of a significant increase in studies on Artificial intelligence and Supply Chain Management practices in 2019. Articles published in 2024 were excluded from the preliminary screening as we focused solely on full-year data. Figure 2 shows the document by year on from 2013 to 2023.
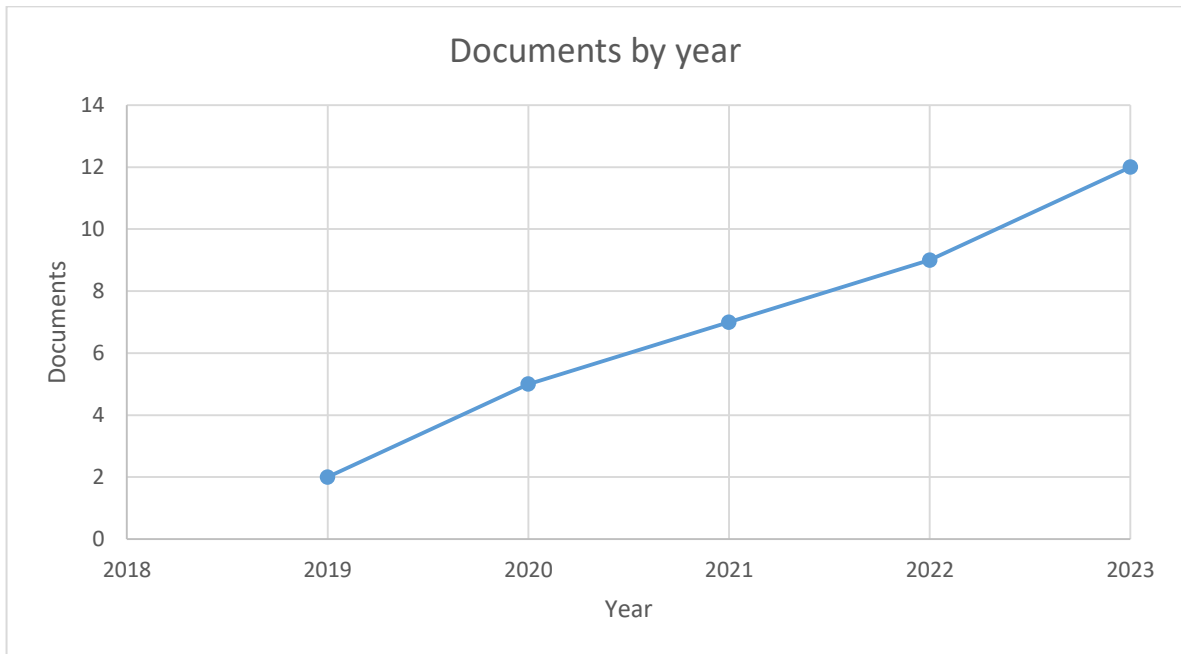

FIGURE 2
DOCUMENT BY YEAR

Figure 2 above shows the chronological distribution of relevant documents in this systematic literature review. The graph is a line chart showing the number of documents every year from 2018 to 2023. The horizontal axis shows the years being studied, and the vertical axis measures the number of documents published each year.

The chronological data from the recent document indicates a progressive increase in the volume of research pertaining to the integration of AI in supply chain management as we approach closer to the present day. Starting from 2019, the data showcases a modest number of publications, totalling 2 documents.

However, there was a notable escalation in the subsequent years, with 2020 recording 5 documents, 2021 seeing a further increase to 7 documents, and 2022 growth 9 documents. The year 2023 marks a slight increase with 12 documents. This trend is indicative of a growing interest and an intensifying research focus on AI in the supply chain sector, particularly in the context of South Africa. This upward trajectory in the volume

of publications could be associated with several factors, including the maturation of AI technologies, a growing recognition of their potential to significantly improve efficiency, accuracy, and cost-effectiveness in supply chains, and an increase in governmental and institutional support for research in this area. However, the economic and logistical challenges faced by South Africa, such as those related to its unique market dynamics and infrastructural issues, might have encouraged innovative research solutions through AI.

Criteria for inclusion and exclusion of studies

Table 1 in the Systematic Review outlines the methodical procedure used to select and reject documents in order critically examine and synthesise existing research on the integration and impact of Artificial Intelligence (AI) in transforming supply chain management practices within South Africa. An initial search produced 65 408 documents before filtering for inclusion. Out of these, 49 107 documents pertained to the selected time frame of 2018 to 2023. An in-depth investigation of a certain topic area reduced the number of documents to 3967 the domains of Business, Management, and Accounting. After refining based on document type, 2807 articles and reviews were selected, 2788 published in English. At the keyword stage, 194 documents were linked to the document with a limitation to artificial intelligence, supply chain management, South Africa, and at the publication stage, 180 documents were finalised. Only open-access documents were included, resulting in 84 open-access documents, a limitation to Country/Territory was for this study, comprising of 35. Therefore, 35 reports were ultimately included in the study

This systematic literature analysis focuses on the impact of artificial intelligence on supply chain management practices in South Africa. The review specifically covers the period from 2018 to 2023 to analyse recent breakthroughs and trends. The rigorous application of exclusion criteria to a large initial corpus of literature is crucial for focusing on the most relevant and up-to-date research that directly addresses the topic of this inquiry.

The review procedure commenced by removing a significant quantity of papers (16,301) that were published prior to the initiation of the specified timeframe in 2018, thereby concentrating on the latest advancements in artificial intelligence within the supply chain industry. 45,140 other documents were excluded because they did not pertain to the relevant subject area, demonstrating the review's strict emphasis on research that specifically examine the use of AI in supply chain management. By excluding 1,160 documents classified as books, book chapters, and conference papers, the focus is narrowed down to only include peer-reviewed journal articles. These pieces underwent a thorough scientific evaluation and provide strong evidence. Due to language limitations, 19 documents were excluded to make sure that the review process remains manageable without the need for extensive translation.

Publications that contained unrelated keywords (2,594 in total) were deliberately eliminated in order to ensure that the remaining materials maintained thematic coherence and relevance to the integration of artificial intelligence in supply chain activities. The availability of documents also played a pivotal role; 96 inaccessible documents were omitted, underscoring the practical difficulties in accessing certain academic materials. The researchers took great care to ensure that the conclusions of the study are relevant and applicable to the South African environment. As part of this process, they removed 49 publications that focused on regions outside of South Africa, thus assuring geographic relevance. Finally, the decision to exclude 65 373 publications in the final phase demonstrates a thorough approach to guarantee that all the research included in the analysis fulfilled the set criteria.

Table 1. Inclusion and exclusion of studies

Category	Included	Number of documents included
Initial search	Documents before screening	65 408
Year Range	2018-2023	49 107
Subject area	Business, Management and	3967

	Accounting	
Document type	Articles	2807
Language	English	2788
Keywords	Related keywords to the title (Artificial Intelligence, Supply Chain Management and South Africa	194
Publication stage	Final	180
Open access	All open access	84
Country/ Territory	South Africa	35
Final Included reports	Included for the analysis	35
Category	**Excluded**	**Number of documents excluded**
Initial search	Documents before screening	0
Year Range	Documents before 2018	16 301
Subject area	Other subject area	45 140
Document type	Books, Book Chapters and Conference papers	1160
Language	Other languages	19
Keywords	unrelated keywords to the title	2594
Publication stage	Article in press	14
Open access	All Inaccessible	96
Country/ Territory	Any other countries excluded	49
Final excluded reports	Not included	65 373

Source: Author

Search Strategy: Detail the databases and search terms used.

Searching keywords

Artificial intelligence, business innovation and supply chain management

Searching string query

("Artificial Intelligence" OR ai OR "machine learning" OR "deep learning" OR "neural networks" OR "natural language processing" OR nlp OR robotics OR automation) AND ("supply chain" OR "supply chain management" OR scm OR logistics OR procurement OR "inventory management" OR distribution OR "demand forecasting") AND (impact OR transformation OR "operational efficiency" OR innovation OR "strategic outcomes" OR "business process" OR "technology adoption" OR "competitive advantage") AND ("South Africa" OR "South African market" OR "SA") AND PUBYEAR > 2017 AND PUBYEAR < 2024 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (EXACTKEYWORD , "Artificial

Intelligence") OR LIMIT-TO (EXACTKEYWORD , "Supply Chain Management") OR LIMIT-TO (EXACTKEYWORD , "South Africa")) AND (LIMIT-TO (AFFILCOUNTRY , "South Africa")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (OA , "all")))

As per the PRISMA guidelines, screening is the second stage in which the previously described final inquiry is utilised. The query requests papers pertaining to the subjects of Artificial Intelligence and Supply Chain Management, specifically within the context of South Africa, that have been published between the years 2018 and 2023. Only articles and reviews that were open access and written in the English language were considered. The query resulted in 35 articles and reviews.

The inclusion stage followed the screening stage. The 35 articles obtained from the search query were assessed at this stage. The 35 articles were converted into a CSV file format for further analysis and evaluation in Microsoft Excel. We conducted a search in Excel to identify duplicate articles and articles that are now in the publication stage. There were no papers deleted as they did not meet the criteria for deletion. Calculated the aggregate number of citations using Excel. Table 2 presents the specific information regarding the citation analysis of all 35 papers and reviews.

Within the scope of this systematic literature evaluation, Table 2 offers an academic analysis of the influence of the referenced works in the subject. The table presents a curated collection of scholarly publications, including information about the authors, the year of publication, the title, the journal in which they were published, and the number of times they have been cited. Examining the "cited by" data uncovers the range of impact that these articles hold in the academic world. The article authored by Bag et al., titled "Role of institutional pressures and resources in the adoption of big data analytics powered artificial intelligence sustainable manufacturing practices and circular economy capabilities," was published in 2021 in the journal "Technological Forecasting and Social Change."

The work has received a considerable number of citations, amounting to 334, highlighting its major impact and contribution to the discussion on AI applications in sustainable manufacturing and the circular economy. The significant number of citations for this work not only demonstrates its significant influence in terms of academic reach, but also indicates a strong interest in the subjects of artificial intelligence, big data analytics, and sustainability within the manufacturing industry.

The high degree of citation suggests that the work of Bag et al. aligns with and reinforces current research endeavours in AI and supply chain management, particularly in situations that emphasise the significance of sustainability. The study's findings offer valuable insights into the impact of institutional pressures and resource allocations on the adoption of AI and big data technologies. These technologies are key for modernising and improving the efficiency of supply chain practices in various industries, including in South Africa.

A paper authored by Chauhan, Parida, and Dhir, entitled "Linking circular economy and digitalisation technologies: A systematic literature review of past achievements and future promises," which was published in 2022 in the journal Technological Forecasting and Social Change. This article, with a total of 198 citations, showcases significant scholarly attention and emphasises the significance of incorporating digital technologies, such as artificial intelligence (AI), in the framework of the circular economy. The article's significant citation count highlights its considerable impact on future research and its contribution to influencing the present comprehension of how digital technology might promote sustainability in supply chain practices. The article's influence demonstrates a wider pattern of integrating modern technologies such as AI to improve the effectiveness, sustainability, and durability of supply chains.

The combination of circular economy principles with digital technology, as mentioned in the referenced article, is very pertinent for South Africa. Implementing these new methods can result in supply chain solutions that are both more sustainable and economically efficient.

This citation analysis not only provides insights into the themes that are receiving the most scholarly attention but also aids in identifying the future research directions in the field of AI and supply chain management. Through an analysis of influential publications, such as the piece authored by Chauhan and colleagues, the literature review can gain a deeper understanding of the thematic and methodological frameworks that are highly effective and esteemed by the research community.

The study conducted by Roberts C.J. et al. (2019), which has been mentioned 75 times, contributes to our knowledge of how buildings are used once they are occupied. It also has an impact on the management of supply chains in the construction and facilities industry.

The study conducted by Makovhololo P. et al. (2020), which has been referenced just twice, presents a comprehensive framework for addressing linguistic obstacles in the healthcare sector in South Africa using information and communication technology (ICT). The research highlights the potential of artificial intelligence (AI) in this field as a promising and developing area of application.

Tsolakis N. et al. (2019), referenced 49 times, and Chinomona E.C. et al. (2023), not yet referenced, respectively examine the use of artificial intelligence (AI) in improving supply chain efficiency for environmentally friendly production and enhancing the effectiveness of supply chains in government-owned companies. They also identify new areas of research in managing supply chains in the government sector. Naz F. et al. (2022), referenced 4 times, Bamel U. et al. (2023), referenced 6 times, and Khan M. et al. (2023), referenced 26 times, investigate the application of artificial intelligence (AI) in property management, healthcare innovation, and green supply chain management, respectively. These studies provide significant impact that AI have on several industries.

Wamba S.F. et al. (2023), not yet cited, and Bag S. et al. (2020), cited 72 times, examine the influence of digital technologies on the acceptance of COVID-19 vaccines and the effects of green supply chain practices on the performance of companies. They highlight the practical advantages and significant public health implications of artificial intelligence (AI). Chauhan C. et al. (2022), with 198 citations, and Dowelani M. et al. (2022), with 5 citations, provide a comprehensive analysis of digitalisation in the circular economy and the adoption of blockchain in financial processes.

Their research demonstrates a strong interest in utilising digital technologies to improve economic and financial systems. Pentz C.D. et al. (2020), with 10 citations, Anzolin G. et al. (2023), with 2 citations, and Leal Filho W. et al. (2022), with 49 citations, investigate consumer behaviour in digital marketplaces, robotisation in the automotive sector, and the use of AI for climate change adaptation.

Table 2. Below: article citations analysis

Authors	Title	Year	Journal	Cited by
Bag S.; Pretorius J.H.C.; Gupta S.; Dwivedi Y.K.	Role of institutional pressures and resources in the adoption of big data analytics powered artificial intelligence, sustainable manufacturing practices and circular economy capabilities	2021	Technological Forecasting and Social Change	334
Roberts C.J.; Edwards D.J.; Hosseini M.R.;	Post-occupancy evaluation: a review of literature	2019	Engineering, Construction and Architectural	75

Mateo-Garcia M.; Owusu-Manu D.-G.				Management	
Makovhololo P.; Iyamu T.	A Framework to Guide ICT Solution for Language Barrier in South African Healthcare		2020	Journal of Cases on Information Technology	2
Tsolakis N.; Bam W.; Srai J.S.; Kumar M.	Renewable chemical feedstock supply network design: The case of terpenes		2019	Journal of Cleaner Production	49
Chinomona E.C.; Nematatani P.; Ntshingila L.	Optimising supply chain effectiveness among state-owned enterprises in South Africa		2023	Journal of Transport and Supply Chain Management	0
Naz F.; Kumar A.; Upadhyay A.; Chokshi H.; Trinkūnas V.; Magda R.	PROPERTY MANAGEMENT ENABLED BY ARTIFICIAL INTELLIGENCE POST COVID-19: AN EXPLORATORY REVIEW AND FUTURE PROPOSITIONS		2022	International Journal of Strategic Property Management	4
Bamel U.; Talwar S.; Pereira V.; Corazza L.; Dhir A.	Disruptive digital innovations in healthcare: Knowing the past and anticipating the future		2023	Technovation	6
Khan M.; Ajmal M.M.; Jabeen F.; Talwar S.; Dhir A.	Green supply chain management in manufacturing firms: A resource-based viewpoint		2023	Business Strategy and the Environment	26
Wamba S.F.; Guthrie C.; Queiroz M.M.; Twinomurinzi H.	Digital Technologies and COVID-19 Vaccine Acceptance: Evidence From France and South Africa		2023	Journal of Global Information Management	0
Bag S.; Gupta S.; Kumar S.; Sivarajah U.	Role of technological dimensions of green supply chain management practices on firm		2020	Journal of Enterprise Information Management	72

	performance				
Chauhan C.; Parida V.; Dhir A.	Linking circular economy and digitalisation technologies: A systematic literature review of past achievements and future promises		2022	Technological Forecasting and Social Change	198
Dowelani M.; Okoro C.; Olaleye A.	Factors influencing blockchain adoption in the South African clearing and settlement industry		2022	South African Journal of Economic and Management Sciences	5
Pentz C.D.; du Preez R.; Swiegers L.	To bu(Y) or not to bu(Y): Perceived risk barriers to online shopping among South African generation Y consumers		2020	Cogent Business and Management	10
Anzolin G.; Andreoni A.	Robotising, but how? Evidence from the automotive sector in South Africa		2023	Journal of Manufacturing Technology Management	2
Leal Filho W.; Wall T.; Rui Mucova S.A.; Nagy G.J.; Balogun A.-L.; Luetz J.M.; Ng A.W.; Kovaleva M.; Safiul Azam F.M.; Alves F.; Guevara Z.; Matandirotya N.R.; Skouloudis A.; Tzachor A.; Malakar K.; Gandhi O.	Deploying artificial intelligence for climate change adaptation		2022	Technological Forecasting and Social Change	49
Tshaai D.; Mishra A.; Pidanic J.	Demonstration of Smart Railway Level Crossing Design and Validation Using Data from Metro Rail, South Africa		2022	Journal of Advanced Transportation	2
Badenhorst-Weiss J.A.; Tolmay A.S.	Trust, commitment and business expansion in automotive supply		2021	International Journal of Applied Management Science	1

	chains in a developing country: A principal-agency perspective				
Nhamo L.; Rwizi L.; Mpandeli S.; Botai J.; Magidi J.; Tazvinga H.; Sobratee N.; Liphadzi S.; Naidoo D.; Modi A.T.; Slotow R.; Mabhaudhi T.	Urban nexus and transformative pathways towards a resilient Gauteng City-Region, South Africa		2021	Cities	27
Ligaraba N.; Chuchu T.; Nyagadza B.	Opt-in e-mail marketing influence on consumer behaviour: A Stimuli–Organism–Response (S–O–R) theory perspective		2023	Cogent Business and Management	3
Kikwasi G.J.; Sospeter N.G.; Rwelamila P.D.	Critical Success Factors for Adopting Supply Chain Management in Tanzanian Construction Projects		2023	Journal of Construction in Developing Countries	0
Bag S.; Srivastava G.; Bashir M.M.A.; Kumari S.; Giannakis M.; Chowdhury A.H.	Journey of customers in this digital era: Understanding the role of artificial intelligence technologies in user engagement and conversion		2022	Benchmarking	30
Manenzhe M.T.; Telukdarie A.; Munsamy M.	Maintenance work management process model: incorporating system dynamics and 4IR technologies		2023	Journal of Quality in Maintenance Engineering	0
Madzimure J.; Mafini C.; Dhurup M.	E-procurement, supplier integration and supply chain performance in small and medium enterprises in South Africa		2020	South African Journal of Business Management	13
Malodia S.; Kaur P.; Ractham P.; Sakashita M.; Dhir	Why do people avoid and postpone the use of voice		2022	Journal of Business Research	25

A.	assistants for transactional purposes? A perspective from decision avoidance theory			
Tandon A.; Kaur P.; Mäntymäki M.; Dhir A.	Blockchain applications in management: A bibliometric analysis and literature review	2021	Technological Forecasting and Social Change	143
Omopariola E.D.; Windapo A.O.; Edwards D.J.; Aigbavboa C.O.; Yakubu S.U.-N.; Obari O.	Modelling the domino effect of advance payment system on project cash flow and organisational performance	2023	Engineering, Construction and Architectural Management	0
Njomane L.; Telukdarie A.	Impact of COVID-19 food supply chain: Comparing the use of IoT in three South African supermarkets	2022	Technology in Society	21
Lamola K.X.T.	External dynamic exasperations on the adoption of enterprise application architecture for supply chain management	2023	Journal of Transport and Supply Chain Management	0
Ligaraba N.; Nyagadza B.; Dörfling D.; Zulu Q.M.	Factors influencing re-usage intention of online and mobile grocery shopping amongst young adults in South Africa	2023	Arab Gulf Journal of Scientific Research	2
Serfontein E.; Govender K.K.	The relationship between resilience and organisational control systems in the south african aviation industry	2021	Journal of Transport and Supply Chain Management	0
Jagtap S.; Bader F.; Garcia-Garcia G.; Trollman H.; Fadiji T.; Salonitis K.	Food Logistics 4.0: Opportunities and Challenges	2021	Logistics	85
Dowelani M.; Okoro C.; Olaleye A.	Blockchain technology in the clearing and settlement industry in South Africa	2023	Acta Commercii	0

Akintola A.; Venkatachalam S.; Root D.	Understanding BIM's impact on professional work practices using activity theory		2020	Construction Management and Economics		19
Lamola K.X.T.	Employees' aptitudes and trepidations for the adoption of enterprise application architecture for supply chain management in small and medium enterprises: A case of Capricorn District Municipality		2022	Journal of Transport and Supply Chain Management		1
Bag S.; Gupta S.; Kumar A.; Sivarajah U.	An integrated artificial intelligence framework for knowledge creation and B2B marketing rational decision making for improving firm performance		2021	Industrial Marketing Management		138

It is recommended to exclude research that has not been referenced. Because there were just a few articles that met our search criteria, we decided to save the papers that had not been cited. The next section provides the results of the thematic analysis conducted on the 35 articles, which includes the detected topics and the final review of these themes. The prominent themes derived from the 35 publications that met the criteria for inclusion in the systematic literature review were reported by following these steps.

4. RESULTS

Presentation of the findings from the systematic review

Figure 3 below displays a word cloud that visually shows how often keywords appear in the literature analysed in this systematic literature review. The domains 'Supply Chain Management' and 'Artificial Intelligence' are prominently represented at their intersection, indicating a significant convergence between these two fields. The fundamental focus of this inquiry is around the integration of cutting-edge digital solutions and their sustainable use in supply chain management (SCM). This is evident by the use of terminology such as 'Digital technologies' and 'Management and sustainability'. Furthermore, the terms 'Efficiency', 'Energy efficiency', 'Innovation', 'Competitive advantage', and 'Performance' encompass the expected range of AI's influence, spanning from improvements in operations to strategic and competitive advantages.

The word cloud effectively highlights the wide range of research methods used in the study, as indicated by terms like 'Research: Quality', 'Research: Analysis', 'Research: Impact', and 'Research: Case-studies'. These terms suggest a thorough and evidence-based approach. This is reinforced by mentions of 'Research:

COVID-19' and 'Research: South Africa', highlighting both the localised emphasis and the examination of current worldwide issues in the evaluation. The terms 'Uncertainty', 'Trust', and 'Disruption' indicate an analysis of the intricacies and difficulties involved in implementing AI in supply chains. The reference to 'SMEs' (Small and Medium-sized Enterprises) implies a specific focus on the ability of AI to be scaled across different business sizes.

FIGURE 3
WORD CLOUD

**Thematic analysis results**

Theme one: business sector
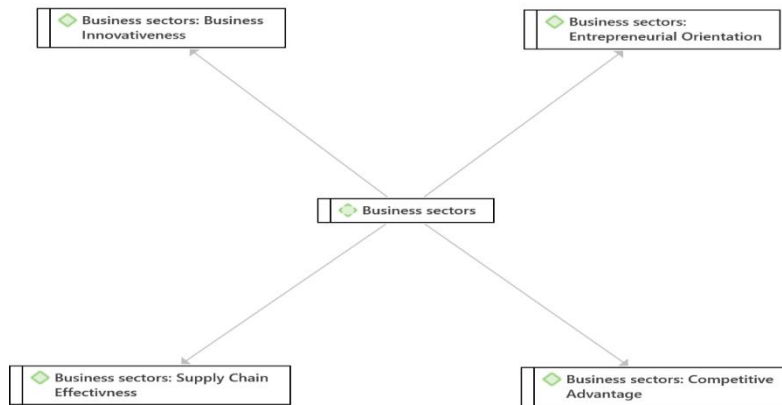
FIGURE 4
CODES DERIVED FROM THEME 1

The first theme contributes a fundamental role in the revolutionary impact of AI. AI improves Supply Chain Effectiveness in this field by optimising processes and improving responsiveness inside State-Owned Enterprises (SOEs), which frequently suffer from inefficiencies. The key significance of AI in creating a Competitive Advantage is apparent as it enables advancements that directly improves the effectiveness of the supply chain. In addition to making operational adjustments, AI promotes a culture of business innovation

where established models are reimagined, and adaptive strategies are put into action. However, AI also improves Entrepreneurial Orientation, motivating organisations to embrace progressive strategies and inventive solutions that challenge conventional market dynamics. The integration of AI in various industries not only improves current operations but also provides innovative business models that utilise technological advancements for competitive advantage Figure 4.

Theme two: Decision- making
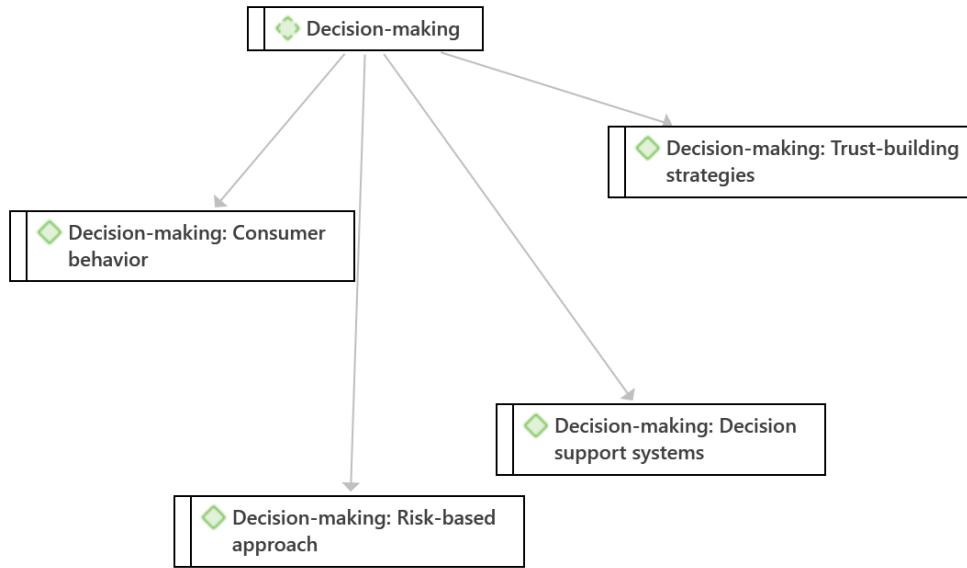
FIGURE 5
CODES DERIVED FROM THEME 2

AI contribute to a revolutionary role in increasing the analytical and predictive capacities of decision-making processes as it transitions to decision-making. The platform provides advanced tools that transform the analysis of consumer behaviour, enabling organisations to customise their practices with unparalleled accuracy and understanding. The need for a Risk-based Approach in AI adoption highlights the dual nature of technology, which has the capacity to promote advancement while also carrying inherent risks. This strategy guarantees that AI applications will improve business resilience and operational reliability while maintaining ethical norms and security. The potential of AI to support Trust Building Strategies is important, especially in areas like healthcare, where public trust directly impacts the effectiveness of initiatives like vaccination distribution. Decision Support Systems powered by Artificial Intelligence offer strategic and operational advantages by incorporating complex datasets into practical insights, thus improving the accuracy and promptness of decision-making Figure 5.

Table 3. Main themes, the codes, and short quotes

Main Theme	Code	Selected Quotes
Business Sector	Supply Chain Effectiveness	"Investigating the improvement of SCE in SOEs is crucial for operational success."
	Competitive Advantage	"Competitive advantage is linked directly to innovation and effectiveness in supply chains."
	Business Innovativeness	"Business innovativeness drives the adoption and impact of AI in family

		businesses."
	Entrepreneurial Orientation	"Entrepreneurial orientation significantly influences the integration of AI in business processes."
Decision-making	Consumer Behavior	"Consumer preferences and behaviors are impacted by targeted e-mail marketing strategies."
	Risk-based Approach	"AI brings opportunities and risks, necessitating a balanced risk-based approach."
	Trust Building Strategies	"Developing trust-building strategies is essential for vaccine diffusion and acceptance."
	Decision Support Systems	"AI-improved decision support systems facilitate better strategic and operational decisions."

5. DISCUSSION AND INTERPRETATIONS OF KEY FINDINGS

5.1 Theme one: business sector

Entrepreneurial orientation contributes to the adoption of Artificial Intelligence (AI) in supply chain management practices, particularly in South Africa. Entrepreneurial orientation includes attributes such as independence, creativity, willingness to take risks, initiative, and competitive assertiveness (Ketchen & Craighead, 2020). Studies have demonstrated that having an entrepreneurial mindset encourages organisations to develop a culture of continuous learning, which in turn allows them to quickly take advantage of market possibilities (Aslam et al., 2020). The entrepreneurial approach has been linked to improved corporate performance, innovation initiatives, and supply chain agility (Asih et al., 2020; Müller et al., 2022).

The integration of Artificial Intelligence (AI) into supply chain management practices has had a profound impact worldwide, especially in South Africa. Through the utilisation of artificial intelligence (AI) technologies, businesses are able to improve their operational efficiencies, stimulate innovation, and attain strategic objectives. Artificial Intelligence (AI) facilitates the use of advanced data analysis practices to make predictions, forecast demand, and make real-time decisions. This results in more efficient inventory management, streamlined logistics, and improved customer satisfaction (Sayin, 2020).

Competitive advantage is key not only for the long-term viability of a corporation but also for outperforming competitors (Khuong & Nguyen, 2022). It is important to emphasise that competitive advantage is a phrase that is subject to change and is influenced by both internal and external forces within organisations (Ma, 2000). The importance of pursuing competitive advantage to achieve organisational success is highlighted in strategic management research (Wang & Gao, 2021). In the context of incorporating AI into supply chain management in South Africa, recent research has examined the role of Information Technology (IT) capabilities in mediating the relationship between AI and competitive advantage (Awamleh & Bustami, 2022).

Business innovativeness is the capacity of organisations to offer novel concepts, procedures, goods, or services that improve operational effectiveness, promote creativity, and result in strategic achievements. Teece (2010) states the significance of business models and strategies in promoting innovation, emphasising the necessity of taking into account the production system and value chain organisation.

5.2 Theme two: decision- making

The integration of Artificial Intelligence (AI) in South Africa significantly influences supply chain management practices by being shaped by consumer behaviour. Comprehending customer behaviour is key as it affects supply chain preferences and has an impact on operational efficiencies, innovation, and strategic results. Manufacturers are able to improve their supply chain management practices by analysing the influence of consumer behaviour on coordination of supply chain channel conflicts (Liu et al., 2020). This analysis

enables the development of effective solutions for conflict management. The utilisation of artificial intelligence (AI) in supply chain resilience improves the visibility, optimise last-mile delivery, reduce disruptions, and enable agile procurement strategies (Modgil et al., 2021). This provides the need of utilising AI to synchronise supply chain operations with consumer requirements and preferences.

The research on customer behaviour in the omni-channel supply chain emphasises the significance of comprehending consumer preferences and behaviours across various channels (Yan et al., 2019). This intelligence is able to inform supply chain decisions to maximise consumer happiness and operational efficiencies.

The influence of consumer behaviour on warranty period decisions in closed-loop supply chains highlights the importance of including consumer preferences into the design of supply chain strategies (Zhu et al., 2019).

A risk-based approach is key for improving operational efficiencies, stimulating innovation, and delivering strategic objectives in the integration of Artificial Intelligence (AI) to improve supply chain management practices in South Africa. Organisations are able to improve their decision-making processes by using AI technology to proactively discover, assess, and mitigate risks along the supply chain. The comprehensive literature review undertaken by Khan et al. (2019) emphasises the significance of prioritising risks in supply chains and consolidating risk factors with the involvement of professionals and academicians. Nayal et al. (2021) examine the use of artificial intelligence (AI) in the management of supply chain risks.

Trust-building strategies contribute to the improvement of operational efficiencies, stimulating innovation, and attaining strategic results in the arena of Artificial Intelligence (AI) impacting supply chain management practices in South Africa. Trust is a key factor for the successful incorporation of AI technologies in supply chain partnerships. The research conducted by Laeequddin et al. (2009) state the need of establishing trust in supply chain partnerships by evaluating risks. It emphasises the necessity of striking a balance between trust-building initiatives and risk reduction strategies in order to establish a network that is both sustainable and dependable.

Proposing an innovative model: stages of ai integration into supply chain management
The principal objective of the model being developed and employed for this study is to characterise the phases of artificial intelligence integration in the supply chain and evaluate the resulting effects on operational effectiveness, innovation potential, and strategic results. This model functions as a comprehensive framework that directs the examination of how AI technologies, such as predictive analytics, machine learning, and automation, are being utilised in supply chains in South Africa. It acts both as a conceptual framework and a practical instrument for this research. The model offers an in-depth investigation of the various steps involved in adopting AI, starting from identifying needs and continuing with continuous development. It provides a full understanding of the process of integrating AI into supply chains and the tangible benefits it brings in terms of improving resilience and competitiveness.

The model's objective is to recognise and examine the potential benefits that AI offers as well as the difficulties it brings about specifically in the South African setting. This involves analysing aspects such as the sufficiency of infrastructure, the availability of skilled personnel, and the readiness of technology, all of which have significant impacts on the success of AI solutions Figure 6. This model consists of six stages:
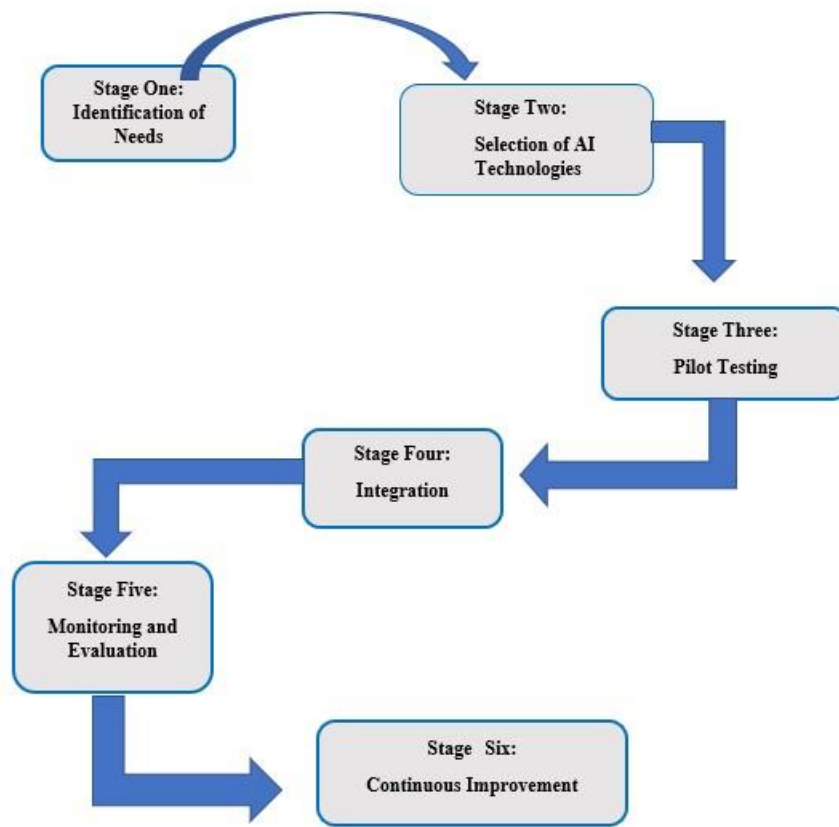
FIGURE 6
STAGES OF ARTIFICIAL INTELLIGENCE INTO SUPPLY CHAIN MANAGEMENT
Source: Author Own construction

The model starts by establishing a fundamental basis in the "Identification of Needs," which corresponds to the diagnostic stage of the literature study. During this phase, the model identifies existing gaps and possible uses of artificial intelligence in supply chains in South Africa. This stage involves determining the revolutionary capabilities of AI in research, specifically identifying areas such as demand forecasting, inventory management, and logistics where AI may greatly improve decision-making and operational flexibility.

The research examines and compares several AI tools and approaches discussed in the literature, specifically evaluating their suitability and efficiency in the distinct South African setting. This encompasses evaluations of the region's technological preparedness, infrastructure capacities, and socio-economic variables that impact the acceptance of technology.

"Pilot Testing" in research refers to the examination of case studies or specific instances of experimental artificial intelligence applications inside supply chains in South Africa. This analysis examines concrete evidence of the influence of AI, offering a focused perspective on the practical advantages it brings, its role in encouraging innovation, and its contribution to strategic realignment.

The research focuses on the process of integrating AI into firms' supply chains, including practices for smooth integration, technical adaptability, and upskilling of the workforce. The significance of AI in

enabling a connected and responsive supply chain ecosystem is emphasised, demonstrating its role in improving operational efficiencies.

The "Monitoring and Evaluation" stage involves analysing performance metrics after the deployment of AI, based on information from the literature. This provides information on the primary effects of AI, including improved precision in demand forecasting, decreased operational expenses, elevated levels of customer service, and the production of practical insights for ongoing improvement.

The concept of "Continuous Improvement" is in accordance with the progressive viewpoints found in the literature regarding the iterative process of implementing AI. The statement highlights the increasing importance of AI in promoting a culture of innovation, which in turn leads to long-term strategic advantages such as maintaining a competitive edge and being able to quickly respond to changes in the market.

Implications for practioners and policymakers

First and foremost, using AI requires evaluating existing operating procedures to pinpoint the specific areas where AI might provide the most advantages. This requires a comprehensive comprehension of AI capabilities and a deliberate approach to technological investments. AI improves operational efficiencies by reducing lead times, improving accuracy in demand forecasting, and optimising inventory levels. This, in turn, leads to cost reduction and increased responsiveness. Practitioners are also urged to consistently come up with new ideas and use AI to develop innovative ways of doing business and offering value, ultimately promoting a culture of long-term competitive advantage. Policymakers should prioritise the development of legal frameworks that promote the adoption of AI, while also addressing issues related to data privacy, ethical use of AI, and potential employment displacement. The study emphasises the need for policies that strengthen collaboration between industry and academics in order to promote AI research and development specifically designed for the South African setting. It is key to invest in digital infrastructure and efforts aimed at improving skills in order to develop a workforce capable of efficiently implementing and collaborating with AI technology. Policymakers will be able to promote an environment that is favourable to the integration of AI by prioritising these areas. This will stimulate economic growth and improve South Africa's standing in the global supply chain landscape.

6. FUTURE RESEARCH

Future research on the integration of Artificial Intelligence (AI) into supply chain management in South Africa should investigate various crucial domains to improve comprehension and efficiency. Examining the challenges to the use of artificial intelligence (AI), particularly in smaller businesses and conventional industries, may uncover practical knowledge on how to overcome socio-economic, technical, and infrastructural difficulties. It is imperative to thoroughly analyse the effects of AI on employment, such as changes in job categories and necessary skills, due to the rising automation. Research on the impact of AI in advancing sustainable practices and mitigating ethical issues like data privacy and algorithmic prejudice will provide significant insights.

7. CONCLUSION

The transformation of Artificial Intelligence (AI) in supply chain management practices in South Africa has the capacity to bring about profound changes, offering noteworthy prospects as well as significant challenges. This comprehensive literature analysis emphasises that the integration of AI is changing the way operational efficiencies are defined, improving strategic decision-making, and promoting innovation in South African industry. The introduction of AI technology in supply chain management has facilitated firms in attaining elevated levels of efficiency and competitiveness. AI improves demand forecasting, inventory management, and logistics operations, which improves the ability to respond to market demands and promotes supply chain resilience. This is particularly important in a dynamic market such as South Africa.

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