



DYNAMIC CAPABILITIES AND SUPPLY CHAIN PERFORMANCE IN THE FOURTH INDUSTRIAL REVOLUTION: THE INTERVENING EFFECTS OF SERVICE QUALITY AND RELATIONSHIP LONGEVITY

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The Fourth Industrial Revolution is transforming supply chains through swift digital advancements, escalating uncertainty, and heightened competition, which compels organisations to cultivate dynamic capabilities that improve performance and competitiveness. While earlier research has demonstrated that dynamic capabilities, collaboration, and Industry 4.0 technologies play a role in enhancing supply chain resilience and performance, there has been insufficient focus on the behavioural and relational mechanisms that mediate the impact of these capabilities on operational results. Consequently, this article seeks to explore how service quality and the longevity of relationships mediate the connection between dynamic capabilities and supply chain performance in Industry 4.0 contexts. Based on the Dynamic Capabilities View and the Resource-Based View, dynamic capabilities are defined as a firm's capacity to identify opportunities, capitalise on them, and reorganise resources and digitally enabled processes throughout the supply chain network. Service quality is characterised by reliability, responsiveness, and flexibility in supply chain interactions, whereas relationship longevity pertains to the stability and continuity of inter-organisational collaborations. Utilising survey data gathered from manufacturing and service organisations functioning within Industry 4.0 environments and analysed via structural equation modelling, the results reveal that dynamic capabilities exert a significant positive influence on supply chain performance. This connection is further enhanced by improved service quality and enduring business relationships. Among the mediating variables, service quality exhibits the most substantial impact, indicating that capabilities focused on quality and visibility are essential for converting digital investments into superior performance results. The longevity of relationships additionally amplifies these advantages by fostering trust, coordination, and ongoing learning among supply chain partners. The article concludes that organisations aiming to enhance supply chain performance in Industry 4.0 settings should emphasise the cultivation of dynamic capabilities while promoting high service quality and lasting collaborative relationships to secure a sustainable competitive edge.

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1. INTRODUCTION

In the context of the Fourth Industrial Revolution, supply chains are undergoing considerable disruption due to the swift digital transformation propelled by technologies such as artificial intelligence (AI), the Internet of Things (IoT), big data, and blockchain. These transformations, coupled with geopolitical instability, global pandemics, and heightened competition, have resulted in a business environment characterised by significant uncertainty. Consequently, organizations are increasingly prioritizing Dynamic Capabilities to bolster their adaptability and maintain competitiveness.

Rooted in the Dynamic Capabilities View (DCV) and the Resource-Based View (RBV), dynamic capabilities pertain to a firm's capacity to identify opportunities and threats, capitalize on them through strategic choices, and continually reconfigure both internal and external resources, including digitally enabled processes throughout the supply chain¹². Although previous studies have established that dynamic capabilities, collaboration, and Industry 4.0 technologies enhance supply chain resilience and performance, there has been limited focus on the behavioral and relational mechanisms that elucidate how these capabilities affect daily supply chain operations³⁴

This research formulates and evaluates a model that investigates the role of service quality and relationship longevity as mediating elements between dynamic capabilities and Service quality is defined in terms of reliability, responsiveness, and flexibility in supply chain interactions, while relationship longevity signifies the long-term stability of

¹ DJ Teece, 'Business Models and Dynamic Capabilities' (2018) 51(1) *Long Range Planning* 40–49.

² P Mikalef, J Krogstie, IO Pappas and PA Pavlou, 'Big Data Analytics Capabilities and Firm Performance' (2021) 58(4) *Information & Management* 103417 <https://doi.org/10.1016/j.im.2021.103417>.

³R Dubey, A Gunasekaran, SJ Childe and others, 'Big Data Analytics and Artificial Intelligence Pathway to Operational Performance' (2021) *Annals of Operations Research* 1–26.

⁴ MM Queiroz, D Ivanov, A Dolgui and SF Wamba, 'Impacts of Epidemic Outbreaks on Supply Chains' (2020) 136 *Transportation Research Part E* 101922.

partnerships that foster trust, coordination, and value creation⁵⁶. Employing survey data gathered from over 350 managers in manufacturing and service firms functioning within Industry 4.0 settings, this study utilises partial least squares structural equation modeling (PLS-SEM) to evaluate the proposed relationships. The results indicate that dynamic capabilities have a significant influence on supply chain performance.

This article presents a thorough literature review, encompassing an in-depth discussion of the theoretical frameworks that support the study, alongside a comprehensive empirical examination of prior research. Additionally, the article delineates the research methodology utilised and elaborates on the data collection methods applied in the study. The results and findings are showcased and analysed using Analysis of Moment Structures (AMOS) and Structural Equation Modelling (SEM) techniques. Moreover, the article addresses the ethical considerations that informed the research process, ensuring the safeguarding of participants and the integrity of the study. The research also emphasises the theoretical implications of the findings and pinpoints areas that necessitate further exploration, thus offering guidance for future research endeavours. Furthermore, the article articulates the study's contribution to the existing body of knowledge and its practical relevance for scholars, practitioners, and policymakers. Lastly, recommendations derived from the findings are presented to enhance comprehension and facilitate the implementation of suitable strategies within the investigated field.

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

The Dynamic Capabilities Theory has emerged as both an extension of and a response to the shortcomings of the Resource-Based View (RBV), especially regarding its failure to elucidate how firms develop and continuously renew their resources in rapidly evolving environments. While the RBV emphasises the significance of valuable, rare, inimitable,

⁵ BB Flynn, B Huo and X Zhao, 'The Impact of Supply Chain Integration on Performance' (2010) 28(1) *Journal of Operations Management* 58.

⁶ R Kumar, *Research Methodology: A Step-by-Step Guide for Beginners* (5th edn, Sage 2021).

and non-substitutable (VRIN) resources as sources of competitive advantage, it inadequately addresses how organizations adapt when circumstances change. Dynamic capabilities fill this void by highlighting the processes through which firms integrate, build, and reconfigure their internal and external resources to maintain competitiveness⁷⁸.

In this framework, dynamic capabilities can be perceived as a crucial driver of sustained competitive advantage, particularly in volatile and uncertain environments. They empower organizations to respond adeptly to changes by reconfiguring their strategies, operations, and resource base. Consequently, firms endowed with robust dynamic capabilities are more likely to achieve superior performance over time. Nevertheless, despite the expanding body of research surrounding this theory, there remains a pressing need for greater clarity regarding its fundamental concepts and stronger connections between theory and practical application within organisations⁹¹⁰.

This study aims to tackle two significant questions. First, it investigates whether there exists a widely accepted, empirically grounded definition of dynamic capabilities. Second, it analyses the most influential conceptual definitions that have shaped empirical research in this domain since the foundational contributions of David¹¹. This seminal work is widely acknowledged as a cornerstone in the literature of strategic management and has profoundly impacted subsequent research on organisational capabilities and performance.

⁷ Ibid 1

⁸ Ibid 2

⁹ CL Wang and PK Ahmed, 'Dynamic Capabilities: A Review and Research Agenda' (2007) 9(1) *International Journal of Management Reviews* 31.

¹⁰ R Wilden, TM Devinney and GR Dowling, 'The Architecture of Dynamic Capability Research' (2016) 10(1) *Academy of Management Annals* 997.

¹¹ DJ Teece, G Pisano and A Shuen, 'Dynamic Capabilities and Strategic Management' (1997) 18(7) *Strategic Management Journal* 509.

3.0 EMPIRICAL REVIEW

3.1 Supply Chain Performance and Dynamic Capabilities

A growing body of research connects robust supply chain dynamic capabilities (SCDCs) with enhanced supply chain performance. For instance, a recent meta-analysis indicates that companies gain a competitive edge by cultivating SCDCs such as the ability to sense market fluctuations and reconfigure processes which subsequently enhances responsiveness, cost efficiency, and reliability. Empirical investigations in sectors like manufacturing and healthcare support this notion: organizations exhibiting greater integration, agility, and resilience (facilitated by dynamic capability routines) report superior financial and operational outcomes. For example,)¹² demonstrate that supply chain agility completely mediates the relationship between integration and financial performance, while also showing that Industry 4.0 technologies enhance the benefits of agility on performance. In practical terms, technology-driven SCDCs (such as real-time visibility and analytics-based reconfiguration) assist firms in managing disruptions and maintaining stable operations during periods of volatility (e.g., the COVID-19 pandemic).

In the context of South Africa,¹³ reveal that dynamic capabilities play a crucial role in determining supply chain outcomes for SMEs. Their structural equation model, based on survey data from SMEs in the Gauteng area, illustrates that enhanced sensing, learning, and reconfiguration capabilities (dimensions of dynamic capabilities) significantly elevate fulfilment rates, cost management, and flexibility, thereby improving overall supply chain performance. In conclusion, SCDCs enable firms to integrate partners and processes more effectively

¹²MH Eslami, H Jafari, L Achtenhagen, J Carlback and A Wong, 'Financial Performance and Supply Chain Dynamic Capabilities: The Moderating Role of Industry 4.0 Technologies' (2021) 62(3) *International Journal of Production Research* 8092–8109.

¹³ PD Lavhelani, O Omoruyi and E Chinomona, 'Dynamic Capabilities as Determinants of Supply Chain Performance in Small to Medium Enterprises in Gauteng Province' (2018) 10(2) *Journal of Economics and Behavioral Studies* 165–175.

and to respond swiftly to changes, which ultimately leads to improvements in cost, delivery, and flexibility-related performance gains.

3.3 Service Quality in the Context of the Fourth Industrial Revolution

Recent empirical research indicates that service quality outcomes within supply chains depend on both dynamic capabilities and digitalisation.¹⁴examine service firms in the UK and discover that organizations possessing enhanced information systems capabilities (a form of IT-based dynamic capability) foster improved collaboration with suppliers and customers, which subsequently elevates quality performance (characterised by fewer errors, quicker responses, and greater satisfaction). Crucially, in environments characterized by high market dynamism, the importance of customer collaboration is amplified: environmental dynamism significantly enhances the relationship between customer collaboration and quality performance. In essence, when faced with high levels of turbulence, the significance of adaptability and collaborative routines (skills associated with dynamic capabilities) surpasses that of static processes. In the era of Industry 4.0, digital servitisation-encompassing IoT-based remote monitoring, cloud support, and predictive maintenance- further enhances service quality. Research conducted among Italian B2B manufacturers reveals that IoT-enabled services substantially elevate both relationship and service quality. For instance, Grandinetti et al. (2020) ¹⁵note that access to real-time customer data and a close supplier-customer relationship (“relational intimacy”) enhances data-driven efficiency and effectiveness, leading to a marked improvement in perceived relationship and service quality.

3.4 Relationship Longevity and Relational Quality

Empirical research increasingly indicates that the duration of relationships is a result of robust relational quality, characterised by trust,

¹⁴ T Teng, C Tsinopoulos and YK Tse, ‘IS Capabilities, Supply Chain Collaboration and Quality Performance in Services: The Moderating Effect of Environmental Dynamism’ (2022) 122(7) *Industrial Management & Data Systems* 1592–1619.

¹⁵ R Grandinetti, MV Ciasullo, M Paiola and F Schiavone, ‘Fourth Industrial Revolution, Digital Servitization and Relationship Quality in Italian B2B Manufacturing Firms: An Exploratory Study’ (2020) *The TQM Journal*.

commitment, and information sharing, which are influenced by dynamic capabilities (DCs) and digital collaboration. For example, ¹⁶apply commitment-trust theory to demonstrate that elevated institutional trust and relational commitment among partners help maintain long-term relationships by fostering open collaboration and knowledge exchange. In the realm of digital "c-commerce" channels, they observe that firm engagement (c-commerce behaviour) and dynamic capabilities significantly enhance performance, with firms possessing stronger DCs being more adept at utilising e-collaboration. In practical terms, organisations that proactively invest in supplier–customer information sharing, collaborative problem-solving, and trust-building experience reduced coordination costs and uncertainties, thus fostering longer-lasting, higher-value partnerships.

The Fourth Industrial Revolution amplifies this trend through enhanced data sharing and connectivity. Cloud platforms, APIs, and integrated IoT systems enhance transparency and coordination throughout the supply chain, thereby reinforcing mutual commitment. For instance, highlight that IoT-enabled servitisation not only enhances efficiency but also strengthens relational intimacy: firms report that data-driven collaboration mitigates opportunism and encourages prolonged partnerships. Likewise, in healthcare networks, digital capabilities that facilitate joint decision-making and ongoing feedback (such as integrated cloud-based dashboards) have been shown to diminish uncertainty and enhance mutual value capture, thereby extending the duration of partnerships in sensitive sectors, such as patient–supplier collaborations.

3.5 Integrating 4IR Technologies and Dynamic Capabilities

As organisations embrace 4IR technologies such as IoT, advanced analytics, cloud computing, robotics, and blockchain, their dynamic capabilities (DCs) become essential for realising performance advantages.

¹⁶ WT Wang, YL Lin and TJ Chen, 'Exploring the Effects of Relationship Quality and C-Commerce Behavior on Firms' Dynamic Capability and C-Commerce Performance in the Supply Chain Management Context' (2023) 164 *Decision Support Systems* 113865.

¹⁷ illustrate this point: within Swedish manufacturing firms, Industry 4.0 technologies moderate the relationship between DC and performance—specifically, digital tools amplify the beneficial impact of supply-chain agility on financial outcomes, although they do not independently foster agility. In essence, companies that possess robust sensing, learning, and reconfiguration capabilities derive significantly greater value from their 4IR investments than those that implement technology without concurrently developing these capabilities. A recent qualitative study conducted in South Africa supports this view: numerous local firms have trialed I4.0 tools, yet value generation is only realised when dynamic capabilities, strategic direction, and partner networks are in harmony.¹⁶ observes that while novel technologies present substantial opportunities, "emerging technological implementations frequently fail to achieve the intended results" unless organizations persistently refine their capabilities.

3.6 The integration of Artificial Intelligence (AI), Blockchain, and Internet of Things (IoT).

Supply Chain Management Artificial Intelligence (AI) has emerged as a revolutionary force, enhancing forecasting precision, operational productivity, and decision-making. AI-driven systems possess the capability to scrutinise extensive amounts of historical and real-time data, enabling the identification of demand trends and more accurate predictions of future needs. This capability allows organisations to minimise both inventory shortages and surplus stock, leading to reduced operational expenses and heightened customer satisfaction. Additionally, AI facilitates route optimisation, warehouse management, supplier performance assessment, and predictive analytics, empowering organisations to anticipate potential disruptions and take proactive

¹⁷ J Jacobs, 'Strategic Management of Technology-Enabled Capabilities: A Dynamic Capabilities Approach to Strategically Aligned Value Creation' (PhD thesis, University of Pretoria 2021).

measures rather than merely react. As a result, AI plays a significant role in fostering supply chains that are more agile, resilient, and efficient. ^{18J.19}

Blockchain technology has garnered considerable attention for its ability to enhance transparency, traceability, and trust across supply chain networks. By utilising a decentralised, immutable ledger system, blockchain allows stakeholders to access precise, tamper-proof records of transactions and product movements. This advancement enhances accountability, mitigates the risk of fraud, and bolsters the reliability of information exchanged among supply chain partners. Furthermore, blockchain enables smart contracts, which automate transactions and business processes such as payments and order fulfilment. These features foster collaboration, decrease administrative expenses, and elevate overall supply chain performance²⁰. The Internet of Things (IoT) is pivotal in enhancing supply chain visibility and operational efficiency through the real-time monitoring of products, assets, and transportation activities. IoT technologies, such as sensors, RFID tags, and GPS tracking devices, consistently gather and transmit data regarding the location, condition, and movement of goods throughout the supply chain. This real-time data empowers organisations to make informed decisions, optimise inventory management, and reduce delays. IoT facilitates predictive maintenance by detecting potential equipment failures before they arise, thus minimising downtime and operational interruptions. Consequently, IoT improves coordination among supply chain partners, reduces costs, and enhances the overall reliability and responsiveness of supply chain operations.²¹

¹⁸ S Pattnaik, N Liew, AO Kures, E Pinsky and K Park, 'Catalyzing Supply Chain Evolution: A Comprehensive Examination of Artificial Intelligence Integration in Supply Chain Management' (2024) 68(1) *Engineering Proceedings* 57.

¹⁹ MA Jahin, SA Naife, AK Saha and MF Mridha, 'AI in Supply Chain Risk Assessment: A Systematic Literature Review and Bibliometric Analysis' (2024) arXiv.

²⁰ A Sharabati and Elias Radi Jreisat, 'Blockchain Technology Implementation in Supply Chain Management: A Literature Review' (2024) 16(7) *Sustainability* 2823 <https://doi.org/10.3390/su16072823> accessed 17 June 2026.

²¹ TK Dasaklis, TG Voutsinas, GT Tsoulfas and F Casino, 'A Systematic Literature Review of Blockchain-Enabled Supply Chain Traceability Implementations' (2022) 14(4) *Sustainability* 2439.

4.0 METHOD AND DATA

4.1 Research design

This study employed descriptive research designs to examine the influence of dynamic capabilities (DC) on supply chain outcomes (SQ), relationship Longevity (RL), and supply chain performance (SCP). The study adopted a deductive research approach, in which theoretical propositions were first developed from an extensive review of existing literature and then empirically tested using collected data.^{22; 23}).

A descriptive research design was used to provide an accurate and systematic representation of individuals, events, and variables relevant to the research questions. Descriptive research focuses on portraying characteristics of a population and identifying patterns, relationships, and trends among variables without manipulating the study environment. Descriptive studies are particularly useful for obtaining information about participants' perceptions, attitudes, and opinions, which aligns with the objective of this study in assessing SMEs' supply chain performance.

Furthermore, descriptive research enables the identification of associations between variables, thereby supporting the analysis of how dynamic capabilities, relational learning, and supply chain integration interact to influence performance outcomes. This approach was therefore appropriate for capturing a comprehensive view of the relationships and patterns underpinning the research model.

4.2 Population and Sampling

The target population denotes the entire collection of individuals or entities from which a researcher aims to extract a sample and formulate generalisations. It encompasses all elements that exhibit characteristics pertinent to the study, enabling the derivation of significant conclusions.

²² JW Creswell and JD Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (6th edn, Sage 2023)

²³ M Saunders, P Lewis and A Thornhill, *Research Methods for Business Students* (9th edn, Pearson 2023).

Therefore, the target population signifies the larger group to which the study results are anticipated to be applicable (²⁴; ²⁵).

In this research, the target population comprised owners and managers of small and medium-sized enterprises (SMEs) operating across sectors such as retail and manufacturing in the context of the Fourth Industrial Revolution (4IR). These enterprises are distinguished by their engagement with or exposure to emerging digital technologies and evolving business models. The population was delineated using databases sourced from the Gauteng Enterprise Propeller (GEP), the Vaal Triangle business directory, and SME records from pertinent municipalities in Southern Gauteng. The research included both male and female SME owners and managers from various racial backgrounds in South Africa, promoting inclusivity and representation across diverse demographic groups. This methodology bolsters the generalisability of the findings to the wider SME sector within the region ²⁶).

4.3 Data Collection

Data collection is the systematic process of gathering and measuring information about variables of interest to answer research questions and evaluate outcomes. The primary aim of data collection is to obtain high-quality evidence that supports meaningful analysis and leads to credible and reliable conclusions ; ²⁷)²⁸. In this study, a structured, sequential approach was used during data collection.

4.4 Data Collection Method and Instrument

This research employed a quantitative research approach using a survey method. The researcher distributed self-administered structured questionnaires to identified respondents, who were also encouraged to refer other potential participants within the Vaal region. Surveys are widely used for collecting primary data from a defined sample, particularly

²⁴ Ibid 23

²⁵ Ibid 24

²⁶ Ibid 26

²⁷ Ibid 23

²⁸ Ibid 24

when the aim is to obtain standardised information efficiently and economically.^{29, 30}

The survey method was selected due to its ability to provide quick, cost-effective, and reliable data from a relatively large population. Self-administered questionnaires were considered appropriate because they are easy to distribute, reduce administrative costs, and allow respondents to complete them at their own convenience. Additionally, this method enhances anonymity, which can improve the honesty and accuracy of responses.^{31, 32}

4.5 Questionnaire Layout

A structured questionnaire consisting of 22 items was developed based on previously validated instruments relevant to the study constructs. The questionnaire was divided into five sections:

- Section A: Captured general information about SMEs, including the type of business, the nature of operations, and the number of employees.
- Section B: Focused on dynamic capabilities, measured using four items adapted from prior studies.
- Section C: Addressed service quality, measured using four items.
- Section D: Examined relationship longevity, measured using six items.
- Section E: Assessed supply chain performance, measured using eight items.

The questionnaire served as the primary data collection instrument for SME owners and managers. Questionnaires are designed to ensure the accuracy and relevance of the data collected, encourage participation, and

²⁹ Ibid 26

³⁰ Ibid 24

³¹ Ibid 23

³² Ibid 6

facilitate efficient data analysis.³³ They are particularly effective at collecting large volumes of empirical data within a limited time frame.³⁴

The development of the questionnaire was guided by the literature reviewed in this study, ensuring alignment with established measurement scales. Most of the questions were based on multi-item scales, specifically five-point Likert-type scales, which are widely used to measure attitudes, perceptions, and opinions. Likert scales help standardise responses, minimise bias, and simplify the coding and analysis of data^{35; 36}).

4.6 Questionnaire Format and Structure

The questionnaire consisted primarily of closed-ended questions. Closed-ended questions require respondents to select answers from predetermined options, ensuring consistency and ease of analysis³⁷. These questions included multiple-choice, dichotomous, and scale-based formats.

A five-point Likert scale was utilised, ranging from 1 = strongly disagree to 5 = strongly agree. This scale was chosen because it is simple to design, easy for respondents to understand, and effective in capturing the intensity of respondents' attitudes and perceptions^{38, 39}.

The Likert scale was applied in Sections B to E to measure key constructs, including dynamic capabilities, service quality, relationship longevity, and supply chain performance. Respondents were required to indicate their level of agreement with a series of statements, enabling the researcher to assess relationships between variables and test the study hypotheses quantitatively⁴⁰).

³³ Ibid 24

³⁴ Ibid 6

³⁵ Ibid 23

³⁶ Ibid 26

³⁷ Ibid 24

³⁸ Ibid 26

³⁹ Ibid 6

⁴⁰ Ibid 23

4.7 Data analysis

The data analysis process commenced with coding the questionnaire responses into a Microsoft Excel spreadsheet. Subsequently, the data were imported into the Statistical Package for the Social Sciences (SPSS) for additional analysis. Initially, descriptive statistics were performed using SPSS to summarise and elucidate the primary characteristics of the data. Following this, Confirmatory Factor Analysis (CFA) and path modelling were executed using AMOS to facilitate Structural Equation Modelling (SEM).

Structural Equation Modelling is a multivariate statistical method employed to investigate and validate theoretical relationships among constructs within a proposed research framework. This technique allows researchers to evaluate both measurement and structural relationships concurrently, thus offering a holistic understanding of the interrelations among variables (; ⁴¹). ⁴²SEM is especially advantageous for analysing intricate models that encompass multiple dependent relationships, as it permits the simultaneous estimation of several regression equations.

Moreover, SEM integrates multiple observed variables (indicators) for each construct, which aids in addressing measurement error and enhances the precision of the results. By examining all relationships at once rather than in isolation, SEM improves the reliability and validity of the outcomes and provides more robust support for hypothesis testing (⁴³; ⁴⁴).

⁴¹ JF Hair, WC Black, BJ Babin and RE Anderson, *Multivariate Data Analysis* (8th edn, Cengage 2021).

⁴² RB Kline, *Principles and Practice of Structural Equation Modeling* (5th edn, Guilford Press 2023).

⁴³ Ibid 44

⁴⁴ BM Byrne, *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming* (4th edn, Routledge 2022).

5.0 ETHICAL CONSIDERATION

5.1 Anonymity and respect for the dignity of individuals

This entails safeguarding individual confidentiality, a significant operational manifestation of this principle. Throughout the data collection phase, participants' identities were protected; specifically, respondents were never required to disclose their names. The anonymity of the respondents was maintained throughout the research process, with data aggregated without reference to individual participants.

5.2 Informed consent

The principle of informed consent was highly valued throughout the study. To facilitate informed consent, the study's nature and objectives were clearly articulated to participants at the time of questionnaire distribution. Additionally, a cover letter outlining the study's nature and goals was included on the front page of the questionnaire for respondents to review independently.

5.3 No harm to participants

This philosophical principle complements the autonomy principle and mandates that researchers ensure that no harm comes to research participants as a result of the study. The researcher ensured that participation was entirely voluntary for respondents. They were reminded that participation in the surveys was completely optional and that they retained the right to withdraw from the interview at any time.

5.4 Justice

Mutual trust represents an ethical concern. In the context of research, justice is a multifaceted philosophical principle that generally requires researchers to treat participants with fairness and equity throughout all phases of the research process. Researchers are obligated to uphold the standards of confidentiality and anonymity as promised to respondents. In this study, all respondents were treated with equal respect and professionalism, fostering mutual respect during the data collection process. The conversations aimed to cultivate mutual trust.

6.0 RESULTS AND DISCUSSION

In this study, three assessments were performed, specifically Cronbach’s alpha, CR, and AVE, to evaluate the reliability of the measurements. It was crucial that all three assessments were carried out to determine the level of reliability. The Cronbach’s alpha test aims to verify the existence of reliability, whereas the CR and AVE tests are designed to affirm and validate the presence of reliability. Table 1 presents the results of the tests, which will be discussed in detail subsequently. The scale item column indicates the average value of the responses described, along with the corresponding standard deviation value.

Table 1: Internal consistency reliability results

Research constructs		Cronbach Alpha Value	CR	AVE
DYNAMIC CAPABILITIES	DC1	0.766	0.767	0.713
	DC2			
	DC3			
	DC4			
SERVICE QUALITY	SQ1	0.760	0.759	0.533
	SQ2			
	SQ3			
	SQ4			
RELATIONSHIP LONGEVITY	RL1	0.757	0.757	0.717
	RL2			
	RL3			
	RL4			
	RL5			
	RL6			
SUPPLY CHAIN PERFORMANCE	SCP1	0.804	0.805	0.555
	SCP2			
	SCP3			
	SCP4			
	SCP5			

	SCP6			
	SCP7			
	SCP8			

According to the results, the Cronbach's alpha values for each research construct fall between 0.757 and 0.804, exceeding the minimum threshold of 0.7 as suggested by Nunnally and Bernstein (1994:43). The specific Cronbach's alpha values for the constructs, in order, are 0.766, 0.760, 0.757, and 0.804. Additionally, the Composite Reliability (CR) values are recorded as 0.767, 0.759, 0.757, and 0.805. In terms of Average Variance Extracted (AVE), the values are 0.713, 0.533, 0.717, and 0.555. These findings confirm the reliability of the instruments employed in the present study. A strong representation of the latent construct by the item is indicated when the variance-extracted estimate exceeds 0.5 (F⁴⁵; ⁴⁶). Consequently, the AVE results range from 0.613 to 0.738.

6.1 Descriptive Statistical Analysis

The overall scale for relationship longevity (RL1 – RL6) had the highest mean score of 4.00, followed by supply chain performance overall scale (SCP1 – SCP8) with the mean rating of 3.96. The service quality scale had a mean score of 3.87 (SQ1 – SQ4). While dynamic capabilities and service quality overall scales had the lowest mean rating of 3.80, consisting of DC1 – DC4. The mean score ratings of the four variables are presented in Table 2 below.

Table 2: Mean and standard deviation

Variables	N	Mean	Std. Deviation
Dynamic capabilities: Overall	288	3.80	0.989
DC1	288	3.83	.949

⁴⁵ C Fornell and DF Larcker, 'Evaluating Structural Equation Models with Unobservable Variables and Measurement Error' (1981) 18(1) *Journal of Marketing Research* 39.

⁴⁶ M Sarstedt, CM Ringle, D Smith, R Reams and JF Hair Jnr, 'Partial Least Squares Structural Equation Modelling' (2014) 5 *Journal of Family Business Strategy* 105.

DC2	288	3.77	.902
DC3	288	3.78	1.090
DC4	288	3.80	1.015
Service quality: Overall	288	3.87	1.025
SQ1	288	3.95	1.069
SQ2	288	3.83	.951
SQ3	288	3.80	.971
SQ4	288	3.91	1.010
Relationship longevity: Overall	288	4.00	0.907
RL1	288	4.02	.933
RL2	288	4.07	.830
RL3	288	4.07	.867
RL4	288	4.01	.946
RL5	288	3.90	.952
RL6	288	3.93	.914
Supply chain performance: Overall	288	3.96	0.949
SCP1	288	3.80	1.070
SCP2	288	3.97	1.062
SCP3	288	3.83	.926
SCP4	288	4.00	.879
SCP5	288	3.98	.927
SCP6	288	3.95	.888
SCP7	288	3.93	.898
SCP8	288	3.87	.907

In the questionnaire, the significance of various aspects of dynamic capabilities was assessed, revealing that item DC1 had the highest mean score of 3.83, followed closely by item DC4 with a mean of 3.80. Conversely, the lowest mean scores were observed for items DC2 and DC3, which recorded means of 3.77 and 3.78 respectively, indicating these items are perceived as the least critical aspects of dynamic capabilities. Notably, items DC3 and DC4 exhibited the highest standard deviations of 1.090 and 1.015, reflecting a greater variability in responses among participants for these items. In contrast, items DC1 and DC2 had the lowest standard deviations of 0.949 and 0.902, suggesting a consensus among respondents regarding their dynamic capabilities. In section C, which focused on service quality, the highest mean scores were recorded for items SQ1 and SQ4, with values of 3.95 and 3.91 respectively. The lowest mean scores in this section were found for SQ3 and SQ2, with means of 3.80 and 3.83. Furthermore, items SQ1 and SQ2 displayed the highest levels of variance, indicated by standard deviations of 1.069 and 1.010. Conversely, SQ2 and SQ3 had the lowest standard deviations of 0.951 and 0.971, suggesting a strong consensus among customers regarding service quality. Regarding the significance of relationship longevity, all mean scores were above 4.00, with the exceptions of RL5 and RL6, which had means of 3.90 and 3.93 respectively. Items RL1, RL4, RL5, and RL6 showed the highest levels of variance, with standard deviations ranging from 0.914 to 0.952. The lowest standard deviations in section D were recorded for RL2 and RL3, with scores of 0.380 and 0.867 respectively, indicating a strong agreement on the importance of sustaining supplier-buyer relationships. In section E of the questionnaire, which evaluated supply chain performance, all mean scores exceeded 3.50, with the highest mean recorded for item SCP4 at 4.00. The lowest mean score was noted for item SCP3, which had a mean of 3.83. Both SCP1 and SCP2 recorded high mean scores, further emphasising the overall positive assessment of supply chain performance.

The standard deviation is frequently associated with the mean, as it serves as a metric to quantify the average deviation of values from the arithmetic mean. The highest standard deviation across all calculated scales was observed in the service quality scale, which recorded a value of 1.025, followed by the dynamic capabilities scale at 0.989. In contrast, the supply

chain performance scale exhibited a standard deviation of 0.949, while the relationship longevity scale had the lowest value at 0.907. This indicates a greater consensus among respondents regarding service quality and dynamic capabilities and their impact on supply chain performance, in comparison to relationship longevity.

7.0 PRACTICAL IMPLICATIONS

Organisations should not only allocate resources towards advanced technologies linked to the Fourth Industrial Revolution but also concentrate on developing robust dynamic capabilities. This entails enhancing the capacity to detect market changes, swiftly capitalise on new opportunities, and perpetually adjust internal processes. Merely implementing digital tools is insufficient; companies must guarantee that their personnel, systems, and processes are synchronised to utilise these technologies effectively. The research underscores the significance of service quality as a fundamental factor influencing supply chain performance.

Managers ought to emphasise the enhancement of reliability, responsiveness, and flexibility within their operations. For instance, ensuring precise deliveries, minimising response times to customer requests, and maintaining adaptability to disruptions can greatly improve overall performance. Investments in real-time data systems, tracking technologies, and communication platforms can facilitate these enhancements. Organisations should proactively foster long-term relationships with their supply chain partners. Strong, stable relationships founded on trust and consistent collaboration can enhance coordination and mitigate uncertainty. Managers are advised to shift away from short-term, transactional interactions and instead concentrate on strategic partnerships that encourage shared learning and ongoing improvement.

8.0 THEORETICAL IMPLICATION AND FUTURE RESEARCH

This research expands upon the Dynamic Capabilities View (DCV) and the Resource-Based View (RBV) by demonstrating that dynamic capabilities not only have a direct impact on supply chain performance but

also operate through significant mediating factors such as service quality and relationship longevity. This enhancement enriches the existing theoretical framework by elucidating the mechanisms through which these capabilities lead to improved performance. Furthermore, the research makes a theoretical contribution by incorporating both behavioural (service quality) and relational (relationship longevity) dimensions into the discourse on supply chain studies. This integration is crucial, as numerous prior investigations have predominantly concentrated on technological and internal capabilities, thereby neglecting the human and relational aspects inherent in supply chains. Moreover, the results underscore that within the context of the Fourth Industrial Revolution, mere digital transformation is insufficient. The findings indicate that theoretical frameworks must also consider how organisations leverage their capabilities to enhance interactions and foster enduring partnerships.

9.0 CONTRIBUTION

The research presents a theoretical contribution by enhancing the current understanding of dynamic capabilities. It demonstrates that dynamic capabilities not only exert a direct influence on supply chain performance but also operate through significant mechanisms such as service quality and the longevity of relationships. This elucidates the processes through which performance enhancements occur in actual supply chains.

The research offers a conceptual contribution by formulating and validating an integrated model that unifies dynamic capabilities, service quality, relationship longevity, and supply chain performance. This holistic approach is advantageous as it connects internal capabilities with both operational results and external relationships, which are frequently examined in isolation.

The research provides a methodological contribution by employing structural equation modelling to analyse the relationships among variables. This approach yields robust empirical evidence and a more dependable comprehension of the interactions between the principal constructs.

The research delivers a practical (managerial) contribution by guiding managers on where to concentrate their efforts. It emphasises that enhancing service quality and fostering long-term relationships are crucial strategies for transforming capabilities and digital investments into improved performance outcomes. The research contributes to the South African and emerging market context by supplying evidence pertinent to local organisations. It indicates that in settings characterised by uncertainty, infrastructural challenges, and relationship dynamics, firms must prioritise not only technology but also collaboration, trust, and service deliver

10.0 RECOMMENDATION

Organisations ought to allocate resources not solely to digital technologies but also to cultivating robust dynamic capabilities, including the capacity to adapt, innovate, and respond swiftly to market fluctuations. Companies must emphasise service quality by enhancing reliability, responsiveness, and flexibility within their supply chain operations, as these factors significantly influence overall performance. It is crucial for organisations to establish and sustain enduring relationships with supply chain partners, emphasizing trust, collaboration, and ongoing communication. Managers should synchronise internal capabilities with external partnerships to facilitate improved coordination and more efficient supply chain processes.