

EXPLORING COMPLEXITY LEADERSHIP DURING TURBULENT TIMES: A CASE STUDY OF TRANSNET NATIONAL PORTS AUTHORITY, SOUTH AFRICA

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Abstract

This research study investigates how leaders at Transnet National Ports Authority (TNPA), a state-owned enterprise in South Africa, apply complexity leadership theory to adapt, innovate, and sustain performance amid the volatility of global trade, economic shifts, and organizational change. By using semi-structured interviews and conducting focus groups, context-specific insights were gathered and analysed using thematic analysis. The findings provide empirical evidence-driven practical recommendations to strengthen leadership capacity to navigate uncertainty and complexity. It also advances academic understanding of complexity leadership within state-owned enterprises in developing countries.

Keywords: *leadership; organizational complexity; organisational turbulence; leadership challenges*

1. Introduction

In the current volatile, unpredictable, complex, and ambiguous (VUCA) environment, organizations are more than ever driven to adapt and prosper amid continual change (Syamsir et al., 2025). Among the sectors most exposed to the above dynamics is the maritime industry, where the complexities of the national ports' operating systems pose significant challenges and limitations to maritime infrastructure growth. Thus, as critical enablers of global trade, ports are especially vulnerable to volatile scenarios induced by shifting market demands, increasing regulatory standards, technological changes, and socioeconomic influences (Syamsir et al., 2025). In such a setting, leadership

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effectiveness emerges as being particularly important to foster organizational resilience, creativity, and maintain long-term performance.

South Africa's eight commercial ports are overseen by the Transnet National Ports Authority (TNPA), a subsidiary of Transnet SOC Ltd, that serves as the landlord and sole provider of marine services at each port. TNPA operates at the intersection of economic growth and global trade competitiveness (Mthembu and Chasomeris, 2023) and its management is frequently confronted with the onerous task of making strategic and operational choices (Transnet National Ports Authority, 2023).

Traditional leadership frameworks, which are typically structured hierarchically and authoritatively, have faced criticism for their inability to manage dynamic contexts; consequently, contemporary challenges necessitate innovative leadership viewpoints and frameworks (Kutama, 2021). This is particularly relevant to the Transnet National Ports Authority (TNPA), which operates in a volatile and complex maritime environment where rapid adaptation is essential. As a result, there has been increasing curiosity in alternative frameworks, such as Complexity Leadership Theory (CLT), which focuses on adaptability, decentralized decision-making, and the capacity to leverage emergent, innovative solutions from within the organization (Kutama, 2021).

Against the above background, this study aims to critically examine how TNPA managers understand, implement, and deal with leadership challenges based on the complexity leadership theory. The research will attempt to address the following questions:

- How can Transnet National Ports Authority managers apply Complexity Leadership theory to overcome obstacles in volatile operating conditions?
- What kind of leadership practices do managers adopt to maintain the correct equilibrium between the requirements for flexible and adaptable reactions and obedience-determined operations?
- How can TNPA managers promote resilience, decentralized solutions, and creativity in the face of operational chaos by utilizing Complexity Leadership Theory?
- What effects does TNPA's cultural environment have on managers' application of complexity leadership?
- What enablers and impediments impact TNPA's Complexity Leadership efficacy in times of turbulence and uncertainty?

2. Literature Review

The encounters of business complex systems necessitate a new kind of leadership in order to establish and foster an environment that is flexible enough to enable innovations and eventually integrate them into an institution's core operations (Tsai et al., 2019). Adopting a different leadership paradigm that is defined by diverse but complementary leadership functions is necessary to increase an organization's capacity

to adapt and deal with environmental complexity, as they are viewed as complex adaptive systems (Sedibe, 2021). Although Complexity Leadership Theory (CLT) has limited relevance in the complex operational environment of businesses, its integrative, collaborative, and relational approach to leadership makes it a suitable theoretical lens for the research (Sedibe, 2021).

According to Hallo et al. (2020), organizations are seen as Complex Adaptive Systems (CAS) under the CLT (Complexity Leadership Theory). The CLT stresses leadership as a process integrated throughout organizational networks and adaptive dynamics, as opposed to merely defining it as the function of formal managers, and the three primary leadership traits recognized by the CLT are administrative leadership, which emphasizes productivity, authority, framework, and coordination while guaranteeing adherence to rules and guidelines, adaptive leadership which allows people and groups to react creatively to new problems, which promotes creativity, knowledge acquisition, and figuring out solutions and enabling leadership: establishes circumstances for flexibility, cooperation, and information sharing by serving as an intermediary among administrative and systems that adapt (Abbaszade, 2022).

CLT offers a helpful paradigm for comprehending how managers might resolve conflicts amid adherence to processes and the requirement for immediate action within deviations in the context of Transnet National Ports Authority (TNPA), where decisions are frequently centered at the national level, and CLT promotes how managers might improve organizational resilience during turbulent times by seeking a balance between efficiency and adaptation (Pramjeeth & Mutambara, 2022). Additionally, the idea of VUCA conditions informs the theoretical framework, highlighting the disconnect between static leadership approaches and the changing conditions of contemporary seaport operations (Jerab & Mabrouk, 2023). CLT makes it possible to analyze how managers develop dispersed strategic solutions, improve adaptive capability, and promote a resilient culture within the TNPA. In order to analyze how TNPA managers deal with uncertainty and turbulence in port operations, Complexity Leadership Theory (CLT) provides a guiding lens, while the conceptual framework anchored in CLT illustrates how contextual turbulence, leadership functions, and organizational results interact (Kutama, 2021).

Given the interdependence between leadership and culture, the Complexity Leadership Theory (CLT) provides a useful framework for analyzing leadership in TNPA, as it highlights the need for leaders to both adjust to and influence the evolving cultural environment of their organizations (Jerab and Mabrouk, 2023). Unlike conventional models, CLT views organizations as complex adaptive systems and emphasizes three interconnected fundamental leadership mechanisms, namely, administrative leadership which emphasizes productivity, authority, framework, and coordination while guaranteeing adherence to rules and guidelines, adaptive leadership: allows people and groups to react creatively to new problems, which promotes creativity, knowledge acquisition, and figuring out solutions and enabling leadership: establishes

circumstances for flexibility, cooperation, and information sharing by serving as an intermediary among administrative and systems that adapt (Jerab and Mabrouk, 2023).

Judgments on capacity requirements are essential to the effective delivery of seaport services; the Transnet National Ports Authority (TNPA) requires flexibility in making these decisions; however, with managers at the port level functioning primarily as operators while critical decisions remain centralized at national headquarters, this flexibility is constrained (Mthembu and Chasomeris, 2023). Application of Complexity Leadership Theory (CLT) within the TNPA context can provide managers with new perspectives on how to balance compliance-driven operations with the need for adaptive responses during disruptions, a balance that is imperative for ensuring resilience, enhancing operational performance, and advancing South Africa's broader logistics reform agenda (Simpson, 2018).

Traditional tactics of leadership prioritize centralized deliberation and conclusion-construction processes, systematic practice, and governance systems; however, these strategies frequently fail in volatile, unpredictable, complex, and ambiguous (VUCA) contexts (Shikalepo, 2020). This is especially visible in the global logistics and maritime sectors, where the Transnet National Ports Authority (TNPA) is constantly under strain from economic changes, technology improvements, and external influences; hence, addressing these problems necessitates leadership mechanisms that emphasize flexibility, creativity, and distributed decision-making rather than depending primarily on direct and authoritative control. Thus, this study explores how leaders at Transnet National Ports Authority (TNPA), a state-owned enterprise in South Africa, apply complexity leadership theory to adapt, innovate, and sustain performance amid the volatility of global trade, economic shifts, and organizational change.

3. Methodology

A qualitative design was used to explore in-depth insights into experiences and utilize descriptions and categories to examine human experiences and realities based on participants' perceptions of Transnet National Ports Authority (TNPA) managers concerning the application of complexity leadership in turbulent times (Singh, 2021). Semi-structured interviews were conducted with TNPA managers, providing flexibility in examining participants' viewpoints while ensuring uniformity in addressing key study questions, and, to further promote group interactions and collective reflections on TNPA's complexity leadership practices, focus groups will also be conducted alongside one-on-one interviews (Khan et al., 2023).

A purposive sampling strategy was employed to select 14 participants with relevant experience and expertise in leadership practices during times of turbulence at TNPA, thereby ensuring that the information gathered is both comprehensive and aligned with the study's aims (Mthembu and Chasomeris, 2023).

Thematic analysis, which involves identifying and interpreting patterns within the data, was employed to examine the gathered information, thereby enabling a deeper

understanding of the fundamental elements influencing TNPA managers' complexity leadership (Alem, 2020). Participants were fully informed about the aim of the study and that their participation was voluntary, with informed consent being obtained before data collection. Confidentiality was maintained to protect participants' identities and responses. Permission to conduct focus groups and interviews was obtained from Transnet National Ports Authority's executive leadership, and ethical clearance was obtained from the University of KwaZulu-Natal's Human and Social Sciences Research Ethics Committee.

4. Results

Thematic analysis was used to analyse the interview data, since it is a common qualitative analytical method that involves identifying, analysing, and interpreting patterns of meaning within textual data (Braun and Clarke, 2021). All interviews were recorded, transcribed and analysed. The transcripts were cleaned, anonymized, and combined into one dataset to maintain consistency and confidentiality throughout the analysis process, which is in line with recommended qualitative data preparation procedures (Creswell and Poth, 2023).

The study followed the six-phase thematic analysis framework of Braun and Clarke (2021), consisting of data familiarisation, coding, generating themes, reviewing themes, defining and naming themes, and producing the final report. This framework offered a systematic and rigorous approach to interpret the qualitative data and ensured analytical consistency across the study (Creswell and Poth, 2023).

After transcription, the researcher immersed himself in the data by reading and re-reading the transcripts to gain a deep understanding of participants' experiences, perceptions, and meanings of complexity leadership in turbulent times. This phase is similar to the familiarisation phase of thematic analysis (Braun and Clarke, 2021; Creswell and Poth, 2023). Initial observations, recurring ideas, and significant patterns that were relevant to the research questions were recorded during this phase to inform further analysis.

Initial codes were created by systematically identifying meaningful segments of text throughout the dataset. Coding was aimed at capturing significant concepts, behaviours, experiences, and leadership practices expressed by participants. Then, similar codes were grouped into broader categories to find relationships and common meanings in the data. This process allowed for the organisation of large quantities of qualitative data into manageable analytical units (Braun and Clarke, 2021; Saunders, Lewis, and Thornhill, 2023). Subsequently, categories were refined and developed into overarching themes and sub-themes. Themes were generated by identifying common patterns and interpreting them in relation to the study objectives and the wider context of organisational complexity and leadership practices. The themes were constantly reviewed, refined, and checked against the data set to ensure that they remained consistent with the participants' narratives and the overall research focus, following the

procedures of thematic analysis and interpretation of qualitative data (Braun and Clarke, 2021; Creswell and Poth, 2023).

After presenting information on the demographics of the research participants, the themes which emerged from the data are presented and discussed.

4.1 Participants’ Demographic Profile

Background information on the participants is provided to contextualise the findings and provide insight into the characteristics of the individuals who participated in the study. Information on the participants’ demographics assisted in establishing contextual relevance, credibility, and transferability of qualitative findings in organisational research settings (Creswell and Poth, 2023; Saunders, Lewis, and Thornhill, 2023). The information was captured in Table 1 to provide an overview of the participants involved in the study.

Table 1: Participants’ Demographic Profile

Participant Code	Position/Designation	Department/Business Unit	Years of Leadership Experience	Management Level
P01	Senior Risk Management Leader	Enterprise Risk Management	Since 2017	Senior Management
P02	Quantity Surveyor	Infrastructure Technical Support Services	Since 2023	Middle Management
P03	Quantity Surveyor/Estimator	Infrastructure Department	6 Years	Middle Management
P04	Senior Project Manager	Infrastructure Department	10 Years	Senior Management
P05	Lead Cost Engineer	Infrastructure Technical Support Services	7 Years	Middle Management
P06	Infrastructure Manager (Road & Rail)	Infrastructure Department	6 Years	Middle Management
P07	Project Manager / Project Engineer	Engineering Department	8 Years	Middle Management
P08	Senior Engineer	Engineering Department	3–4 Years	Middle Management
P09	Strategic Infrastructure Leader	Infrastructure Department	11 Years	Executive Management
P010	Senior Manager	Architecture / Engineering Design	15 Years	Executive Management
P011	Principal Manager Project	Infrastructure Project Delivery	20 Months	Executive Management
P012	Regional Manager Quality	Infrastructure Department	1 Year	Executive Management
P013	Procurement	Project Delivery Unit	7 Years	Middle

Participant Code	Manager		Management Level	
	Position/Designation	Department/Business Unit	Years of Leadership Experience	Management Level
P014	Contract Manager	Legal and Compliance	10 Years	Middle Management

4.2 Emerging Themes

The themes which emerged from the data analysis reflect how managers handle uncertainty, coordinate interdependent systems, and maintain operational continuity in complex organisational environments. The findings also highlight the significance of flexibility, teamwork, communication, innovation, resilience, and compliance with governance for effective complexity leadership in interconnected systems and teams. The results were presented thematically following the thematic analysis framework of Virginia Braun and Victoria Clarke (2022). To increase the credibility and interpretation of findings, each theme was linked to the research objectives and supported with participant quotations (Creswell and Poth, 2023). Table 2 reflects the themes that emerged through the data analysis.

Table 2: Emerging Themes

Theme	Supporting Categories	Explanation of the Theme	Research Question Alignment	Complexity Leadership Theory Alignment
Theme 1: Adaptive Leadership Balancing Compliance and Operational Flexibility	Leadership Roles and Responsibilities; Adaptive and Flexible Leadership; Governance, Compliance and Bureaucracy; Decision-Making Challenges; Organisational and Environmental Complexity	TNPA managers balance governance compliance with the need for operational flexibility and rapid adaptation during volatile operating conditions. Leaders shift between directive and adaptive leadership approaches to maintain operational continuity under uncertainty.	Main Research Question: RQ 7.2	Administrative Leadership and Adaptive Leadership
Theme 2: Collaborative Leadership and Decentralized Problem-Solving for Organisational Resilience	Communication and Information Sharing; Team Collaboration and Participation; Stakeholder and Relationship Management; Innovation, Learning, and Empowerment		Main Research Question: RQ 7.3	Enabling Leadership and Adaptive Dynamics
Theme 3:	Governance,	Organisational culture,	Main	Interaction

Theme	Supporting Categories	Explanation of the Theme	Research Question Alignment	Complexity Leadership Theory Alignment
Organisational Culture and Structural Conditions Shaping Complexity Leadership	Compliance and Bureaucracy; Conflict, Misalignment and Silo Working; Communication and Information Sharing; Stakeholder and Relationship Management; Innovation, Learning and Empowerment	bureaucracy, communication systems, and interpersonal relationships either enable or constrain the implementation of complexity leadership within TNPA.	research Question: RQ 7.4 & RQ 7.5	between Administrative and Adaptive Leadership
Theme 4: Managing Operational Complexity and Resource Constraints in Turbulent Environments	Organisational and Environmental Complexity; Resource and Capacity Constraints; Operational and Project Delivery Challenges; Decision-Making Challenges	TNPA managers operate within interconnected and volatile systems affected by resource shortages, operational disruptions, and environmental uncertainty, requiring continuous adaptation and coordination.	Main Research Question: RQ 7.5	Complex Adaptive Systems and Systemic Interdependence
Theme 5: Innovation, Learning, and Empowerment as Drivers of Adaptive Capacity	Innovation, Learning and Empowerment; Team Collaboration and Participation; Adaptive and Flexible Leadership		Main Research Question: RQ 7.3	Adaptive Leadership and Emergence
Theme 6: Bureaucratic Constraints and Organisational Fragmentation as Barriers to Complexity Leadership	Governance, Compliance and Bureaucracy; Conflict, Misalignment and Silo Working; Decision-Making Challenges; Resource and Capacity Constraints	Bureaucratic delays, silo working, mistrust, communication breakdowns, and resource shortages constrain leadership responsiveness and reduce the effectiveness of complexity leadership practices.	Main research Question: RQ 7.5	Constraints on Adaptive Emergence within Complexity Leadership Theory

The themes reflected in Table 2 collectively highlight ways in which TNPA managers work within a complex bureaucratic and operationally volatile context that requires

constant adaptation, collaboration, resilience, and strategic coordination. The findings indicate that effective complexity leadership at TNPA requires managers to balance governance compliance with operational flexibility while promoting collaborative and decentralised decision-making.

The themes also collectively indicate that TNPA managers are working in a space where control and adaptability have to exist together. The findings also suggest that resilience at TNPA is a group responsibility rather than an individual accomplishment. If teams communicate well and share information, and if they are empowered to act, then the organisation can better absorb shocks. When bureaucracies, silos, and slow decision-making are the norm, adaptive capacity is eroded, and managing disruptions becomes more difficult. Each theme would be discussed in the broader context of the research.

4.2.1 Theme 1: Balancing Governance Compliance with Operational Flexibility

For all participants, leadership was a balancing act between compliance with governance frameworks and operational responsiveness within dynamic environments. Managers understood the need for regulatory compliance, but also understood that rigid bureaucratic structures often delayed effective decision-making.

For participant P01, leadership responsibilities were “ensuring compliance with governance frameworks” and “anticipating future challenges.” Likewise, P09 noted the tension between ‘stakeholder expectations versus governance’, arguing that leaders often find it difficult to manage the balance between flexibility and compliance obligations.

Several participants pointed to bureaucratic approval systems as hindrances to the responsiveness of organisations. Participant P03 stated that “approval processes cause delays,” and P013 stated that “bureaucracy slows decisions.” These findings suggest that the complexity leadership in TNPA requires the managers to constantly trade off the governance controls with operational agility.

Participants also reported that leadership style varied across environments. Managers often gravitated towards directive leadership styles in times of uncertainty or crisis. Leaders sometimes “move to directive leadership”, explained participant P08. Participant P09 also talked about the need to “move to a directive approach in an emergency”. This indicates that leadership in complex systems is not static, but is shaped by contextual pressures. The findings, therefore, indicate that managers in TNPA seek to maintain governance accountability while also seeking flexibility to respond effectively to operational complexity.

4.2.2 Theme 2: Collaborative and Adaptive Leadership Practices

Across all interviews, a common theme emerged: the importance of collaborative leadership practices in managing complexity. Leadership was described by the participants as collective problem solving, team involvement, empowerment, and participative decision making. Organisational problems are “solved together”, said P03, and leadership is a “collaborative approach”, said participant P12. Participant P07 also

discussed leadership as ensuring teams work towards a “shared vision” and P05 emphasised that “teams must share goals”.

Many participants related good leadership to empowering employees and encouraging participation. P06 talked about “encouraging participation”, while P013 emphasised the importance of “empowering team members”. Participant P014 further explained that a “participative leadership style” was adopted to manage the diversity of opinion within teams.

Adaptability was also found to be a critical leadership skill. Participants described the working environment as dynamic, reactive, and ever-changing. Participant P02 mentioned “dynamic and changing environments”, P07 stated that the organisation is “reactive and changing work and P09 stated, “Leadership requires flexibility.”

The findings suggest that complexity leadership at TNPA depends primarily on the leaders’ capability to foster collaboration, empower teams, and adapt their leadership style to the evolving operational environment.

4.2.3 Theme 3: Communication as a Mechanism for Coordination and Trust

Communication was one of the most important enablers of effective leadership in complex organisational systems. Participants repeatedly linked communication to alignment, trust, decision-making, and team cohesion. Participant P02 highlighted regular communication and alignment, as well as maintaining safe and open communication. Participant P07 also discussed the importance of “continuous communication,” and P09 spoke of “consistent communication”. Some participants related communication to improvement in the quality of decision-making. Participant P06 said that “clear communication improves decisions,” and P011 said likewise that “structured communication improves decisions”.

Trust was also strongly associated with communication practices. Participant P07 said “building trust within the team” is crucial, and P09 said, “lack of trust affects teams”. Additional participant input suggested that poor communication was a contributing factor to operational inefficiencies. For example, a major challenge identified by P03 was ‘lack of communication’. The findings therefore show that communication is not only an information sharing mechanism but a strategic leadership tool to coordinate, build trust, and enable organisational adaptability.

4.2.4 Theme 4: Navigating Organisational Complexity and Interdependencies

The respondents described TNPA as a highly interconnected environment with multiple stakeholders, competing priorities, and system interdependencies. Interdependent relationships are vital for managers to comprehend for effective leadership. Participant P01 described “multiple stakeholders, internal and external,” and P08 described the challenge of “balancing stakeholder demands.” P11 further expanded on the importance of “managing interdependencies” with the suggestion that organisational units and projects are “deeply interconnected.”

Participants also discussed the problems that come from organisational fragmentation. Participant P12 said “work done in silos affects outcomes,” and P13 mentioned “misalignment across management levels”. The findings suggest that organisational complexity is increased with poor communication and coordination across functions. Managers, therefore, saw leadership as demanding systems thinking and an ability to understand the interaction of different organisational elements. Participant P12 especially stressed the need to “understand system interconnections”. The findings suggest that complexity leadership within TNPA is about managing interconnected systems rather than controlling isolated organisational functions.

4.2.5 Theme 5: Structural and Resource Constraints Limiting Adaptability

Participants pointed to a number of structural barriers that limited organisational adaptability and leadership effectiveness. These included resource shortages, understaffing, instability of organisations, delays in approvals to challenges with contractors. Interviewees repeatedly referenced resource constraints. Participant P01 referred to the “limited resources”, and P06 talked about the “budget constraints” and the need to “take on multiple roles”. P02 also described the organisation as “under-staffed”.

Organisational instability was also cited as a key issue. Participant P010 spoke of “organisational instability” and “projects started and stopped,” suggesting continuity of operations was uncertain. Contractor-related issues were another regular challenge, such as “contractor variation claims” and “contractor financial difficulties”. The participants argued that these structural constraints reduce the responsiveness of the organisation and place extra pressure on managers who are trying to maintain performance and stability. Overall, the findings suggest that while managers aim to exercise collaborative and adaptive leadership, organisational structures and resource constraints play a significant role in their ability to respond effectively to complexity.

6. Discussion, Conclusions and Recommendations

The findings suggest that leadership in the Transnet National Ports Authority (TNPA) is challenged by the necessity to reconcile the imperatives of governance, compliance, and accountability with the demands of adaptability, innovation, and operational responsiveness in a complex and uncertain environment. In line with Complexity Leadership Theory (CLT), leadership was understood to develop not only through formal authority but through the interactions of people, teams, and stakeholders. The findings therefore support the notion that leadership effectiveness in complex environments is influenced by dynamic relationships, communication, and collective problem-solving processes (Abbaszade, 2022; Beresford-Dey, Howden, and Martindale, 2024). The findings also imply that organizations dealing with uncertainty benefit from leadership that is both adaptable and collaborative, a view held by other researchers (Esenyel, 2024; Sott and Bender, 2025).

The managers noted that bringing stakeholders into decision processes, communicating transparently, and spreading problem-solving authority help resolve operational problems and build resilience. This is in line with previous research (Jiang et al., 2023; Esenyel, 2024; Syamsir, Saputra, and Mulia, 2025), which highlights distributed leadership, teamwork, and adaptability as essential for organizations operating amid rapid change and unpredictability.

Similar to previous findings reported by researchers such as Esenyel (2024) and Wiese, Lehmann, and Beckmann (2024), this study also highlighted that organisational culture and structural conditions are important shapers of the enactment of complexity leadership. This means that the effectiveness of leadership is influenced not only by the actions of the leaders but also by the organisational conditions that enable or restrict adaptation, innovation, and collaboration (Beresford-Dey, Howden, and Martindale, 2024; Abukalusa and Oosthuizen, 2025).

The findings also highlight the importance of innovation, learning, empowerment, and resilience in enhancing organisational agility (Chughtai et al., 2024; Piubello Orsini et al., 2024). Participants stressed that learning, experimentation, and working together to solve problems are critical to providing effective responses to uncertainty and change. The findings also point to specific challenges that highly regulated infrastructural organisations in the public sector face to balance adaptive leadership practices with governance and compliance requirements (Juknevičienė et al., 2025; Abukalusa and Oosthuizen, 2025). Resource constraints, operational interdependencies, and institutional limitations were found to compound the complexity of leadership within the organisation, supporting perspectives that view leadership as embedded within interrelated organisational systems and governance structures (Gottfredson and Crane, 2025; Mahmud et al., 2026).

In general, the results align with modern leadership research pointing to adaptability, collaboration, resilience, organisational learning, and stakeholder engagement as essential skills for leadership in complex settings (Jiang et al., 2023; Esenyel, 2024; Syamsir, Saputra, and Mulia, 2025; Gottfredson and Crane, 2025). However, the study adds to the existing knowledge by illustrating the application of these leadership processes within a unique context of a South African public sector infrastructure organisation.

The findings further indicate that while Complexity Leadership Theory offers a valuable perspective to comprehend leadership in turbulent environments, its practical application is influenced by the organisational culture, governance structures, stakeholder relationships, and resource constraints that define public-sector infrastructure organisations (Beresford-Dey, Howden, and Martindale, 2024; Abukalusa and Oosthuizen, 2025).

This study contributes to the growing body of knowledge on Complexity Leadership Theory by offering context-specific insights from a South African public-sector infrastructure organisation. It confirms the ongoing utility of CLT to explain leadership in

complex systems. It demonstrates that leadership effectiveness depends on the interaction of the processes of adaptive leadership, organisational conditions, and the demands of institutional governance.

Notwithstanding the limitations of the study in terms of a single organisational context and a qualitative, cross-sectional design, it provides useful theoretical and practical insights into leadership in turbulent environments. In summary, the study finds that complexity leadership is a useful framework to understand and address leadership challenges in public-sector infrastructure organisations and lays the groundwork for future research and leadership practice that seeks to improve adaptability, resilience, collaboration, and sustainable organisational performance.

Future research could expand on this study by examining the application of complexity leadership in additional public-sector infrastructure organisations, logistics firms, and port authorities. It would be possible to determine whether the leadership styles seen at the Transnet National Ports Authority are distinct or common in other institutional contexts by comparing different situations. Such research would not only make the findings more transferable but also deepen our understanding of how complexity leadership operates in tightly regulated environments

In order to improve knowledge of the development of complexity leadership and its relationship to organisational success, future research should have a long-term perspective and use a variety of approaches. Longitudinal research would provide insight into how leaders react over time to uncertainty, change, and operational disturbances. The relationships between complexity leadership and outcomes, including innovation, employee engagement, service quality, and organisational resilience, may be simultaneously investigated using mixed-method approaches.

To give a more thorough picture of leadership across organisational levels, future research should also take into consideration the viewpoints of a larger range of stakeholders, such as non-managerial staff, union representatives, regulators, clients, suppliers, and customers. In addition, the influence of emerging technology, organisational culture, and digital transformation on complexity leadership should be further studied. This would clarify how trust, communication, learning, and structural conditions enable or constrain adaptive leadership processes.

Lastly, in order to increase explanatory depth and improve understanding of leadership in complex public-sector environments, future theoretical work should take into account integrating Complexity Leadership Theory with complementary perspectives like adaptive leadership, systems leadership, distributed leadership, and organisational resilience theory.

References

Abbaszade, R.N., 2022. Complexity Leadership Theory (CLT).

- Abukalusa, K. and Oosthuizen, R., 2025. An adaptive organisational leadership framework through systems thinking. *International Journal of Organizational Analysis*, 33(8), pp.2673-2703.
- Ahmed, S.K., Mohammed, R.A., Nashwan, A.J., Ibrahim, R.H., Abdalla, A.Q., Ameen, B.M.M., and Khedhir, R.M., 2025. Using thematic analysis in qualitative research. *Journal of Medicine, Surgery, and Public Health*, 6, p.100198.
- Beresford-Dey, M., Howden, S. and Martindale, L., 2024. Complexity leadership theory and its application in higher education: Using duoethnography to explore enabling leadership during a time of uncertainty. *International Journal of Leadership in Education*, pp.1-26.
- Braun, V. and Clarke, V., 2022. Thematic analysis: A practical guide. *QMIP Bulletin*, 1(33), pp.46-50.
- Chughtai, M.S., Syed, F., Naseer, S., and Chinchilla, N., 2024. Role of adaptive leadership in learning organizations to boost organizational innovations with change self-efficacy. *Current Psychology*, 43(33), pp.27262-27281.
- Creswell, J.W. & Poth, C.N., 2023. Qualitative inquiry and research design: Choosing among five approaches. 5th ed. Thousand Oaks, CA: Sage Publications.
- Dahal, N., Neupane, B.P., Pant, B.P., Dhakal, R.K., Giri, D.R., Ghimire, P.R., and Bhandari, L.P., 2024. Participant selection procedures in qualitative research: Experiences and some points for consideration. *Frontiers in Research Metrics and Analytics*, 9, p.1512747.
- Esenyel, V., 2024. Evolving leadership theories: integrating contemporary theories for VUCA realities. *Administrative Sciences*, 14(11), p.270.
- Gottfredson, R. and Crane, B., 2025. Navigating complex environments requires complex leaders. *Business Horizons*.
- Jerab, D. and Mabrouk, T., 2023. The role of leadership in changing organizational culture. Available at SSRN 4574324.
- Jiang, G., Boghrat, D., Grabmeier, J., and Cross, J.E., 2023. Complexity leadership in action: A team science case study. *Frontiers in Research Metrics and Analytics*, 8, p.1211554.
- Juknevičienė, V., Leach, N., Toleikienė, R., Balčiūnas, S., Razumė, G., Rybnikova, I. and Āboliņa, I., 2025. E-Leadership within public sector organisations: a systematic literature review. *Sustainability*, 17(10), p.4474.
- Kutama, N. (2021). The mediating effect of environmental dynamism on complexity leadership and dynamic capabilities: it takes three to tango (master's thesis, University of Pretoria (South Africa).
- Mahmud, Y., Evaldsson, C., Schmidt, M. and Kjellström, S., 2026. Complexity leadership theory and fostering organizational adaptability: Enabling leadership in complex systems change. *Leadership*, p.17427150261431137.
- Mthembu, S.E. and Chasomeris, M., 2023. An evaluation of the governance structure of marine services in South Africa's port system. *Journal of Shipping and Trade*, 8(1), p.17.
- Piubello Orsini, L., Leardini, C., Landi, S., and Veronesi, G., 2024. Drivers of adaptive resilience of public sector organizations: an investigation into the individual characteristics of hybrid professional managers. *Public Management Review*, 26(12), pp.3577-3600.
- Pramjeeth, S. and Mutambara, E., 2022. Examining Leadership Traits to Succeed in a VUCA-Induced Environment in Eskom. *African Journal of Inter/Multidisciplinary Studies*, 4(1), pp.234-249.
- Saunders, M., Lewis, P. & Thornhill, A., 2023. Research methods for business students. 9th ed. Harlow: Pearson Education.

- Sedibe, K.G. 2021. Developing a complexity leadership competency framework for the Governance and Administration Cluster of the South African Public Service. MPhil thesis. University of Pretoria.
- Sott, M.K. and Bender, M.S., 2025. The role of adaptive leadership in times of crisis: A systematic review and conceptual framework. *Merits*, 5(1), p.2.
- Syamsir, S., Saputra, N., and Mulia, R.A., 2025. Leadership agility in a VUCA world: a systematic review, conceptual insights, and research directions. *Cogent Business & Management*, 12(1), p.2482022.
- Tenny, S., Brannan, J.M., and Brannan, G.D., 2022. Qualitative study. StatPearls Publ [online]
- Transnet National Ports Authority (TNPA). (2023), "Reinvent for Growth". Available at: Transnet website (Accessed: 25 August 2025).
- Underwood, S. 2024. 'Redefining leadership within the NHS' complex adaptive system', *BMJ Leader*. Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC11025063/> [Accessed 2 June 2026].
- Wiese, S.A., Lehmann, J., and Beckmann, M., 2024. Organizational culture and the usage of Industry 4.0 technologies: Evidence from Swiss businesses. arXiv preprint arXiv:2412.12752.