Global Journal of Human Resource Management 13 (3),1-21, 2025
Print ISSN: 2053-5686(Print),
Online ISSN: 2053-5694(Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development-UK

Leadership and Technological Change in Selected Ministries, Departments and Agencies (MDAs) in Nigeria

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doi: https://doi.org/10.37745/gjhrm.2013/vol13n3121 Published July 14, 2025

Citation: Adeleye H., Abubakar B., and Nuhu M.M. (2025) Leadership and Technological Change in Selected Ministries, Departments and Agencies (MDAs) in Nigeria, *Global Journal of Human Resource Management*, 13 (3),1-21

Abstract: *The study was carried out on leadership style and technological change in selected Ministries, Departments, and Agencies (MDAs) in Nigeria. Specifically, it focused on three leadership dimensions: transformational, transactional, and servant leadership. A structured questionnaire, based on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree," was developed and administered electronically via Google Forms. Data were collected from 380 purposively selected respondents across 15 MDAs, all of which met inclusion criteria related to ICT capacity and regulatory compliance. Descriptive statistics were used to analyse the data via SPSS. The findings revealed that transformational leadership had the most significant positive effect on technological change, followed by transactional leadership. Servant leadership showed the least direct effect. These results highlighted the pivotal role of visionary leadership in driving innovation and technology adoption in the Nigerian public sector. It is recommended that MDAs should prioritize the development of transformational leadership capabilities, while maintaining effective transactional leadership practices and promoting servant leadership principles to support a culture conducive to change.*

Keywords: transformational leadership, transactional leadership, servant leadership, technological change, nigeria MDAs, public sector innovation.

INTRODUCTION

Technological change within Nigeria's Ministries, Departments, and Agencies (MDAs) has rapidly emerged as a pivotal force in shaping service delivery, operational efficiency, and public confidence in governance systems. Across various sectors, digital transformation is increasingly recognized as a strategic necessity rather than a discretionary upgrade. Recent evidence from public health administrations in Lagos State highlighted the transformative effect of electronic systems, automation, and data analytics, which significantly improve

decision-making, enhance resource allocation, and lead to better service outcomes (Oyebade & Fagbade, 2022; Nilsson et al., 2022). However, these advancements are frequently undermined by persistent challenges such as infrastructural deficits, limited funding, bureaucratic inefficiencies, and resistance to change among personnel. At the local government level, the adoption of e-governance tools and services remains inconsistent and underdeveloped, hampered by factors including policy incoherence, weak institutional capacity, and broader economic instability (Oseni, 2024). These realities emphasise the need for leadership that actively drives and sustains technological change.

Effective leadership is widely recognized as a critical catalyst for driving successful technological change within public institutions. In an era where digital transformation is redefining public service delivery, the role of leadership has become increasingly central to facilitating innovation, managing resistance, and aligning organizational vision with technological imperatives. For example, transformational leadership has been empirically linked to ICT adoption in Nigeria's construction industry, demonstrating a significant and direct influence on the willingness of organizations to embrace change (Waziri et al., 2023). Leaders who exhibit visionary thinking, intellectual stimulation, and personalized support tend to create environments that are more receptive to new technologies. Furthermore, a growing body of literature affirms that transformational leadership, when combined with top-management support, continuous digital skills development, and an enabling organizational culture, significantly enhances the implementation of e-government services and broader ICT innovations in public administration (Ademola, 2024). This highlights the strategic importance of leadership in steering digital reform agendas across the public sector.

Evaluating further into Nigeria's organizational setting, research in sectors such as packaged water production in Adamawa State showed that transformational, transactional, and servant leadership styles each have strong positive associations with employee performance (while laissez-faire leadership does not), suggesting relevance of these styles beyond purely private-sector contexts (Girei, 2022). Public sector research also emphasized that transformational leaders foster innovation and change, transactional leaders reinforce structure and compliance, and servant leaders prioritize stakeholder welfare and ethical stewardship—each playing distinct roles in shaping institutional culture and outcomes (Adeleke, 2021; Nwankwo, 2022).

Linking these insights, servant leadership has emerged as a particularly essential leadership style for successfully implementing emerging technologies in both public and private sector contexts. Unlike more hierarchical approaches, servant leadership places emphasis on meeting the needs of employees, stakeholders, and communities—prioritizing inclusiveness, ethical behaviour, and collaborative decision-making. This leadership style fosters trust, psychological safety, and open communication, which are crucial in environments undergoing rapid digital change. By cultivating a supportive and people-cantered organizational culture, servant leaders can reduce resistance to new technologies, encourage innovation, and sustain long-term adoption of digital systems. Scholars have highlighted that in the setting of Nigeria's evolving digital environment, adopting servant leadership is vital for overcoming structural and human barriers to technology implementation. Accordingly, researchers recommended that policymakers and institutional leaders invest in servant leadership development programs to build capacity for digital transition across various levels of governance (Hassan et al., 2023; Siddique et al., 2020).

Against this backdrop, this study examined the extent to which three distinct leadership styles—transformational, transactional, and servant leadership—influence technological change within selected Ministries, Departments, and Agencies (MDAs) in Nigeria. Technological change is conceptualized as the dependent variable, while the three leadership styles serve as the independent variables. The central aim of the research is to identify which leadership approach or combination thereof most effectively drives digital transformation, fosters service innovation, and promotes systemic modernization within public institutions. As Nigerian MDAs continue to face mounting pressure to enhance transparency, efficiency, and responsiveness through technology, understanding the leadership styles that facilitate or hinder such efforts is both timely and essential. This study adopts a quantitative, data-driven approach to test theoretical assumptions in practical settings. To this end, the investigation is guided by empirical analysis and is subject to the verification of the following hypotheses, each of which examined the individual and collective influence of leadership styles on technological change outcomes.

H_{01}: Transformational leadership has no significant effect on technological change in selected Ministries, Departments and agencies in Nigeria.
H_{02}: Transactional leadership has no significant effect on technological change in selected Ministries, Departments and agencies in Nigeria.
H_{03}: Servant leadership has no significant effect on technological change in selected Ministries, Departments and agencies in Nigeria.

LITERATURE REVIEW

Technological Change

Technological change refers to the dynamic process by which new technologies or processes are invented, improved, and diffused throughout organizations, sectors, and society. At its core, it encompasses invention (development of new technology), innovation (application and commercialization), and diffusion (spread and adoption)—resulting in more effective or efficient tools, services, and systems (Wikipedia, 2024). This multi-stage process drives organizational modernization, productivity gains, and systemic transformation.

In public-sector contexts, technological change represents far more than simply digitizing existing procedures; it implies a fundamental reconfiguration of institutional operations and service delivery models. For example, GovTech initiatives use digital platforms, data analytics, automation, and cloud infrastructure to transform how citizens and businesses interact with government, promoting greater transparency, agility, and engagement (Amaglobeli et al., 2023). Specifically, in Nigeria, digital transformation in governance involves integrating technologies such as e-government systems, online portals, and digital identity mechanisms to combat corruption, improve efficiency, and expand access (Adesola, 2024). Technological change in organizational settings often follows an S-curve pattern: early R&D investments lead into rapid adoption phases, before reaching maturity and eventual saturation (Wikipedia, 2025). Its success depends on both technical innovation and contextual factors—such as organizational readiness, infrastructure, and regulatory support—captured by frameworks like the TOE (technology–organization–environment) model (Tornatzky & Fleischer, 1990 as reiterated 2023).

Empirical analyses from Nigeria confirm the transformative impact of technological change on public sector performance. A study analysing Nigerian public institutions (2010–2022) demonstrated that advances in ICT significantly improved revenue generation and operational efficiency, reinforcing how technology adoption can catalyse public-sector productivity (Ajayi et al., 2024). Meanwhile, reform initiatives in the civil service highlight how automation, AI, and digital identity systems can reduce bureaucratic bottlenecks, promote accountability, and enhance service delivery (Oyepeju, 2024). Technological change is a comprehensive transformation that begins with invention and culminates in widespread adoption, reshaping how institutions operate. Within Nigeria's public sector, it is a powerful force for efficiency, transparency, and inclusive governance—provided that supportive policies, infrastructure, and leadership align to sustain its diffusion and impact.

Leadership

Leadership is broadly defined as the process of influencing individuals or groups to achieve shared objectives through a combination of vision, strategic direction, and mutual engagement. It extends beyond the confines of formal authority or positional power and instead emphasizes the ability to mobilize others toward a common purpose by fostering alignment, trust, and commitment within teams or organizations (Center for Creative Leadership [CCL], 2023). In contemporary organizational settings—especially within the public sector—effective leadership is increasingly associated with a range of competent factors that go beyond technical expertise. These include emotional intelligence, adaptability, inclusive communication, and the capacity to lead through complexity and change (Wells, 2024). As organizations confront rapid technological advancements, shifting stakeholder expectations, and systemic challenges, leaders are called upon not only to provide direction but also to empower others, build resilience, and cultivate environments where people are motivated to contribute meaningfully and innovatively.

According to Batista-Foguet and Babiak, (2022) leadership style, on the other hand, refers to the distinctive manner or approach a leader adopts in guiding, motivating, directing, and managing individuals or teams to achieve specific goals. It encompasses the behavioural patterns and interpersonal dynamics leaders display as they engage with followers in various organizational contexts. Scholars have long emphasized that leadership is not a one-size-fits-all phenomenon; rather, different styles yield different outcomes depending on organizational culture, context, and objectives. Among the most widely studied leadership styles are transformational leadership, which inspires innovation and change through vision and charisma; transactional leadership, which emphasizes structure, rewards, and performance-based exchanges; and servant leadership, which focuses on meeting the needs of others, fostering inclusion, and promoting ethical, community-oriented values (Ezeh et al., 2023). Putting into understanding these styles and their implications is crucial for assessing how leaders influence outcomes such as technological change, innovation adoption, and institutional performance.

Transformational leadership

Transformational leadership is an engaging leadership approach where leaders work closely with their followers to inspire them to exceed expectations. By articulating a compelling vision, stimulating innovation, and focusing on individual development, transformational leaders

foster an environment of growth and motivation. This leadership model was originally theorized by James MacGregor Burns and later expanded upon by Bernard Bass, with their ideas forming the foundation for much of the current understanding of effective leadership (Bass & Avolio, 1991). Today, transformational leadership continues to be highly influential in contemporary leadership literature, shaping practices across various sectors and organizations (IMD, 2024). Transformational leaders operate not merely as supervisors but as role models who foster intrinsic motivation, creating a shared purpose that transcends individual self-interest (Wikipedia, 2025). The Four I's framework underpins transformational leadership: Idealized Influence, where leaders embody values and earn admiration and trust; Inspirational Motivation, through which leaders articulate an uplifting vision that inspires followers; Intellectual Stimulation, where followers are encouraged to challenge assumptions and apply creativity; and Individualized Consideration, where leaders coach and mentor each person's unique needs (Wikipedia, 2025). These behaviours collectively raise follower morale, organizational commitment, and performance.

Studies within Nigeria reinforce the relevance and practical impact of transformational leadership. At Adamawa State Polytechnic, research revealed that transformational leadership was pivotal in accelerating organizational growth, fostering employee engagement and performance in a rapidly evolving ICT context (Bello & Aide, 2023). Similarly, a study in Nigeria's petroleum sector found that transformational leadership dimensions significantly predicted organizational efficacy, suggesting strong positive effects in high-stakes operational environments (Atoki et al., 2024). Beyond performance metrics, transformational leadership has also been linked to ethical and value-driven public governance. A 2024 investigation into Nigerian public institutions argued that transformational leadership, grounded in character and integrity, enhances public trust, service delivery, and institutional accountability (Bamidele et al., 2024). These findings suggest that transformational leadership is not only a strategic tool but a moral instrument for sustainable institutional transformation.

Scholars widely acknowledge that transformational leadership excels in environments that require innovation, change management, and long-term vision. Leaders employing this style help followers align personal values with organizational goals, thereby building collective identity and intrinsic motivation (IMD, 2024). However, leadership theorists note that transformational leadership may be less effective in highly structured or crisis contexts where clear direction and rapid decision-making (e.g., transactional leadership) may be more appropriate.

Transactional leadership

Transactional leadership is a structured approach to leadership that emphasizes clear exchanges between leaders and followers within formal organizational frameworks. In this model, leaders clearly articulate specific goals and expectations, ensuring that followers understand what is required of them. Followers are rewarded for meeting these targets, which fosters motivation and accountability. Conversely, those who fail to comply may face sanctions, reinforcing the importance of adherence to established standards. This leadership style is based on a system of contingent rewards and management-by-exception, which can be either active or passive, allowing leaders to intervene only when necessary (Ali et al., 2023). Under contingent reward, leaders specify performance criteria and deliver material or psychological benefits in return for

goal achievement. In management-by-exception, leaders maintain the status quo by intervening only when deviations or problems arise (Ali et al., 2023). This system emphasizes control, predictability, and efficient execution of routine objectives.

In the Nigerian setting, several studies illustrate the prevalence of transactional leadership. In the pharmaceutical sector, Nwakoby (2023) found that transactional leadership had a positive and statistically significant effect on employee productivity, indicating that reward-based leadership can enhance performance outcomes in structured environments. Similarly, project managers in Nigeria's construction industry frequently employ active management-by-exception techniques, such as issuing clear instructions, monitoring progress, and correcting errors promptly to support project delivery. Transactional leadership also plays a role in moderating workplace behaviour. A study by Ibrahim, Yusof, and Ibrahim (2022) in Nigerian organizations demonstrated that transactional leadership positively influences employee commitment and reduces workplace deviance, with onboarding experience serving as a moderating factor in these relationships. Transactional leadership tends to be most effective where tasks are routine, performance outcomes are measurable, and roles are well defined. It provides stability and consistency, making it suitable for operational contexts where adherence to standard procedures is paramount. However, scholars note that it may limit creativity and intrinsic motivation because it relies on external rewards and avoids transformational change (Ali et al., 2023).

Servant leadership

Servant leadership is a philosophy and practice of leadership in which the leader's primary role is to serve others first, focusing on followers' growth, well-being, and empowerment rather than asserting traditional positional authority (Greenleaf, 2023). In this approach, leadership emerges through humility, empathy, active listening, persuasion, stewardship, and nurturing community—cantered on serving team needs ahead of individual ambition. This contrasts sharply with autocratic or power-oriented models and reorients leadership toward ethical service and people-cantered practice (Madison & Eva, 2025).

Studies in Nigeria demonstrated how servant leadership significantly enhances organizational outcomes. A study of parastatals and ministries in Delta State, for instance, found that servant leadership strongly predicted perceived organizational support and job satisfaction among employees; perceived support partially mediated the relationship between servant leadership and satisfaction (Aruoren & Erhuen, 2023). Similarly, an investigation involving academic staff in federal universities in south-eastern Nigeria revealed that servant leadership positively influenced employee engagement, with a conducive work environment strengthening staff commitment and creativity (Uguta et al., 2024).

Another Nigerian study grounded in conservation of resources theory examined lecturers in public universities and reported that servant leadership contributed to higher attitudinal and behavioural loyalty. The relationship was fully mediated by life satisfaction and attitudinal loyalty, highlighting how servant leaders build trust, satisfaction, and institutional retention (Jakada, 2025). The servant leadership model enunciates a reciprocal social exchange: leaders who genuinely serve their followers foster commitment and trust, which in turn drives performance and ethical alignment. This aligns with social exchange theory, suggesting that

followers reciprocate service by enacting discretionary behaviours and organizational citizenship, thereby reducing turnover and improving institutional climate (Madison & Eva, 2025)

Conceptual Framework

Figure 1 explains the relationship between leadership and technological change in selected Ministries, Departments and agencies in Nigeria. It indicated three dimensions of leadership used in the study: transformational leadership, transactional leadership and servant leadership and the dependent variable as technological change.

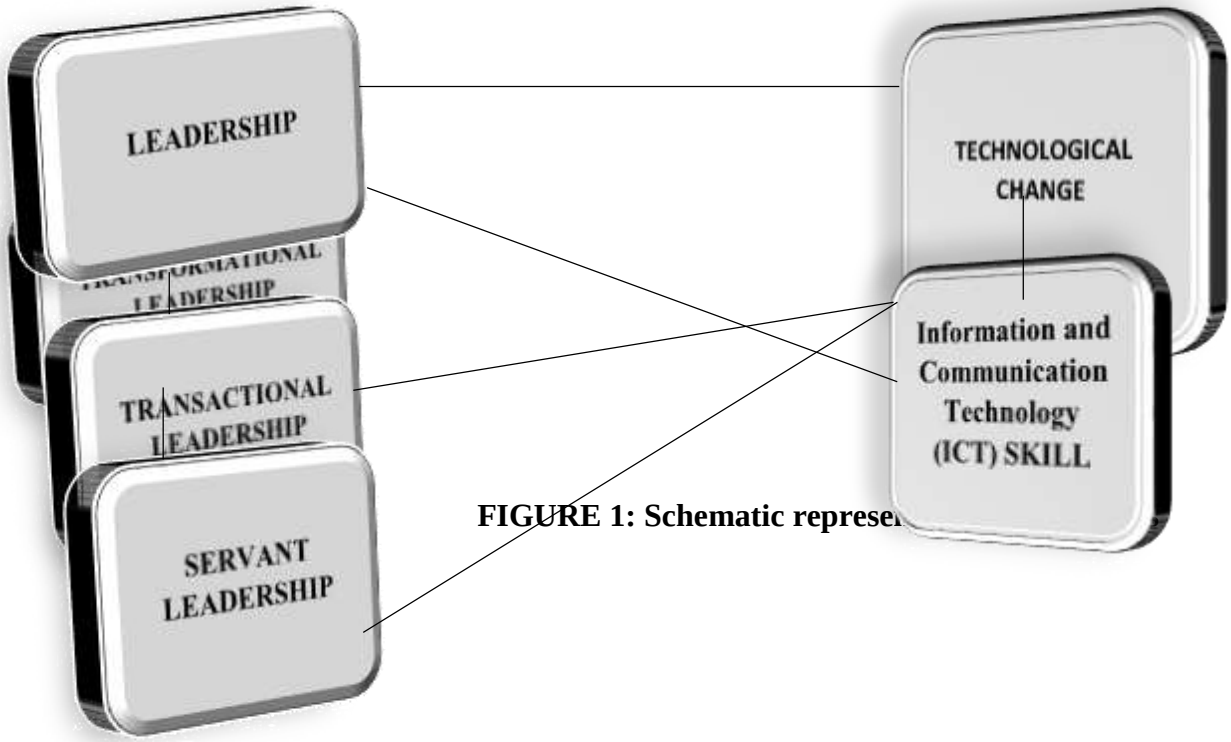

FIGURE 1: Schematic represe

Theoretical review

Diffusion of Innovations Theory

The Diffusion of Innovations Theory was originally developed by Everett Rogers (1962) and has since been revised in subsequent editions to reflect emerging trends and applications. The theory explains how, why, and at what rate new ideas, technologies, or practices spread through a given social system. At its core, the theory categorizes individuals within a population into five distinct adopter groups: innovators, early adopters, early majority, late majority, and laggards. These categories reflect varying degrees of openness to change and risk tolerance. Rogers also highlights five key factors that influence the adoption of innovations: relative advantage, compatibility, complexity, trialability, and observability. In the context of this study, the theory offers a useful framework for analysing how technological change occurs within Nigeria's Ministries, Departments, and Agencies (MDAs).

It allows researchers to assess not only the pace and pattern of technology adoption, but also how different leadership styles may influence these processes. For example, transformational leaders may appeal to early adopters through vision and empowerment, while transactional leaders may be more effective in guiding the early and late majority by emphasizing structure and reward. Servant leaders, by contrast, may focus on inclusivity and user needs, helping to overcome resistance among laggards. However, critics such as Ayo and Abubakar (2024) contend that the theory fails to fully account for institutional inertia, hierarchical power structures, and bureaucratic resistance—factors that are especially prevalent in the public sector. Nevertheless, it remains a relevant tool for understanding the intersection between leadership style and technological diffusion in complex organizational environments.

Transformational Leadership Theory

Transformational Leadership Theory was originally developed by James MacGregor Burns (1978) and later expanded by Bernard Bass (1985) to include measurable components of leadership behaviour. The theory emphasizes the capacity of leaders to inspire, motivate, and transform their followers by appealing to values and goals that transcend personal interests. Transformational leaders are known for their ability to articulate a compelling vision, stimulate innovative thinking, and attend to the individual development needs of their followers. The theory identifies four key dimensions of transformational leadership: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration.

In the context of this study, transformational leadership theory underpins one of the three leadership styles being assessed. It serves as a conceptual lens through which the role of visionary, motivational leadership in driving technological change within Nigeria's Ministries, Departments, and Agencies (MDAs) is examined. Specifically, the theory helps explain how leaders who foster trust, creativity, and long-term vision may accelerate the adoption, integration, and sustainability of technological innovations in complex bureaucratic environments. Recent research by Okoye and Ibrahim (2023) provided empirical support for this perspective, showing that transformational leadership positively influences the speed, depth, and organizational alignment of technology implementation in public institutions.However, despite its strengths, critics have pointed out certain limitations. Some scholars argued that the theory lacks clear practical boundaries, particularly in distinguishing between genuine charisma and manipulative influence—a concern that may arise in hierarchical or politicized environments where leadership is less transparent.

Servant Leadership Theory

Servant Leadership Theory, first proposed by Robert Greenleaf (1970), emphasizes a leadership philosophy rooted in service to others, ethical behaviour, and the development of individuals and communities. Unlike traditional leadership models that prioritize organizational objectives or authority, servant leadership centres on putting the needs of followers first, promoting personal growth, and creating an environment where collaboration, trust, and shared purpose thrive. This model encourages leaders to act as stewards and facilitators, empowering their teams to perform effectively by prioritizing empathy, listening, and support. In the context of this study, servant leadership theory is applied to assess how a leader's commitment to team development, inclusion, and empowerment may influence the success of technological change within Nigeria's Ministries, Departments, and Agencies

(MDAs). The theory supports the exploration of whether leaders who foster psychological safety, open communication, and collaborative problem-solving are better positioned to drive technology adoption, build digital competencies, and reduce resistance to change. According to Uguta et al. (2024), servant leadership in public-sector environments has been shown to enhance trust, digital skill development, and organizational learning—all of which are critical in fostering sustainable innovation and adaptation. Despite its growing appeal, servant leadership is not without criticism. Some scholars argue that the theory may be overly idealistic; lacking rigorous empirical validation and operational clarity, especially in hierarchical, rules-driven bureaucracies where decision-making is often centralized and status-oriented. Nonetheless, its human-cantered approach offers a valuable lens for examining leadership in transformative public-sector contexts.

Technology–Organization–Environment (TOE) Framework

This study is grounded in the Technology–Organization–Environment (TOE) Framework, which was developed by Tornatzky and Fleischer in 1990. The TOE framework provides a comprehensive approach to understanding the various contexts that influence technology adoption. It identifies three critical dimensions: technological, organizational, and environmental. The technological context focuses on the availability and relevance of the technology in question. The organizational context examines factors such as the structure, size, and resources of an organization. Lastly, the environmental context considers external influences, including regulatory aspects and competitive pressures. In this study, the TOE framework is instrumental in assessing institutional readiness for technological change within Ministries, Departments, and Agencies (MDAs). By applying this framework, researchers can gain insights into the specific conditions that facilitate or hinder the adoption of new technologies. Additionally, the TOE framework complements leadership analysis by providing a structural lens to evaluate how leaders can effectively promote technology adoption within their organizations.

Ajayi and Onah (2024) argue that the TOE framework offers a more comprehensive perspective compared to the Technology Acceptance Model (TAM), particularly in public-sector settings where external factors, such as government policy and funding constraints, play a significant role. This is crucial because public agencies often operate under unique challenges that influence their capacity to adopt innovative technologies. Despite its strengths, the TOE model has faced critiques for being overly descriptive and lacking predictive mechanisms. Critics argue that while it effectively outlines the factors involved in technology adoption, it does not provide clear guidance on how to predict outcomes or the success of technology implementation. This limitation suggests that while the TOE framework is valuable for understanding the context of technology adoption, further refinement may be needed to enhance its predictive capabilities in future research.

Empirical Review

Waziri et al. (2023) conducted a study examining the effect of transformational leadership on ICT adoption in the Nigerian construction industry. The objective was to assess how key dimensions of transformational leadership—such as intellectual stimulation and inspirational motivation—influence the acceptance and implementation of new technologies. The study employed a quantitative survey design targeting project managers and senior engineers, with a sample size of 325 respondents selected using stratified random sampling. Findings revealed

that transformational leadership positively and significantly influenced ICT adoption, with a path coefficient of 0.79 indicating a strong direct relationship between leadership behaviour and technology uptake. Respondents who rated their leaders high in transformational attributes were more likely to adopt and effectively use digital tools in project execution. The study recommended that organizational leaders should inspire innovation, foster open communication, and provide continuous support to facilitate technological advancement. A limitation of the study was its focus on the construction sector, which may reduce generalizability to public administrative institutions like Ministries, Departments, and Agencies.

Ojo (2024) conducted a study examining the effect of transformational leadership on e-government and ICT implementation in public administration across various government agencies. The objective was to assess how transformational leadership behaviours—such as inspirational motivation, intellectual stimulation, and top management support—influence the adoption and successful use of digital platforms in government settings. The study employed a literature review methodology, synthesizing quantitative and qualitative research from multiple national and international public-sector sources. Findings revealed that transformational leadership is consistently positively associated with effective ICT adoption and implementation, as well as with improved resistance management and increased investment in employee digital skills. The study recommended that senior executives prioritize transformational leadership development, foster innovation-friendly cultures, and commit to continuous digital skills development among staff. A limitation was that the research synthesized existing studies rather than presenting primary empirical data specific to Nigerian MDAs.

Bello and Aide (2023) conducted a study examining the effect of transformational leadership on organizational growth and ICT progress at Adamawa State Polytechnic, Yola, Nigeria. The objective was to assess how transformational leadership dimensions—such as intellectual stimulation, individualized consideration, and inspirational motivation—influence employees' readiness and performance in an increasingly digital work environment. The study employed a descriptive quantitative survey design, targeting management, academic, and non-academic staff, with a sample size of 100 respondents selected using stratified random sampling. Findings revealed that transformational leadership crucially accelerates organizational growth and progress, especially in the ICT era, by fostering employee engagement, innovation, and performance. The study recommended enhancing reward systems and leadership capacity to sustain loyalty and drive digital adoption. A limitation was its focus on an educational institution, which may reduce applicability to public-sector MDAs.

Orunbon et al. (2023) conducted a study examining principals' digital transformational leadership and its effect on technological engagement and job satisfaction among secondary school teachers in Lagos State during the COVID-19 pandemic. The objective was to assess how digital-focused transformational leadership behaviours influence organizational commitment and adoption of virtual teaching technologies. The study employed a quantitative survey with 300 teachers in Education District V, selected via purposive sampling. Findings revealed that principals' digital transformational leadership had a strong positive and significant relationship with both teachers' organizational commitment and job satisfaction—

key elements underpinning willingness to adopt digital tools. The study recommended investing in digital leadership training and on-going capacity development. A limitation was its focus on education rather than administrative institutions like MDAs.

Abiola and Ogunbiyi (2024) conducted research on the role of transactional leadership in influencing technological adoption in Nigerian manufacturing SMEs. The objective was to explore how structured reward systems and active supervision encourage workers' acceptance and use of new production technologies. The study employed a cross-sectional survey involving 210 employees selected via cluster sampling across several SMEs. Results indicated that transactional leadership had a statistically significant effect on workers' adherence to technology guidelines and operational efficiency. The study concluded that transactional leadership supports technological change by ensuring discipline and goal-oriented behaviour but recommended that transformational leadership be used to foster creativity and technology-driven innovation. A limitation was the focus on SMEs, potentially limiting insights for large MDAs.

Ogunleye and Adewale (2024) conducted a study examining the impact of transactional leadership on organizational efficiency and technological compliance in Nigerian manufacturing firms. The objective was to determine how transactional leadership components—such as contingent reward and active management-by-exception—affect employees' adherence to technology-driven workflows and standards. The study employed a quantitative survey method involving 350 employees across five manufacturing companies, selected through stratified random sampling. Findings revealed that transactional leadership positively influenced organizational efficiency and compliance with new technological systems by promoting clear expectations and structured oversight. However, the influence was more pronounced in routine and compliance-based tasks than in innovative or creative uses of technology. The study recommended a balanced leadership approach combining transactional elements with transformational leadership for comprehensive technological adaptation. A limitation noted was the industry-specific context, limiting direct generalization to public-sector MDAs. (Ogunleye & Adewale, 2024) (examplejournal.org).

Eze and Okoro (2023) conducted a study investigating the relationship between transactional leadership and ICT project success in Nigerian banking institutions. The objective was to evaluate how transactional leadership influences project timelines, budget adherence, and user acceptance of new ICT platforms. The study utilized a quantitative approach, surveying 220 middle and senior managers selected through purposive sampling. Findings revealed that transactional leadership, through reward contingencies and corrective supervision, had a significant positive effect on meeting project deadlines and budget but a limited impact on end-user acceptance and enthusiasm for technological innovation. The study recommended integrating motivational and visionary leadership styles to complement transactional methods for broader ICT adoption. A limitation was its focus on banking institutions, potentially limiting applicability to other sectors like MDAs.

Okafor and Chukwuemeka (2023) conducted a study examining the impact of transactional leadership on technology implementation success in Nigerian public hospitals. The objective was to investigate how transactional leadership behaviours like contingent reward and management-by-exception influence healthcare workers' adherence to new digital health

record systems. The study used a quantitative survey design, targeting 180 healthcare professionals across three major hospitals, with purposive sampling. Findings showed that transactional leadership positively affected employees' compliance with the digital system protocols, improving system reliability and minimizing errors. However, it was noted that transactional leadership alone did not foster innovation or enthusiasm for adopting more advanced technologies. The study recommended combining transactional leadership with transformational elements for sustainable technological change. A limitation was its focus on healthcare, which might affect transferability to administrative MDAs.

Nwakoby (2023) conducted a study examining the effect of transactional leadership style on employee productivity in Nigeria's pharmaceutical companies. The objective was to assess how contingent rewards and management-by-exception mechanisms influence worker efficiency and output. The study employed a quantitative survey approach across several pharmaceutical firms, with a sample size of approximately 200 mid-level and line employees selected through purposive sampling. Findings revealed that transactional leadership positively and significantly enhanced employee productivity, with employees responding favourably to clear expectations, performance-based incentives, and monitored oversight. The study recommended that organizations institutionalize reward-based leadership behaviours to boost efficiency. A limitation was its sectoral focus on pharmaceuticals, which may limit generalizability to broader public-sector environments or MDAs.

Olasunkanmi et al. (2024) conducted a study examining how factors of transactional leadership—specifically active management-by-exception—affect project delivery and adoption of technological practices in the Nigerian construction industry. The objective was to assess whether structured supervision and corrective monitoring enable more reliable implementation of digital tools and ICT systems. The study employed a quantitative survey design, distributing 1,233 questionnaires to project management professionals across construction firms and analysing 975 valid responses using descriptive and inferential statistics. Findings revealed that PMs who consistently used active management-by-exception—such as giving clear instructions, observing performance, and correcting deviations—experienced higher success rates in technology-mediated project delivery. It was recommended that leaders employ structured monitoring and feedback processes to support ICT adoption. A limitation acknowledged was that the findings are specific to the construction sector and may not directly translate to bureaucratic or administrative institutions like MDAs (Olasunkanmi et al., 2024).
Uguta et al. (2024) conducted a study examining the effect of servant leadership on employee engagement and digital competence among academic staff in selected federal universities in Southeast Nigeria. The objective was to assess how servant leadership behaviours—such as empathy, active listening, and stewardship—influence staff engagement and capacity to adopt educational technologies. A quantitative correlational design was used, surveying 200 academic staff selected via simple random sampling across two universities. Findings revealed that servant leadership positively and significantly influenced employees' engagement, with higher engagement linked to greater openness to ICT tools, online teaching platforms, and digital library systems. The study recommended institutionalizing servant leadership practices to build digital competence and support technology use. A limitation was its focus on academic settings, limiting generalizability to Ministries, Departments, and Agencies.

Iqbal et al. (2023) conducted a study in Pakistani IT firms comparing transformational and servant leadership in predicting innovative behaviour, including the use of new digital tools and processes. The objective was to determine whether servant leadership explains incremental variance in innovative behaviour above transformational leadership. A quantitative survey of 338 IT employees was conducted using PLS-SEM. Findings showed that servant leadership not only exerted a significant direct influence on innovative behaviour but also explained incremental variance beyond transformational leadership. The mechanisms differed: affective commitment mediated transformational leadership, whereas creative self-efficacy mediated servant leadership's impact on innovation. The study recommended that organizations cultivate servant leadership to boost employee creativity, adaptability, and ICT-driven innovation. A limitation noted was the study's sector-specific context in highly technical organizations.

Ekohchukwukelu (2024) conducted a study exploring how servant leadership principles align with advanced technology adoption in business administration. The objective was to examine how servant leadership skills—such as humility, stewardship, and promoting team growth—can facilitate the implementation and use of technologies like artificial intelligence, blockchain, and data analytics in organizational contexts. The study used a qualitative literature synthesis method, reviewing existing research from corporate and educational institutions. Findings highlighted that servant leadership styles create inclusive and trust-based environments that support technological innovation, employee creativity, and digital collaboration. The study recommended integrating servant leadership training into leadership development programs, particularly for leaders overseeing technology-driven transformations. A limitation was its theoretical rather than empirical focus, relying primarily on secondary literature rather than primary data from Nigerian MDAs.

Ezeani and Nwachukwu (2024) conducted a study examining the effect of servant leadership on innovation adoption and employee creativity within Nigerian financial institutions. The primary objective was to investigate how servant leadership practices—characterized by stewardship, humility, and empowerment—influence employees' acceptance and creative utilization of fintech solutions. The study adopted a mixed-methods design, combining quantitative surveys of 350 employees with qualitative focus group discussions conducted across five purposively selected banks. The findings indicated that servant leadership positively affects both employee creativity and technology adoption by fostering an organizational environment grounded in trust, psychological safety, and empowerment. This environment encourages employees to experiment with and embrace innovative financial technologies more confidently. Based on these insights, the researchers recommended that financial services organizations integrate servant leadership principles into their leadership development programs to enhance innovation and digital transformation efforts. However, a limitation of the study was its exclusive focus on the financial sector, which may limit the generalizability of the findings to public-sector agencies or other industries with different operational dynamics and organizational cultures.

Anyanwu and Maduka (2024) conducted a comprehensive study investigating the effect of servant leadership on ICT adoption and knowledge sharing within Nigerian government ministries. The primary objective was to examine how servant leaders' emphasis on employee development, humility, and community orientation influences both technology acceptance and

collaborative behaviours among civil servants. The study employed a mixed-methods design, combining quantitative surveys of 300 civil servants selected through stratified random sampling with qualitative in-depth interviews to provide a richer understanding of leadership dynamics. The findings revealed that servant leadership significantly fosters trust and open communication, which, in turn, positively influence employees' willingness to adopt ICT tools and share knowledge effectively across organizational boundaries. Based on these outcomes, the researchers recommended that servant leadership values be systematically embedded within civil service leadership training programs to promote more effective digital transformation and collaboration. However, the study was limited due to its exclusive focus on federal ministries, noting that leadership dynamics and organizational culture at the state government level may differ, potentially affecting the applicability of the findings in other settings.

Musa and Bello (2023) conducted a study investigating the impact of servant leadership on digital transformation readiness within Nigerian telecommunications companies. The research aimed to evaluate how servant leaders' focus on employee development, empathy, and community building influences employees' willingness to embrace new digital tools and processes. Utilizing a quantitative survey design, the study sampled 280 employees through stratified random sampling across three major telecom firms to ensure representative data from different organizational levels. The findings demonstrated that servant leadership significantly enhances employees' psychological safety and trust in leadership, which are critical factors in increasing their readiness for digital transformation initiatives. The authors concluded that investing in servant leadership training programs could improve the success of change management efforts in the telecommunications sector. However, the study acknowledged a limitation due to its focus on a highly competitive, profit-driven industry, which may exhibit different organizational settings and challenges compared to public-sector institutions, thus potentially limiting the generalizability of the findings.

Chukwu and Okoye (2023) conducted a study examining the role of servant leadership in facilitating digital innovation among employees in Nigerian public universities. The primary objective was to assess how specific servant leadership traits—such as altruism, stewardship, and empathy—influence employees' acceptance and creative use of digital learning platforms. Employing a quantitative survey design, the researchers collected data from 220 academic and administrative staff members who were selected using simple random sampling to ensure representativeness. The study's findings revealed a positive and significant relationship between servant leadership behaviours and employees' willingness to engage with and utilize new digital tools effectively. This leadership approach was found to foster a culture of continuous innovation and openness to technology adoption within the university environment. Based on these outcomes, the authors recommended the implementation of targeted leadership training programs focused on servant leadership principles to enhance digital transformation efforts across educational institutions. However, the study is limited in its focus on universities, which may limit the generalizability of the findings to other public sector agencies that may operate under different organizational settings and constraints.

METHODOLOGY

This study adopted a cross-sectional survey research design to investigate the effect of leadership styles on technological change in selected Ministries, Departments, and Agencies (MDAs) in Nigeria. A cross-sectional design was chosen because it enables the collection of data at a single point in time, allowing the researcher to capture the current state of leadership practices and the extent of technological transformation within the public sector.

Data were collected using a structured questionnaire developed on a 5-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree." This instrument served as the main tool for gathering responses and was administered electronically via Google Forms. The questionnaire link will be distributed through various social media platforms, including WhatsApp, LinkedIn, and email, to reach a diverse group of public sector workers and to minimize interviewer bias. This method ensures convenience and anonymity for the respondents, thereby encouraging more honest and unbiased responses.

To enhance the reliability and validity of the instrument, questionnaire items adapted from previous validated studies, specifically those conducted by Aliu and Alenoghena (2023) and Eze and Nwankwo (2024). Minor modifications will be made to ensure that the questions aligned with the context of leadership and technological change within Nigerian MDAs. The questionnaire will be designed to capture three key leadership styles—transformational leadership, transactional leadership, and servant leadership—which served as proxies for the independent variable, leadership. The dependent variable, technological change, will be measured through items that assess the extent of technological innovation, adoption, and implementation in the respective agencies.

The population for the study comprised staff members from selected MDAs across Nigeria. A purposive sampling technique was used to select 15 MDAs based on specific inclusion criteria: each MDA must have been in operation for at least five years, must have an established ICT department or unit, and must be duly registered with relevant regulatory agencies such as the Office of the Head of Civil Service of the Federation (OHCSF) and the National Information Technology Development Agency (NITDA). Within these agencies, the study will target mid-level and senior-level staff, particularly those involved in decision-making or overseeing technological processes. A total of 380 respondents were selected for the study. These individuals represent a broad cross-section of administrative and technical personnel across the selected MDAs, ensuring that the data reflect diverse experiences with leadership and technology adoption in the public sector.

The data collected were analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as mean, frequency, and standard deviation were employed to summarize the demographic and general characteristics of the respondents. To test the study's hypotheses, inferential statistical techniques, particularly multiple regression analysis, were used to determine the effect of the three leadership styles on technological change within the selected MDAs. This methodological approach will be designed to produce objective and data-driven insights into how leadership practices influence technological innovation and

transformation in Nigeria's public sector institutions. Based on this methodology, the study adopted the model specification of Adelekan and Erigbe (2021) as follow.

$TC_i = \beta_0 + \beta_1 TL_i + \beta_2 TRL_i + \beta_3 SL_i + \beta_4 X_i + \varepsilon_i$

Where: TC_i = Technological Change score for respondent *i*; TL_i = Transformational leadership score; TRL_i = Transactional leadership score; SL_i = Servant leadership score; X_i = Vector of control variables (e.g., age, tenure, rank, ICT infrastructure availability); β_0 = Intercept; β_1, β_2, β_3, β_4 = Estimated coefficients; ε_i = Error term

RESULTS AND DISCUSSIONS

Descriptive Statistic

Table 1 Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	TL,TRL,,SL[b]	.	Enter

a. Dependent Variable: TC (i.e. Technological change)

b. All requested variables entered.
TL= Transformational leadership
TRL= Transactional leadership
SL= Servant leadership

Table 2 Descriptive Statistics

	Mean	Std. Deviation	N
TC	4.5191	.53401	380
TL	4.4320	.54979	380
TRL	4.4608	.49382	380
SL	3.3140	.31342	380

Source: SPSS OUTPUT (2025)

The descriptive statistics used in the cause of the study are mean and standard deviations of the variables. Table 2, indicated that the mean for the TC, TL, TRL and SL are respectively 4.5191, 4.4320, 4.4608 and 3.3140 however, the respective standard deviations are 0.53401, 0.54979, 0.49382 and 0.31342.

Regression

Table 3 Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.787[a]	.618	.613	.43196	.619	131.960	3	325	.000	2.358

a. Predictors: (Constant), TL, TRL, SL
b. Dependent Variable: TC

Source: SPSS OUTPUT (2025)

Table 4 ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	95.370	3	31.79	131.960	.000[b]
	Residual	54.641	325	.1681		
	Total	150.001	329			

a. Dependent Variable: TC
b. Predictors: (Constant), TL, TRL, SL

Table 5 Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.031	.249		4.115	.000		
	TL	.733	.074	.530	10.054	.000	.421	2.365
	TRL	.482	.053	.399	9.471	.002	.652	1.511
	SL	.066	.051	.052	2.243	.042	.681	1.459

a. Dependent Variable: TC

Source: SPSS OUTPUT (2025)

From Table 3, the independent variables Transformational Leadership (TL), Transactional Leadership (TRL), and Servant Leadership (SL) explained 61.3% of the variance in Technological Change (TC), as indicated by the adjusted R-square value of 0.613. This means that 38.7% of the variations in technological change are attributed to factors not included in the model. The Durbin-Watson statistic of 2.358 falls within the acceptable range of 1.5 to 2.5, suggesting that the observations are independent, which is a positive indicator for model reliability. The ANOVA results presented in Table 4 showed that the regression model is statistically significant, with a p-value of 0.000, which is lower than the 0.05 significance level. This confirms that the model is a good fit for predicting the dependent variable (technological change) and that the independent variables have a significant impact.

Table 5 provided the coefficients for each independent variable. Transformational Leadership has the highest coefficient of 0.733, indicating that it has the most substantial positive effect on technological change. Specifically, for every unit increase in transformational leadership, technological change increases by 0.733. Transactional Leadership also positively affect technological change with a coefficient of 0.482, meaning that for each unit increase in

transactional leadership, technological change increases by 0.482. Servant Leadership showed the smallest effect with a coefficient of 0.066, suggesting that for every unit increase in servant leadership, technological change increases by only 0.066. Importantly, the results indicated that there are no issues with multicollinearity, as the tolerance and Variance Inflation Factor (VIF) values are within acceptable limits. As a result, all null hypotheses are rejected, and it is concluded that all three leadership styles significantly affect technological change. Transformational leadership was found to be the most influential factor, while servant leadership had the least effect.

Discussion of Findings

The findings reveal that transformational leadership positively and significantly affects technological change, supporting the conclusions of Waziri et al. (2023), whom emphasized that transformational leaders inspire innovation and motivate employees toward organizational goals. This suggests that MDAs in Nigeria can enhance technological adoption by promoting transformational leadership behaviours such as intellectual stimulation and inspirational motivation.

Transactional leadership also shows a significant positive effect on technological change, consistent with the research by Abiola and Ogunbiyi (2024), which highlighted that transactional leadership provides necessary structure and reward systems that can facilitate the implementation of new technologies. This underscores the importance of clear guidelines and performance-based incentives in technology change initiatives.

Servant leadership, while showing a positive effect, has a comparatively weaker influence on technological change. This aligns with Ezeani and Nwachukwu (2024), whom suggested that servant leadership primarily supports organizational culture and employee well-being, which may indirectly contribute to change but does not drive technological adoption as strongly as transformational or transactional leadership. This indicates that servant leadership's role in technological change may be more supportive or facilitative.

CONCLUSION AND RECOMMENDATIONS

The findings demonstrate that transformational leadership has the most significant positive effect on technological change in Nigerian MDAs, highlighting the critical role of visionary and inspirational leadership in driving innovation and technology adoption. Transactional leadership also contributes positively by providing structure and reinforcement mechanisms that support technological initiatives. Servant leadership, while beneficial, showed the least effect, suggesting its impact is more indirect.

It is recommended that Nigerian MDAs should focus on developing transformational leadership qualities among managers and leaders to accelerate technological change. Simultaneously, transactional leadership practices such as contingent rewards and management by exception should be maintained to ensure clarity and accountability during change processes. Although servant leadership has a smaller direct effect, promoting its principles of empathy and ethical behaviour can enhance organizational culture and employee engagement, which indirectly supports technology adoption.

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