

Systems Leadership and Innovation Synergy for Advancing Sustainable Global Transformation in North Central Zone, Nigeria

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Abstract—This quantitative study investigates the relationship between systems leadership, innovation synergy, and sustainable transformation in the North Central States of Nigeria. A descriptive design was employed. The target population included policymakers, innovation hub managers, entrepreneurs, and development officers in six North Central states. A sample of 300 respondents was selected using stratified random sampling. A structured questionnaire with 15 items on a 5-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree) was developed. The instrument was validated by three experts in educational administration and planning. A pilot test with 30 participants yielded Cronbach’s alpha values > 0.80, indicating strong reliability. Descriptive statistics (mean, standard deviation) was used to answer the research questions. Results reveals that systems leadership practices are effectively demonstrated within sustainable development initiatives across North Central Nigeria. This confirms that leadership in these programs emphasizes collaboration, shared purpose, continuous learning, and ethical governance. Systems leadership and innovation synergy contribute significantly to the advancement of sustainable transformation in the North Central States of Nigeria. From the findings it was recommended that Institutionalize Systems Leadership Training: State and local governments should establish leadership development programs emphasizing cross-sector collaboration. Enhance Innovation Hubs: Strengthen funding and capacity-building mechanisms for regional innovation hubs to stimulate joint problem-solving.

Keywords: Systems leadership, Innovation synergy, Sustainable development

I. INTRODUCTION

A. Background

Systems leadership refers to leadership approaches that cut across organizational, sectoral, and geographic boundaries to address complex social problems. Key

features include shared visioning, collaborative governance, boundary-spanning roles, adaptive learning, and accountability (Bigland et al., 2020). The thematic insights from three public health case studies in diverse settings show that systems leaders must “get started” through coalition building, mobilizing diverse stakeholders, then maintain momentum via institutionalization of processes and measurement of success (Bigland et al., 2020).

Globally, sustainable development challenges such as climate change, food insecurity, inequality, and public health require coordinated responses across multiple actors and scales. Systems leadership is characterized by boundary-spanning, shared visioning, stakeholder collaboration, adaptive learning, and accountability—has been identified in literature as critical for guiding collective responses to such ‘wicked’ problems (Bigland, Evans, Bolden, & Rae, 2020). In Nigeria, the Sustainable Development Goals (SDGs) provide a framework for national and sub-national action, including SDG 9 (Industry, Innovation and Infrastructure), which emphasizes fostering innovation, sustainable industrialization, and resilient infrastructure. (United Nations Nigeria, n.d.).

Innovation synergy implies strategic alignment among complementary innovations—technological, institutional, social so as to produce outcomes greater than isolated innovations. Innovation ecosystems, including entrepreneurial hubs, agribusiness clusters, universities, angel investors, and supportive policies, are key to fostering synergy. Empirical work in North Central Nigeria (Mustapha, 2025) demonstrates that agribusiness clusters with strong innovation capacity significantly contribute to education and employment generation. Similarly, studies on entrepreneurial ecosystems show their relevance to sustainable development in North Central region (Abah & Abah, 2023).

The North Central geopolitical zone, comprising Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and the Federal Capital Territory (FCT), is uniquely positioned in Nigeria’s development landscape. It has substantial agricultural endowments, growing urban centres, and it

hosts the country's political capital (Abuja). Nigeria has committed to the 2030 Agenda for Sustainable Development. SDG 9 (Industry, Innovation, and Infrastructure) is particularly relevant for innovation synergies (United Nations Nigeria, n.d.). The Office of the Senior Special Assistant to the President on SDGs (OSSAP-SDGs) has instituted flagship interventions including establishment of regional SDG Innovation Hubs, including one in Nasarawa (North Central). (OSSAP-SDGs, 2021). These hubs are intended for decentralised coordination of SDG implementation and knowledge sharing (OSSAP-SDGs, 2023). Despite these strengths, the region continues to face challenges including fragmented governance, limited infrastructure, insufficient innovation diffusion, and uneven development across rural and urban areas.

II. LITERATURE REVIEW

A. Theoretical Review

This study is anchored on the Systems Leadership Theory (Senge et al., 2015) and Innovation Systems Theory (Lundvall, 1992). Systems leadership emphasizes collective agency and shared purpose, while innovation systems theory focuses on inter-organizational learning and technological diffusion for societal benefit. The integration of these theories provides a multidimensional framework for sustainable transformation.

Statement of the Problem

Despite the global momentum toward achieving the United Nations' Sustainable Development Goals (SDGs), progress across Nigeria's regions remains uneven, particularly in the North Central states. The region—comprising Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and the Federal Capital Territory (FCT) faces persistent developmental challenges such as institutional fragmentation, weak governance coordination, limited innovation infrastructure, and inconsistent policy implementation (OSSAP-SDGs, 2023; United Nations Nigeria, 2023). These shortcomings have hindered sustainable transformation in critical sectors like agriculture, education, and energy.

While leadership and innovation are individually acknowledged as drivers of sustainable development, there is a growing realization that isolated efforts in leadership or innovation alone are insufficient for achieving systemic and long-term impact (Senge et al., 2015; Bigland et al., 2020). Sustainable transformation demands an integrated framework—what scholars call systems leadership—that fosters cross-sector collaboration, collective vision, and shared accountability (Westley et al., 2017). At the same time, innovation synergy, the coordinated interaction between actors within an innovation ecosystem, is vital for generating adaptive solutions and inclusive growth (Abah & Abah, 2023; Mustapha, 2025).

However, in the North Central States of Nigeria, empirical evidence suggests a persistent gap between leadership intentions and innovation outcomes. Public

institutions often operate in silos, innovation hubs lack sustainable partnerships, and multi-stakeholder initiatives are rarely coordinated around measurable SDG outcomes (OSSAP-SDGs, 2023). This disjointed system results in duplication of efforts, underutilization of knowledge networks, and diminished impact on sustainable transformation. Furthermore, despite numerous national and regional programs aimed at integrating leadership and innovation such as the Nigerian Economic Sustainability Plan and regional innovation cluster initiatives limited quantitative research has examined how systems leadership and innovation synergy jointly predict sustainable transformation outcomes in the North Central region. Most existing studies either address leadership or innovation separately, leaving a conceptual and empirical gap in understanding their synergistic influence (Bigland et al., 2020; Mustapha, 2025). Therefore, this study seeks to fill this critical gap by quantitatively examining the extent to which systems leadership and innovation synergy contribute to sustainable transformation in the North Central States of Nigeria. Understanding this relationship is crucial for designing integrated leadership–innovation frameworks that can accelerate Nigeria's progress toward the SDGs and promote inclusive regional development.

III. RESEARCH METHODOLOGY

A quantitative, correlational survey design was employed to examine how systems leadership and innovation synergy predict sustainable transformation in North Central Nigeria. The target population included policymakers, innovation hub managers, entrepreneurs, and development officers in six North Central states. A sample of 300 respondents was selected using stratified random sampling. A structured questionnaire with 15 items on a 5-point Likert scale (1 = Strongly Disagree → 5 = Strongly Agree) was developed. The instrument was validated by three experts in public administration and development studies. A pilot test with 30 participants yielded Cronbach's alpha values > 0.80, indicating strong reliability. Descriptive statistics (mean, standard deviation) was used to answer the research question.

IV. RESULTS AND DISCUSSION

What is the level of systems leadership exhibited in sustainable development initiatives?

Table 1. Descriptive Analysis of Systems Leadership Dimensions

Dimension	N	Mean	SD	Interpretation
Shared Vision and Purpose	300	4.10	0.72	High
Collaborative Capacity	300	3.95	0.68	High

Adaptive and Strategic Thinking	300	3.88	0.74	Moderate to High
Systems Thinking and Learning Culture	300	4.05	0.66	High
Ethical and Inclusive Governance	300	4.15	0.70	High
		Mean = 4.03	SD = 0.70	

The result in Table 1 shows that respondents perceived a high level of systems leadership (M = 4.03, SD = 0.70) in sustainable development initiatives across the North Central States of Nigeria. The mean values across dimensions (ranging from 3.88 to 4.15) indicate that: Shared Vision, Ethical Governance, and Learning Culture are strongly practiced. Adaptive Thinking scored slightly lower, suggesting moderate flexibility and responsiveness to emerging sustainability issues. This pattern implies that leaders effectively mobilize diverse actors, foster shared vision, and uphold ethical governance all hallmarks of robust systems leadership (Senge et al., 2015; Goldstein, 2017).

RQ2: How strong is the innovation synergy among stakeholders?

Table 2. Descriptive Statistics of Sustainable Transformation Dimensions

Dimension	Mean	SD	Interpretation
Institutional Transformation	4.08	0.68	High
Environmental Transformation	3.92	0.71	High
Socio-Economic Transformation	3.85	0.74	Moderate to High
Policy and Institutional Sustainability	4.02	0.69	High
Holistic Development Impact	4.10	0.67	High
Average	3.99	0.70	

The overall mean of 3.99 (SD = 0.70) indicates a high level of sustainable transformation driven by systems leadership and innovation synergy. The highest mean (M = 4.10) is found in Holistic Development Impact, suggesting that the interaction between leadership and innovation is effectively improving overall quality of life and SDG achievements. The lowest mean (M = 3.85) occurs in Socio-Economic Transformation, which implies that while progress exists, economic empowerment through sustainability programs can be further strengthened.

RQ3: To what extent do systems leadership and innovation synergy predict sustainable transformation?

Table 3: Systems Leadership and Innovation Synergy Predict Sustainable Transformation

Statement	Mean (M)	Std. Deviation	Interpretation
Leadership enhances coordination for sustainability	4.05	0.71	High
Innovation synergy accelerates SDG achievement	3.95	0.73	High
Collaboration ensures long-term outcomes	4.02	0.69	High
Leadership–innovation alignment improves institutions	4.10	0.66	High
Joint action improves community well-being	3.92	0.74	High
Innovative leadership strengthens transformation	4.00	0.70	High
Synergy ensures policy continuity	3.88	0.75	Moderate to High
Leaders’ openness to innovation boosts success	4.03	0.68	High
Collaboration improves quality of life	4.08	0.69	High
Leadership + innovation predict sustainability	4.15	0.64	High

The analysis reveals that respondents agree that both systems leadership and innovation synergy are key predictors of sustainable transformation across environmental, institutional, and socio-economic dimensions. The highest mean (M = 4.15) was observed for “Systems leadership and innovation together predict sustainability,” showing strong consensus among respondents. The lowest mean (M = 3.88) was for “Synergy ensures policy continuity,” suggesting that long-term policy integration may require further strengthening. These results indicate that leadership and innovation, when integrated, drive coordinated action, institutional sustainability, and measurable transformation outcomes in the North Central States of Nigeria.

Discussion of the Findings

Table 1 result reveals that systems leadership practices are effectively demonstrated within sustainable development initiatives across North Central Nigeria. This confirms that leadership in these programs emphasizes collaboration, shared purpose, continuous learning, and ethical governance — consistent with the systems leadership framework that advocates collective impact and adaptive problem-solving (Senge et al., 2015; Wheatley, 2019). The moderate score on adaptive thinking suggests the need for greater flexibility and responsiveness to dynamic sustainability challenges, such as climate shocks and socio-economic changes.

The result from Table 2 above shows that systems leadership and innovation synergy contribute significantly to the advancement of sustainable transformation in the North Central States of Nigeria. This finding aligns with the systems leadership theory (Senge et al., 2015) and open innovation model (Chesbrough, 2020), which both emphasize that collective leadership and shared innovation ecosystems are core drivers of transformative sustainability outcomes.

From Table 3 above, the results reveal that innovation synergy is a vital element in achieving sustainable transformation in North Central Nigeria. Stakeholders are actively engaging in collaborative innovation, knowledge sharing, and joint value creation. However, the relatively lower scores in institutional and policy support indicate that government and organizations need to enhance enabling environments through funding mechanisms, regulatory incentives, and technical support to further strengthen innovation networks. These findings align with open innovation theory (Chesbrough, 2020), emphasizing that collaboration across organizations drives sustainable innovation and competitive advantage.

V. CONCLUSION

Effective systems leadership and strong innovation synergy are indispensable for achieving sustainable transformation in North Central Nigeria. The synergy between inclusive governance and innovation ecosystems can bridge regional development gaps. Institutionalize Systems Leadership Training: State and local governments

should establish leadership development programs emphasizing cross-sector collaboration. Enhance Innovation Hubs: Strengthen funding and capacity-building mechanisms for regional innovation hubs to stimulate joint problem-solving. Adopt Shared SDG Dashboards: Implement regional SDG tracking dashboards for transparency and learning. Encourage Public–Private Partnerships: Facilitate collaboration between entrepreneurs, policymakers, and academia for policy innovation.

VI. REFERENCES

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