



Rethinking Leadership Under Constraint: A Behavioural–Structural–Relational Model of Sequenced Transformation in Higher Education

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Abstract

Universities in emerging economies operate under financial austerity, bureaucratic rigidity, and political oversight, yet dominant leadership theories offer limited explanations of how institutional transformation unfolds under such constraints. This study examines the leadership processes associated with institutional change at the University of Mines and Technology (UMaT), Ghana. Using a concurrent mixed-methods design comprising a survey of 223 internal stakeholders and interviews with 17 institutional actors, the study integrates the 4P Framework, Transformational Leadership Theory, Stakeholder Theory, Resource Dependence Theory, and symbolic leadership scholarship to conceptualise strategic leadership as a behavioural–structural–relational system. Quantitative findings show consistently positive stakeholder perceptions across the 4P domains, with moderate-to-strong inter-domain associations. People and Place received stronger ratings than Purpose and Process, while infrastructure and institutional reputation were rated more highly than academic excellence. Qualitative findings indicate that visible infrastructure, digitisation, procedural improvements, and relational accessibility strengthened stakeholder trust and confidence. Mixed-methods integration suggests an adaptive sequencing pattern in which early visible and symbolically meaningful reforms generated legitimacy that supported subsequent academic and cultural change. Because the temporal interpretation rests primarily on retrospective qualitative accounts from a single institutional case, it requires comparative and longitudinal testing. The study advances the Adaptive Sequencing Leadership Model, which explains how behavioural, structural, and relational mechanisms interact over time and how legitimacy generated through early reforms may become a strategic resource for deeper institutional transformation under constraint.

Keywords: adaptive sequencing; behavioural–structural–relational leadership; stakeholder legitimacy; strategic leadership; higher-education governance; resource-constrained universities.

1. Introduction

Universities worldwide are under increasing pressure from digitalisation, heightened accountability, demographic change, and high expectations for societal impact (Altbach & de Wit, 2022; Marginson, 2023). Strategic leadership has been identified as the most powerful lever through which institutions respond to these disruptions (Bolden et al., 2023; Middlehurst, 2013). Much of this literature is rooted in higher-income systems with stable funding, managerial autonomy, and professionalised administrative structures (De Boer & File, 2020; Tapper & Salter, 2021). These contextual assumptions shape theories of strategic behaviour, organisational processes, and stakeholder relations. Such assumptions rarely hold in emerging-economy systems, however, particularly African STEM universities, where austerity, bureaucratic rigidity, and political oversight are systemic features of organisational life (Cloete et al., 2011; Hayward & Ncayiyana, 2015). This mismatch creates a persistent gap: global theories explain how leadership operates under favourable conditions but say little about how leadership actually produces institutional transformation under constraint.

This paper makes three core contributions to address this gap. First, it shows that existing leadership frameworks - behavioural (Bass & Riggio, 2006), structural (Wilkinson & Leary, 2020), or relational (Freeman, 1984; Marginson, 2021) - treat these dimensions as separable, an assumption that breaks down under resource constraint where behavioural influence, structural credibility, and relational legitimacy are interdependent (Bolden & Kirk, 2009; Wanjala, 2023). Second, the paper proposes adaptive sequencing as a new theoretical mechanism to explain how leaders initiate and sustain transformation in such contexts - visible, confidence-building reforms in infrastructure, digital systems, and reputation generate symbolic legitimacy that facilitates deeper academic and cultural change (Deem, 2022; Scott, 2014). Third, the paper offers the Adaptive Sequencing Leadership Model (ASLM), a formally specified, theory-generating framework with three testable propositions based on a single institutional case, offered as a basis for comparative testing and extending the 4P Framework, Transformational Leadership Theory, and Stakeholder Theory by foregrounding temporal sequencing and legitimacy as strategic resources in constrained environments.

Ghana's higher-education landscape provides a compelling empirical setting for this work. National-level reforms focusing on STEM expansion, industry relevance, digital transformation, and quality assurance improvement are unfolding within a context of fiscal austerity and procedural complexity (Ministry of Education, 2020; GTEC, 2021; Adjei & Boateng, 2020). Within this landscape, the University of Mines and Technology (UMaT) has achieved significant institutional reforms despite systemic constraints, making it a theoretically important case for studying how strategic leadership builds legitimacy, aligns systems, and sequences reforms under conditions of scarcity (Hayward & Ncayiyana, 2015). A competing explanation must be acknowledged from the outset: external funding structures, state capital allocations, and national STEM policy tailwinds may have influenced the observed reform sequence as much as intentional leadership strategy. The study treats the boundary between strategic choice and structural enablement as an open empirical question rather than a resolved assumption.

Three research questions guide the study:

- (1) How do internal stakeholders perceive the Vice-Chancellor's leadership across the 4P domains?
- (2) What is the pattern of transformation outcomes, and does it fit an adaptive sequencing trajectory?
- (3) What structural and contextual constraints moderate the mechanism?

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2.0 Theoretical Framework

This section develops a theoretical account of how strategic leadership generates institutional transformation in resource-constrained higher-education environments. It examines the limits of existing behavioural, structural, and relational models, integrates insights from Transformational Leadership Theory, the 4P Framework, and Stakeholder Theory, and situates the ASLM in relation to adjacent theories of staged change and resource dependence. Finally, it closes with three formal propositions that constitute the model's testable core.

2.1 Limits of Dominant Strategic-Leadership Approaches

Strategic leadership in higher education is commonly defined as the ability to articulate mission, mobilise people, and align organisational processes to achieve long-term goals (Ireland & Hitt, 2005; Middlehurst, 2013). Dominant frameworks conceptualise behavioural, structural, and relational dimensions as separable. Behavioural models foreground leader charisma, vision, and influence (Bass & Riggio, 2006), while structural approaches foreground governance routines, planning systems, and managerial capability (De Boer & File, 2020; Tapper & Salter, 2021). Relational perspectives, though growing in prominence, tend to conceptualise stakeholder legitimacy as a normative ideal rather than as a mechanism for shaping transformation (Freeman, 1984; Marginson, 2021). These frameworks rest on assumptions that leaders have discretionary authority, that organisational systems operate predictably, and that stakeholders respond to rational incentives - assumptions consistent with higher-income contexts but rarely applicable in African higher education, where resource scarcity, bureaucratic inflexibility, and political oversight constrain leadership action (Cloete et al., 2011; Hayward & Ncayiyana, 2015). This gap motivates an integrated approach capable of explaining how leadership works when conventional levers are weak or absent.

2.2 The 4P Framework: Structural Logic and Its Limits

The 4P Strategic Leadership Framework (Purpose, People, Process, Place) provides a holistic perspective on how leaders construct institutional direction and cohesion (Wilkinson & Leary, 2020). Empirically, the framework has demonstrated how institutional alignment arises when these domains support one another (Leary & Blenkinsop, 2021). The framework treats the four domains as analytically parallel descriptive categories, however. It does not explain how leaders in resource-constrained universities make choices between domains, or how reforms in one domain lend legitimacy to changes in others. Leaders of African STEM universities often initiate reforms in Place and Process because these deliver visible, confidence-building results under constraint (Teferra & Altbach, 2004; Owu-Ewie, 2022). These dynamics are not theorised in the existing 4P

literature. They require a dynamic rather than static interpretation of the framework.

2.3 Transformational Leadership: Behavioural Mechanisms and Limitations

Transformational Leadership Theory explains how leaders use behaviours to articulate a compelling vision, model integrity, inspire commitment, and support follower growth (Bass & Riggio, 2006). Empirical work in African universities has indicated that transformational behaviours can foster collaboration, organisational learning, and institutional cohesion (Nguni et al., 2006; Babalola & Genga, 2024). Behavioural influence alone cannot account for transformation in highly regulated or resource-scarce settings, however. Transformational leadership presumes that vision and moral authority can drive extensive organisational change, but this influence is often diluted when structural systems are incoherent or stakeholder trust is low (Bolden et al., 2015; Deem, 2022). Transformational leadership is necessary but not sufficient. It is one element of a broader systemic model of leadership influence.

2.4 Stakeholder Legitimacy: Relational Perspectives

Stakeholder Theory highlights that organisations are dependent on different actors whose cooperation must be earned through transparent, ethical, and inclusive engagement (Freeman, 1984; Parmar et al., 2010). In higher education, legitimacy is derived from students, faculty, administrative staff, government agencies, and external partners, and is central to institutional performance and reform (Marginson, 2021; Zavale & Schneijderberg, 2020). African scholarship emphasises the importance of relational norms, communal accountability, and moral authority in leadership practice (Wanjala, 2023; Nkomo, 2011). In such contexts, leaders build institutional momentum not through formal authority but through trust-building, consultation, and perceived fairness. The existing stakeholder literature largely treats legitimacy as a normative imperative rather than a strategic resource conditioning the feasibility of structural and behavioural leadership actions. That is the gap the ASLM addresses.

2.5 Situating the ASLM within Existing Leadership and Change Theories

The ASLM draws on but extends theories of organisational change, resource dependence, and contemporary leadership. Punctuated equilibrium explains movement between organisational stability and crisis-driven transformation (Gersick, 1991; Tushman & Romanelli, 1985), whereas the ASLM concerns cumulative, deliberately sequenced reforms. Institutional layering explains how new institutional arrangements are added over time (Mahoney & Thelen, 2010), but it does not specify how individual leaders determine which reforms should come first. Kotter's (1996) planned-change model similarly assumes levels of managerial discretion and organisational resources that may be unavailable in resource-constrained public universities.

Resource Dependence Theory explains how access to critical resources shapes organisational priorities (Pfeffer & Salancik, 1978), but it does not account for how the sequencing of reforms generates stakeholder legitimacy and expands the capacity for subsequent change. Transformational Leadership Theory explains how vision, integrity, and inspiration mobilise commitment but does not specify how these behaviours must be temporally ordered to produce

institutional effects under scarcity. The ASLM addresses this gap by proposing that leaders prioritise visible and achievable reforms whose symbolic value generates legitimacy, thereby enabling reforms that limited resources, autonomy, or stakeholder cooperation might otherwise obstruct.

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The ASLM also complements contemporary leadership perspectives. Adaptive leadership explains how stakeholders are mobilised to address complex challenges but does not theorise the temporal ordering of reform domains (Heifetz, Grashow, & Linsky, 2009). Complexity and distributed leadership locate influence across multiple actors and interactions (Spillane, 2006; Uhl-Bien, Marion, & McKelvey, 2007), whereas the ASLM focuses on the executive-level sequencing decisions that can create conditions for those collective dynamics. Its distinctive contribution is therefore the sequencing–legitimacy–reform mechanism: deliberate reform ordering generates legitimacy as a strategic resource for institutional transformation.

2.6 Strategic Leadership as a Behavioural–Structural–Relational System

The ASLM conceptualises strategic leadership as an interaction among three mechanisms. Behavioural mechanisms include vision, integrity, inspiration, purpose framing, and symbolic signalling. Structural mechanisms encompass systems, routines, governance arrangements, digitisation, and administrative processes. Relational mechanisms include trust, consultation, fairness, accessibility, and stakeholder cooperation.

This integration responds to calls for multidimensional explanations that move beyond leader-centred or structure-centred models (Bolden et al., 2023; Scott, 2014). It is also consistent with organisational-systems theory, which understands transformation as arising from interactions among behaviour, structures, and social relationships within particular environmental conditions (Kuh & Whitt, 1988; Weick, 1995). In resource-constrained universities, behavioural influence requires credible structures, while structural reforms require relational legitimacy to secure adoption and sustain momentum.

2.7 Adaptive Sequencing: The Proposed Explanatory Mechanism

Adaptive sequencing refers to the strategic ordering of reforms according to their feasibility, visibility, symbolic significance, and capacity to generate stakeholder confidence. Leaders initially prioritise reforms that can demonstrate institutional direction and credible progress, typically within Purpose and Place, before advancing more demanding reforms in People and Process.

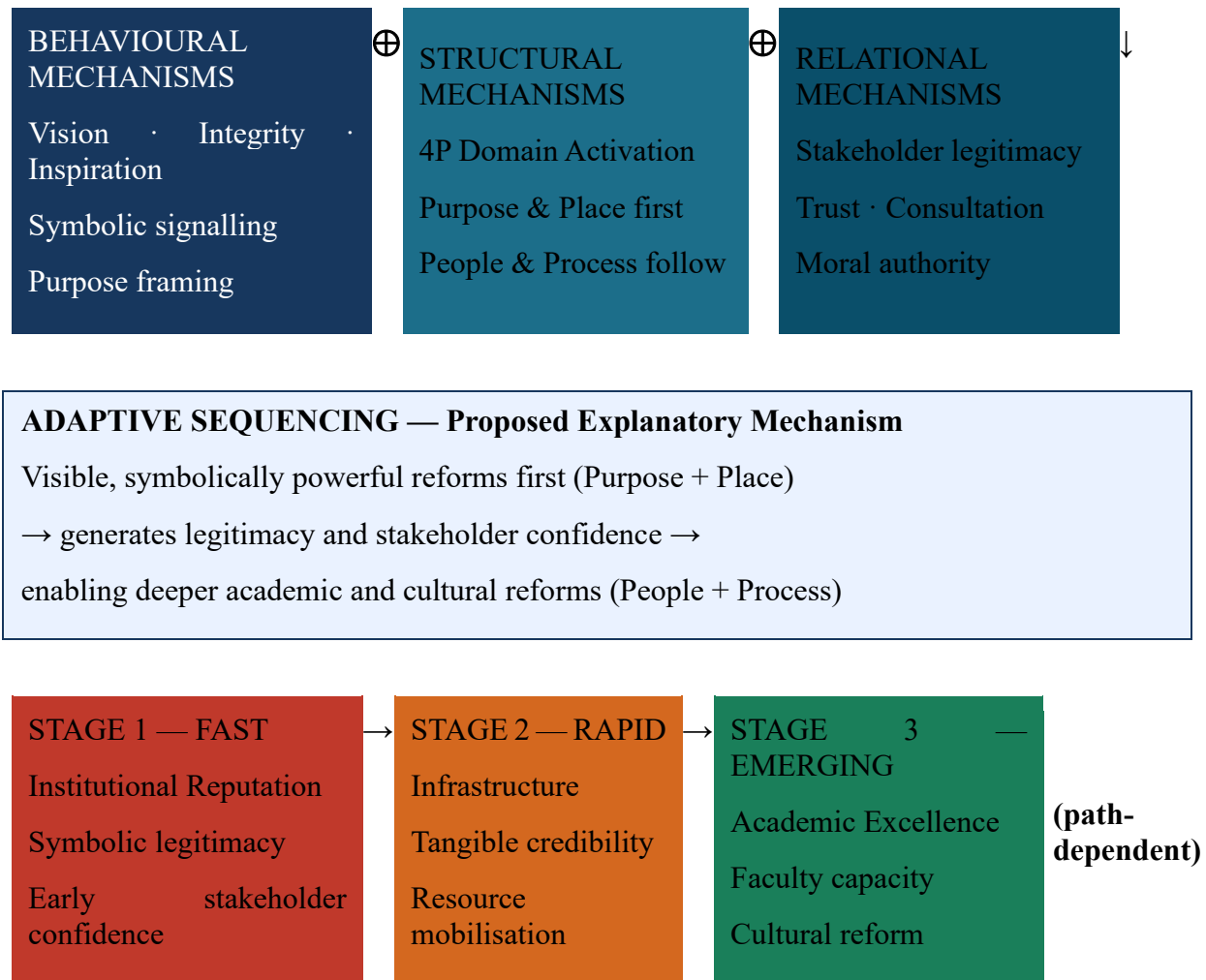
The mechanism follows a temporal logic: early visible achievements reduce uncertainty and build legitimacy; established legitimacy strengthens stakeholder cooperation and resource mobilisation; and these conditions support deeper academic, administrative, and cultural change (Deem, 2022; Scott, 2014). Adaptive sequencing therefore explains why transformation may occur unevenly across institutional domains and why institutional reputation and infrastructure may advance more quickly than faculty capacity, academic quality, and organisational culture.

2.8 The Adaptive Sequencing Leadership Model

Drawing on Transformational Leadership Theory, the 4P Framework, Stakeholder Legitimacy Theory, Resource Dependence Theory, and symbolic leadership scholarship, this study advances the ASLM. Figure 1 depicts the model.

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Figure 1. *The Adaptive Sequencing Leadership Model (ASLM): A Behavioural–Structural–Relational System of Strategic Leadership in Resource-Constrained Higher Education*



The model proposes that behavioural, structural, and relational mechanisms converge through adaptive sequencing. Transformation is therefore expected to unfold at different rates: reputation and infrastructure may develop relatively rapidly, while academic excellence and cultural reform emerge more slowly because they require sustained human-capital investment, institutional cooperation, and behavioural change.

2.9 Formal Propositions

The ASLM generates three propositions for empirical testing. Legitimacy occupies two temporally distinct positions in the model: it is first generated by early sequencing and subsequently operates as a resource that strengthens later reforms.

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Proposition 1, Legitimacy Generation: In resource-constrained higher-education institutions, the early prioritisation of Purpose and Place reforms generates symbolic legitimacy, which mediates the relationship between leadership behaviour and subsequent transformation in People and Process.

Proposition 2, Legitimacy Amplification: Once established, stakeholder legitimacy moderates the relationship between structural reforms and institutional outcomes, such that structural investments produce broader effects when legitimacy is present than when it is absent.

Proposition 3, Boundary Conditions: The effectiveness of adaptive sequencing depends on sufficient baseline institutional integrity, adequate executive discretion over early-stage reform domains, and enough pre-existing stakeholder trust for early achievements to be attributed to leadership competence.

These propositions constitute the ASLM's theory-generating core. The present study assesses whether evidence from the UMaT case is consistent with them; it does not claim to confirm them. Comparative and longitudinal research is required to test their causal relationships, generalisability, and boundary conditions.

3. Methodology

This study used a pragmatic, concurrent mixed-methods design to examine how strategic leadership functions as a behavioural–structural–relational system within a resource-constrained African STEM university. The design, sampling procedures, instrumentation, analytic strategy, and integration logic were selected to illuminate both patterned stakeholder perceptions and the interpretive processes through which institutional transformation is understood.

3.1 Research Paradigm and Design

A pragmatic paradigm was adopted because the phenomenon under examination requires both measurement of perceptual regularities and exploration of meaning-making (Creswell & Plano Clark, 2018). A concurrent mixed-methods design enabled simultaneous generation of quantitative breadth and qualitative depth. Integration occurred at the interpretation stage through joint displays and convergence analyses, generating the meta-inferences central to theorising adaptive sequencing. The integration was designed to go beyond triangulation: it sought to distinguish between patterns that both strands confirmed and patterns where qualitative accounts complicated or challenged quantitative regularities.

3.2 Sampling Strategy and Population

The population comprised three stakeholder groups: student leaders, faculty, and administrative

staff. Proportionate stratified sampling preserved the natural distribution of these groups within the institution, reducing sampling bias and improving representativeness. A sampling frame of 250 participants was determined based on Krejcie and Morgan's (1970) guidelines for institutional populations. For the qualitative component, 17 participants were purposively selected for their involvement in academic leadership, administrative decision processes, student governance, or external institutional partnership - roles giving access to the strategic decision-making processes most relevant to adaptive sequencing. Table 1 presents the full qualitative participant profile.

Table 1: Qualitative Participant Profile (n = 17)

Participant	Role	Code	Functional Area	Primary Relevance to ASLM
Senior Administrator 1	Pro-Vice-Chancellor (Academic)	P1	Academic governance	P1 (top-level leadership); P3 (sequencing decisions)
Senior Administrator 2	Registrar	P2	Administration	P1; institutional structure
Senior Administrator 3	Director, Finance	P3	Finance / resource allocation	P1; P3 (resource constraints on sequencing)
Dean 1	Dean, Faculty of Engineering	P4	Academic leadership	P2 (participation); P3 (feedback)
Dean 2	Dean, Faculty of Minerals	P5	Academic leadership	P2; P3
Dean 3	Dean, Faculty of Sciences	P6	Academic leadership	P2; all propositions
Head of Department 1	HoD, Mining Engineering	P7	Programme management	P2 (unit-level ownership)
Head of Department 2	HoD, Electrical Engineering	P8	Programme management	P2; P3
Head of Department 3	HoD, Geomatic Engineering	P9	Programme management	P2; P3

Faculty Member 1	Senior Lecturer, Civil Eng.	P10	Teaching and research	P2; P3 (feedback uptake)
Student Executive 1	SRC President	P11	Student governance	All propositions (stakeholder legitimacy)
Student Executive 2	SRC Academic Affairs	P12	Student governance	P2; P3
Industry Partner Rep.	Ghana Chamber of Mines Liaison	P13	External stakeholder	P1 (reputational sequencing)
Quality Assurance Officer	PQAU Officer	P14	Quality assurance	P3 (feedback continuity)
Faculty Member 2	Senior Lecturer, Computer Sci.	P15	Teaching and research	P2; academic sequencing
Administrative Staff	Senior Administrative Officer	P16	Operations	P2 (non-academic participation)
Student Executive 3	SRC General Secretary	P17	Student governance	P2; P3

3.3 Research Site

The University of Mines and Technology (UMaT), a specialised STEM university in Ghana, served as the study site. UMaT represents an analytically significant case because it combines a track record of institutional transformation with resource scarcity and bureaucratic rigidity, conditions typical of many African universities.

3.4 Researcher Positionality and Bias Mitigation

The authors hold an institutional affiliation with UMaT, which created conditions of privileged access to participants, documents, and institutional context but also introduced risks of confirmation bias, loyalty to institutional narratives, and social desirability effects among participants. Several strategies were implemented to address these risks. The interview guide was developed to probe explicitly for constraints, failures, and structural vulnerabilities alongside achievements. Participants were specifically invited to describe what was not working and what threatened sustainability. The qualitative analysis paid deliberate attention to hesitations, qualifications, contradictions, and divergent accounts rather than seeking consensus narratives. A subsample of coded transcripts was reviewed

by an independent qualitative researcher with no UMaT affiliation, who provided feedback on coding coherence and potential interpretive bias. Quantitative and qualitative findings were also triangulated against publicly available institutional documents, including Vice-Chancellor's Congregation Reports and strategic planning records, to test consistency between reported perceptions and documented institutional actions. The boundary between adaptive sequencing as a deliberately chosen strategy and adaptive sequencing as a structurally forced adaptation to resource availability was treated as an open empirical question throughout analysis rather than assumed.

To protect confidentiality and minimise social desirability bias, interviews were conducted privately in participants' offices or neutral meeting rooms, without institutional authority figures present. Participants were assured verbally and through the written information sheet that recordings would remain within the research team, their responses would not be accessible to the Vice-Chancellor, Registrar, or line managers, and participation would not affect their institutional standing. In reporting the findings, participant codes (P1–P17) and functional role categories are used to attribute quotations, preserving anonymity while allowing readers to assess the evidential basis of proposition-related claims. During analysis, accounts that contradicted or qualified the prevailing leadership narrative were specifically flagged and proportionately represented. The presence of such critical accounts, including from participants who otherwise affirmed the Vice-Chancellor's performance, suggests that the interview conditions did not produce uniformly favourable responses.

3.5 Instrumentation

3.5.1 Quantitative Instrument

The structured questionnaire measured stakeholder perceptions across the four 4P domains and perceived transformation outcomes. Item development followed three steps: theoretical grouping under 4P domains reflecting factor-structure assumptions grounded in prior studies (Wilkinson & Leary, 2020; Leary & Blenkinsop, 2021); adaptation from established leadership and organisational-change instruments; and psychometric validation. The 4P domains were treated as correlated but distinct latent constructs. Construct validity was evaluated through expert review and discriminant validity was assessed by examining inter-subscale correlations. A pilot test ($n = 30$) confirmed clarity, contextual appropriateness, and internal consistency (overall $\alpha = .89$; subscales $\alpha = .78-.87$).

The final instrument comprised 48 items distributed across the four 4P domains (Purpose: 12 items; People: 12 items; Process: 12 items; Place: 12 items) and seven transformation outcome items. Items were adapted from validated leadership scales including the Multifactor Leadership Questionnaire (Bass & Riggio, 2006) and the Organisational Change Questionnaire (Herscovitch & Meyer, 2002), with contextual modifications to reflect the UMaT setting. The expert panel comprised five reviewers: two senior academics in educational leadership and management, one institutional researcher with experience in Ghanaian higher education, one professional working in university administration at UMaT, and one external practitioner from the Ghana Tertiary Education Commission. Panel members independently rated each item for relevance to its 4P

domain on a four-point scale, and a Content Validity Index (CVI) of .80 or above per item was required for inclusion. Items rated below the CVI threshold were revised and re-reviewed before finalisation. All items were rated on a five-point Likert scale from 1 (Very Low) to 5 (Very High).

3.5.2 Qualitative Instrument

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The semi-structured interview guide mirrored the quantitative domains to facilitate strand parallelism. Open-ended items explored participants' interpretations of leadership behaviour, structural alignment, stakeholder relations, enabling conditions, and constraints. The guide also probed directly for the sequencing mechanism: participants were asked whether particular types of reform were prioritised at particular times, what preceded infrastructure investments, and whether early visible gains appeared to enable or constrain later academic reforms. This design ensured that the qualitative strand could corroborate or challenge the sequencing hypothesis rather than merely describe outcomes.

3.6 Data Analysis

3.6.1 Quantitative Analysis

Descriptive statistics summarised stakeholder perceptions across constructs. Group differences were examined using the Kruskal–Wallis H test, justified because Likert-type responses are ordinal, stakeholder subgroups exhibited non-normal distributions, and uneven group sizes risk violating ANOVA assumptions. Where significant differences emerged, Dunn's post-hoc tests with Bonferroni correction controlled for Type I error. Effect sizes (epsilon-squared) estimated practical significance. Supplementary Spearman correlations examined associations among the 4P domains and transformation outcomes to assess whether the structural interdependencies proposed in the ASLM were present in stakeholder perception data. These correlations are exploratory and cross-sectional: they indicate co-occurrence of perceptions, not temporal precedence.

It is important to acknowledge that the analytical toolkit employed in this study - descriptive statistics, Kruskal–Wallis tests, and Spearman correlations - is descriptive-exploratory rather than confirmatory. These analyses are appropriate for a first-stage study establishing the perceptual patterns and qualitative mechanisms that a subsequent study can test more formally. The current analyses are explicitly framed as stage one of a two-stage research programme. Stage two, recommended in Section 6.3, would apply confirmatory factor analysis, structural equation modelling, or path analysis across multiple institutions to test the mediating and moderating relationships proposed in the ASLM's propositions. The descriptive findings reported here provide the empirical motivation and model specification required for that future confirmatory work.

3.6.2 Qualitative Analysis

Qualitative data were analysed using Braun and Clarke's (2021) reflexive thematic analysis with a hybrid deductive–inductive coding approach. Deductive codes reflected the behavioural–structural–relational conceptual model. Inductive codes captured emergent concepts related to legitimacy-building, symbolic reform, and sequencing dynamics, including participants' explicit accounts of when and why particular reforms were prioritised. These accounts provided the

temporal evidence for the sequencing interpretation that the cross-sectional quantitative data cannot supply.

Line-by-line coding of the 17 transcripts generated 214 initial codes, which focused coding consolidated into 18 codes and six themes: (1) deliberate sequencing of visible reforms; (2) legitimacy-building through early gains; (3) relational leadership and trust; (4) structural constraints on sequencing; (5) boundary conditions and fragility; and (6) monitoring and accountability gaps. Deductive and inductive analysis were integrated by mapping focused codes onto the ASLM propositions - legitimacy generation, legitimacy amplification, and boundary conditions - while retaining non-aligned codes as emergent findings. Conflicts between theoretical expectations and inductive patterns were documented and reported rather than suppressed. An independent reviewer examined 30% of the transcripts - five interviews spanning all stakeholder groups - and confirmed the framework's internal consistency. The reviewer questioned whether three passages reflected deliberate agency or structural constraint; following discussion, the interpretation was revised to preserve this ambiguity. Member checking with six participants confirmed the overall thematic interpretation, while two participants added nuance to the theme of succession vulnerability.

3.7 Mixed-Methods Integration

Integration occurred through joint displays aligning quantitative patterns with qualitative explanations. Three integration steps were used: convergence coding compared findings domain by domain; meta-inference development generated explanatory statements showing how mechanisms interacted; and resolution of contradictions ensured that when discrepancies emerged, such as uniformly high quantitative scores alongside nuanced qualitative concerns, interpretations prioritised explanatory insight over numerical dominance. A central integration finding is that cross-sectional correlations alone cannot establish sequencing: the temporal evidence derives from qualitative accounts in which participants explicitly described the ordering of reforms and the relationship between early visible gains and subsequent academic development.

3.8 Ethical Considerations

Ethical approval was obtained from the Institutional Research Ethics Committee of the University of Mines and Technology (Reference: UMaT-IREC-2023-014, approved January 2023). Participation was voluntary, informed consent was secured in writing prior to each interview, and confidentiality was ensured through the anonymisation procedures described in Section 3.4. Data were stored securely on password-protected institutional servers in compliance with UMaT's data governance protocols. Participants were free to withdraw at any stage without consequence.

4. Results

Results are presented in four stages: descriptive patterns across domains and outcomes; group comparisons with assessment of social desirability risk; supplementary correlational evidence aligned with the ASLM's structural propositions; and qualitative themes providing the temporal and interpretive evidence that the cross-sectional quantitative strand cannot supply.

4.1 A Note on Score Elevation and Social Desirability

Across all 4P domains and transformation outcomes, stakeholder means cluster between 3.81 and 4.48 on a five-point scale. This elevation reflects either genuine high satisfaction with leadership or social desirability bias, or most likely both. The study was conducted by researchers affiliated with the institution, and all participants are internal stakeholders with existing relationships to institutional leadership. These conditions are known to inflate self-report ratings in organisational research. Table 2 records a social desirability risk rating for each domain, distinguishing between constructs where visible, easily verifiable outcomes (infrastructure, reputation) are more susceptible to bias and constructs requiring genuine insider engagement (Process, Purpose) where bias is somewhat less likely. The differential between the relatively lower ratings for Purpose ($M = 3.96$) and Process ($M = 3.81$) compared to People ($M = 4.30$) and Place ($M = 4.22$), and the lower ratings for Academic Excellence ($M = 3.90$) compared to Infrastructure ($M = 4.48$) and Reputation ($M = 4.44$), reflects a pattern consistent with genuine differentiation, not merely uniform positivity. The absolute levels should be interpreted with caution, however: the quantitative data establish relative comparisons and perceptual patterns, not definitive measures of institutional quality.

4.2 Descriptive Patterns Across Domains and Outcomes

Table 2 presents descriptive statistics for all 4P domains and transformation outcomes.

Table 2: Descriptive Statistics: Stakeholder Perceptions Across 4P Domains and Transformation Outcomes ($N = 223$)

Domain / Outcome	Students M (SD)	Faculty M (SD)	Admin M (SD)	Overall M	Overall SD
Purpose	3.96 (0.88)	3.97 (0.85)	3.94 (0.91)	3.96	0.88
People	4.30 (0.89)	4.31 (0.86)	4.29 (0.92)	4.30	0.89
Process	3.81 (0.85)	3.82 (0.83)	3.80 (0.88)	3.81	0.85
Place	4.22 (0.87)	4.23 (0.84)	4.20 (0.91)	4.22	0.87
Institutional Reputation	4.43 (0.85)	4.46 (0.82)	4.41 (0.87)	4.44	0.84

Infrastructure Development	4.47 (0.80)	4.50 (0.78)	4.45 (0.83)	4.48	0.81
Academic Excellence	3.89 (0.90)	3.91 (0.87)	3.88 (0.92)	3.90	0.89

Note. Five-point scale (1 = Very Low to 5 = Very High). All means fall above 3.80; absolute values should be interpreted with caution given the social desirability concerns discussed in Section 4.1. The relative pattern - People and Place rated higher than Purpose and Process; Infrastructure and Reputation rated higher than Academic Excellence - is the analytically meaningful finding.

The relative pattern is consistent with the ASLM's propositions. Relational engagement (People) and environmental investment (Place) received the strongest ratings among the 4P domains. Infrastructure and Reputation received the highest transformation outcome ratings. Academic Excellence, while positively perceived, received the lowest rating and showed greater variance, consistent with the ASLM's prediction that academic reforms develop more slowly and with greater stakeholder uncertainty than visible, infrastructure-driven gains.

4.3 Group Comparisons

Table 3 presents Kruskal–Wallis results testing for significant perceptual differences across stakeholder groups, with social desirability risk annotations.

Table 3: Kruskal–Wallis Group Comparisons Across 4P Domains and Transformation Outcomes (N = 223)

Domain Outcome	H (df = 2)	p	Significant?	ε^2	Social Desirability Risk and Interpretation
Purpose	2.24	.33	No	—	Moderate risk (insider sample). The null group difference is consistent with shared experience of strategic direction but also with social desirability in a sample with common institutional affiliations. Lower susceptibility than visible-outcome domains.
People	1.95	.38	No	—	Moderate risk. Shared perception of relational leadership may reflect genuine cross-role experience of openness and accessibility, or

					shared incentive to affirm positive perceptions of leadership approachability.
Process	2.08	.35	No	—	Moderate risk. Process-level governance is less easily verified by all respondents, slightly reducing susceptibility to observer-expectancy effects.
Place	2.14	.34	No	—	Moderate-to-high risk. Physical and digital infrastructure is highly visible, making positive responses more socially normative; the high mean (4.22) should be interpreted cautiously.
Reputation	2.01	.37	No	—	High risk. Institutional reputation is visible, publicly discussed, and tied to participant pride in their institution. Uniform elevation is plausible partly as impression management.
Infrastructure	1.93	.38	No	—	High risk. Infrastructure improvements are the most observable domain outcome. All three groups can easily identify and affirm these gains, creating strong conditions for uniform social desirability.
Academic Excellence	1.62	.44	No	—	Lower risk. Academic quality is harder to assess without direct engagement in teaching, research, or student outcomes. The lower mean (3.90) and greater variance are more consistent with genuine differentiation.

Note. No significant group differences were observed for any domain or outcome (all $p > .30$). Epsilon-squared not reported for non-significant comparisons. Uniformity across groups is

consistent with institution-wide leadership reach under the ASLM and with social desirability effects operating across groups; neither interpretation can be ruled out from this design.

No statistically significant group differences emerged for any domain or outcome, consistent with the ASLM's proposition that adaptive sequencing produces shared institutional experience rather than group-specific perceptions. The null result is also consistent with ceiling effects and social desirability bias producing uniform elevation. Both interpretations are acknowledged, and the qualitative data are used below to assess which is more plausible.

4.4 Supplementary Correlational Evidence

Table 4 presents exploratory Spearman correlations with 95% confidence intervals, organised by their theoretical alignment with the ASLM. These associations are cross-sectional and describe co-occurrence of perceptions at one point in time. They do not establish temporal precedence or causation.

Table 4: Exploratory Spearman Correlations Among 4P Domains and Transformation Outcomes, with ASLM Alignment Annotations (N = 223)

Association	ρ	p	95% CI (ρ)	Theoretical Link	ASLM Stage
People Reputation →	.63	< .001	[.53, .71]	Relational legitimacy visibility →	Stage 1
Place Reputation →	.59	< .001	[.48, .68]	Infrastructure credibility →	Stage 1–2
Process Infrastructure →	.57	< .001	[.46, .66]	Governance tangible outcomes →	Stage 2
Purpose Academic Excellence →	.49	< .001	[.37, .59]	Vision academic outcomes (lagged) →	Stage 3
People Purpose →	.61	< .001	[.51, .70]	Relational behavioural alignment →	Cross-domain

Process Purpose →	.54	< .001	[.43, .64]	Structural strategic clarity →	Cross-domain
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Page | 24 *Note. 95% CIs calculated using Fisher's z-transformation. All correlations significant at $p < .001$. The pattern of associations is consistent with the ASLM's domain-outcome mapping. These are cross-sectional correlations and do not establish the temporal precedence required by the sequencing argument; temporal evidence is provided by the qualitative strand in Section 4.5.*

The domain-outcome specificity in the correlation pattern is noteworthy. People and Place show stronger associations with Reputation outcomes than with Academic Excellence, while Purpose shows its strongest association with Academic Excellence. This specificity is more consistent with the ASLM's domain-outcome mapping than with a halo effect, which would produce approximately uniform correlations across all pairings.

4.5 Qualitative Evidence: Themes and Temporal Interpretation

The qualitative strand provides three categories of evidence that address aspects of the ASLM the quantitative data cannot. Participant accounts of domain salience confirm the relative prominence of People and Place: relational accessibility, open forums, and environmental improvements were the most frequently cited unprompted references to leadership impact. Participants' temporal accounts, describing when and why particular reforms were prioritised, provide the strongest available evidence for the sequencing mechanism. Participant accounts of constraints and limitations provide qualitative texture inconsistent with uniform social desirability.

4.5.1 Temporal Evidence for Sequencing

Several participants spanning senior administration, deans, and faculty described a conscious prioritisation logic in which infrastructure and reputation were addressed before academic reforms were pursued. The convergence of this account across different organisational roles is itself significant: it was not one unusually articulate participant but a consistent narrative across P1, P4, P6, and P10.

"The first thing was to show that we could build and be seen. You needed to establish that UMaT was a serious higher education institution even before you could talk about changing how we teach or do research. The buildings and the digital systems came first and that was deliberate. (P1, Senior Administrator)"

"I believe reputation was always going to be stronger. You attract partnerships and funding first. Then you have the resources and the legitimacy to make the harder changes inside. (P4, Dean)"

"I think the sequencing is real. Infrastructure gave us credibility. Credibility gave us partnerships. Partnerships give us the foundation for research excellence. But that last step is still developing and it takes much longer. (P10, Faculty Member)"

These accounts describe deliberate prioritisation, a temporal ordering, and a causal logic - visible gains enabling later academic reforms - that maps directly onto Proposition 1's legitimacy-generation claim. They constitute the primary evidence for adaptive sequencing as an interpretive account rather than a demonstrated causal mechanism.

Page | 25 **4.5.2 Constraints and Critical Accounts**

Participants across roles also described structural constraints and developmental gaps, evidence inconsistent with uniform social desirability. These critical accounts came from the same participants who affirmed leadership performance, which strengthens the credibility of both sets of accounts.

"Financial constraints are quite severe. We rely on government subventions that are delayed. Capital projects depend on state allocations that may not be available when we need them. (P3, Senior Administrator)"

"Succession planning is our most vulnerable point. What we have built is tied to one person's energy and vision. If that changes, I'm not sure the momentum survives. (P6, Dean)"

"Monitoring and evaluation are weak. We introduce initiatives but we don't systematically track whether they work or not. (P10, Faculty Member)"

These accounts directly address Proposition 3's boundary conditions: they identify where the sequencing mechanism is most likely to break down - succession vulnerability, monitoring gaps, and funding dependence are precisely the conditions under which pre-existing stakeholder trust cannot be assumed to persist.

4.6 Synthesis: What the Evidence Establishes

Three meta-inferences emerge. The relative pattern of perceptions - People and Place higher than Purpose and Process; Infrastructure and Reputation higher than Academic Excellence - is consistent with the ASLM's domain-outcome mapping and is more specific than a halo or social desirability effect would produce. The temporal and causal accounts in the qualitative data provide evidence for deliberate sequencing that the cross-sectional quantitative data cannot supply; without these accounts, the sequencing claim would rest on correlation alone. Transformation is perceived as genuine but fragile: shared perceptions of progress coexist with specific structural vulnerabilities - financial constraint, succession risk, weak monitoring - that qualify optimistic readings of the quantitative pattern. Table 5 provides a compact proposition-evidence summary, indicating the degree of support, the primary evidence source, and what remains untested for each of the three ASLM propositions.

Table 5: Proposition-Evidence Summary: Support Level, Primary Evidence, and What Remains Untested

Proposition	Core Claim	Evidence: What Supports It	Evidence: Suggestive Only	What Remains Untested
P1 Legitimacy Generation	Leaders who prioritise Purpose and Place reforms early generate symbolic legitimacy mediating the relationship between leadership behaviours and later academic transformation.	Convergent qualitative accounts across P1, P4, P6, and P10, spanning senior administration, deans, and faculty, describe deliberate prioritisation of visible reforms before academic transformation. Cross-role convergence strengthens evidential weight.	Quantitative correlation pattern is consistent with P1's domain-outcome mapping but is cross-sectional, establishing perceptual co-occurrence, not temporal precedence. Social desirability bias cannot be ruled out.	Whether legitimacy, rather than external funding cycles, state capital allocations, or national STEM policy tailwinds, is the primary generative mechanism. Longitudinal measurement of legitimacy perceptions before and after early visible reforms is needed.
P2 Legitimacy Amplification	Once established through early sequencing, stakeholder legitimacy moderates the relationship between structural reforms and	Non-significant Kruskal–Wallis results across all three stakeholder groups (all $p > .30$) are consistent with institution-wide diffusion.	Null group differences are equally consistent with ceiling effects and uniform social desirability bias. No direct measure of legitimacy as a	SEM with legitimacy as an explicitly measured latent moderator between structural investment and institutional

	institutional outcomes, yielding broader impact when legitimacy is present.	Moderate-to-strong cross-domain correlations ($\rho = .54-.63$) suggest structural reforms co-occur with positive outcomes across the full sample.	moderating variable was included; P2 is inferred from outcome patterns.	outcomes. Multi-institution comparison testing whether the same structural reforms yield different outcomes depending on prior legitimacy level.
P3 Boundary Conditions	Effectiveness of adaptive sequencing depends on: sufficient baseline institutional integrity; leader discretionary capacity; and pre-existing stakeholder trust sufficient to attribute early gains to leadership competence.	All three boundary conditions receive direct qualitative support — P3 (resource dependency), P6 (succession vulnerability), and P10 (weak M&E) — from participants who also affirmed leadership performance, reducing social desirability as a competing explanation.	Pre-existing trust is difficult to evidence retrospectively. Critical accounts represent a small portion of the qualitative data; majority or minority status cannot be determined.	Comparative cases in which one boundary condition is absent. Succession research tracking whether transformation trajectory is sustained or disrupted after leadership transition.
Cross-P Feedback Continuity	Weak M&E systems limit the feedback loop through	Identified by P10 and corroborated by P6 and P3.	This emergent finding was not specified in advance. It	Formal incorporation of feedback continuity as a

	which sequencing gains are consolidated into sustained transformation. This cross-cutting condition emerged empirically.	Consistent with the documented weak M&E finding in Section 4.5.2.	may reflect the concerns of a vocal minority rather than institution-wide experience.	fourth boundary condition in P3, to be tested comparatively.
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Note. Support levels assessed from UMaT case only; none of the propositions has been tested comparatively. 'Supports' indicates convergent evidence from qualitative accounts and quantitative pattern; 'suggestive' indicates one strand only or evidence consistent with rival explanations. P1–P3 correspond to the formal propositions in Section 2.9.

5. Discussion

This study examined strategic leadership in a resource-constrained African STEM university and proposed the ASLM to explain the observed pattern of institutional transformation. Before interpreting the results, it is important to restate the epistemological frame that governs all interpretation in this section: adaptive sequencing is treated throughout as a plausible interpretive account emerging from participant narratives, not as a demonstrated causal process. The cross-sectional design prevents causal inference, and the qualitative evidence provides interpretive depth but not causal confirmation. All claims are made within this constraint. The results are largely consistent with the model's propositions but also reveal interpretive tensions and alternative explanations that appropriately constrain its claims.

5.1 Leadership as a Behavioural–Structural–Relational System

The consistent perception of leadership effectiveness across stakeholder groups, combined with moderate-to-strong cross-domain associations, is consistent with the systemic nature of leadership influence proposed in the ASLM. Rather than operating through discrete behavioural or structural channels, leadership appeared to function through co-activation of relational trust, structural credibility, and symbolic visibility - consistent with Proposition 1's expectation that early visible gains in Purpose and Place produce legitimacy effects that spill over into other domains. The social desirability risk is addressed in Section 4.3 and the mitigation procedures described in Section 3.4. A longitudinal study capturing perceptions at multiple points, including periods of institutional difficulty, would provide a more discriminating test of whether the uniformity reflects genuine institutional transformation or shared impression management.

5.2 Adaptive Sequencing: Evidence, Limits, and Rival Explanations

The most important evidence for the ASLM's sequencing account is the qualitative temporal testimony from participants who described a deliberate prioritisation of visible reforms before academic transformation. These accounts - convergent across senior administrators (P1, P3), deans (P4, P6), and faculty (P10) - describe sequencing as intentional strategy rather than structural inevitability, providing the temporal and causal evidence that the cross-sectional quantitative data cannot supply. The correlation pattern - People and Place more strongly associated with Reputation; Purpose more closely associated with Academic Excellence - is consistent with the model's domain-outcome mapping but, as noted in the results tables, establishes co-occurrence rather than precedence.

Two rival explanations require substantive engagement, not merely acknowledgement. First, and most seriously, capital projects and visible institutional gains may have been substantially shaped by state allocations, donor funding cycles, and Ghana's national STEM policy agenda that were largely exogenous to leadership agency. Specifically, Ghana's national STEM Capital Investment Programme - under which public universities received targeted infrastructure grants during the study period - and the Ghana Chamber of Mines Partnership Fund for applied research and facility development both provided resources to UMaT that were not equivalently available to institutions outside the STEM designation. On a strict resource dependence reading (Pfeffer & Salancik, 1978), any institution in UMaT's position within this policy architecture might have followed the same reform sequence regardless of the specific leader's decisions. This alternative cannot be ruled out from the current design. The qualitative accounts provide partial countervailing evidence - participants describe active cultivation of industry partnerships and deliberate framing of reputational strategy as prior to, rather than simply responsive to, external funding availability - but these are retrospective accounts from institutional insiders who may rationalise structural outcomes as deliberate strategy. The study cannot calculate the relative contribution of leadership agency versus structural policy conditions to the observed sequencing pattern, and this inability constitutes the study's most important empirical limitation. Second, academic improvements may reflect parallel processes - faculty initiative, accreditation cycles, curriculum reform requirements - rather than being unlocked by prior visible gains. The sequencing claim rests on participant accounts and perceptual co-occurrence, not on demonstrated temporal precedence. The study therefore presents adaptive sequencing as a plausible and participant-supported interpretation, not as the demonstrated mechanism of academic development.

5.3 Situating the UMaT Case within Global Higher-Education Leadership Scholarship

Three assumptions common in global leadership theory are complicated by the UMaT evidence, offered as propositions for comparative testing rather than as demonstrated revisions. The assumption that effective transformation requires managerial autonomy and resource abundance is complicated by the evidence that legitimacy, relational trust, and symbolic visibility appear to have substituted for material capacity in this context. The assumption that structural reforms precede symbolic or relational shifts appears to be reversed here, where symbolic and relational gains preceded structural consolidation - a sequencing not predicted by managerialist models.

The assumption that stakeholder alignment derives from rational incentive structures is complicated by the evidence that alignment at UMaT emerged from moral authority, visible effort, and participatory engagement - factors foregrounded in African leadership scholarship (Wanjala, 2023; Nkomo, 2011) but often marginalised in Western leadership theory. A single case can illustrate why existing theory may be insufficient and motivate a theoretical revision, but cannot by itself demonstrate that revision's generality. The three propositions in Section 2.9 provide the testable form of these claims for future research.

5.4 African Contextualisation: Relational Legitimacy and Its Limits

African leadership scholarship highlights communal accountability, Ubuntu-grounded relationality, and moral legitimacy (Wanjala, 2023; Nkomo, 2011). The findings resonate with these traditions: stakeholders interpreted leadership influence through fairness in decision-making, accessibility and humility, visible effort despite constraints, and consistent communication. Relational legitimacy alone cannot overcome structural delays, procurement constraints, or succession vulnerabilities, however. Africa-specific leadership logics are necessary but not sufficient for sustained transformation. This nuanced approach advances African higher-education leadership theory by balancing cultural relationality with structural realism.

5.5 Structural Constraints and Model Refinement

Stakeholders consistently identified financial constraints, bureaucratic bottlenecks, and weak monitoring systems as threats to the sustainability of transformation. Two model limitations follow. First, adaptive sequencing may be reversible: if legitimacy erodes due to stalled projects or changing political environments, the sequencing cycle may break, causing stakeholders to lose confidence in deeper reforms. Second, strong perceptions of the Vice-Chancellor's leadership raise concerns about continuity. The model must account for the fragility of transformation when succession planning is weak - a concern raised explicitly by P6 and corroborated across the dean-level participants. Future comparative research should examine whether sequencing is sustained under successor leadership or collapses into the compliance-driven pattern it replaced.

5.6 Theoretical Contributions

The findings yield three theoretical propositions derived from this case. The ASLM proposes extending the 4P Framework from a static descriptive tool into a dynamic, temporally ordered model of leadership under constraint, an extension that requires comparative evidence to confirm. It proposes that behavioural influence requires strategic sequencing to have institutional effect in resource-scarce settings, qualifying rather than replacing Transformational Leadership Theory. And it proposes a symbolic and relational mechanism through which resource prioritisation generates legitimacy - a mechanism absent from purely structural accounts but currently evidenced only from one institution. Each proposition requires future comparative and longitudinal testing before it can be treated as a demonstrated generalisation.

6. Conclusion and Implications

6.1 Conclusion

This study demonstrates that institutional transformation in a resource-constrained African STEM university may depend not merely on what leaders reform, but on how they sequence reforms over time. The evidence from UMaT suggests that early, visible reforms in Purpose and Place can generate legitimacy and stakeholder confidence, which subsequently enable deeper reforms in People and Process. Through the Adaptive Sequencing Leadership Model, the study therefore conceptualises legitimacy not only as an outcome of effective leadership but also as a strategic resource that can amplify later structural and cultural transformation.

The findings are consistent with the ASLM's propositions concerning legitimacy generation, legitimacy amplification, and the boundary conditions of institutional integrity, executive discretion, and pre-existing trust. However, because the evidence derives primarily from qualitative accounts within a single insider case, these propositions should be regarded as theoretically informed explanations requiring comparative and longitudinal testing rather than confirmed causal claims. The study's central contribution is therefore the proposition that, under conditions of scarcity, effective strategic leadership lies in deliberately sequencing achievable and symbolically meaningful reforms to build the legitimacy required for more difficult and enduring institutional change.

6.2 Theoretical and Governance Implications

Three theoretical and governance implications emerge from the study. First, leadership effectiveness in resource-constrained institutions arises from the interaction of behavioural, structural, and relational mechanisms. Governance frameworks that emphasise managerial competence, strategic planning, or regulatory compliance alone therefore provide an incomplete account of how leaders generate influence and mobilise institutional change. Leadership development programmes should consequently cultivate multidimensional capabilities, including vision, symbolic communication, stakeholder engagement, trust-building, and structural reform, rather than technical competence alone.

Second, legitimacy must be institutionalised rather than personalised. Transformation that depends heavily on a leader's relational trust and symbolic authority remains vulnerable to leadership succession. Governance systems should therefore embed legitimacy in transparent communication, participatory decision-making, accountable structures, and stable procedural norms that endure beyond an individual leader's tenure.

Third, governance expectations should recognise the sequential nature of transformation in resource-constrained institutions. Leaders may need to prioritise visible, symbolic, and relational reforms to generate the legitimacy and stakeholder support required for subsequent academic and cultural consolidation. Accreditation and quality-assurance frameworks that demand simultaneous transformation across all institutional domains may therefore impose unrealistic expectations and potentially weaken the sequencing processes through which sustainable change becomes possible.

6.3 Directions for Future Research

Four research directions are particularly important for testing and refining the ASLM. First, comparative case studies across African and other global STEM universities are required to test the model's three propositions under varied institutional conditions and establish the scope and boundary conditions of adaptive sequencing.

Second, longitudinal research is needed to determine whether early visible gains predict deeper academic and cultural transformation over time. Such research is essential because the temporal relationship at the centre of the ASLM cannot be established through cross-sectional evidence.

Third, quantitative studies employing structural equation modelling could test the relationships among behavioural, structural, and relational leadership mechanisms, stakeholder legitimacy, and transformation outcomes. This would provide a necessary second-stage test of the mediating and moderating relationships specified in Propositions 1 and 2.

Fourth, succession-focused research should examine whether institutional sequencing trajectories are sustained, redirected, or disrupted following leadership transitions. This would test one of the model's most practically significant expectations: transformation grounded predominantly in an individual leader's legitimacy may remain fragile unless that legitimacy is embedded in governance structures, institutional procedures, and organisational culture.

By theorising adaptive sequencing and providing preliminary evidence of its operation, this study offers a framework for understanding leadership-driven transformation wherever institutional ambitions exceed available resources. Its principal contribution lies not in treating the UMaT case as universally representative, but in advancing three testable propositions and a transferable analytical lens for future comparative, longitudinal, and quantitative research.

Declarations

Conflict of Interest: The authors hold an institutional affiliation with the study site (UMaT). Mitigation procedures are described in Section 3.4.

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