



FROM INNOCULTURE TO INNOVATION ECOSYSTEMS: RE-READING AFRICA'S COMPETITIVENESS CHALLENGE THROUGH SMALL-STATE INNOVATION GOVERNANCE

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Abstract

Africa's competitiveness challenge is often framed in terms of limited finance, infrastructure, skills, research capacity and institutional weakness. While these constraints remain significant, this paper argues that they do not fully explain why growing innovation activity across the continent has not consistently translated into stronger productive and technological capabilities. Revisiting the concept of Innoculture, the paper develops a conceptual framework linking continuous learning and innovation culture to ecosystem connectivity, innovation governance, capability accumulation and differential advantage. The central argument is that innovation becomes more consequential for competitiveness when dispersed actors, resources and knowledge are connected and governed in ways that allow capabilities to accumulate over time. The framework is developed particularly for resource-constrained small African states, where limited institutional, financial and technological resources make fragmentation especially costly and strategic coordination more consequential. Five conceptual propositions are advanced to explain the relationships among Innoculture, ecosystem connectivity, governance, capability accumulation and competitiveness. The paper contributes by extending Innoculture beyond its original cultural emphasis and by positioning innovation governance as the mechanism through which innovation activity can become cumulative capability. It concludes that competitiveness depends not only on generating more innovation, but on building systems capable of learning from and building upon successive innovation efforts.

Keywords: *Innovation governance; capability accumulation; competitiveness; small African states; innovation systems*

INTRODUCTION

Africa's Persistent Competitiveness Puzzle

Africa's competitiveness challenge presents a familiar but persistent puzzle. Across the continent, governments and development partners have invested in entrepreneurship programmes, innovation hubs, universities, digital infrastructure, research and enterprise support. African entrepreneurs have also demonstrated considerable capacity to adapt, identify opportunities and develop new products, services and business models. Yet this growing innovation activity has not consistently translated into stronger productive capabilities, technological upgrading or sustained improvements in the international competitiveness of many African economies.

This matters because competitiveness is relative. Countries develop in an environment in which other economies are also learning, investing and building new capabilities. An economy may expand its universities, train more entrepreneurs or increase innovation support and still lose competitive ground if comparable economies are developing productive and technological capabilities more rapidly. The more difficult question, therefore, is not simply whether innovation is occurring, but whether it is accumulating into capabilities that allow firms, industries and economies to compete more effectively over time.

Much of the debate has understandably focused on Africa's constraints: limited research and development expenditure, infrastructure gaps, shortages of specialised skills, restricted access to finance, weak university-industry linkages and institutional limitations. These constraints matter, but they do not fully explain why existing innovation activities often remain fragmented, why promising initiatives struggle to survive beyond individual projects, or why knowledge and entrepreneurial activity do not always develop into broader technological and productive capabilities.

The problem may therefore lie not only in the quantity of resources devoted to innovation, but also in how existing resources, institutions and actors are connected and governed. Universities may produce knowledge without strong pathways into industry; entrepreneurs may develop promising solutions without access to finance or markets; and externally supported projects may weaken once funding ends. Innovation actors can consequently occupy the same national space without necessarily functioning as an effective innovation system.

An earlier formulation of this problem introduced Innoculture as a culture in which learning, experimentation and innovation become embedded in how societies and institutions pursue competitiveness (Ikonne, 2016). Its central proposition was that sustainable competitive advantage requires more than the possession of resources. It requires the capacity to learn

from those resources, combine them with knowledge and continually identify areas of differential advantage.

That proposition remains useful, but it raises a further question: can a culture of innovation, by itself, explain how innovation becomes sustained national capability? A society may value entrepreneurship and experimentation while the institutions required to support, finance, diffuse and commercialise innovation remain poorly connected. Moving from innovative behaviour to competitive capability therefore requires attention to the ecosystem within which innovation takes place and, importantly, to how that ecosystem is governed.

This question is particularly relevant to small African states. Limited domestic markets, specialised expertise and research resources can restrict the scale of their innovation systems. Yet smaller systems may also offer shorter institutional distances and opportunities for more deliberate coordination. Their competitiveness may therefore depend not simply on the volume of innovation resources available, but on how effectively those resources are connected and directed towards areas where national needs, existing capabilities and market opportunities intersect.

Against this background, the paper revisits *Innoculture* and extends it from its original emphasis on learning and innovation culture towards a broader explanation of innovation ecosystems and their governance. It asks how resource-constrained small African states can move from dispersed innovation activities towards governed ecosystems capable of accumulating productive, technological, institutional and market capabilities. The central argument is that *Innoculture* provides an important cultural foundation, but culture alone is insufficient. Innovation becomes more consequential for competitiveness when actors and resources are connected and governed in ways that allow capabilities to accumulate.

The paper therefore proposes the following progression:

Innoculture → *Ecosystem Connectivity* → *Innovation Governance* → *Capability Accumulation* → *Differential Advantage* → *Competitiveness*

The paper makes three related contributions. First, it revisits *Innoculture* and positions it within innovation systems and ecosystem thinking. Second, it introduces innovation governance as the mechanism through which dispersed actors and resources can be coordinated around capability development. Third, it brings small-state conditions into the argument, proposing that where innovation resources are constrained, the quality of coordination may be as consequential as the quantity of resources available. The resulting question shifts from whether African economies have sufficient innovation activity to whether that activity is organised in ways that allow capabilities to accumulate and strengthen competitiveness.

BACKGROUND, PROBLEM AND CONCEPTUAL GAP

Africa's competitiveness challenge is often explained through what its economies lack: adequate infrastructure, research funding, specialised skills, access to finance, industrial depth and strong institutions. These constraints remain important, but the deficit-based explanation is incomplete. It says less about why capabilities and innovative activities that already exist do not always combine to produce stronger productive and competitive outcomes. African innovation research increasingly points to structural and systemic weaknesses, including difficulties in building technological capabilities and coordinating institutions involved in research, innovation and industrial development (Ahmad et al., 2022; Twiringiyimana et al., 2021).

Innovation capacity therefore cannot be inferred simply from the number of universities, research programmes, entrepreneurship initiatives, innovation hubs or financing schemes within an economy. What also matters is whether knowledge, institutions, enterprises, finance, markets and public policy interact in ways that allow learning to accumulate and promising ideas to move into productive and commercial use (Twiringiyimana et al., 2021).

This paper approaches the problem through two related ideas: **competitive relativity**, recognising that countries develop capabilities while other economies are simultaneously learning and innovating; and **innovation conversion**, concerned with turning knowledge, experimentation and entrepreneurial activity into capabilities that endure beyond individual projects. *Innoculture* sits at the intersection of these concerns.

Africa's Competitiveness Challenge

Competitiveness is dynamic. Technologies change, markets evolve and capabilities that once differentiated firms or countries can become commonplace. An economy's position therefore depends not only on the resources it possesses, but also on its capacity to learn, adapt and build new productive and technological capabilities. African evidence similarly points to relationships between the configuration of innovation systems, economic growth and sustainable competitiveness (Ahodode, 2023). This makes **relative progress** important. Improvements in education, digital infrastructure, entrepreneurship or research capability may represent genuine development without necessarily narrowing the competitive distance between economies. Other countries are improving at the same time. What matters is not simply whether capabilities are growing, but whether they are developing sufficiently—and in relevant areas—to create or sustain advantage.

Resources operate in much the same way. Natural resources, labour, geographical location or market access do not automatically translate into competitiveness. Their value depends partly on the knowledge, technology, enterprise capabilities and institutions built

around them. African industrialisation scholarship similarly emphasises local technological and innovation capabilities in translating resource potential into sustained industrial development (Ahmad et al., 2022). The issue, therefore, is not simply how African economies can acquire more resources for innovation, but how existing and emerging resources can be combined to build capabilities over time.

Competitive Relativity and the Origins of Innoculture

It is within this understanding of competitiveness that *Innoculture* was originally conceived. The concept argues that innovation should not be treated simply as the introduction of new technology or an activity confined to entrepreneurs, scientists or research institutions. For innovation to contribute consistently to competitiveness, learning, experimentation and the search for better ways of creating value need to become embedded in institutions, enterprises and society (Ikonne, 2016).

Innoculture therefore describes a culture in which learning and innovation become continuous rather than occasional activities and are connected to the search for differential advantage. Its concern is not novelty for its own sake, but the capacity to recognise change, learn from it and apply knowledge in ways that create economic and societal value. Its underlying logic can be expressed as:

Learning → Innovation → Anticipation → Differential Advantage → Competitiveness

Learning strengthens the capacity to understand problems and recognise opportunities. Innovation applies that learning through new or improved products, processes, services or institutional arrangements. Anticipation extends the process towards emerging technological, market and societal changes. Applied in areas where an economy has, or can develop, distinctive strengths, these capabilities can contribute to differential advantage (Ikonne, 2016). This makes an important distinction between **innovation and innovation capability**. Individual innovations may succeed without creating the conditions for further innovation. Capability, by contrast, develops through capacities that can be learned, retained and recombined (Mushangai, 2023). *Innoculture* therefore emphasises continuity: learning should produce innovation, innovation should generate further learning, and both should strengthen the capacity to respond to change.

There is, however, a limitation. A culture that values learning and experimentation does not automatically provide research infrastructure, finance, technical expertise, regulatory support or routes to market. Moving from innovative behaviour to sustained economic capability requires an **institutional explanation as well as a cultural one**.

From Innovation Activity to Innovation Capability

Innovation activity is comparatively visible: universities establish innovation centres, governments introduce entrepreneurship programmes, researchers develop prototypes and startups introduce new services. Each may create value. Innovation capability goes further. It develops when knowledge, skills, institutions, infrastructure and relationships become sufficiently embedded for innovations to be generated, absorbed, improved, financed, commercialised and reproduced over time. African research has identified weaknesses not simply in resources, but in interactions among innovation actors and in the governance capabilities required to make research and innovation systems work effectively (Twiringiyimana et al., 2021). The difficulty, therefore, may not always be an absence of innovation activity. **It may be that innovative activity does not accumulate into capability.**

We describe this condition as **innovation fragmentation**: potentially useful innovation activities coexist but remain insufficiently connected to generate cumulative technological, enterprise and institutional capabilities. The term is used as an analytical description, not as an assumption that all African innovation systems are fragmented. This directs attention towards relationships: whether research reaches enterprises; whether firms and communities influence research priorities; whether promising innovations obtain finance; and whether knowledge generated through publicly funded programmes survives individual projects. Innovation-ecosystem research similarly shows that interdependence among heterogeneous actors creates both opportunities for value creation and challenges of coordination and governance (Reiter et al., 2024; Scheidgen et al., 2021).

The movement from *Innoculture* towards competitiveness therefore contains an institutional layer. Learning and innovative behaviour create possibilities; relationships among actors develop those possibilities; and governance becomes important if these relationships are to produce cumulative capabilities rather than remain disconnected activities.

The Conceptual Gap

Innovation systems and ecosystem scholarship explain important parts of this process. Innovation-system research emphasises relationships among firms, universities, government and other institutions involved in creating and diffusing knowledge. Ecosystem research places greater emphasis on interdependence among heterogeneous actors, while ecosystem-governance scholarship examines how actors, responsibilities and relationships are coordinated across organisational boundaries (Hoffmann et al., 2022; Reiter et al., 2024). The existence of an ecosystem, however, does not guarantee common direction. Governance involves questions of actor roles, relationships, coordination, shared objectives and value creation, while more

recent work also emphasises openness, mutual learning and systems-level capacity rather than control by a single central actor (Hoffmann et al., 2022; Smolka & Bösch, 2023).

The unresolved question for this paper is therefore:

How can resource-constrained African states connect and govern dispersed innovation actors and capabilities so that innovation activity accumulates into differential competitive advantage?

The question becomes especially important in small African states, where smaller markets, specialised skill shortages, narrower research systems and constrained public resources can limit the scale of innovation ecosystems. Yet smaller systems may also create shorter institutional distances and opportunities for deliberate coordination. Whether such proximity translates into stronger innovation performance is therefore a governance question, not an automatic consequence of smallness.

The conceptual gap addressed here sits **between innovation culture and competitive outcomes**. *Innoculture* explains the cultural and behavioural foundations of continuous learning and innovation. Innovation ecosystems explain how knowledge, resources and capabilities become connected. Innovation governance introduces coordination, prioritisation and feedback. What remains to be explained is how these elements work together under small-state resource constraints to produce **capability accumulation and differential advantage**.

The paper therefore proposes:

Innoculture → Ecosystem Connectivity → Innovation Governance → Capability Accumulation → Differential Advantage → Competitiveness

Small-state conditions are treated not simply as the setting for this progression but as a **boundary condition**. Where innovation resources are limited, the capacity to connect, coordinate and strategically deploy them may be as important as their absolute quantity.

THEORETICAL FOUNDATIONS

The argument developed in this paper sits at the intersection of four related but distinct bodies of thought. Innovation culture explains the behavioural environment within which learning and experimentation occur. Innovation systems and ecosystems shift attention towards the relationships through which knowledge and resources are combined. Innovation governance asks how these relationships are coordinated when no single actor possesses all the resources or authority required to produce innovation outcomes. Small-state scholarship adds a contextual dimension because scale affects both available resources and the institutional relationships through which they are governed.

Bringing these perspectives together helps explain the transition at the centre of this paper: how a culture of learning and innovation becomes sustained national capability capable of generating differential advantage.

Innovation Culture and Learning

Innovation rarely begins with technology alone. It also depends on whether individuals and institutions are willing and able to learn, question established practices, experiment and use knowledge in new ways. Research continues to connect organisational learning and innovation-supportive cultures with innovation capability (Alsaied & Alkhoraif, 2024), while knowledge sharing and organisational learning cultures have also been associated with more open forms of innovation (Naqshbandi et al., 2023).

This literature is useful for understanding *Innoculture*, but the two are not interchangeable. Much innovation-culture research concerns conditions within organisations—leadership, openness to ideas, knowledge sharing and experimentation. *Innoculture* begins from a wider concern: the relationship between learning, innovation and competitiveness at societal and national levels (Ikonne, 2016).

For the present paper, learning provides the bridge between them. It allows individuals and organisations to acquire and recombine knowledge and adapt as technologies, markets and societal needs change. Evidence from an African emerging-economy context similarly associates organisational learning capability with innovation and SME performance (Zand, 2024). Learning is also cumulative: what is learned through one innovation can inform subsequent experimentation when that knowledge is retained and shared.

Innoculture extends this reasoning by placing learning within the search for differential advantage. The question is not simply whether learning produces more innovation, but whether repeated learning and innovation strengthen capabilities that allow an economy to perform more effectively or distinctively over time (Ikonne, 2016).

Culture, however, cannot perform this function alone. Learning has to travel. Knowledge generated in universities needs pathways into firms and communities; enterprise experience needs to inform research and policy; innovators need access to finance and markets; and user feedback needs to return to the innovation process. This takes the argument from innovation culture towards innovation systems and ecosystems.

National Innovation Systems and Innovation Ecosystems

Innovation-system thinking challenged the idea that innovation could be understood by examining firms or research organisations in isolation. Its central insight is relational: innovation

emerges through interactions among firms, universities, governments, research organisations and other institutions involved in creating, adapting and applying knowledge.

More recent ecosystem research takes this interdependence further. Innovation and entrepreneurial ecosystems are increasingly understood as configurations of actors whose resources, activities and outcomes depend on one another. Research emphasises shared resources, knowledge spillovers and institutional support, as well as the institutional and relational dimensions through which ecosystems develop (Bouncken & Kraus, 2022; Fernandes & Ferreira, 2022).

The implication is important: having the right actors is not the same as having a functioning ecosystem. Universities, financiers, governments, business associations and entrepreneurs may occupy the same geographical space while maintaining weak relationships. What gives the ecosystem analytical meaning is not simply their presence, but their interaction.

Network-oriented research reinforces this point by placing inter-organisational relationships, collaboration and knowledge transfer at the centre of ecosystem formation and performance (Scott et al., 2022; Johnson et al., 2022). This provides a useful extension of *Innoculture*:

Innoculture creates a disposition towards learning and innovation; ecosystem connectivity provides the relationships through which that learning can circulate and combine.

Yet connectivity introduces another problem. Networks contain actors with different interests, incentives, resources and influence. Greater interaction does not automatically produce shared priorities or collective capability. Ecosystems therefore raise questions not only about connection, but about coordination.

Innovation Governance

Innovation governance addresses this coordination problem. Innovation ecosystems differ from conventional organisations because participants are rarely controlled through a single hierarchy. Universities, firms, government agencies, financiers, entrepreneurs and intermediaries retain their own mandates and interests. Cooperation therefore has to occur across organisational boundaries.

Recent research increasingly treats governance as central to understanding how such arrangements function. Ecosystem studies examine how heterogeneous actors coordinate interdependent activities and how governance arrangements change as ecosystems become more complex (Scott et al., 2022; Reiter et al., 2024). Reiter et al. (2024), for example, show that ecosystems involving multiple types of complementors may require differentiated

governance arrangements, while Clough (2026) argues that different ecosystem architectures generate different coordination problems and governance requirements.

Governance, in this sense, should not be confused with government. Government may convene, finance, regulate or provide policy direction, particularly in developing economies. Innovation governance refers more broadly to the mechanisms through which priorities are established, actors connected, resources mobilised, responsibilities negotiated, knowledge exchanged and collective learning sustained.

This distinction matters for African innovation policy. Establishing a ministry, innovation fund, technology hub or entrepreneurship programme may add another actor without necessarily improving how the system works. Ecosystem-policy research similarly cautions against reproducing institutional arrangements from elsewhere without regard to existing relationships and local conditions (Carayannis et al., 2022; Candeias & Sarkar, 2022).

For this paper, innovation governance therefore sits between ecosystem connectivity and capability accumulation. Connectivity creates opportunities to combine knowledge and resources; governance influences whether those interactions acquire sufficient direction, continuity and feedback to build capabilities that persist.

Small-State Innovation and Competitiveness

Small states typically operate with narrower institutional and human-resource bases than larger economies. A limited number of universities, research institutions, specialised firms, financiers and public agencies may perform functions distributed across much larger networks elsewhere. Overlapping responsibilities and specialised human-resource limitations can therefore create persistent capacity constraints (Corbett et al., 2021).

Smallness, however, is not only a disadvantage. Shorter organisational distances and close social networks can facilitate informal coordination. Yet these same characteristics can concentrate authority and create governance vulnerabilities. Comparative small-state research therefore cautions against assuming that smaller scale automatically produces more effective governance; capacity, accountability and concentration of authority may remain significant constraints (Corbett et al., 2021).

The important question is therefore how scale changes the relationship between coordination, capacity and institutional effectiveness.

For innovation governance, this has practical consequences. A small African state may not be able to reproduce the breadth of research infrastructure, specialist institutions or industrial capabilities found in larger economies. More important may be the ability to identify

areas where capabilities can realistically develop, connect the institutions relevant to those areas and deploy scarce resources in ways that generate cumulative learning.

This is where small-state conditions intersect with differential advantage. Scarcity increases the importance of choice. Where resources cannot be spread across every technological field or industrial ambition, national needs, existing capabilities, resource endowments, technological opportunities and potential markets have to be considered together.

This does not mean that governments can simply select future winners or engineer ecosystems from above. Ecosystem research cautions against such mechanical intervention and emphasises institutional context, relationships and entrepreneurial actors (Fernandes & Ferreira, 2022; Scott et al., 2022). Rather, the framework advanced here suggests that governance becomes more consequential as resources become more constrained. The challenge is to provide enough strategic direction to reduce fragmentation while retaining openness for experimentation, entrepreneurial discovery and learning.

Taken together, the four theoretical streams suggest a progression often examined in parts. Innovation culture explains why learning and experimentation occur. Ecosystem perspectives explain how actors and resources become connected. Governance explains how those relationships acquire coordination and direction. Small-state conditions shape the resources available and make strategic choices more consequential.

The synthesis leads to the central argument developed in the next section: Sustained innovation-based competitiveness in resource-constrained small states depends not only on the presence of innovative actors or a culture supportive of innovation, but on the capacity to connect and govern those actors in ways that produce cumulative capabilities in strategically relevant areas.

This provides the theoretical foundation for moving from *Innoculture* towards a governed innovation ecosystem.

FROM INNOCULTURE TO GOVERNED INNOVATION ECOSYSTEMS

The preceding discussion suggests that Africa's competitiveness challenge cannot be reduced to a shortage of innovation or innovative people. The more difficult question is how innovative activity becomes cumulative: how ideas, knowledge and experimentation are converted into capabilities that can be repeatedly mobilised to create economic and societal value. The starting point remains *Innoculture*. Its original formulation called for a nationally embedded culture of learning and innovation directed towards areas of potential differential advantage. It also recognised the need for ecosystems, stakeholder linkages and feedback loops capable of connecting ideas, institutions and resources (Ikonne, 2016). What remained

less developed was the governance mechanism through which these relationships could be sustained and converted into cumulative capability. **The present paper develops that missing layer.**

Innoculture as the Cultural Foundation

Innoculture occupies the first stage of the framework because innovation systems ultimately depend on human and institutional behaviour. Funding, infrastructure and incentives have limited effect where organisations do not learn, knowledge is poorly shared or innovation remains an occasional activity. The original formulation therefore placed **learning and anticipation** at the centre of competitiveness and viewed competitive position as relative rather than fixed (Ikonne, 2016). A culture supportive of learning, however, can generate ideas without necessarily creating the institutional relationships required to move them towards application and scale. This produces the first transition:

Innoculture* → *Ecosystem Connectivity

Knowledge becomes more economically useful when it can move between people and institutions.

Ecosystem Connectivity as the Conversion Mechanism

Ecosystem connectivity describes the ability of innovation actors to exchange knowledge, combine resources and perform complementary functions. Universities contribute research and specialised knowledge; enterprises bring production and market capabilities; government provides policy and regulatory frameworks; financiers provide capital; intermediaries connect actors; and users contribute knowledge about needs and adoption. Innovation-ecosystem research supports this emphasis on interdependence: value emerges through relationships among heterogeneous actors rather than through the performance of individual organisations alone (Reiter et al., 2024). Therefore, connectivity allows dispersed innovation resources to begin functioning as a system. But connectivity should not be mistaken for performance. Interaction can coexist with duplication, competing priorities and short-lived project relationships. The second transition is therefore:

Ecosystem Connectivity* → *Innovation Governance

Innovation Governance as Strategic Coordination

Innovation governance provides direction without requiring centralised control. It concerns how priorities are negotiated, complementary actors are connected, resources are mobilised, responsibilities are clarified, and learning is fed back into subsequent decisions.

Governed does not mean government-controlled. The state may convene, finance, regulate or provide strategic direction, but universities, firms, entrepreneurs, financiers and communities retain agency within the ecosystem. Different forms of interdependence may consequently require different governance arrangements (Reiter et al., 2024; Smolka & Bösch, 2023).

For resource-constrained states, governance also involves choice. Scarce financial, technological and institutional resources cannot be distributed equally across every possible field. Strategic governance therefore involves identifying areas where existing capabilities, national needs, market opportunities and technological possibilities offer realistic prospects for capability development. This is not an argument for governments to predict technological winners, but for avoiding the dispersion of scarce resources across disconnected initiatives that generate activity without cumulative capability.

From Governance to Capability Accumulation

The intended outcome of effective ecosystem governance is **the accumulation of capabilities**. Hence, capability accumulation occurs when successive innovation activities leave something behind: knowledge, specialised skills, infrastructure, institutional routines, enterprise capabilities, intellectual property, market relationships or stronger networks. Capabilities develop through learning, knowledge accumulation and the progressive ability to undertake more complex productive and innovative activities (Aistleitner et al., 2021; Gräbner & Hornykewycz, 2022). An innovation activity therefore contributes to competitiveness not merely because it produces an immediate output, but because it strengthens the system's capacity to undertake subsequent innovation. Evidence similarly associates accumulated technological capabilities and learning processes with subsequent innovation and productive performance (Figueiredo et al., 2021). The framework is therefore cumulative as follows:

Innoculture → Ecosystem Connectivity → Innovation Governance → Capability Accumulation

Each stage addresses a different constraint. *Innoculture* strengthens the disposition to learn and innovate. Connectivity allows knowledge and resources to circulate. Governance introduces coordination and strategic direction. Capability accumulation captures whether these processes leave the innovation system stronger than before. The final movement reconnects the framework to competitiveness:

Capability Accumulation → Differential Advantage → Competitiveness

Differential advantage emerges where accumulated capabilities allow an economy to develop distinctive strengths relative to competing locations. Knowledge creation, diffusion,

absorption and application have similarly been associated with innovation performance and competitive advantage across innovation ecosystems (Robertson et al., 2023). Such advantage need not originate in frontier technologies; it may arise from applying existing or emerging knowledge particularly effectively in areas consistent with a country's capabilities, resources and opportunities.

The Small-State Governance Proposition

Small African states provide a particularly revealing setting for the framework because resource scarcity makes fragmentation costly. Limited specialist expertise, finance and institutional capacity increase the consequences of disconnected innovation activities. At the same time, smaller institutional systems may facilitate closer relationships among key actors. As established in earlier section, however, institutional proximity does not guarantee effective coordination (Corbett et al., 2021).

The framework therefore treats **small-state conditions as a boundary condition affecting how innovation resources are governed**, rather than as either an inherent disadvantage or an automatic coordination advantage. This leads to the paper's central conceptual argument:

In resource-constrained small African states, innovation-based competitiveness depends less on the absolute volume of innovation activity than on the capacity to connect, govern and accumulate dispersed innovation resources around areas capable of generating differential advantage.

The framework consequently extends *Innoculture* rather than replacing it. *Innoculture* provides the cultural foundation for continuous learning, innovation and anticipation (Ikonne, 2016); ecosystem connectivity links dispersed actors and resources; innovation governance provides direction and continuity; and capability accumulation converts repeated innovation activity into a productive asset.

The complete progression is therefore:

Innoculture → Ecosystem Connectivity → Innovation Governance → Capability Accumulation → Differential Advantage → Competitiveness

This constitutes the proposed **Innoculture–Innovation Governance Framework** and provides the basis for the propositions developed in the next section.

CONCEPTUAL PROPOSITIONS

The preceding framework suggests that innovation-based competitiveness emerges through a cumulative process rather than from innovation activity alone. *Innoculture* provides

the behavioural foundation for learning and experimentation; ecosystem connectivity allows knowledge and resources to move between actors; governance gives these relationships strategic direction; and repeated interaction can produce capabilities from which differential advantage emerges. These relationships lead to five propositions.

Innoculture and Ecosystem Connectivity

A culture that encourages learning, experimentation and anticipation increases the likelihood that individuals and institutions will search for knowledge beyond their organisational boundaries. Its competitive value, however, depends partly on whether learning can move across the innovation system. Where universities, enterprises, government agencies, financiers and users remain weakly connected, valuable knowledge may remain confined to the institutions in which it originates. *Innoculture* should therefore be understood not only as a disposition towards innovation, but also as a foundation for interaction and knowledge exchange.

P1: Stronger Innoculture is positively associated with greater connectivity among actors within an innovation ecosystem.

Ecosystem Connectivity and Capability Accumulation

Connectivity allows actors with different resources and knowledge to perform complementary functions. Research can inform enterprise development, market experience can shape research priorities, finance can support commercialisation, and user feedback can improve subsequent innovation. These interactions contribute to capability accumulation when knowledge, relationships and institutional learning persist beyond individual programmes or projects.

P2: Greater ecosystem connectivity contributes positively to innovation capability accumulation when interactions generate sustained knowledge exchange, complementary resource use and institutional learning.

The Governance Effect

Connected actors do not necessarily share the same objectives or priorities. Without coordination, an ecosystem may contain considerable activity while still experiencing duplication, resource dispersion and weak continuity. Governance can improve this conversion process by aligning complementary actors, clarifying roles, supporting feedback and directing scarce resources towards areas where capabilities can realistically develop. This is consistent with research showing that interdependence among heterogeneous ecosystem actors creates

coordination requirements that cannot be addressed simply by increasing the number of participants (Reiter et al., 2024; Smolka & Bösch, 2023).

P3: Innovation governance positively moderates the relationship between ecosystem connectivity and capability accumulation by improving coordination, strategic alignment and continuity among ecosystem actors.

Capability Accumulation and Differential Advantage

Capability accumulation provides the bridge between innovation and competitiveness. Innovation becomes strategically significant when successive efforts strengthen knowledge, skills, technologies, institutional routines, enterprise capabilities and market relationships.

This returns the framework to the original logic of competitive relativity. The *Innoculture* formulation argued that countries need to assess their resources and identify areas in which those resources can be combined with innovation to develop differential advantage (Ikonne, 2016). The present framework extends that argument by identifying capability accumulation as a mechanism through which such advantages can become more durable.

P4: The accumulation of innovation capabilities in strategically relevant areas increases the likelihood that an economy will develop differential advantages that strengthen its competitive position.

The Small-State Condition

These relationships should not be assumed to operate identically across countries. In small African states, limited finance, specialist expertise, institutional capacity and domestic markets can constrain the breadth of sustainable innovation activity, making fragmentation particularly costly. Yet smaller institutional systems may also shorten distances among key actors. The effect therefore depends less on size itself than on how effectively available resources and relationships are governed. This leads to the boundary proposition:

P5: In resource-constrained small states, the positive relationship between innovation governance and capability accumulation becomes stronger where governance enables strategic concentration, institutional coordination and efficient deployment of scarce innovation resources.

Together, the propositions describe the following theoretical sequence:

Innoculture → Ecosystem Connectivity → Innovation Governance → Capability Accumulation → Differential Advantage → Competitiveness

Small-state conditions shape both the resources available to this process and the importance of coordinating them effectively. The propositions therefore shift attention from

whether innovation occurs towards whether it is organised in ways that allow capabilities to accumulate faster than they dissipate.

DISCUSSION

Re-reading Africa's Competitiveness Challenge

The framework developed in this paper offers a different reading of Africa's competitiveness challenge. Familiar constraints—limited finance, infrastructure gaps, skills shortages, weak research capacity and relatively shallow industrial bases—remain important, and African innovation research continues to identify structural and systemic barriers to capability development (Ahmad et al., 2022; Twiringiyimana et al., 2021). The argument here is not that these constraints have been overstated, but that they can obscure another problem: how effectively existing resources and innovation capabilities are connected, governed and allowed to accumulate.

Increasing innovation activity does not necessarily strengthen an innovation system. Entrepreneurship programmes, research projects, innovation hubs and technology initiatives may expand activity without creating relationships through which knowledge and capabilities are retained and recombined. Ecosystem research similarly emphasises interdependence and knowledge flows among actors rather than their presence alone (Fernandes & Ferreira, 2022; Scott et al., 2022). The question is therefore not simply whether innovation occurs, but whether one innovation effort leaves the system better able to undertake the next.

Re-reading the Competitiveness Problem

Seen through this lens, Africa's competitiveness problem is partly one of conversion: innovative activity has to be converted into capability, and capability into forms of differential advantage that remain valuable in a changing competitive environment.

This returns to the competitive-relativity argument underlying *Innoculture*. The original formulation stressed that national competitiveness cannot be judged only by a country's own progress because competitors are also learning and improving. It therefore called for continuous learning, anticipation and the strategic use of national resources to create differential advantage (Ikonne, 2016).

The present paper extends that reasoning by locating an institutional process between innovation and competitive outcomes. Countries may encourage learning and generate innovative activity without developing the relationships needed to diffuse knowledge or the governance arrangements required to build capabilities around it. What appears to be an

innovation deficit may therefore sometimes contain a deeper problem of fragmentation and weak accumulation.

This shifts the policy question from *how can more innovation be generated?* towards *what happens after innovation occurs?* Does a research project strengthen later research? Does an entrepreneurship programme leave behind stronger enterprises and support institutions? Does imported technology create domestic learning? Do publicly funded innovations develop routes to market?

The unit of concern therefore moves from individual interventions towards the learning capacity of the system itself.

Theoretical Contribution

The first contribution of the framework is to extend *Innoculture* beyond its original cultural emphasis without abandoning its central logic. The earlier formulation already recognised the importance of stakeholder linkages and feedback loops rather than disconnected innovation activities (Ikonne, 2016). The present paper advances that argument by distinguishing four related functions: culture, connectivity, governance and capability accumulation.

Innoculture explains the disposition towards continuous learning, experimentation and anticipation. Ecosystem connectivity explains how knowledge and resources move between actors. Innovation governance concerns how otherwise autonomous actors acquire sufficient coordination and strategic direction. Capability accumulation captures what remains after successive innovation activities have taken place.

The framework also clarifies what governance means in an innovation ecosystem. It is not synonymous with greater government control. Innovation ecosystems involve heterogeneous actors whose interdependence creates different coordination requirements (Hoffmann et al., 2022; Reiter et al., 2024). Governance is therefore better understood as the arrangements through which priorities, relationships, resources, responsibilities and feedback are coordinated across institutional boundaries.

A second contribution concerns the relationship between innovation activity and capability accumulation. Innovation discourse often focuses on visible outputs: startups created, patents registered, technologies developed, people trained or projects financed. These matter, but the framework proposes an additional test of innovation-system effectiveness: What capability remains in the system after the activity is completed?

Capability research supports the importance of cumulative learning and knowledge accumulation in building more sophisticated productive and innovative capacities (Aistleitner et

al., 2021; Gräbner & Hornykewycz, 2022). The contribution here is to connect that accumulation explicitly to ecosystem governance and, ultimately, to differential advantage.

Implications for Small African States

The small-state perspective sharpens the argument. Small African economies cannot reasonably reproduce every component of the innovation systems found in larger economies. Limited research capacity, specialised skills, finance and domestic markets make such replication costly and sometimes unnecessary. Small-state research also cautions against assuming that smaller systems are automatically easier to coordinate; institutional proximity may coexist with capacity constraints, concentrated authority and other governance vulnerabilities (Corbett et al., 2021). The alternative is not lower ambition, but greater selectivity.

For small states, competitive potential may depend particularly on identifying areas where national needs, existing capabilities, resource endowments, technological possibilities and market opportunities intersect. Innovation governance then becomes concerned with building sufficient depth around those areas while maintaining access to external knowledge, finance, technologies and markets.

This avoids treating smallness as either inherently problematic or inherently advantageous. Institutional proximity can facilitate interaction, but proximity alone does not produce effective coordination. The potential advantage arises only where proximity is converted into purposeful relationships and institutional learning.

Resource scarcity also creates a difficult balance. Concentrating every available resource in a few centrally selected activities can suppress experimentation and entrepreneurial discovery, while spreading limited resources across disconnected programmes can prevent capabilities from reaching sufficient depth to become competitive. Ecosystem-policy research similarly cautions against treating innovation ecosystems as structures that policymakers can mechanically design from above (Candeias & Sarkar, 2022).

The governance challenge therefore lies between these extremes: strategic concentration without institutional closure, and ecosystem coordination without excessive centralisation.

Drawing on this argument, Africa's competitiveness challenge is not solely a question of how much countries spend on innovation or how many innovation organisations and programmes they create. These remain important inputs. The deeper question is whether learning from those investments accumulates strongly enough within firms, institutions and relationships to alter what an economy is capable of doing.

The framework therefore shifts attention from innovation quantity towards innovation-system quality. For resource-constrained small African states in particular, competitive progress may depend not only on acquiring more innovation resources, but on becoming better at connecting, governing, learning from and accumulating the resources already available.

CONCLUSION

From Innoculture to Governed Innovation Ecosystems

This paper began with a persistent question: why has the growth of innovation activity across Africa not translated more consistently into stronger productive capabilities and competitiveness? The argument developed here does not discount familiar constraints such as finance, infrastructure, skills, research capacity and institutional weakness. Rather, it adds another concern: whether innovation systems are able to connect existing resources, learn from successive interventions and convert dispersed activity into capabilities that accumulate over time.

Revisiting *Innoculture* provides the starting point. The original concept placed continuous learning, innovation and anticipation at the centre of competitiveness and linked these to the search for differential advantage. It also recognised the importance of stakeholder linkages and feedback within a wider innovation ecosystem (Ikonne, 2016). What remained less developed was the governance process through which such relationships could generate cumulative national capability. The framework proposed here addresses that gap through the progression: *Innoculture* → *Ecosystem Connectivity* → *Innovation Governance* → *Capability Accumulation* → *Differential Advantage* → *Competitiveness*

The framework distinguishes the functions performed by each element. *Innoculture* provides the cultural foundation for learning and experimentation; ecosystem connectivity allows knowledge and resources to move between actors; innovation governance provides coordination and strategic direction without requiring centralised control; and capability accumulation captures what successive innovation activities leave behind.

For small African states, this perspective is particularly relevant. Limited finance, specialised expertise, research infrastructure and domestic markets make it difficult to pursue every technological or industrial opportunity simultaneously. The implication is not that small states should innovate less, but that they may need to connect and deploy their innovation resources more deliberately, while remaining open to experimentation, external knowledge and entrepreneurial discovery.

The paper therefore proposes that innovation activity alone is an incomplete measure of progress. A more consequential question is whether each cycle of research, entrepreneurship,

technology development and policy intervention leaves firms, institutions and the wider system more capable of undertaking the next.

The framework and propositions now require empirical examination. Comparative research across small African states could test how *Innoculture*, ecosystem connectivity and innovation governance interact under different institutional conditions, and whether stronger coordination contributes to capability accumulation and competitive outcomes.

Ultimately, the transition from *Innoculture* to governed innovation ecosystems is a transition from encouraging innovation to building the institutional capacity to learn from it. For resource-constrained African states, that capacity may prove as important to long-term competitiveness as the individual innovations themselves.

SCOPE FOR FURTHER STUDIES

Future research could extend the framework developed in this paper through empirical testing across different African and small-state innovation systems. Comparative studies could examine whether the proposed progression from *innoculture* through ecosystem connectivity, innovation governance and capability accumulation operates similarly across different institutional and economic contexts. Longitudinal research would also be useful in assessing how innovation-governance reforms translate into capability development and competitiveness over time. Further work could operationalise the framework's constructs and examine their relationships using mixed-methods or quantitative designs, while sector-specific studies could explore how the model applies within areas such as higher education, entrepreneurship, industrial development and public-sector innovation.

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