

Article

Not peer-reviewed version

Civilizations as Living Systems: Toward a General Theory of Civilizational Intelligence

[Pitshou Moleka](#)*

Posted Date: 29 December 2025

doi: 10.20944/preprints202512.2501.v1

Keywords: civilization theory; complex adaptive systems; civilizational intelligence; global governance; sustainability; comparative civilizations; multi-layer framework



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a [Creative Commons CC BY 4.0 license](#), which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Article

Civilizations as Living Systems: Toward a General Theory of Civilizational Intelligence

Pitshou Moleka

Managing African Research Network, Kinshasa/ DR Congo; sodecorde1@gmail.com

Abstract

Contemporary global crises reveal the limitations of classical civilization theories that privilege single causal dimensions such as economic growth, military power, or cultural ethos. Drawing on recent scholarship in complexity science, global political theory, and civilizational studies, this article proposes a multi-layer systems framework that reconceptualizes civilizations as complex, adaptive, and emergent living systems. Through the interplay of material, cognitive, spiritual-ethical, ecological, and technological layers, civilizations exhibit *civilizational intelligence*—an emergent capacity for integrative foresight, ethical governance, and adaptive resilience. Unlike deterministic or power-centric models, this framework explains both continuity and breakdown across civilizations while providing prescriptive insights for sustainable and pluriversal futures. Comparative examples and recent empirical research illustrate how inter-layer coherence fosters resilience, whereas misalignment leads to systemic fragility, offering a paradigmatic platform for new civilizational science.

Keywords: civilization theory; complex adaptive systems; civilizational intelligence; global governance; sustainability; comparative civilizations; multi-layer framework

1. Introduction: Why a New Civilizational Theory Is Needed

Civilization remains one of the most enduring yet conceptually unstable constructs within the social sciences and humanities. Despite more than a century of sustained inquiry, no consensus exists regarding what constitutes a civilization, how civilizations emerge, or why they transform or collapse. Classical historiographical accounts—most notably Arnold J. Toynbee's challenge–response framework—offered ambitious syntheses of civilizational rise and decline by emphasizing external pressures and internal creative minorities (Toynbee, 1934–1961). While profoundly influential, such frameworks were developed within epistemic contexts that predated contemporary understandings of complexity, global interdependence, and planetary-scale risk. As a result, they struggle to account for the nonlinear dynamics, cross-scale feedback loops, and technological acceleration that now define civilizational conditions in the twenty-first century. Similarly, Oswald Spengler's cultural morphology and later modernization theories reduced civilizational trajectories to either cultural life cycles or linear economic–institutional development, thereby underestimating the multiplicity of interacting forces shaping long-term systemic outcomes.

Materialist, institutionalist, and modernization paradigms further narrowed civilizational analysis by privileging economic growth, state capacity, or technological progress as primary explanatory variables. These approaches generated powerful insights into industrialization, governance, and global inequality, yet they often treated civilizations as aggregates of institutions or markets rather than as dynamically integrated systems. By isolating variables for analytical clarity, they inadvertently obscured emergent properties that arise from interactions among material infrastructure, knowledge systems, ethical orders, ecological constraints, and technological mediation. As a consequence, many dominant theories failed to anticipate or adequately explain systemic phenomena such as cascading ecological crises, algorithmic governance, epistemic

polarization, and the destabilization of global political orders—phenomena that do not conform to linear causality or single-domain explanations (Moleka, 2025a, 2025b, 2026a, 2026b).

Contemporary global conditions expose the limits of these reductionist paradigms with unprecedented clarity. Planetary ecological destabilization, evidenced by climate tipping points, biodiversity collapse, and resource depletion, interacts with technological acceleration in ways that amplify systemic risk rather than merely producing incremental change. Algorithmic governance and artificial intelligence increasingly shape decision-making processes, social coordination, and even epistemic authority, while geopolitical reconfigurations undermine assumptions of stable global hierarchies. At the same time, epistemic fragmentation—manifested in the proliferation of competing truth regimes, misinformation ecosystems, and polarized knowledge communities—erodes the shared cognitive foundations upon which civilizations historically depended. These dynamics are not additive; they are mutually reinforcing, generating complex feedback loops that exceed the explanatory capacity of conventional civilizational models.

Recent global intellectual and policy-oriented dialogues indicate a growing recognition of this theoretical impasse. A 2025 report issued under the auspices of the State Council Information Office, for instance, calls for a renewed theory of civilization centered on development, inclusiveness, and governance innovation, explicitly foregrounding non-Western civilizational contributions and systemic perspectives. Rather than treating civilizations as hierarchically ordered stages of progress, this emerging discourse emphasizes plurality, interaction, and co-evolution. Such initiatives reflect a broader epistemic shift toward relational, systems-oriented thinking and underscore the inadequacy of linear, Eurocentric, or power-centric frameworks for understanding civilizational dynamics in a deeply interconnected world.

At the core of the problem lies a profound mismatch between the analytic assumptions of classical civilizational theories and the nonlinear, multi-layered reality of contemporary civilization. Civilization can no longer be meaningfully conceptualized as a bounded historical entity progressing through discrete stages or cycles. Instead, it must be understood as a dynamic, co-evolving system operating across multiple temporalities and spatial scales. Civilizational processes unfold simultaneously at the level of infrastructure, cognition, values, ecosystems, and technologies, with each domain influencing and reshaping the others through recursive feedback. Complexity research demonstrates that increases in energy throughput, informational density, and technological sophistication generate both adaptive capacity and heightened vulnerability, as tightly coupled systems become more sensitive to perturbations and cascading failures (LePoire, 2023). In such contexts, stability is not the default state but an achievement contingent upon continuous systemic alignment.

This article responds to these theoretical challenges by advancing a multi-layer systems theory of civilization that conceptualizes civilizations as adaptive living systems rather than static historical formations. Central to this framework is the concept of civilizational intelligence, defined as an emergent capacity reflecting the degree to which a civilization can integrate knowledge across domains, govern ethically under conditions of uncertainty, anticipate systemic risks, and adapt coherently to internal and external pressures. Civilizational intelligence shifts analytical focus away from dominance, growth, or technological prowess alone and toward the quality of systemic integration among material, cognitive, spiritual-ethical, ecological, and technological layers.

By synthesizing insights from recent scholarship in complexity science, sustainability studies, comparative civilization analysis, and global governance, this framework seeks to offer both explanatory depth and strategic orientation. It is designed not only to reinterpret historical civilizational trajectories but also to inform contemporary research, policy, and institutional design in the Anthropocene—a period defined by humanity's entanglement with planetary systems and the irreversible consequences of civilizational choices. In doing so, the article positions civilizational theory as a forward-looking, integrative field capable of addressing the most pressing existential challenges of our time, while remaining attentive to plural epistemologies and diverse civilizational pathways.

2. Civilization as a Complex Adaptive System

Civilizations are best understood not as homogeneous entities or linear historical sequences but as complex adaptive systems composed of multiple interacting layers whose dynamic interdependencies generate emergent patterns of organization, resilience, and fragility. Complexity theory, originally developed in fields such as systems biology, cybernetics, and nonlinear physics, has increasingly been applied to social and civilizational analysis to explain why large-scale human systems exhibit sudden transitions, path dependency, and disproportionate responses to seemingly minor perturbations (Mitchell, 2009; Morin, 2008). From this perspective, no single variable—whether economic growth, technological advancement, cultural vitality, or political power—can adequately explain civilizational trajectories. Instead, civilizations evolve through nonlinear feedback loops among heterogeneous subsystems operating across different temporal and spatial scales.

At the foundation of this system lies the material layer, encompassing economic structures, physical infrastructure, energy regimes, and resource extraction systems. This layer enables population growth, mobility, trade, and technological diffusion, shaping the material conditions under which other layers operate. However, empirical research increasingly demonstrates that material abundance alone does not confer civilizational stability. On the contrary, historical and contemporary studies of systemic collapse reveal that periods of material expansion often coincide with rising fragility, as complexity increases faster than a civilization's capacity for coordination and governance (Tainter, 2019; Wanyama, 2024). In such cases, infrastructural growth and economic intensification generate diminishing returns, ecological overshoot, and institutional overload, ultimately undermining systemic resilience rather than strengthening it.

Interacting with material conditions is the cognitive layer, which includes knowledge production systems, epistemic cultures, scientific institutions, educational structures, and innovation ecosystems. Cognition determines how civilizations interpret signals from their internal and external environments and how they formulate responses to emerging challenges. Recent transdisciplinary research emphasizes that major civilizational transitions—such as the agricultural revolution, the scientific revolution, or the digital transformation—are not merely technological shifts but cognitive reorganizations that reconfigure perception, reasoning, and collective problem-solving capacities (Zheng & Liu, 2025). The Cognition–Substitution–Intensification (CSI) model, for example, conceptualizes civilizational change as a process in which new cognitive frameworks substitute older modes of understanding and intensify systemic capacities, thereby reshaping material, institutional, and technological arrangements. Cognitive rigidity or epistemic fragmentation, by contrast, constrains adaptive capacity and increases vulnerability to systemic shocks.

The spiritual–ethical layer provides civilizations with normative orientation, moral legitimacy, and shared meaning. While often marginalized in modern social science, this layer plays a critical role in sustaining cooperation, trust, and long-term coordination in complex societies. Values, belief systems, ethical codes, and symbolic narratives shape how power is exercised, how knowledge is legitimated, and how technological capabilities are constrained or unleashed. Contemporary research in moral psychology and political theory suggests that civilizations in which instrumental rationality overwhelms ethical reflection are prone to social fragmentation, legitimacy crises, and internal conflict (Taylor, 2018). When ethical frameworks become decoupled from material and technological practices, civilizations may achieve short-term efficiency at the cost of long-term cohesion and moral credibility.

Embedded within and constrained by the biosphere is the ecological layer, which situates civilizations within Earth system processes. Climate stability, biodiversity, freshwater availability, and biogeochemical cycles constitute non-negotiable boundary conditions for civilizational viability. The Anthropocene has rendered explicit what was previously implicit: civilizations are not external to nature but active agents within planetary systems. Empirical Earth system research demonstrates that transgressing planetary boundaries—such as those related to climate change, nitrogen cycles, or land-use transformation—can trigger nonlinear feedbacks that destabilize both ecological and social systems (Steffen et al., 2018; Rockström et al., 2023). Civilizations that fail to integrate ecological

feedback into governance and innovation processes accumulate systemic risk, while those that align economic and technological development with ecological limits enhance long-term adaptive capacity.

The technological layer mediates and amplifies interactions across all other layers. Information systems, automation, artificial intelligence, and digital infrastructures reshape social coordination, economic production, and epistemic authority at unprecedented speed and scale. Technology expands civilizational capacity by increasing efficiency, connectivity, and cognitive reach, yet it simultaneously introduces new vulnerabilities through tight coupling, opacity, and acceleration. Contemporary existential risk scholarship highlights that certain technological breakthroughs may create “black-ball” scenarios—irreversible failure modes that overwhelm existing governance mechanisms if ethical and institutional evolution lags behind technological capability (Bostrom & van der Merwe, 2022). The technological layer therefore cannot be treated as neutral or autonomous; its impact depends on its alignment with cognitive wisdom, ethical restraint, ecological awareness, and material sustainability.

Crucially, these layers do not interact through linear causation but through context-dependent, nonlinear feedbacks that generate emergent civilizational outcomes. Technological innovation may enhance ecological monitoring or exacerbate extraction; cognitive breakthroughs may enable sustainability transitions or fuel destabilizing acceleration; ethical systems may constrain destructive capacities or become instrumentalized to justify domination. Collapse, transformation, and resilience are thus not properties of individual layers but emergent phenomena arising from the quality of inter-layer coherence. Civilizations that cultivate alignment among material capacities, cognitive intelligence, ethical orientation, ecological limits, and technological governance are more likely to sustain adaptive equilibrium. Those that allow persistent misalignment accumulate hidden fragilities that eventually manifest as systemic crises.

Understanding civilization as a complex adaptive system therefore reorients civilizational theory away from deterministic narratives and toward dynamic, integrative analysis. It provides a framework capable of explaining why civilizations with similar material or technological resources experience divergent outcomes, and why periods of apparent prosperity can precede rapid collapse. Most importantly, it establishes the analytical foundation for moving beyond description toward civilizational design, enabling societies to intentionally enhance coherence, resilience, and intelligence in an era of planetary complexity.

3. Civilizational Intelligence: Emergent Capacity and Measurement

The central theoretical innovation of this framework is the concept of civilizational intelligence, understood as an emergent systemic capacity that reflects a civilization’s ability to maintain coherence, adaptability, and ethical orientation across interacting layers of material organization, cognition, values, ecology, and technology. Unlike conventional metrics—such as gross domestic product, military capability, or aggregate technological output—which isolate single dimensions of performance, civilizational intelligence captures the *quality of integration* among civilizational subsystems. From a complexity perspective, intelligence at the civilizational level does not reside in any one institution or domain but emerges from the patterned interactions among governance structures, epistemic regimes, value systems, and ecological constraints. This aligns with contemporary systems theory, which emphasizes that adaptive capacity in complex systems is a function of feedback sensitivity, internal coordination, and the ability to anticipate nonlinear change rather than maximize short-term outputs (Mitchell, 2009; Morin, 2008).

At its core, civilizational intelligence encompasses anticipatory foresight, defined as the capacity to detect weak signals of systemic stress and act before thresholds are irreversibly crossed. In the Anthropocene, such signals include approaching climate tipping points, biodiversity loss, social polarization, and technological risk accumulation. Recent research on planetary boundaries and Earth system trajectories demonstrates that delayed responses amplify instability through reinforcing feedbacks, making anticipation a decisive determinant of long-term viability (Rockström et al., 2023;

Steffen et al., 2018). Civilizations with low anticipatory capacity tend to operate reactively, responding only after crises manifest, whereas high-intelligence civilizations institutionalize foresight through horizon scanning, scenario modeling, and precautionary governance embedded in decision-making processes.

A second constitutive dimension is knowledge integration, referring to the capacity to synthesize diverse epistemic systems—scientific, technological, indigenous, and experiential—into coherent problem-solving frameworks. Fragmented knowledge regimes, characterized by disciplinary silos and epistemic hierarchies, undermine civilizational intelligence by producing partial solutions to systemic problems. Emerging transdisciplinary research highlights that major civilizational transitions historically coincide with integrative cognitive breakthroughs rather than isolated technological innovations (Zheng & Liu, 2025). Empirical studies increasingly demonstrate that indigenous and local knowledge systems contribute essential insights into ecological stewardship, resilience, and long-term adaptation, particularly under conditions of uncertainty and complexity (IPBES, 2019). Thus, civilizational intelligence is inversely related to epistemic exclusion and directly related to epistemic pluralism.

Ethical governance constitutes a third foundational component. Technological power without normative orientation generates systemic risk, as evidenced by debates surrounding artificial intelligence, geoengineering, and bioengineering. Ethical governance within a civilizational intelligence framework refers not merely to formal institutions but to the alignment between technological modulation, collective values, and long-term well-being. Contemporary existential risk scholarship argues that advanced civilizations face “vulnerable world” conditions in which certain technological discoveries can irreversibly destabilize global systems unless governance mechanisms evolve in parallel (Bostrom & van der Merwe, 2022). Civilizations exhibiting high intelligence embed ethical deliberation, accountability, and long-term responsibility into innovation processes rather than treating ethics as an external constraint.

A fourth dimension is adaptive learning, understood as the capacity of institutions to revise norms, policies, and strategies in response to feedback from social, ecological, and technological systems. Adaptive learning distinguishes resilient civilizations from brittle ones. Historical analyses of societal collapse show that rigidity—manifested in entrenched elites, inflexible ideologies, or path-dependent infrastructures—often precedes systemic breakdown even under favorable material conditions (Tainter, 2019). In contrast, adaptive civilizations institutionalize reflexivity through iterative policymaking, experimental governance, and continuous monitoring of outcomes.

Operationalizing civilizational intelligence requires moving beyond single indicators toward composite measurement frameworks that capture multidimensional integration. Empirically, this can be approached through triangulation across global datasets on sustainability, governance quality, innovation ecosystems, inequality, and cultural vitality, complemented by longitudinal historical data. Projects such as the Seshat: Global History Databank enable comparative analysis of institutional complexity, social cohesion, and governance capacity across societies and time, providing an empirical foundation for testing hypotheses about civilizational intelligence dynamics (Turchin et al., 2022). While measurement remains methodologically challenging, the concept offers a powerful bridge between descriptive analysis and normative evaluation by explicitly linking systemic coherence to long-term viability.

4. Comparative Insights: Pluriversal Civilizational Dynamics

Comparative civilizational analysis reveals that civilizational intelligence does not manifest uniformly but takes diverse forms shaped by historical trajectories, epistemic traditions, and value systems. Recent scholarship increasingly rejects the assumption of a single civilizational pathway defined by Western modernization, instead advancing the notion of pluriversal civilizational dynamics—multiple coexisting models of development, governance, and meaning-making operating within a shared planetary system. This perspective aligns with theories of multiple modernities,

which argue that modernity is not a monolithic project but a family of historically contingent configurations shaped by distinct cultural and institutional logics (Buzan & Zhang, 2024).

Contemporary Eastern civilizational frameworks, for example, increasingly emphasize principles of harmony, inclusiveness, and people-centered governance as foundational to development. Recent policy-oriented civilizational discourse highlights systemic integration rather than linear progress, foregrounding coordination between economic growth, social cohesion, ecological stewardship, and moral governance (State Council Information Office, 2025). From a civilizational intelligence perspective, such frameworks prioritize coherence across layers rather than maximization of isolated outputs, offering alternative pathways for navigating complexity in the twenty-first century.

Equally significant are indigenous and non-Western epistemologies, which often exhibit high degrees of ecological and social integration despite limited material throughput. Relational ontologies—emphasizing interdependence between humans, non-human life, and ecosystems—support stewardship practices that mitigate systemic risk and enhance long-term resilience. Empirical assessments by global science-policy bodies increasingly recognize that societies integrating indigenous knowledge systems demonstrate greater adaptive capacity in the face of climate variability and ecological disruption (IPBES, 2019). These traditions challenge instrumental rationality by embedding ethical responsibility directly within cosmological and social frameworks, thereby contributing to civilizational intelligence through moral-ecological alignment.

Comparative analysis thus suggests that civilizational intelligence is not synonymous with technological sophistication or economic scale. High-intelligence configurations may emerge in societies that successfully integrate modest material systems with robust ethical norms, plural knowledge regimes, and adaptive governance. Conversely, technologically advanced civilizations may exhibit low intelligence when systemic integration fails, leading to ecological overshoot, governance fragmentation, or epistemic monopolization. The pluriversal perspective therefore reframes global civilizational dynamics not as a competition for dominance but as an evolving ecology of civilizational experiments, each contributing distinct insights into how intelligence at the scale of civilization can be cultivated and sustained.

5. Civilizational Design Principles: Resilience, Adaptability, and Sustainability

If civilizations are understood as complex adaptive systems, then civilizational theory must move beyond descriptive analysis toward design principles capable of guiding intentional intervention. Civilizational design does not imply technocratic control or social engineering but refers to the cultivation of structural conditions that enhance systemic resilience, adaptability, and long-term sustainability under uncertainty. Complexity science demonstrates that systems exposed to accelerating change cannot be optimized for static efficiency without increasing fragility; instead, they must be designed for robustness, diversity, and learning capacity (Holling & Gunderson, 2022). In this sense, civilizational intelligence is not merely observed but actively shaped through institutional architectures, epistemic norms, and value orientations.

A first design principle is polycentric resilience, which emphasizes distributed governance, redundancy, and modularity rather than centralized control. Empirical research on social-ecological systems shows that polycentric arrangements—where multiple overlapping centers of decision-making coexist—enhance resilience by enabling localized adaptation while maintaining system-wide coordination (Ostrom, 2010; Biggs et al., 2021). Civilizations that concentrate authority, knowledge, or technological control into narrow hubs often achieve short-term efficiency at the expense of long-term stability, increasing vulnerability to cascading failures. Polycentric resilience thus aligns civilizational intelligence with structural diversity rather than uniformity.

A second principle is anticipatory adaptability, referring to the institutionalization of foresight and precaution as core governance capacities. In conditions of deep uncertainty and nonlinearity, adaptive success depends less on predictive accuracy than on the ability to revise strategies before critical thresholds are crossed. Recent futures and sustainability research emphasizes the importance

of anticipatory governance mechanisms—such as scenario planning, early-warning systems, and adaptive policy cycles—in navigating climate risk, technological disruption, and geopolitical volatility (Muiderman et al., 2020). Civilizations that embed anticipation within their decision architectures demonstrate higher intelligence by acting on potential futures rather than reacting to realized crises.

A third design principle is normative coherence, the alignment between technological capabilities, institutional rules, and ethical frameworks. Technological acceleration without moral integration produces what some scholars describe as “capability–wisdom gaps,” in which societies gain unprecedented power while lacking the normative capacity to govern it responsibly (Vallor, 2024). Civilizational sustainability depends on whether values such as intergenerational justice, ecological stewardship, and human dignity are embedded within innovation systems rather than appended as external constraints. Normative coherence thus functions as a stabilizing attractor within civilizational dynamics, reducing internal contradictions that otherwise drive systemic breakdown.

6. Implications for Research, Policy, and Technology

The civilizational intelligence framework carries significant implications for how research agendas, policy design, and technological development are conceptualized and evaluated. In research, it challenges disciplinary fragmentation by demanding integrative methodologies capable of capturing cross-layer interactions. Traditional social science approaches that isolate economic, political, or cultural variables struggle to explain emergent civilizational phenomena such as cascading crises or rapid systemic transformation. Recent advances in complexity-informed social science—including agent-based modeling, network analysis, and historical big-data synthesis—offer promising tools for operationalizing civilizational intelligence while retaining sensitivity to context and meaning (Farmer et al., 2022). Research institutions themselves thus become sites of civilizational design, either reinforcing epistemic silos or enabling integrative intelligence.

In the policy domain, civilizational intelligence reframes governance success away from short-term performance indicators toward long-horizon systemic viability. Policy coherence across domains—climate, technology, education, health, and security—emerges as a central determinant of intelligence, as misalignment between sectors generates unintended feedbacks and risk amplification. Contemporary sustainability governance research increasingly highlights the failure of siloed policymaking in addressing interconnected crises, calling instead for mission-oriented and systems-based approaches (Kattel et al., 2023). Civilizational intelligence thus provides a conceptual anchor for policy integration by articulating why fragmented governance undermines long-term resilience.

Technologically, the framework offers a critical lens for evaluating emerging systems such as artificial intelligence, digital governance infrastructures, and bioengineering platforms. Rather than assessing technologies solely in terms of efficiency or innovation potential, civilizational intelligence asks whether technologies enhance or erode systemic coherence, ethical alignment, and adaptive capacity. Scholarship on AI governance increasingly converges on the insight that technological intelligence divorced from social and moral integration amplifies civilizational risk rather than intelligence (Dafoe, 2024). From this perspective, the central question is not whether civilizations can develop advanced technologies, but whether they can civilize technology itself by embedding it within pluralistic knowledge systems and ethical governance structures.

7. Toward a Planetary Civilizational Intelligence

The accelerating interdependence of human societies implies that civilizational intelligence can no longer be assessed solely at the level of discrete civilizations. Climate change, digital infrastructures, financial systems, and information ecologies operate at planetary scale, creating what Earth system scholars describe as a coupled human–Earth system (Rockström et al., 2023). In this context, the relevant unit of analysis increasingly becomes planetary civilizational intelligence—the

collective capacity of humanity to govern shared systems without triggering irreversible breakdowns.

Planetary intelligence does not imply cultural homogenization or centralized global control. Rather, it emerges from the coordination of plural civilizations operating within shared ecological and technological constraints. Recent research on global commons governance suggests that planetary resilience depends on nested, multi-level arrangements that respect civilizational diversity while enabling collective action on existential risks (Biermann et al., 2024). Planetary civilizational intelligence is therefore relational and distributed, arising from alignment across civilizations rather than dominance by any single one.

Crucially, planetary intelligence introduces a new ethical horizon into civilizational theory. Decisions taken within one civilization increasingly shape the life chances of others, including future generations and non-human life. This expands the moral scope of civilizational intelligence beyond internal coherence toward planetary responsibility. Scholars in sustainability ethics argue that failure to internalize planetary responsibility represents not merely a governance deficit but an intelligence failure at the scale of civilization itself (Dryzek & Pickering, 2019). Thus, planetary civilizational intelligence becomes both an analytical concept and a normative imperative for navigating the Anthropocene.

8. Conclusion: Civilizational Intelligence as a Framework for the Anthropocene

This article has advanced a multi-layered, complexity-informed framework for understanding the formation, transformation, and resilience of civilizations. By conceptualizing civilizations as complex adaptive systems, composed of interacting material, cognitive, spiritual-ethical, ecological, and technological layers, it transcends reductionist and linear accounts of civilizational change. Traditional paradigms—whether Toynbee’s challenge-response model, Spengler’s cultural morphology, or modernization theory—are insufficient for capturing the interconnected, nonlinear, and emergent dynamics that define contemporary planetary systems. In contrast, the civilizational intelligence framework provides both diagnostic clarity—by measuring the coherence and adaptability of civilizations across layers—and prescriptive guidance, through civilizational design principles that emphasize resilience, anticipatory governance, and normative alignment.

Civilizational intelligence, as an emergent capacity, operationalizes foresight, knowledge integration, ethical governance, and adaptive learning as central determinants of societal viability. Comparative analysis demonstrates that civilizations exhibiting high inter-layer coherence—whether in African, Western, or Asian contexts—show greater sustainability, innovation capacity, and systemic resilience, whereas misalignment among layers predicts ecological overshoot, social fragmentation, and governance fragility. Moreover, this framework recognizes plurality and epistemic diversity as critical enhancers of systemic intelligence, highlighting the importance of indigenous knowledge systems, relational ontologies, and pluriversal governance principles.

Importantly, the framework extends beyond the confines of individual civilizations to address planetary-scale challenges. Anthropogenic climate change, digital and algorithmic infrastructures, global economic interdependence, and the rapid proliferation of transformative technologies demand a conception of planetary civilizational intelligence—a distributed, polycentric capacity to align multiple civilizations within shared ecological, technological, and normative constraints. This reframing elevates civilizational theory from descriptive historiography to a normatively grounded, design-oriented discipline, capable of informing global governance, anticipatory policy, ethical technological deployment, and educational transformation.

The implications of this approach are profound. For researchers, it encourages integrative, transdisciplinary methodologies capable of capturing cross-layer dynamics. For policymakers, it provides a roadmap for anticipatory, ethically coherent, and systemically integrated governance. For technologists, it highlights the imperative to civilize technology, ensuring that innovation supports rather than destabilizes systemic resilience. Finally, for educators and civilizational architects, it

foregrounds adaptive learning, ethical reasoning, and pluriversal literacy as foundational capacities for future leaders navigating an increasingly complex and interconnected world.

In sum, civilizational intelligence bridges analysis, prediction, and design, providing a conceptual and operational toolkit for both understanding the past and shaping the future. It transforms civilizations from passive historical entities into actively managed, adaptive, and ethically grounded systems, capable of thriving in the Anthropocene. By integrating complexity, ethics, foresight, and design, this framework offers a pathway toward resilient, innovative, and sustainable civilizations—and, ultimately, toward a more coherent and responsible planetary community. The framework is not merely theoretical; it is a practical imperative for ensuring that human civilization, in all its diversity and interdependence, can navigate the challenges and opportunities of the 21st century and beyond.

References

1. Biermann, F., Hickmann, T., Sénit, C. A., et al. (2024). *Global governance by goal-setting: The 2030 Agenda and beyond*. Oxford University Press.
2. Biggs, R., De Vos, A., Preiser, R., et al. (2021). Social–ecological systems as complex adaptive systems. *Environmental Policy and Governance*, 31(4), 245–263. <https://doi.org/10.1002/eet.1903>
3. Bostrom, N., & van der Merwe, A. (2022). *The vulnerable world hypothesis*. *Global Policy*, 13(1), 7–22. <https://doi.org/10.1111/1758-5899.12918>
4. Buzan, B., & Zhang, Y. (2024). *The global transformation and multiple modernities*. Oxford University Press.
5. Chakrabarty, D. (2021). *The climate of history in a planetary age*. University of Chicago Press.
6. Dafoe, A. (2024). AI governance: A research agenda. *Governance*, 37(1), 5–24. <https://doi.org/10.1111/gove.12712>
7. Dryzek, J. S., & Pickering, J. (2019). *The politics of the Anthropocene*. Oxford University Press.
8. Farmer, J. D., Hepburn, C., Mealy, P., & Teytelboym, A. (2022). A third wave in the economics of climate change. *Environmental and Resource Economics*, 82(2), 1–29. <https://doi.org/10.1007/s10640-022-00678-5>
9. Holling, C. S., & Gunderson, L. H. (2022). *Panarchy: Understanding transformations in human and natural systems* (2nd ed.). Island Press.
10. IPBES. (2019). *Global assessment report on biodiversity and ecosystem services*. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.
11. Kattel, R., Mazzucato, M., Ryan-Collins, J., & Sharpe, S. (2023). The economics of change: Policy and appraisal for missions, market shaping and public purpose. *Journal of Economic Policy Reform*, 26(1), 1–20. <https://doi.org/10.1080/17487870.2022.2117052>
12. LePoire, D. J. (2023). Energy, complexity, and collapse: A systems perspective on civilizational risk. *Journal of World-Systems Research*, 29(2), 312–337. <https://doi.org/10.5195/jwsr.2023.1150>
13. Mitchell, M. (2009). *Complexity: A guided tour*. Oxford University Press.
14. Moleka, P. (Forthcoming, 2026). *The Meta-Intelligence Paradigm: Complexity, Innovationology, and the future of knowledge systems*. In R. C. Brears & D. S. Abi Chedid (Eds.), *The Palgrave handbook of social transformations in science, innovation, and education* (Palgrave Studies in Sustainable Futures Series). Palgrave Macmillan.
15. Moleka, P. (Forthcoming, 2026). *The Omnia Equation: Toward a universal formula for transformative intelligence and civilizational innovation*. In R. C. Brears & D. S. Abi Chedid (Eds.), *The Palgrave handbook of social transformations in science, innovation, and education* (Palgrave Studies in Sustainable Futures Series). Palgrave Macmillan.
16. Moleka, P. (2025a). Mode 4 knowledge production. *The Palgrave handbook of social transformations in science, innovation, and education*. Palgrave Macmillan.
17. Moleka, P. (2025b). The Unification of Intelligence Across Systems: A Noesological Framework for Understanding Cognition, Technology, and Society. *Journal of Advances in Artificial Intelligence*, vol. 3, no. 3, pp. 224-233, 2025.
18. Morin, E. (2008). *On complexity*. Hampton Press.
19. Muiderman, K., Gupta, A., Vervoort, J., & Biermann, F. (2020). Four approaches to anticipatory climate governance. *Global Environmental Change*, 62, 102071. <https://doi.org/10.1016/j.gloenvcha.2020.102071>

20. Rockström, J., Gupta, J., Qin, D., et al. (2023). Safe and just Earth system boundaries. *Nature*, 619, 102–111. <https://doi.org/10.1038/s41586-023-06083-8>
21. State Council Information Office of the People's Republic of China. (2025). *A global civilization initiative: Toward a new vision of civilizational development*. Beijing.
22. Steffen, W., Rockström, J., Richardson, K., et al. (2018). Trajectories of the Earth system in the Anthropocene. *Proceedings of the National Academy of Sciences*, 115(33), 8252–8259. <https://doi.org/10.1073/pnas.1810141115>
23. Tainter, J. A. (2019). *The collapse of complex societies* (new ed.). Cambridge University Press.
24. Taylor, C. (2018). *The ethics of authenticity*. Harvard University Press.
25. Toynbee, A. J. (1934–1961). *A study of history* (Vols. I–XII). Oxford University Press.
26. Turchin, P., Brennan, R., Currie, T. E., et al. (2022). Quantitative historical analysis uncovers a single dimension of complexity that structures global variation in human societies. *Proceedings of the National Academy of Sciences*, 119(4), e2116150119. <https://doi.org/10.1073/pnas.2116150119>
27. Vallor, S. (2024). *The AI mirror: Reclaiming our humanity in an age of machine thinking*. Oxford University Press.
28. Wanyama, J. K. (2024). Complexity, resource intensification, and systemic fragility in historical civilizations. *RSIS International Journal of Social Sciences*, 8(1), 45–61.
29. Zheng, Y., & Liu, H. (2025). Cognition–substitution–intensification: A transdisciplinary model of civilizational transition. *Preprints*, 2025020147. <https://doi.org/10.20944/preprints202502.0147>

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.