Energy, Sustainability, and the Life-Value Paradigm: A New Framework for Macroeconomic Resilience *

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Abstract:

The failure of traditional value systems to address global challenges underscores the urgent need to rethink mainstream economic paradigms. This paper advocates a paradigm shift in economic theory through the 'Life-Centric Value System' framework, which redefines valuation mechanisms. By redefining the foundations of valuation and centering economic activity around life itself, this framework addresses the missing link in combating market failures.

Developed through a mixed-methodology approach (including theoretical modeling, conceptual modeling, and policy evaluation), the framework delineates valuation mechanisms at both micro- and macroeconomic levels, offering a pathway to enhance the efficacy of economic policies. Analytical findings demonstrate that this architecture fosters systematic synergies

[1] *I am deeply indebted to the seminal works of Joseph Stiglitz, William Nordhaus, and Mousa Ghaninejad, which profoundly shaped this research. For their invaluable contributions, I thank Somayeh Alizadeh (for data acquisition), Sajjad Timouri Lalo (for scholarly guidance), and Mehdi Faramarzi (for steadfast encouragement). Special gratitude goes to my spouse for their emotional support and my son, Ehsan Alizadeh, for his technical assistance. All remaining errors are mine

between individual and collective values, enabling the design of more sustainable policies in environmental, distributive, and security domains globally.

Beyond its theoretical contribution to macroeconomic literature, the framework's operationalizability—through mechanisms like **"Life Tokens"**—positions it as a potential catalyst for global policy transformation and strengthened international cooperation.

Keywords: Life-value economics, Systemic market failures, Biocentric valuation, Macroeconomic policy innovation, Economic paradigm shift

1. Introduction

The global economy is grappling with a complex set of interconnected and structural crises that pose serious threats to sustainable development. The United Nations' *Global Sustainable Development Report 2023* indicates that while the world is midway to the 2030 deadline, progress toward achieving the Sustainable Development Goals (SDGs) remains alarmingly inadequate, with only 12% of targets currently on track. Nearly half of the goals face significant or severe delays, despite some evidence of progress (United Nations 2023).

The global inequality index starkly reveals that income disparities between top and bottom deciles have not narrowed. Between 1990 and 2020, the income share of the top decile increased in 70% of studied countries, while the bottom half of the population saw their share decline or stagnate in most economies—a trend that intensified post-2008 crisis (Piketty et al. 2022, 72–85).

On environmental fronts, the 2023 report by the Intergovernmental Panel on Climate Change (IPCC) underscores that despite international efforts like the Paris Agreement and proposals such

as carbon taxes, greenhouse gas emissions continue to rise. The likelihood of irreversibly crossing the 1.5°C warming threshold remains critically high (IPCC 2023).

Meanwhile, the global financial system remains vulnerable to systemic shocks. Stiglitz (2010) warns that ineffective regulations and the extreme concentration of wealth and power in financial markets could trigger repeats of crises like the 2008 collapse.

Although in the past decade, policies such as wealth taxation, structural reforms in the financial system, and carbon pricing have been proposed and implemented in some countries (Piketty 2014; Nordhaus 2019), empirical evidence and economic analyses indicate that these interventions have yet to achieve a sustained reduction in the intensity of crises. In other words, even with incremental policy reforms, the global economic system remains prone to generating and perpetuating systemic failures. As noted in the Stiglitz-Sen-Fitoussi Commission report (2009), despite disagreements over the methodology for adjusting quality or measuring the quantitative dimensions of these phenomena, there is broad consensus among economists that such adjustments are necessary.

The central question this paper addresses is: Why is mainstream economics unable to reflect the real costs of these crises in its calculations? The answer lies in re-examining the economic value system. By distinguishing valuation at micro (individual preferences) and macro (collective preferences) levels, and introducing life tokens (these non-monetary, non-digital measurement units are detailed in Section 5) as multidimensional measurement units, this framework enables the internalization of crisis costs.

This approach specifically targets the measurement gap identified by the Stiglitz-Sen-Fitoussi Commission (2009), which highlighted traditional accounting systems' failure to account for collective costs. Ultimately, this paper aims to bridge existing policy gaps by redefining the value

system and proposing mechanisms to: (1) guide markets toward public goods provision, and (2) establish pricing mechanisms for global public goods. From this perspective, the study constitutes an *important contribution*[2] to economic literature.

Research Methodology:

This study employs an integrated three-phase methodological framework: (1) **Theoretical Modeling**, analyzing causal relationships based on natural rights (Locke, 1689) and bioscientific epistemology; (2) **Conceptual Modeling**, translating theoretical foundations into measurable indicators (e.g., HDI, SEEA) and a life-token framework; and (3) **Policy Analysis**, assessing implementation feasibility through cost-benefit analysis and scenario testing (Dunn, 2017). Key limitations include the absence of specific weightings for life-value components and the need for future studies to examine the model's applicability across diverse institutional contexts.

[2] In the research literature, an *important contribution* refers to a study that offers novel perspectives or practical solutions to fundamental theoretical or policy gaps, thereby opening new avenues for research or decision-making. Given that this article revisits the value system in economics and proposes a framework to steer markets toward public goods provision—addressing a structural challenge in mainstream economics—it qualifies as such a contribution (Hamermesh 2013, 162).

2.Literature Review

An Introduction to the Necessity of Value Theory in Economics

Mainstream economic literature suffers from two fundamental flaws : First, subjective value theory, by reducing value to individual preferences while ignoring Earth's biophysical limits (Hickel 2021; Rockström 2023), has pushed the ecological crisis to the brink of collapse. Second, GDP-based growth indicators, by disregarding natural capital (Dasgupta 2021) and socioecological costs (IPCC 2022), have steered development toward the destruction of vital systems.

Market failures in internalizing these costs (Steffen 2018) and managing systemic risks (Skinner 2021) threaten the survival of industrial civilization. However, existing literature lacks an operational framework for transitioning to a value system aligned with sustainability and life enhancement.This paper addresses this gap by proposing a 'Life-Value'-based model as a **sustainability-oriented** alternative.

2.1 Historical Evolution of Economic Value Theories

The earliest discussions on the concept of value can be traced to Aristotle's works. In *Nicomachean Ethics*, he grounded exchange value in commutative justice (Aristotle 1999, V.5,p.78). Subsequently, mercantilists equated value with gold and silver, viewing foreign trade as the primary source of national wealth accumulation (Thomas Mun, 1571-1641). In contrast, the Physiocrats identified agricultural production as the true source of value (François Quesnay1754).This evolution culminated inThe first classical breakthrough in economic value systems emerged with Adam Smith (1776). In his seminal work *The Wealth of Nations*, Smith proposed the labor theory of value Smith (1776), calculating commodity values based on the labor

required for their production. Ricardo (1817) later refined this labor theory of value. The extensive application of labor value by Marx (1867) in socialist theories created a historical case study of value system failure. As Rothbard (1995)[3] argues, socialism's fundamental economic weakness lay in ignoring value determinants like demand and resource scarcity. This theoretical flaw not only led to distortions in Marx's economic theory but also served as a cautionary example about the importance of value systems and the consequences of misusing one-dimensional value frameworks (Rothbard 1995).

2.2 Subjectivism and the Rise of the Marginalist School

The emergence of the Marginalist School through the works of William Stanley Jevons (1871), Carl Menger (1871), and Léon Walras (1874) marked a turning point in economic history, replacing classical production-cost theories with subjective value theory - the paradigm now dominant in mainstream economics.

Economic subjectivism (particularly in the Austrian School) has its roots in 18th-century philosophical developments. Hume (1739), by emphasizing the role of sensory perception in value formation, and Kant (1781), through his concept of subjectivity, laid the theoretical foundations for economics' transition from objective to subjective value theory. This period witnessed

[3] Murray N. Rothbard, in his work *Classical Economics: An Austrian Perspective on the History of Economic Thought, Volume II*, rejects the labor theory of value as flawed and inefficient. He maintains that market forces and marginal demand determine commodity values - not the labor required for their production - and argues that Marx erred in applying the labor theory of value. In the section on surplus value, Rothbard demonstrates how Marx employed the labor theory to derive his conclusions about worker exploitation without establishing its theoretical validity Rothbard (1995). Mises similarly endorses Rothbard's critique of labor value theory in *Human Action* Mises(1949).

revolutionary theories about the role of individual subjectivity in determining value and price, with pivotal contributions coming from Ludwig von Mises (1949) and Friedrich Hayek (1960).

2.3 Macro-Level Value-Centric Schools of Thought

Recent developments in behavioral economics and game theory have proposed more sophisticated dimensions of value systems compared to neoclassical models. Behavioral economics, by emphasizing the role of cognitive and emotional factors in individual decisionmaking, has provided a more realistic framework for understanding valuation and choice. This approach, through concepts like Kahneman and Tversky's (1979) "Prospect Theory" and Thaler's (1988) Mental Accounting theory, has demonstrated how economic decisions are significantly influenced by reference points, collective emotions, and cognitive biases.

2.4 Value in Mainstream Economics

The neoclassical school established mainstream economics' value system by combining marginal value theory with mathematical tools, basing it on market equilibrium and Pareto efficiency. In this approach, prices reflect the preferences of market actors who evaluate value based on scarcity and individual preferences (Fine 2016). This paradigm, with Kuznets (1941) invention of Gross Domestic Product (GDP) and its subsequent adoption as the dominant progress

indicator, values all economic activities - even destructive ones - through the lens of monetary transactions.[4]

However, despite the Kuznets curve's prediction that inequality and pollution would eventually decline with continued growth, we continue to observe their increase. Stiglitz (2012) emphasizes that GDP is an incomplete welfare indicator that ignores long-term environmental consequences. Moreover, the predicted mechanisms fail to achieve global coordination for effective public goods provision due to free-rider problems[5].

The proposed value recognition system reframes free-riding as equivalent to lost growth and investment opportunities. This system could mobilize governments and corporations toward international objectives.

2.5 Integrating Ecology and Sustainability into Economics

[4] Kuznets himself acknowledged the limitations of GDP and never accepted it as a measure of economic growth. In his seminal paper *Economic Growth and Income Inequality*, he even cautioned regarding his own curve: *"The variety of patterns is truly wide. One is forced to the conclusion that a much more adequate supply of empirical data is required before any plausible hypotheses can be established and any reasonable parameters selected."* (Kuznets 1955).

[5] The free-rider problem refers to a phenomenon whereby individuals or countries tend to benefit from public goods (e.g., environmental resources) without bearing proportionate costs. This concept was systematically developed by Mancur Olson in *The Logic of Collective Action (1965)*, where it was established as a fundamental cause of market failure in public goods provision.

As classical theories' limitations became apparent, economists began incorporating ecological dimensions. The emergence of indicators like the System of Environmental-Economic Accounting (SEEA) serves as an international standard. By quantifying economy-ecosystem interactions, environmentally adjusted Net Domestic Product (ea-NDP) was developed - subtracting ecological degradation costs (e.g., deforestation, soil erosion) from GDP to provide a more accurate picture of nations' "net wealth."

Complementing these efforts, Adjusted Net Savings (ANS) integrates changes in natural, human, and physical capital to measure long-term economic development sustainability. While these indicators provide useful reporting frameworks, their lack of enforcement mechanisms has hindered global coordination in improving measurement systems.

2.6 Integrating Welfare and Human Development into Economics

The Adjusted Net Savings (ANS) indicator, developed by the World Bank, represents a pioneering effort to measure long-term development sustainability by calculating changes in "comprehensive wealth" (encompassing physical, human, natural, and social capital).

The Index of Sustainable Economic Welfare (ISEW), designed by Herman Daly and John Cobb in the 1980s, stands as a groundbreaking framework in ecological economics literature Daly (1994). This approach, inspired by Daly's concept of uneconomic growth, demonstrates that quantitative growth does not necessarily lead to improved collective welfare Daly (1999). These indicators can also serve as markers for sustainability and environmental tokens.

2.7 The Imperative for Value System Reform

Mainstream economics, despite its achievements, proves inadequate in addressing global challenges like climate change, inequality, and financial crises. As Nordhaus (2019) notes: "Welfare theorems rest on assumptions such as perfect information and absence of externalities - conditions rarely met in reality, rendering markets inefficient against challenges like climate change and social inequalities." Similarly, Stiglitz (2012) observes: "Pareto efficiency may prove inadequate in contexts of severe inequality. An economy can be Pareto-efficient yet socially unjust."

The life-value[6] system uniquely integrates planetary life components as economic indicators, enabling real-time economic responses to global threats - a transformative feature absent in conventional economics where ecological factors remain external to market mechanisms.

3. Methodology

[6] The operational definition of the life-value system and its constituent components will be presented in the Theoretical Framework and Conceptual Modeling section.

3.1 Philosophical-Methodological Background

Since Milton Friedman published his seminal essay defending economic positivism, diverse interpretations have emerged. In his essay *The Methodology of Positive Economics* Friedman (1953), he argues that the initial assumptions of an economic theory need not precisely mirror reality, provided they yield accurate predictions. According to his view, excessive debate about foundational assumptions is unnecessary; any theory generating reliable predictions remains valid until it fails to do so, at which point it should be replaced by a superior predictive framework.

Friedman's proposition that more abstract economic assumptions prove more useful—requiring no substantive debate—was considered ingenious, as it resolved numerous protracted theoretical disputes. The significance of this proposition lies not merely in ending debates, but in its philosophical underpinnings: from Friedman's perspective, abstract or even unrealistic assumptions do not undermine a theory's validity, so long as its outcomes remain precise and useful. This view aligns with subjectivist approaches prevalent in philosophy of science and social sciences.

However, significant criticisms have been raised against this approach. Mäki (2009) particularly warns that "neglecting the content of initial assumptions can lead to serious theoretical distortions." Another fundamental critique concerns positivism's standing in science itself—the positivist approach, particularly as it emerged in natural sciences (especially physics), has lost its dominant position even within those disciplines. For instance, Einstein, as cited by Holton (1973), maintained that "scientific hypotheses often originate from scientists' imagination rather than simple observations." He and other scientists considered hypothesis formulation as the starting point of scientific theorizing.

In this context, Hausman (1992) warns that "a theory may yield accurate predictions while resting on assumptions that are incorrect or even dangerous." Therefore, investigating economics' foundational assumptions—particularly under conditions where there is a broad consensus in mainstream economics on the necessity of changes—constitutes an essential and valuable step.

3.2 Methodological Framework

This study employs an integrated three-phase methodological approach:

1. Theoretical Modeling: Analyzing causal relationships among constructs grounded in natural rights (Locke, 1689) and bioscientific epistemology (Section 4.1).
2. Conceptual Modeling: Translating theoretical foundations into measurable indicators (e.g., HDI, SEEA) and the *life-token* framework (Section 5.5).
3. Policy Analysis: Evaluating implementation feasibility through cost-benefit assessment and scenario testing (Dunn, 2017).

3.3 Theoretical Modeling

Theoretical modeling refers to the process of developing analytical frameworks through causal relationships among concepts and theoretical constructs, based on established theoretical foundations in the scientific literature (Sutton & Staw, 1995). In this phase, the theoretical foundation of the value model in this paper is theorized based on the "right to life"—a concept rooted in John Locke's theoretical of natural rights. This concept forms the basis of liberal systems and free markets.

3.4 Conceptual Modeling

Conceptual modeling serves as a bridge between theory and practice, transforming theoretical concepts into measurable constructs and indicators. (Kaplan & Duchon, 1988) While the final weighting of indicators will depend on subsequent empirical studies, the current conceptual framework allows for testing any weighting combination. At this stage, the model delineates values into four primary dimensions—economic growth, ecological sustainability, social welfare, and peace and security—providing a foundation for macroeconomic valuation beyond Gross Domestic Product (GDP).

3.5 Policy Analysis

As the final stage of this framework, policy analysis examines the implications, requirements, and implementation outcomes of the conceptual model. Drawing on Dunn's (2017) approach, this analysis emphasizes cost-benefit assessment, institutional feasibility, and alignment with developmental objectives, offering a structured pathway for transitioning from the current profit- and GDP-based valuation system to one grounded in sustainability metrics and intergenerational values.

3.6 Research Action Plan and Complementary Studies

This study adopts a mixed theoretical-applied approach in three sequential phases: (1) theoretical modeling of life value (Section 4), (2) conceptual model development with composite indicators and tokens (Section 5), and (3) policy analysis of implementation scenarios (Section 6).

Operational implementation requires supplementary studies: indicator weighting using AHPCRITIC methods, pilot testing in volunteer countries, and institutional monitoring mechanisms. The methodology mirrors established protocols like the Human Development Index (HDI), which first developed its conceptual framework before calculation methods (UNDP 1990).

3.7 Methodological Limitations and Future Prospects

Given the inherent complexity of implementation mechanisms such as token quotas and the role of supranational regulatory institutions, a comprehensive analysis of these policies requires a multilevel examination of institutional, economic, and social interactions. Although simulations of token-based life-cycle models provide preliminary insights into the efficacy of these mechanisms, deeper and generalizable analyses will necessitate supplementary future research. Moreover, theoretical modeling may be deemed optimistic due to its neglect of political and social variables, and policy analysis relies on the assumption of international cooperation—which, in reality, may face practical challenges.

Another limitation of this study is the absence of specific weights for the components of life-value. While equal weighting at this stage allows for a preliminary examination of the model, in practice, weights must be tailored to the conditions of each country or region (e.g., development level, prevailing crises, and policy objectives). This task is deferred to future studies to ensure the flexibility needed for adaptation to diverse global contexts.

Despite these limitations, the proposed framework lays the groundwork for further research and field experiments in the evolution of macroeconomic valuation systems. For instance, future phases could explore the measurability of the conceptual model using international indicators such as the **Human Development Index**, **Ecological Footprint**, and **World Bank Sustainability Indicators**.

1. Theoretical Framework

4.1 Theoretical Introduction: Philosophical and Epistemological Foundations

Building on the literature review (noting Rothbard's critique of Marx), a key error in Marx's work was his extensive reliance on the labor theory of value without sufficiently substantiating its foundations. To avoid this pitfall, we first examine the theoretical and epistemological roots of our proposed "life-value" system.

4.1.1 Theoretical Basis of Life-Value in John Locke's Thought

The necessitating liberty and private property for its realization Locke (1689, 112–122). In Locke's framework, life, liberty, and property constitute inviolable human rights, forming the basis of civil society. His social contract theory emerges as a means to transcend the "state of nature" (characterized by conflict) and achieve order and security Locke (1689, 146).

If we distill the fundamental value of Locke's envisioned society, we arrive at nothing less than the **"right to life"**—a concept that imbues both liberty and property with legitimacy.

intellectual foundations of capitalism and free markets can be traced to John Locke's theory of **natural rights**. Locke regarded the **right to life** as the most fundamental human right,

4.1.2 Epistemological Foundations of Life-Value from Natural Sciences Perspective

Cognition emerges as a phenomenon rooted in biological life and evolutionary processes. Depending on ecological contexts, biological tools, and evolutionary pathways, different species develop varying levels of cognitive abilities. Research on octopuses, crows, and primates demonstrates that intelligence and consciousness can evolve independently across divergent evolutionary trajectories.

Octopuses, with their unique neural architecture, exhibit complex behaviors indicative of advanced cognition (Godfrey-Smith 2016). Similarly, crows and primates display sophisticated problem-solving skills in social and ecological contexts, despite structural differences (Emery and Clayton 2004; Hare and Tomasello 2005).

These findings challenge the anthropocentric view of cognition as uniquely human. Rather, all living organisms possess some level of cognitive capacity to adapt to their environments. This perspective places humans on a continuum with other species and expands the concept of **lifevalue** beyond human exclusivity. Within this framework, the preservation and enhancement of life becomes not merely an economic objective for humans, but a universal biological principle.Consequently, interpreting economic actions through a **life-value theory** reconciles human economic behavior with the broader ecological web, positioning *Homo economicus* in harmony with other life forms.

4.1.3 Evidence from Other Sciences - Measurement Systems at Different Scales

The life-value system does not negate existing economic paradigms but rather redefines them within a broader framework - much like how relativity theory and quantum mechanics in physics expanded the boundaries of knowledge without invalidating Newtonian laws. This new framework revealed that while classical physics remains valid for everyday phenomena at normal scales, it proves inadequate at cosmic or subatomic scales, requiring theories with greater precision and flexibility. Thus, the principle of scale-appropriate explanatory models became established as a methodological necessity in natural sciences.

4.2 Foundations of the Value of Life in Mainstream Economics

4.2.1 The Search for Foundations of the Value of Life in Mainstream Economics

To better understand value in economics, one might liken the economy to an ocean, where prices resemble its turbulent waves. The dominant value system treats observable market forces as the primary drivers of these waves, yet deeper, hidden currents—such as tides, ocean depths, and other underlying forces—also shape this turbulence. In this analogy, the will to survive is the fundamental force that gives direction and meaning to all superficial economic dynamics. If properly recognized, this foundational value system could serve as the basis for genuine valuation in economics and clarify why negative market outcomes intensify. The value system governing mainstream economics considers prices as reflections of individual preferences and resource scarcity. However, this framework superficially—and without substantive foundation—neglects the value of life. In reality, behind all market preferences lies a fundamental desire for survival. Every economic agent's choice, whether conscious or unconscious, is an effort to preserve or improve living conditions.

4.2.2 Observing Long-Term Signs of Change in Economics

Historically, economists have attempted to correct market failures through price interventions. From Pigouvian taxes to degrowth theories, wealth taxes, and carbon taxes - all represent efforts to bridge the gap between private and social costs (Stiglitz, 2010). However, this paper adopts a different approach: examining the root causes of these failures through the lens of value systems.

Perhaps the source of many such discrepancies lies not in the market's nature, but in theoretical errors embedded within economics' value framework. Just **as the flawed application of** Marx's

labor theory of value led to significant consequences in socialist systems, the subjective preference-based value system appears to have created macro-level distortions that, through gradual accumulation, have produced substantial negative outcomes.

4.2.3 Are Market Failures Inherent to Capitalism or Stem from the Value System?

Extensive evidence demonstrates that environmental challenges and structural inequalities cannot be effectively managed through market mechanisms alone Jacobs et al. (2017). The proliferation of corrective models—from Pigouvian taxes and carbon pricing to doughnut economics frameworks—reveals persistent attempts to address systemic failures accumulating within the current paradigm. This situation raises a more fundamental question: are market failures intrinsic to capitalism or rooted in conceptual deficiencies?

The Stiglitz Commission report (2009) underscores this very shortcoming: "Neither private nor public accounting systems were able to provide early warning because our measurement system has failed." This failure appears partially attributable not to markets themselves, but to flawed valuation frameworks governing them.

Building on this argument, we contend that much of this inefficiency stems from misalignment between individual preference-based value systems and collective vital objectives. Just as Marx's misinterpretation of labor value theory yielded profound consequences in socialist experiments, persistent growth within inefficient value frameworks has generated analogous negative outcomes in capitalist systems. In both cases, the flaw lies in the application of economic value systems rooted in fundamental conceptual errors about value itself, not in exchange mechanisms or economic systems per se.

4.2.4 Transition from Disembedded Economics Economics to Life-Centered Economics

The proposed "life-value" system does not negate the market but rather seeks to elevate its function from mere profit-seeking to a framework reflecting the true costs of sustaining and enhancing life. Just as Einstein's theory of relativity expanded humanity's understanding of physical reality by adding layers of depth and precision, the "life-value" paradigm attempts to redefine our comprehension of economic dynamics within the context of collective life.

In this framework, the market remains a mechanism for resource allocation and distribution, but its valuation rules are redesigned to incorporate biological, social, and intergenerational values. From this perspective, "life-value" acts as a compass guiding economic decision-making from individual choices to macro-level policymaking

toward maintaining habitable conditions for both present and future humanity.

The most significant feature of this approach is its adaptability in facing crises. Rather than focusing solely on monetary variables or quantitative growth indicators, it assesses environmental resilience, social cohesion, and quality of life as key metrics. Thus, "life-value" represents not merely a theoretical concept but a model for redesigning the entire macroeconomic system.

4.3 The Role of Macro-Institutions

4.3.1 The Role of Macro-Institutions in Implementing Change

The transition to a life-centered economy requires active engagement from major economic and political institutions. Governments, international organizations, and transnational corporations

must acknowledge their responsibility toward collective survival and restructure their reporting systems, pricing mechanisms, and decision-making frameworks based on life-value indicators.

Such a transformation can only be achieved through a top-down mechanism. By establishing global standards, creating supranational regulatory bodies, and adopting binding agreements, the shift in valuation must first originate at the macro-institutional level before gradually permeating intermediate and micro-level market structures. This process—facilitated through education, legal reforms, and the redefinition of economic behavioral norms—will ultimately align individual preferences with overarching ecological and humanistic objectives.

4.3.2 Structural Limitations of Voluntary Environmental Agreements

The implementation challenges of international environmental agreements, such as the Paris Climate Accord, reveal fundamental weaknesses in voluntary governance frameworks. Empirical evidence demonstrates that when enforcement mechanisms are non-binding, compliance becomes subject to shifting political priorities and competing national interests. Several signatory nations have exhibited patterns of either partial implementation or periodic disengagement from their commitments, significantly undermining the agreements' collective effectiveness.

4.3.3 Policy Architecture for Life-Centered Growth: Institutional Transformations

The *life-value system*, if properly implemented across economic layers, will have profound implications for economic reporting, macroeconomic decision-making, financial institutions, and even the enforcement of international agreements. This system seeks to bridge the gap between

conventional quantitative economic metrics (such as GDP or capital growth rates) and ecological, social, and security realities.

In reporting frameworks, this shift manifests as a paradigmatic change in economic growth indicators. Rather than focusing solely on quantitative increases in production and consumption, reports will emphasize development quality, ecological sustainability, human welfare, distributive justice, and ecological resilience. Each economic activity will be assessed and reported based on its direct and indirect impacts on life-value components. Indicators such as ecosystem health, food security, public health, social equity, and climate conflict mitigation will become integral to economic evaluations alongside financial and trade data.

In economic policymaking, adopting a life-value-oriented system necessitates a redefinition of macroeconomic objectives. While economic growth remains the goal, it is no longer measured solely through monetary indicators like GDP. Rather, it requires the establishment of **new flexible metrics** – developed with support from scientific and international institutions – termed *"vitality components."* These components measure societal well-being through a proposed combination of economic factors that must demonstrate **dynamic resilience** against planetary life-threatening conditions.

This redefined growth paradigm maintains the **core trajectory of economic development** while unlocking **new strategic dimensions** for both nation-states and global economic players (e.g., multinational enterprises). Crucially, these actors can now **align profit generation** with **planetary stewardship** by.

This new system facilitates the gradual transition from a linear economy to a life-centered economy by aligning decision-making scales (from individual to supranational entities) and harmonizing short-term preferences with long-term ecological benefits.

Summary and Conclusions

This paper sought to rethink the value foundations of macroeconomics by employing Locke's natural rights theoretical, bioscientific epistemology, and critiques of mainstream value systems to establish the theoretical basis for a new framework termed the "Life-Value System." In this framework, life—as a fundamental value manifest across human, social, and ecological dimensions—is proposed as the primary metric for economic valuation. Labor, subjective preferences, property, and economic growth are thus reconceptualized as instruments for preserving and enhancing life, rather than as independent ends.

The theoretical model demonstrates that market failures, environmental crises, and policy distortions often stem not from inherent flaws in market mechanisms, but from misapplied valuation metrics at macro levels. While microeconomics, grounded in individual preferences and marginal utility, may function efficiently in small-scale interactions, its direct extrapolation to national and global scales leads to the neglect of social, environmental, and intergenerational costs.

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5. The Conceptual Model of the Life-Value System

5.1 Limitations in Future Projections

This paper proposes a paradigm shift in value theory aimed at redefining the economic value system. Many thinkers—particularly philosophers, theorists, and social designers—tend to envision future societies. However, they often regard this exercise as mere speculation, dismissing

it as impractical or trivial. Overly detailed blueprints for humanity's future, such as long-term development plans with excessive minutiae, rely on unnecessary hypotheticals. These frameworks neglect the inherent unpredictability of the future and the likelihood that future generations will not adhere to our designs. Thus, hyper-specific planning becomes not only meaningless but potentially detrimental.

While precise blueprints are futile, a broad, ideal vision of the future—what we aspire to achieve—remains essential. This vision serves as a general framework for political and economic decision-making, especially when creating something new. As Gramsci (1971) observed, *"Before people can adopt a new system, they must first conceive it in their minds."* Even when replicating old methods, we implicitly project a future—one resembling the present. Yet attempting to detail this image (e.g., the state of the economy, environment, or society in 20 years) yields outcomes with negligible odds of realization.

My objective is not to prescribe a rigid plan but to outline a foundational ideal. I seek to demonstrate that such a future is attainable. *"We must orient the present toward an ideal vision of the future"* Kant (1784). While alternative paths may prove superior, initiating change requires a starting point—an initial proposal to be refined incrementally.

5.2 Linking the Theoretical Model to the Conceptual Framework: From Abstract

5.2 Conceptual Definition: The Value of Life

The Life Value System is a conceptual framework for macroeconomic valuation that, rather than relying on individual preferences and market fluctuations, is grounded in collective preferences as reflected in public institutions and governance structures. These macro-level preferences emerge from the objectives and responsibilities of institutions such as governments,

central banks, the United Nations, the International Monetary Fund, and other international bodies—entities entrusted with representing intergenerational interests, collective justice, and planetary sustainability.

Just as the market system derives value from individual, short-term preferences and choices, the Life Value System is based on the manifestation of collective preferences (transnational agreements and foundational documents). These sources include national constitutions, development plans, Sustainable Development Goals (SDGs), international environmental agreements such as the Paris Accord, and other binding global declarations. Thus, within this framework, "value" is not merely a subjective, individual reflection but rather the outcome of an institutional, interactive, and forward-looking process that is redefined through shared responsibility and common destiny.

In response to the widespread crises of our time—environmental, social, economic, and security-related—the Life Value System identifies five core pillars as central components of macroeconomic preferences:

1. **Inclusive and sustainable economic growth**
2. **Ecological sustainability and preservation of natural capital**
3. **Human development, welfare, and the dignity of life**
4. **The advancement of peace, security, and global coexistence**
5. **Equitable distribution of resources, opportunities, and income**

Within this paradigm, economic valuation cannot rely solely on a single metric such as money; rather, it necessitates the adoption of multidimensional valuation systems capable of internalizing and managing the conflicts and externalities of economic policies.

5.3 Operational Definition: The Composite Life Value Index

To operationalize the Life Value System, economic activities at national and global levels must be evaluated using a set of composite, multidimensional indicators. This framework moves beyond reliance on metrics like GDP—which primarily reflect numerical productivity and individual profit—to adopt a composite index system designed to ensure life sustainability. These indicators are capable of rapid response to emerging threats against planetary ecosystems, social security, and human livability.

This index integrates quantitative data across five key domains, evaluating not only traditional economic performance but also a country's capacity to sustain and enhance quality of life. Initially, the components are assigned equal weights to avoid theoretical biases. However, during implementation, the weights should be adjusted based on scientific criteria (such as AHP or CRITIC) and aligned with local priorities. For instance, countries facing environmental crises may assign greater weight to ecological sustainability components, while those with severe inequality might focus on equitable resource distribution. Thus, attempting to assign fixed weights at this stage would compromise the flexibility intrinsic to the theoretical framework of the components.

Moreover, the index is specifically designed to exhibit sensitivity and economic responsiveness to major threats, including climate crises, war, climate migration, and natural resource collapse. In other words, under this model, economies cannot remain passive in the face of systemic global disruptions.

5.4 Specialized Unit of Measurement for Macroeconomics

The Life Value System requires a measurement unit compatible with the multidimensional and dynamic nature of life itself. This unit must be capable of quantifying various aspects of livability, welfare, justice, and sustainability within economic activities, while providing meaningful insights into the state of life within a given domain through economic reporting.

Such a unit cannot be an absolute, fixed, or universal metric; rather, it must be adaptable to the planet's changing biological conditions, emerging challenges, and developmental objectives. Therefore, the term "token" has been selected to represent this unit. The word "token" originally signifies "a tangible representation of intangible value or meaning." In this context, it is not used in the sense of digital currencies but rather as a conceptual measurement unit for life—a tool that enables the visualization, comparison, allocation, and analysis of biological values across different economic levels.

In subsequent phases of this research, to enhance scientific accuracy, it is recommended that the assigned weights be reviewed or validated using one of the following methods**:**

1. **Expert surveys** employing the **AHP (Analytic Hierarchy Process)** or **Delphi method**.
2. **Utilization of real-world country data** and weight extraction through statistical methods such as **CRITIC** or **Entropy**.

Types of Life Tokens

To avoid reducing heterogeneous values to a single unit of measurement and to enhance the flexibility of the life-value system, **five distinct types of life tokens**—each corresponding to one of the five life components and featuring unique objectives and mechanisms—have been designed:

1. Inclusive and Sustainable Economic Growth Token
2. Ecological Sustainability and Natural Capital Preservation Token
3. Human Development, Well-being, and Dignity of Life Token
4. Global Peace, Security, and Coexistence Advancement Token
5. Token for Equitable Distribution of Resources, Opportunities, and Incomes

This classification avoids the mechanical aggregation of dissimilar values, enabling targeted responses to specific crises (climate-related, economic, or security-related). The weighting of tokens, their conversion coefficients to monetary values, and the definitions of token types are calculated based on proposals from economists and related disciplines, as well as agreements among international specialized institutions (such as the World Bank for economic growth, SEEA for ecological measures, and the United Nations for peace indicators), using standardized data. For example, the ecological token is defined based on the SEEA framework and natural capital accounting, while the peace token relies on the Global Peace Index. By transforming each token into an independent policy instrument, this system allows countries to align their priorities with planetary sustainability goals without disrupting market mechanisms.

At this stage, the model maps values onto core dimensions and establishes a foundation for macroeconomic valuation. Given the dynamic and context-dependent nature of global challenges, uniform weighting of components has been adopted as a preliminary, non-prescriptive framework. This approach is grounded in the principle that prioritizing life-value components (e.g., ecological sustainability, distributive justice, or security) must be tailored to region-specific conditions—including development levels, environmental vulnerabilities, and institutional structures. For instance, fixed weights applied to a drought-stricken country (requiring emphasis on biophysical survival components) versus one focused on industrial pollution reduction could yield ineffective policymaking. Thus, while scientific weighting methods (e.g., AHP or entropy) are essential for precision, their implementation requires future empirical studies that integrate local conditions into weight design.

Table I: Components of the Life-Value Assessment Framework

Component	Indicator	Weight	Data Source
1. Economic Growth	Gross Domestic Product (GDP)	20%	World Bank, IMF
2. Ecological Sustainability	Net Natural Capital (SEEA)	20%	SEEA, UNEP
3. Human Development	Human Development Index (HDI)	20%	UNDP
4. Equitable Distribution	Gini Coefficient / Bottom 40% Income Share	20%	World Bank, UN
5. Peace and Security	Global Peace Index (GPI)	20%	Institute for Economics & Peace

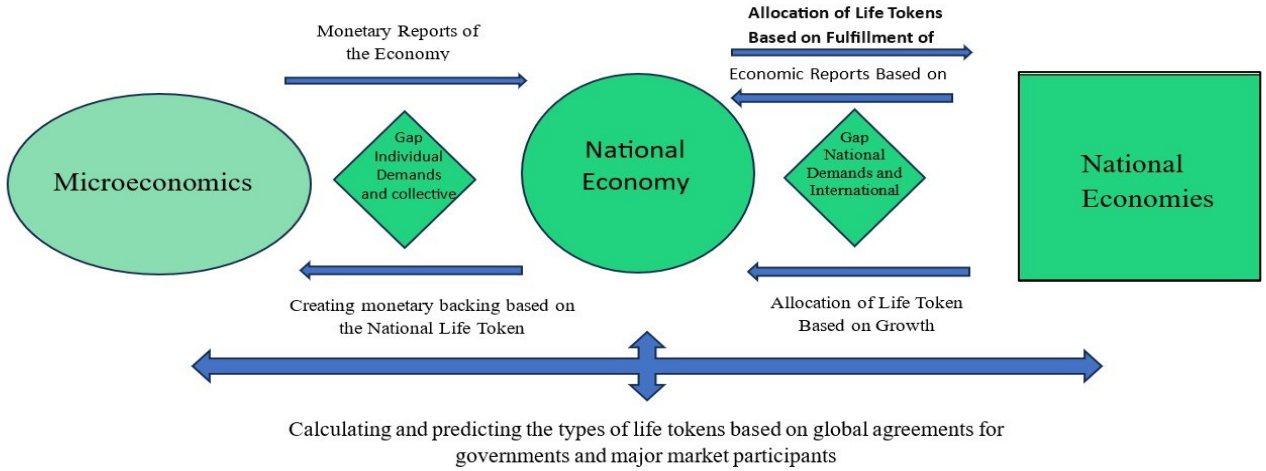
Notes:

1. Initial calculations use GDP baselines, adjusted by performance on other components.
2. Tokens operate as independent policy instruments, allocated based on quantitative performance of countries/organizations.

Implementation Phases:

- **Pilot:** Test 3–5 key indicators.
- **Development:** Establish international regulatory bodies.
- **Institutionalization:** Integrate with national accounting systems.
- **Footer:** Weights are preliminary; regional adaptations may apply (see Section 3).

Flowchart I: Conceptual Framework of Information Flow, Decision-Making, and Token Allocation Across Micro, National, and International Economies



Notes:

1. **Microeconomics** ○ Maintains free-market mechanisms while gradually integrating macro-level preferences into micro-level via cultural transmission.
    - Monetary reserves are converted into *Life Tokens*, influencing microeconomic actors.
    - Major economic entities (e.g., corporations) whose activities align—intentionally or unintentionally—with macroeconomic goals may submit performance reports to the **Global Quota Committee**.
2. **National Economies** ○ Adjust monetary reports from microeconomics based on *Life Token* metrics and standardized national accounts. ○ Submit performance reports on national economic growth targets to domestic and global stakeholders.
    - International financial institutions use these reports for **country ranking and credit assessment**.
3. **International Economy** ○ Calculates planetary *Life Token* allocations based on jurisdictional reporting.
    - Designs *potential tokens* aligned with global objectives (e.g., sustainability goals).

4. **Micro-Macro Gap** ○ Divergent value systems between micro and macro levels create **preference gaps**, visible in national account transfers.
    - Narrowing this gap indicates:
        - Economic growth with **sustainable welfare**
        - Reduced inequality
        - Enhanced security
        - Improved environmental indices
5. **National-International Gap** ○ Government focus on national economies exacerbates this gap.
    - Reducing it ensures **true sustainability of life systems**.

5.5 Causal Chains Across Economic Levels

The proposed model is based on the transmission of data, values, and decisions among the three primary levels of the economy—micro, macro, and international. This causal chain enables the integration of biological and human indicators into economic reports and resource allocation through the "Life Value" system.

1. Microeconomics → Macroeconomics

Firms and other key actors at the microeconomic level operate within the free market framework as usual. However, if the activities of major market participants incorporate aspects of Life Tokens or voluntarily involve participation in international projects rewarded with Life Tokens, they must submit reports on their Life Token-related performance. This allows them to benefit from a specific and limited framework of tradable Life Tokens. Consequently, the micro level serves as both a source of information and a global economic actor.

2. Macroeconomics → International Economics

Governments revise traditional economic reports to align with the "Life Value" system indicators, then submit their performance through redesigned national accounts and reports based on Life Tokens to international institutions. These data—after evaluation via satellite accounts and regulatory mechanisms—will form the basis for allocating global Life Token quotas. In this process, the adaptability of macroeconomic policies to global objectives serves as the key determinant for quota allocation and resource access.

3. International Economics → Macroeconomics

The international system, by establishing a purpose-driven institutional framework for Life Tokens and quota allocations, becomes the primary authority in setting national resource allocation priorities. These allocations directly influence macroeconomic planning, budget structures, and even the direction of public and private investments.

4. Value Gap Between Micro and Macro Economics

The divergence of preferences between micro and macroeconomics is conceptualized as an equilibrium-seeking mechanism in economics. This gap may lead to resource waste, social dissatisfaction, and weakened policy efficacy. Conversely, narrowing this gap signals aligned, equitable, and sustainable development.

5 .Gap Between Macro and International Economics

The preference mismatch between national and international economies is framed as a final equilibrium concept in economics. Its consequences include reduced access to global resources and heightened external pressures for compliance. Targeted design of global tokens could mitigate this gap and redefine national growth trajectories.

Feedback Loops in the Life-Value System

The proposed conceptual model is based on a dynamic equilibrium between positive (reinforcing) and negative (balancing) feedback loops at different levels of the economy. These loops demonstrate how changes in value gaps can transform policy trajectories, resource allocation, and livelihood quality over time.

Reinforcing Loop R1 – Reducing Micro-Macro Gaps and Enhancing Sustainable Life Indicators

A reduction in the value gap between the micro level (firm preferences and behaviors) and the macro level (national objectives based on life values) improves the alignment of performance data with national accounts. This alignment leads to more precise resource allocation, fostering economic growth alongside advancements in equity, social welfare, and environmental quality. Consequently, public trust in policies increases, and voluntary participation of economic actors in value-driven initiatives is strengthened.

Reinforcing Loop R2 – Reducing Macro-Global Gaps and Strengthening Global Sustainability

The synergy between national policies and global objectives gradually aligns biological and social indicators. This harmonization not only reduces international tensions and enhances planetary sustainability but also improves countries' international credibility, facilitating foreign direct investment, technology transfer, and the strengthening of sustainable cooperation.

Balancing Loop B1 – Widening Micro-Macro Gaps and Structural Instability

Misalignment between the behavior of economic actors and macro-level policies based on life values leads to unreliable data production, distortions in national accounts, and, consequently,

ineffective macroeconomic policymaking. This situation exacerbates socioeconomic inequalities, environmental pressures, and public distrust, ultimately making institutional and structural reforms inevitable.

Balancing Loop B2 – Expanding Macro-Global Gaps and Escalating Global Tensions

The mismatch between national programs and global goals or international standards results in policy divergence, conflicting resource allocation, and the spillover of negative economic and ecological consequences to the international level. Under such conditions, countries face external pressures to revise their policies, which may exacerbate financial, political, and environmental crises.

Conclusion: The "Life Tokens" conceptual model offers a novel framework for assessing and guiding national development trajectories by bridging different economic levels and addressing value gaps in the global system. By integrating economic equity, environmental sustainability, and social progress into its valuation system, this model redefines economic growth based on human well-being and planetary viability.

6. Policy Analysis

6.1 Linking the Conceptual Model to Political Analysis: From Idea to Implementation

Following the exposition of the conceptual framework for a token-based multidimensional life-value system (Ostrom, 2009) and alternative accounting methods for measuring economic performance, this section focuses on policy analysis, emphasizing institutional requirements and the feasibility of implementing the model. The objective is to outline a gradual path for an endogenous paradigm shift (North, 1990) within the macroeconomic value system—a shift that, while preserving foundational elements such as economic growth, market competition, and freedom, aligns the economic valuation framework with global macro-objectives such as sustainable development, social justice, livability, and human security.

6.2 The Role of Institutions in Transitioning to a New Value System

Institutional implementation of value systems requires mutually reinforcing relationships between normative frameworks and governance structures. Beyond serving as mere policy instruments, institutions play a pivotal role in operationalizing the life-value system through three core functions: establishing standardized metrics for contemporary economic conditions, administering life-token parity mechanisms, and monitoring allocation processes. Simultaneously, these institutions facilitate systemic transition by reconfiguring national monetary reserves to prioritize life-based indicators over traditional growth metrics. This dual capacity proves particularly vital in addressing the chronic enforcement deficiencies of international institutions, as evidenced by the mixed performance of existing mechanisms like carbon markets. The lifevalue

system's mandatory reporting frameworks offer a substantive solution by creating enforceable compliance measures that transcend national interests.

The resulting institutional-system symbiosis manifests through two dynamics: institutions stabilize the new framework by providing executable policy architectures, while the system reciprocally redefines institutional mandates—particularly in transnational governance—by filling critical regulatory voids. This mutual reinforcement establishes the necessary preconditions for examining state roles in macroeconomic transformation, as explored in the following section.

6.3 Theoretical Innovations of the Model

The theoretical innovations of this model can be identified along three key axes:

First, the transition from a one-dimensional monetary valuation system to a multidimensional token-based framework that enables the simultaneous disaggregation, tracking, and valuation of diverse development dimensions.

Second, the design of binding mechanisms for implementing international agreements, aimed at addressing the institutional gaps in the current system, which suffers from a lack of enforceable instruments.

Third, the preservation of fundamental neoclassical economic structures at the microeconomic and market-mechanism levels, gradually implementing reforms at the macroeconomic and national accounting levels. This approach, by avoiding direct confrontation with mainstream economic paradigms, paves the way for realistic adoption and implementation of the model.

The theoretical foundations outlined above necessitate corresponding adaptations in state functions. As the primary architect of macroeconomic policy, the state must evolve beyond its traditional growth-oriented mandate to become a steward of multidimensional value creation—a transition explored in the following section.

6.4 Revisiting the Value System and the Role of the State in Macroeconomics

Within capitalism, the role of the state has long been a contentious issue among economic schools of thought. From the minimal "night-watchman" state to the interventionist welfare state, a broad spectrum of governmental roles has been proposed—each shaped by historical conditions and the theoretical paradigms of their time. Today, while most capitalist economies have adopted a mix of market mechanisms and state intervention, the scope and limits of such intervention remain hotly debated. In such a framework, the state, by managing **life token**-based reporting and target-setting systems, becomes the backbone of a new macroeconomic order. This order harmonizes **economic growth** with **ecological constraints**, **social equity**, and **human security**.

6.5 The Role of Life Tokens in Global Governance: From Institutional Autonomy to a New Financial Anchor

A key advantage of the proposed *Life Value System* and its *life tokens*, compared to the prevailing economic framework, lies in their potential to grant international organizations genuine autonomy by reducing their budgetary dependence on nation-states. By allocating *life tokens* to international institutions based on their performance in advancing global sustainability, welfare, and security, these entities could gain independent funding streams, thereby diminishing their reliance on nationally contributed quotas and politically influenced budgets.

6.6 Central Banks and Aligning Growth Objectives with Biocentric Sustainability

At the national level, central banks and financial policymaking institutions play a pivotal role in transitioning from traditional economic growth models to novel frameworks based on life tokens. As emphasized in recent Bank for International Settlements (BIS) reports, central banks are increasingly incorporating climate indicators and sustainability data into their policy mandates. This evolution lays the groundwork for gradually shifting growth metrics such as GDP toward composite measures that evaluate performance through the allocation of life tokens to green projects, pollution reduction initiatives, and social welfare enhancements.

6.7 The Future Economy and Extraterrestrial Settlements

For some economists, this section may seem overly futuristic or even reminiscent of science fiction. However, current trends in the search for extraterrestrial habitats and the development of space infrastructure suggest that such scenarios are not far from reality.

In this vision, a life-anchored valuation framework could emerge as an effective framework, lending economic and existential significance to activities aimed at human survival and expansion to other planets. These endeavors, functioning as life-sustaining initiatives, would be considered value-generating. As interplanetary settlements develop, the life-value system could provide a structure for regulating new economic territories, assessing their worth based on their capacity to preserve and enhance life. Moreover, coordinating economic interactions between these habitats under the guiding principle of life-value may prove the most effective way to manage these geographically dispersed economies.

Simultaneously, humanity's expansion into new territories would be conducted with equilibrium in mind, as the life-value-regulated economic incentives would render the destructive exploitation of these domains economically irrational.

6.8 Final Conclusion

Policy analysis demonstrates that implementing a life-value system through life tokens - with its robust theoretical foundation and coherent conceptual design - possesses significant potential for deployment at both national and international levels. This model not only transforms approaches to classical macroeconomic issues such as growth targeting, balance of payments, and the role of government, but also offers a complementary and synergistic framework. By leveraging existing implementation mechanisms like central banks, international agreements, and reliable satellite accounts, it enables the steering of the global economy toward sustainability.

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7. Addressing Implementation Challenges of the Life-Value System

The implementation of the proposed model based on *life tokens* and the redefinition of economic value based on sustainability faces a complex set of challenges. Understanding and managing these challenges is not only a prerequisite for the model's success but also reflects the institutional and Political realities of The phased transitionin global economic valuation (Keohane & Nye, 2001; Drezner, 2007). These challenges can be categorized into three levels: institutionalpolitical, technical-executive, and scientific-paradigmatic.

7.1 Institutional and Political Challenges

Resistance from Countries with Conflicting Interests:

Resource-exporting nations whose economic structures depend on direct income from nature often perceive new valuation models such as carbon tokens as threats to their geopolitical interests.

Response: Under the proposed model, countries with resource-dependent economies can become key players in the ecological transition, provided the mechanisms are properly designed. Since these countries' core activities are fundamentally linked to environmental degradation, any investments they make in pollution reduction, ecosystem restoration, or sustainable resource management can be evaluated as positive contributions to biological performance and serve as a basis for allocating life tokens.

Furthermore, international resources and life tokens, aligned with global development objectives, would primarily be directed toward developing countries. This approach would position these nations at the center of attention for multilateral institutions and global investors.

The Challenge of Powers' Opposition to Financial Independence of Token-Based International Institutions

Many global economic powers exert influence over international institutions through direct funding. Establishing mechanisms that finance these institutions via value-backed tokens—derived from their activities and controlled distribution of such tokens—may be perceived as a threat to the structural dominance of these powers, potentially triggering strong resistance.

Response: To overcome this resistance, a transitional phase must be designed, granting limited special privileges to major powers. These privileges could include priority participation in

international token-backed initiatives, advisory roles in setting metrics, or access to discretionary redistribution mechanisms. The goal is to incentivize these actors to perceive relative benefit and ownership during the transition, rather than resist it, while preventing the new structure from reverting to monopolization. Such designs align with recent debates on global governance reform and the shift from purely national models to collaborative global frameworks (Held & KoenigArchibugi, 2005).

Lack of Penal Mechanisms for Non-Compliance: If tokens are allocated without consequences for violations—such as misreporting or failure to meet benchmarks—the entire system risks losing credibility.

Response: Implementing punitive measures—such as downgrading credit ratings with international financial institutions, revoking tokens, or suspending allocations for non-compliant actors—is essential.

7.2 Technical, Cost-Related, and Security Challenges

Manipulation of Data and National Accounts to Obtain More Tokens:

In the absence of transparent and verifiable systems, there is a high risk of data manipulation or falsified reports by countries or polluting industries.

Strategic Response: Utilizing independent data sources such as satellite imagery, systems like SEEA (UNSD, 2021), and cross-validating data at the international level can effectively mitigate this risk.

High Costs of Modifying National Accounts and Statistical Infrastructure:

Developing countries often lack the financial and technical resources to update software, train personnel, and design new reporting mechanisms (Koskela & Vehmas, 2020).

Response:A portion of human development and ecological tokens could be allocated to cover transition costs, or these countries could be granted access to financial markets linked to token trading (World Bank, 2020).

Ensuring Prevention of Misuse in Secure Token Exchange:

Without a unified regulatory body, risks such as forgery, theft, or misconduct in token storage and exchange remain prevalent.

Response: Implementing a distributed ledger technology (DLT)-based infrastructure and establishing an internationally supervised exchange under a joint governance body can enhance security and trust.

Enforcing Compliance in Token Allocation and Exchange:

In the absence of mechanisms to revoke tokens, irresponsible behaviors—such as data distortion or reversal of prior actions in subsequent periods—may persist unchecked.

Response: The exchange model should structurally incorporate provisions for reducing or nullifying tokens in cases of proven fraud or significant non-compliance.

7.3 Paradigmatic and Scientific Challenges

Resistance from Prevailing Scientific Structures:

Shifting the valuation paradigm requires revising educational content, academic curricula, and the mindset of economists.

Response: Despite initial resistance, the history of science demonstrates that problem-driven paradigms ultimately displace existing frameworks (Kuhn, 1962).

Ambiguity in Quantifying the Value of Life and Related Indicators:

Integrating biospheric justice, intergenerational sustainability, ecological health, and social welfare into a measurable model is complex yet imperative.

Response:This paper takes an initial conceptual step toward defining life tokens and the biological quota model, paving the way for more precise theoretical-applied research.

Challenges in Institutionalizing the Paradigm in Academic Curricula:

As Kuhn noted, the best way to identify a discipline's dominant paradigm is to examine its textbooks. Yet, no paradigmatic shift in scientific history has been halted by educational barriers alone (Kuhn, 1962).

Final Conclusion

The implementation challenges discussed here should not be viewed merely as obstacles, but rather as fundamental components in the transition toward a more sustainable and ecocentric valuation system. In addressing these challenges, the "Life Tokens" model seeks to create a phased and participatory institutional framework by leveraging existing tools.

Three key pillars will determine the model's success in its path toward globalization:

1. Gradual adoption
2. Careful incentive design
3. Robust transparency mechanisms

This approach acknowledges that systemic transformation requires both technical solutions and evolutionary institutional development, positioning the Life Tokens model as a viable bridge between current economic paradigms and future sustainability requirements.

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8. Distinguishing the Proposed Model from Similar Efforts and Research

The life-value system model presented in this paper, while drawing inspiration from certain innovative approaches in macroeconomics and environmental economics, possesses fundamental differences and distinct practical advantages that set it apart from other models.

8.1 Distinction from Ecological Economics

The school of ecological economics, centered on the ideas of Herman Daly and his followers, has offered a radical response to market failures in environmental and welfare domains. This school rejects the ideology of endless growth, emphasizing that economic systems must operate within the biosphere's physical limits (Daly, 1996). Its notable achievements include introducing alternative indicators like the Index of Sustainable Economic Welfare (ISEW) and Genuine Progress Indicator (GPI) to replace GDP in progress assessments.

However, despite these accomplishments, ecological economics has largely remained confined to critical discourse against mainstream economic foundations. Many models within this school either explicitly reject economic growth or abandon market concepts, money, and profit altogether. This fundamental disconnect, while theoretically appealing, has significantly hindered the practical implementation of its proposals at macro levels and within international institutions. Even among the most prominent advocates of ecological economics, there remains palpable

skepticism regarding a complete disengagement from mainstream economic paradigms. As Spash (2019) notes, "The unwillingness to complete the break from mainstream [economics] remains even among critical voices (e.g., Daly, Farley, Norgaard, Kallis, Jackson) and alternatives such as steady-state and degrowth/post-growth."

In contrast, the life-value system model accepts core market economy principles - including **free**market mechanisms, economic growth, and efficiency - while seeking to redefine the "valuation system" at macro level rather than rejecting existing mechanisms. In this model, growth isn't eliminated but transformed into a tool for advancing social justice and ecological sustainability through allocating life tokens to activities aligned with sustainable development goals. Thus, rather than attempting to replace the entire economic system, this model functions as an "intraparadigmatic reform" that can synergize with existing institutional structures like central banks, climate agreements, and national accounting systems.

8.2 Key Distinction from Doughnut Economics

Doughnut Economics, introduced by Kate Raworth (2017), employs the metaphorical image of a doughnut to illustrate two critical boundaries for a sustainable economy. The inner boundary represents the minimum social standards, such as nutrition, education, healthcare, and energy, while the outer boundary defines the ecological ceiling of the planet, beyond which environmental degradation occurs (Raworth, 2012). The goal of Doughnut Economics is to strike a balance between these two boundaries, ensuring the economy operates within a safe and equitable space.However, the proposed *Life Value System* model moves beyond this framework and introduces the following key innovations:

1. **Transforming Poverty Alleviation into a Value-Creating Economic Objective**:

   Elevating deprived populations to meet and exceed the inner boundary is not only an

ethical imperative but also an economically viable activity with measurable returns in national accounts and corporate profits. Under this system, developmental projects (particularly those led by the United Nations) are settled using tradable *Life Tokens*.

2. **Harnessing Economic Growth to Enhance Social Welfare**: Instead of viewing growth as a destructive force, this model channels it toward expanding human well-being. Rather than hindering growth, the economy intelligently mobilizes it to address social needs.

3. **Redefining the Outer Boundary Based on Ecological Resilience and Regeneration**: Unlike the static view of planetary boundaries in the Doughnut model, this approach redefines boundaries as dynamic, regenerative capacities. Projects aimed at repairing and restoring degraded planetary boundaries are treated as profitable economic opportunities, with participants receiving *Life Tokens* as economic rewards from international institutions or governments.

In summary, the *Life Value System* preserves the driving force of economic growth while transforming it into a tool for advancing social justice and ecological restoration. This model offers a more integrated and dynamic alternative to Doughnut Economics. Rather than restricting or halting growth, it seeks to direct and give purpose to growth by addressing humanity's greatest challenges.

8.3 Comparison with Heterodox Approaches

Numerous heterodox economic schools—including post-growth economics [7], feminist economics [8], and participatory economics [9]—have critiqued the foundational principles of mainstream economics with the aim of transforming contemporary economic systems. These schools have challenged concepts such as economic growth, market logic, and profit, proposing alternative systems centered on justice or ecological values. However, these efforts often face resistance in policymaking and decision-making institutions due to their fundamental departure from the language and analytical tools of neoclassical economics.

In contrast, the *Life Value System* model proposes transformative change at the level of macroeconomic valuation without rejecting the core principles of market economics or conflicting with growth, profit, and efficient allocation. Rather than dismantling the engine of economic growth, this model redirects it toward objectives such as ecological sustainability,

[7] Degrowth economics rejects the notion of endless economic growth and advocates for redefining welfare and reducing natural resource consumption. Emerging in the 2000s through the works of scholars like Tim Jackson(2009) and Serge Latouche(2009), this school emphasizes simpler living, intergenerational justice, and reduced inequality.

[8] Feminist economics argues that traditional economic systems have systematically undervalued women's unpaid labor (e.g., caregiving and child-rearing) and exhibit androcentric biases. This approach calls for a redefinition of welfare, equitable valuation of labor, and equal participation in decision-making. Waring, Marilyn(1989)

[9] Participatory economics proposes democratic decision-making at the level of firms and communities, along with equitable resource distribution, as an alternative to both markets and centralized planning. This framework was developed by Michael Albert(1991) and Robin Hahnel(1991).

intergenerational justice, and human security. Unlike radical proposals that lack institutional feasibility, this paper's approach introduces actionable tools—such as *Life Tokens* and macrolevel reporting mechanisms—to drive change within existing global economic structures.

Thus, this model does not represent a complete break from economic tradition but rather a reform aligned with mainstream currents, addressing the failure of current valuation systems to tackle global crises.

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9. Suggestions for Future Research

The model presented in this paper represents not only a theoretical innovation in macroeconomic valuation but also provides a rich foundation for future empirical and theoretical research. The following proposed directions can pave the way for developing, testing, and gradually implementing this model:

1. **Dynamic Equilibrium Mathematical Modeling**: Developing dynamic models that examine the balance between individual preferences and collective goals, alongside tensions between national interests and international commitments, within a unified analytical framework. Such modeling—inspired by game theory, system dynamics, or international general equilibrium—could elucidate the sustainability mechanisms in allocating *Life Tokens*.

2. **Redesigning National Accounting Systems Based on Life Indicators**: Creating a coherent framework for alternative national accounts using *Life Tokens* to integrate environmental sustainability, social justice, and human security into official economic

reports. This project could align with the current System of National Accounts (SNA) or expanded versions like the UN's System of Environmental-Economic Accounting (SEEA), offering a basis for multidimensional data-driven policymaking.

3. **Exploring Diverse Weighting Approaches for Selected Indicators** This involves examining various weighting methodologies to adapt the life-value system model. Potential focuses include: Analyzing the dynamics of life-value components under emerging critical threats, Investigating components across diverse domains with varying needs (requiring distinct combinations of factors), or Developing flexible weighting schemes for specific components.

4. **Research on Institutional Structures for Allocating, Calculating, and Regulating Life Tokens**: Examining suitable institutional frameworks—emphasizing scientificinternational bodies and their relationships with governments, markets, and civil society—to manage *Life Tokens*.

5. **Designing Tokenized Models for Global Agreements and Declarations**: Aligning international accords (e.g., climate change, disarmament, food security, sustainable peace, and technology) with economic incentive mechanisms by embedding *Life Tokens* into their implementation frameworks.

6. **Empirical Validation Through Pilot Projects**: Testing the model's alignment with sustainability and policy efficacy metrics via national or regional pilot projects to validate *Life Tokens* in practice.

Collectively, these pathways can expand and empirically test the participatory framework proposed in this paper for value-driven macroeconomics. By redefining the relationship between

sustainability, welfare, and economic growth, the *Life Value System* offers a novel perspective for analyzing and guiding macroeconomic policies—a perspective worthy of further exploration as a ***important contributiun*** to economic theory in future studies.

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10. Conclusion and Key Message

This paper has sought to establish a novel theoretical, conceptual, and policy-relevant framework for rethinking macroeconomic valuation systems. The *Life Tokens* model aims to transcend one-dimensional, money-centric valuation by proposing a multidimensional mechanism that synergizes economic growth, environmental sustainability, and social justice. While upholding the principles of market economics and growth logic, this framework redirects these principles toward long-term goals of planetary survival, security, and intergenerational welfare.

Compared to heterodox approaches, this model exhibits a distinctive feature of *intra-paradigm reform*—it seeks to recalibrate macroeconomic valuation without rejecting the foundational tenets of neoclassical economics. This characteristic positions the model uniquely for institutional adoption and practical implementation. Whereas many alternative approaches face significant barriers due to their radicalism or incompatibility with existing policy mechanisms, the proposed framework speaks the language of mainstream economics while achieving divergent ends.

This paper has introduced an innovative framework for transforming economic valuation systems—one that not only addresses market failures but also serves as an engine for sustainable growth. By centering life-oriented values and planetary viability, the approach enhances social

welfare, reduces inequalities, and tackles global challenges such as climate change, weapons proliferation, and financial crises—all while preserving free-market mechanisms. Crucially, it provides international institutions with an actionable mechanism to address any crisis threatening human or ecological survival, thereby improving environmental, social, and economic conditions.

The *Life Tokens* model represents a pragmatic evolution in economic thought, merging the dynamism of markets with the imperative of safeguarding life in all its dimensions. It is not merely an academic exercise but a call to reimagine how economies measure—and ultimately value—what truly sustains us.

Integrating the Life-Value Paradigm into Energy and Climate Macroeconomics

The Life-Value Paradigm also offers a practical avenue for rethinking energy valuation and policy design. By incorporating the concept of *Life Tokens* into macroeconomic frameworks, energy pricing, carbon taxation, and natural capital valuation can be grounded in multidimensional measures of human and ecological well-being rather than in purely market-based costs. Such an approach can enhance the resilience of energy systems by aligning fiscal and environmental incentives with the preservation of life-supporting capacities. In this sense, the Life-Value framework bridges macroeconomic resilience with sustainability goals, providing a normative basis for integrating climate and energy policies into long-term development strategies.

Final Message and Call to Action 3

This paper's core message is unequivocal: global crises—from climate change and inequality to emerging security threats—compel us to rethink the foundations of economic valuation. Persisting on the current trajectory will only widen the divergence between economic objectives

and vital planetary imperatives. The *Life Value System* offers a flexible yet actionable framework to facilitate a gradual but fundamental transition toward life-centered economies.

A Call for Collaboration

This proposal marks the beginning of a challenging yet essential journey. I invite economists, environmental scientists, data specialists, and policymakers to join this critical dialogue. Your critiques, refinements, and practical insights will enrich this framework's rigor and applicability. Developing such a system demands multidisciplinary collaboration, scientific consensus, and political will—only through collective effort can we transform this vision into implementable solutions across all governance levels.

The time for incremental change has passed. What we propose is nothing short of redefining how economies value life itself.

Declaration of generative AI and AI-assisted technologies in the writing process
During the preparation of this work, I used DeepL and ChatGPT solely to improve the readability and language of the manuscript. I reviewed and edited all content, and I take full responsibility for the final text.

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Declaration of competing interest

I declare that I have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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