

The transition from industrial civilization to ecological civilization

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Abstract: Rapid technological advancement fueled substantial economic growth in the West yet simultaneously strained the relationship between humanity and nature. The recurrent emergence of ecological crises has compelled humanity to confront environmental issues. Against this backdrop, a new form of civilization is urgently needed to reshape human thought, production, and lifestyles. It is therefore essential to reflect on the dialectical relationship between industrial and ecological civilizations, learn from historical experience, and make scientifically informed projections for the future—so as to forge a path toward harmonious coexistence between humanity and nature, and sustainable development.

Keywords: Industrial Civilization; Ecological Civilization; Sustainable Development.

1. Introduction

To date, industrial civilization has been the most dynamic and innovative form of civilization. Its strength lies in mass production, which rapidly expanded the availability of goods [1]. Its weakness, however, is the accelerated consumption and pollution of Earth's resources. In the post-industrial era of the 21st century, the trajectory points toward a high-tech economic model rooted in sustainable development—namely, a circular and ecological economy.

Industrial society is unique in its dependence on continuous economic growth. Should wealth accumulation stagnate, its legitimacy would be lost. Sustained growth demands innovation, which constitutes the vital foundation of industrial society. Innovation, in turn, requires endless knowledge expansion. Agricultural societies also witnessed inventions and improvements—at times substantial in scale. Yet progress was never, nor could it be expected to be, continuous. Even the most dynamic agricultural societies (such as China during the Tang and Song dynasties) produced innovations that, in quantity, sophistication, and impact, fell far short of those in industrial societies. The essence of agricultural society lies in relative stasis and stable division of labor, whereas industrial society is defined by perpetual innovation and change [2]. However, with the advance of economic globalization, while human society has continued to develop, ecological problems have multiplied—air pollution, widespread desertification, water scarcity, global warming, and an increasing variety of biological viruses. Ecological civilization has thus become increasingly vital to people's lives, and its development has garnered growing attention from nations and modern society. The immense material wealth and scientific advancement that industrial civilization has bestowed upon human society are undeniable. Their role in improving living standards, fostering wealth accumulation, and driving technological innovation is immeasurable. Yet these achievements have been followed closely by global ecological crises and environmental degradation.

This paper examines, from the perspective of the dialectical relationship between industrial and ecological civilizations, how we may draw lessons from history and better navigate this transformation in social development at this critical

junction.

2. The historical development of industrial civilization

(1) The Emergence of Industrial Civilization

The rise of industrial civilization began as a profound social transformation in the latter half of the 18th century, originating in Britain before sweeping across the globe. It was not merely a technological leap but a fundamental shift in how humanity produced, lived, and thought. At its core lay technological innovation. The refinement and widespread adoption of the steam engine freed humanity from its longstanding reliance on natural power sources such as water and animal strength, marking a fundamental breakthrough in energy. Coal became the “bread of industry,” propelling metallurgy, mining, textiles, and other sectors beyond manual labor into the era of mechanized mass production. Subsequently, the invention of railways and steamships reshaped geographical space at an unprecedented pace, binding the world closely together [3]. Accompanying this technological transformation was a dramatic restructuring of society. The factory system displaced traditional household workshops, drawing vast populations from rural areas into cities and giving rise to an industrial bourgeoisie and proletariat in the modern sense. Urbanization accelerated, and the old social hierarchy rooted in land ownership gave way to new classes defined by capital and wage labor. At the same time, industrial civilization gave rise to new institutions and ideas. Modern corporate structures, patent laws, and financial systems emerged to meet the demands of large-scale production. Liberal economic theory arose, emphasizing the role of the market as an “invisible hand.” Yet, while industrial civilization generated unprecedented material wealth, it also gave rise to acute tensions—issues of labor rights, wealth inequality, environmental degradation, and colonial expansion came to the fore. In summary, the rise of industrial civilization marked a great leap forward in human history. It laid the foundations of modern society, and the challenges and opportunities it unleashed remain central issues of our time.

(2) The status of industrial civilization

Industrial civilization occupies a foundational role in human history. It is not merely the product of technological

innovation, but a paradigm shifts in civilization that reshaped human existence, social structures, and the global order. Industrial civilization brought about a fundamental leap in productive forces. Prior to this, productivity growth under agricultural civilization had been exceedingly slow [4]. Through mechanized mass production and the utilization of fossil fuels, the Industrial Revolution freed humanity from millennia of material scarcity, ushering in an era of exponential growth. As Marx observed, the productive forces created by industrial civilization surpassed the sum of all previous epochs. Second, industrial civilization restructured society and spatial forms. It dismantled the land-based hierarchical order, gave rise to modern class structures, and rendered urbanization an irreversible trend. The institutional framework of modern society—including the nation-state, the modern corporation, and legal systems—was established during this period. Industrial civilization accelerated globalization. Through railways, steamships, and telegraphy, regions of the world became more tightly interconnected than ever before. It turned human history into what could truly be called “world history,” albeit through processes marked by colonial expansion and unequal exchange. Industrial civilization profoundly altered the relationship between humanity and nature. Shifting from adaptation to large-scale domination, humanity generated immense wealth while simultaneously precipitating ecological crises, making environmental degradation a defining issue of our time. Furthermore, the internal contradictions of industrial civilization gave rise to modern critical movements such as socialism and spurred institutional developments like the welfare state. Today, even as we have entered the information age and are exploring the path to ecological civilization, the material foundations, institutional frameworks, and historical lessons forged by industrial civilization remain essential coordinates for understanding the modern world and envisioning future development.

(3) The Characteristics of industrial civilization

Industrial civilization represents the major civilizational form following agricultural civilization, with fossil fuels as its energy foundation. Its most fundamental characteristic lies in the large-scale exploitation of fossil fuels such as coal and oil [5]. The invention of the steam engine freed humanity from dependence on natural forces like water and wind, providing a continuous, stable, and transportable source of industrial power. This energy revolution enabled productive forces to transcend natural constraints, achieving a qualitative leap forward. Industrial civilization is defined by mechanized mass production as its core mode of production. Machines replaced hand tools, and factories supplanted workshops as the dominant form of production. Standardization, large-scale operations, and finely detailed division of labor dramatically enhanced labor productivity. Scientific management methods such as assembly lines and Taylorism pushed the pursuit of efficiency to its limits. Socially industrial civilization is characterized by urbanization and class differentiation. It prompted a massive migration of population from rural areas to cities, rapidly accelerating urbanization rates. The hierarchical structure of traditional society gave way to two opposing classes: the industrial bourgeoisie and the industrial proletariat. While social mobility increased, class tension grew increasingly acute. In its intellectual and cultural dimensions, industrial civilization is marked by market logic and rationalism. It champions free competition, efficiency as a priority, and profit maximization. Scientific rationality

became the dominant worldview, with technological progress viewed as the fundamental driver of social advancement. Contractual relations permeated all spheres of society, and individualism supplanted the collective identity of traditional communities. Spatially, industrial civilization unfolded as globalization and a world-system. Through modern transportation and communication technologies, it tightly interconnected the world, giving rise to a “center-periphery” global economic system. Western industrial nations, leveraging their productive advantages, came to dominate the international division of labor, while non-Western regions were drawn into the world market—marking the true beginning of globalization. Ecologically, industrial civilization is characterized by an adversarial relationship between humanity and nature. It established humanity’s position as conqueror and dominator of the natural world. Large-scale resource extraction and waste discharge generated unprecedented material wealth yet also produced severe problems such as environmental pollution and ecological degradation, placing the human-nature relationship in profound tension. Industrial civilization is a double-edged sword. It achieved unprecedented material progress and drove profound advancements in human society, yet it also gave rise to modern predicaments such as ecological crises and human alienation. Understanding these characteristics is essential for comprehending the contemporary world and charting a path toward sustainable development.

3. The inexorable shift from industrial to ecological civilization

(1) The decline of industrial civilization

At the height of its ascendancy, industrial civilization has already begun to reveal deep signs of crisis; its internal logic is driving itself toward the brink of collapse and the collapse of ecosystems is the most immediate crisis of industrial civilization. Built upon the limitless extraction and linear consumption of fossil fuels, industrial civilization treats nature as an inexhaustible reservoir of resources and a boundless sink for waste. Over the past two centuries, this development model has breached multiple planetary boundaries—climate change, biodiversity loss, resource depletion, and environmental pollution—pushing nature’s capacity for self-restoration to its limits. When growth is achieved at the expense of natural capital, such prosperity is inherently unsustainable. The fragmentation of social structure is equally striking. In its pursuit of maximum efficiency, industrial civilization has exacerbated inequality. A small class of capital holders has amassed immense wealth, while large numbers of workers face unemployment and marginalization amid the wave of automation [6]. Traditional communities have disintegrated, individuals have become atomized, social trust has eroded, the middle class has shrunk, and social stability has been undermined. The alienation of the spiritual realm has left human existence increasingly impoverished. Individuals are instrumentalized as cogs in the production line, while consumerism reduces them to slaves of desire. A sense of meaning and belonging dissolves amid utilitarian calculation. The collapse of industrial civilization is not a sudden catastrophe but a profound crisis of transition. It warns us that a civilizational model predicated on resource overexploitation and the reification of human life is ultimately unsustainable. The path beyond this crisis lies in transcending

the logic of industrial civilization and forging a new civilizational form—one that respects planetary boundaries, pursues social justice, and restores the holistic development of human beings.

(2) Environmental Protection and the Imperative of Sustainable Development

The decline of industrial civilization is no accident, but rather the inevitable outcome of its internal contradictions under the constraints of resources and the environment. As a civilizational form built on fossil fuels, driven by linear growth, and centered on the logic of capital, industrial civilization, while creating unprecedented material wealth, has simultaneously planted the seeds of its own negation. First, the development model of industrial civilization rests on the illusion of unlimited natural resources. For over two centuries, large-scale extraction of fossil fuels and unchecked waste emissions have pushed the Earth's ecosystems to the brink of their carrying capacity [7]. Global crisis—climate change, biodiversity loss, resource depletion, and environmental pollution—are the inevitable products of industrial civilization's operating logic. When nature can no longer supply exploitable resources nor absorb the waste emitted, the material foundation of industrial civilization collapses. Second, the social structure of industrial civilization has also become fractured in its own development. The logic of efficiency above all has exacerbated inequality, allowing capital accumulation to coexist with labor poverty. Automation and digitalization have further eroded traditional employment, leading to the shrinkage of the middle class and a decline in social mobility. When social trust disintegrates and a sense of community dissolves, the social foundation of industrial civilization begins to crumble. It is against this backdrop that the imperatives of environmental protection and sustainable development have emerged. This is not about making piecemeal adjustments to industrial civilization, but about transcending its underlying logic. Sustainable development demands that economic activities remain within ecological boundaries, that social justice be integrated into development goals, and that the holistic development of human beings become the fundamental measure of civilizational progress [8]. This marks a profound paradigm shift in human civilization—from the conquest of nature toward harmonious coexistence between humanity and nature, from limitless growth toward qualitative improvement, and from the logic of capital toward the logic of life. The decline of industrial civilization thus presents a historical opportunity for ecological civilization as a new civilizational form. Environmental protection and sustainable development are not merely strategies for managing crises; they represent the necessary path for human civilization to advance to a higher stage.

Ecological civilization represents the historical trajectory of human civilization. Guided by the pursuit of ecological civilization, efforts should be made to harmonize the relationship between humanity and nature [9]. It is essential to address the contradictions arising from industrial civilization by keeping human activities within the limits of ecological and environmental carrying capacity, while pursuing integrated conservation and systematic governance of mountains, waters, forests, farmlands, lakes, grasslands, and deserts. A deep understanding of this major scientific assertion and its underlying principles holds significant theoretical and practical value. It enables the comprehensive, accurate, and full implementation of the new development

philosophy across all stages and domains of development, supports the creation of a new development paradigm, facilitates high-quality development, drives a comprehensive green transformation of the economy and society, and advances the paradigm shift from industrial civilization to ecological civilization. Ultimately, it contributes to building a shared future for humanity and nature, as well as a community with a shared future for mankind.

4. Pathways and strategies for civilization transition

(1) Pathways for transition

Protecting the ecological environment is equivalent to protecting productive forces; improving the ecological environment is equivalent to developing productive forces [10]. In building an ecological civilization today, we must endow “productive forces” with a fundamentally new connotation. Modern green productive forces necessarily entail, alongside the capacity to understand, transform, and utilize nature, the gradual development of an intrinsic capacity to protect nature, including capabilities for ecological balance, ecosystem restoration, wilderness conservation, environmental monitoring, and pollution prevention.

(2) Strategies for transition

This also represents a fundamental correction to the insufficient attention paid over the past four decades to the green dimension of productive forces—a dimension that has rarely been addressed or has been inadequately articulated. It is essential to consistently regard the ecological environment as an intrinsic component and endogenous driver of economic and social development. Likewise, the greening and recolonization of the entire production process must be upheld as the means, the constraint, and the guarantee for achieving and ensuring the green and ecological outcomes of productive activities.

5. Conclusion

From a grand vision and broad perspective, it is essential to recognize that ecological civilization represents the historical trajectory of human civilization. In practice, it must serve as a guiding strategy for advancing a comprehensive green transformation of the economy and society, as well as for fostering harmony between humanity and nature. It should not be simplistically equated with environmental protection—still less reduced to superficial or pseudo-ecological practices. Only through a fundamental transformation of both green productive forces and green relations of production can ecological civilization truly emerge as a new paradigm that leads human civilization forward—a more complete form of civilization and a higher stage of development.

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