

## The Survival Dilemma of the “Technological Society” and the Transcendent Logic of Digital Ecological Civilization

By Li Xiaozhen\*

*This paper critically examines, from a Marxist philosophical standpoint, how instrumental rationality manifests in digital technologies in the modern era. It investigates the shift from applying such rationality to re-imagining a digital ecological civilization, aiming to reveal the dialectical relationship between “digital ecologization” and “ecological digitization.”. Habermas, in discussing the direction of technological progress, similarly observed: People have not reflected upon the direction of technological progress itself, nor have they contrasted it with the political self-understanding proclaimed by social groups. Consequently, new technological capabilities have insinuated themselves unnoticed into contemporary ways of life. Today, the newly developed potential of technology's dominant forces has laid bare the discord between the most far-reaching rational conclusions and reflective ends, rigid value systems—that is, fragile ideologies.”<sup>1</sup>The article focuses on three main areas: the relationship between digital ecosystems and ecological civilization, specific examples of technological alienation, and possible ways to move beyond instrumental rationality in technology. Within contemporary capitalist production relations, how do technologies like artificial intelligence and big data contribute to new challenges—such as the alienation of ecological governance, data monopolies, and the erosion of value-oriented rationality? How does the current digital condition compare with earlier forms of technological alienation under industrial capitalism? What social structures underlie these developments? And finally, how might we move beyond existing forms of technological alienation to construct a digital ecological civilization that integrates both “digital ecologization” and “ecological digitization”? This study adopts a two-pronged methodology: critical theoretical analysis combined with a literature review. The research proceeds in three stages. First, it constructs a comprehensive theoretical framework by drawing on Marx's theory of alienation, Weber's concept of instrumental rationality, and Habermas's critique of technology. Second, it applies this framework to analyze specific contemporary applications of digital technology, uncovering their inherent contradictions and alienated forms. Finally, building on both theoretical insights and a critical engagement with current realities, the study explores potential pathways and guiding principles for transitioning toward a digital ecological civilization. The paper is structured around three main contributions. First, it introduces a novel theoretical lens by extending classical Marxist theories of alienation and capital critique into the digital context. This deepens our understanding of technology's non-neutral character and its social origins, offering a powerful analytical tool for diagnosing the challenges of digital society. Second, it provides a critical analysis of contemporary issues. By examining how instrumental rationality manifests today—for instance, through data monopolies*

---

\*The PhD student, School of Philosophy, Shaanxi Normal University in Xi'an, China

<sup>1</sup>Jürgen Habermas: *Technology and Science as “Ideology”*, Shanghai: Xuelin Publishing House, 1999, p. 108

*that create “closed capital ecosystems” and the alienation of ecological governance—the paper sheds light on pressing technological and social problems. Finally, it proposes a forward-looking framework for digital civilization. By clarifying the dialectical relationship between “digital ecologization” and “ecological digitization,” the study offers both a theoretical foundation and a practical path for moving beyond technological alienation—toward a digital ecological civilization rooted in harmonious coexistence between humanity and nature.*

**Keyword:** *Technological society; digital ecological civilization; digital technology*

## **The Spectre of Capitalism Behind the Veil of the 'Technological Society'**

In recent years, interdisciplinary research on digital technology and ecological civilization has become a key topic in academic discourse. Sun Bowen<sup>1</sup> approaches this subject through three interconnected dimensions—history, theory, and practice—to systematically explore the development of a digital ecological civilization tailored to Chinese-style modernization. He argues that this project involves two interrelated goals: the practical task of digitizing ecological civilization, and a broader theoretical endeavor in which new productive forces generate innovative forms of human civilization.

Tian Jia further analyses the emergence logic of digital ecological civilization construction, explicitly positioning it as the inevitable extension of Marx and Engels' ecological perspective into the digital realm.<sup>2</sup> Concurrently, he identifies developmental challenges such as the proliferation of technological rationality and inadequate infrastructure. In international academic discourse, Marenko and Haselager employ Marx's theory of alienation to examine intelligent objects, proposing that while smart environments support users, they simultaneously capture users' data, time, and attention. This creates new forms of technological-digital alienation, where users, content providers, and products collapse into a unified “datafication” role.<sup>3</sup> Hassan, drawing upon philosophical anthropology and media studies, examines the alienation of humanity during the transition from analogue to digital. He emphasizes that within the historical context where digitalis has become an instrument for realizing capitalist modernity, the revival and re-conceptualization of the notion of alienation holds paramount significance.<sup>4</sup>

However, while existing research has revealed the manifold manifestations of technological alienation in the digital age, it has seldom delved deeply into the underlying mechanisms of transition from the instrumental rational application of

---

<sup>1</sup>Sun Bowen. The Triple Logic of Digital Ecological civilization Construction for Chinese-Style Modernisation [J]. Reform, 2024, (10): 62-77.

<sup>2</sup>Tian Jia. Construction of Digital Ecological Civilization: Emergence Logic, Development Challenges and Promotion Paths[J]. Journal of Beijing Forestry University (Social Science)

<sup>3</sup>Marenko, Betti and Haselager, Pim (2021) Marx in the Smart Living Room. What would a Marx-Oriented Approach to Smart Objects be Like? In: Designing Smart Objects in Everyday Life. Intelligences, Agencies, Ecologies. Bloomsbury, pp. 169-184.

<sup>4</sup>Hassan, R. 2020. The Condition of Digitality: A Post-Modern Marxism for the Practice of Digital Life. Pp. 35-72. London: University of Westminster Press. DOI: <https://doi.org/10.16997/book44.c>. License: CC-BY-NC-ND 4.0

technology to the reconstruction of a digital ecological civilization paradigm. Most studies either focus on identifying risks in specific technological applications or remain confined to critical descriptions of alienation phenomena, failing to systematically elucidate the intrinsic logic and realization pathways of the dialectical unity between ‘digital ecologization’ and ‘ecological digitization’. This study aims to address this theoretical gap. Employing a critical Marxist philosophical perspective, it delves into the societal roots of digital technology's alienation, clarifies the paradigm shift mechanism from instrumental rationality critique to ecological rationality construction, and provides a systematic theoretical foundation and practical direction for advancing digital ecological civilization.

The concept of the “technological society” was first proposed by the French sociologist Jacques Ellul following his research into the relationship between science and society. Compared to Marcel Mauss, Ellul systematically organized numerous academic discussions on technology and further explored the subject from a sociological perspective. He posited that from ancient Greece to the mid-20th century, the evolution of technology's relationship with society unfolded as follows: initially, technology served merely as tools rooted in folk traditions, extending human capabilities. Through iteration and development, technology gradually gained autonomy, transcending tradition to become embedded within organizational and state apparatuses, evolving into instruments for commercial activity and governmental administration. The concept of a “technological society” may thus be understood as follows: technology, functioning as an instrument, permeates every facet of human social life, becoming a pervasive presence within human existence. It extends into human life to form a technological environment that stands alongside the natural and built environments. Within this social milieu characterized by the generalization of technology, a “technological society” emerges. In the current examination of existential predicaments within the “technological society”, the following issues have come to the fore: the comprehensive suppression of workers' agency, the intensification of contradictions between productive forces and relations of production, and the erosion of human essence by a technological society governed by capitalist logic.

### **The Deepening of Labour Alienation and the Comprehensive Suppression of Workers' Agency**

Marx's theory of “alienation of labour”, systematically expounded in his *Economic and Philosophical Manuscripts of 1844*, forms the cornerstone for understanding the predicament of workers in technologically advanced societies. Far from eliminating alienation, technological progress has instead deepened and distorted it on new levels, manifesting most acutely in the systematic suppression of workers' agency.

Firstly, alienation in the “technological society” has intensified in various forms. A key example is “algorithmic alienation” on digital platforms, where individuals have evolved from being “servants of machines” to “slaves to algorithms.” Marx famously observed that under capitalism, workers were reduced to “living appendages of the machine,” losing their autonomy to mechanical rhythms. Today, this dynamic has transformed into a more subtle yet powerful form of control: algorithmic alienation.

In the digital platform economy, this alienation of the labour process has deepened. Workers now enjoy the apparent “freedom” to accept tasks at will. In reality, they remain under constant surveillance and control through the platform's algorithms. These systems employ precise time tracking, route planning, reward-punishment mechanisms, and dynamic pricing to standardize and fragment work while imposing relentless performance pressure.

Unlike the past, workers no longer confront a factory owner. Instead, they submit to a cold, impersonal, and continuously self-optimizing algorithmic system. This form of labour is both coercive and illusory, leaving workers profoundly alienated from the very process they engage in.

There is also the alienation of human relationships and the alienation of labour products: through rating systems and ranking mechanisms, platforms place workers in a competitive rather than cooperative relationship. A customer's “negative review” can directly translate into punishment for the worker, rendering service relationships tense and fragile. Workers become isolated from one another in the scramble for orders and favourable ratings, with traditional solidarity and collective consciousness replaced by atomized individual competition, intensifying the alienation between people. The value of the labour products created by workers—whether delivery services or user data—is wholly appropriated by platform capital. Workers not only fail to share in the substantial profits generated by their labour and data contributions, but their own user data becomes a tool for the platform to refine algorithms, strengthen control, and intensify exploitation.

Secondly, automation and “deskilling”: the erosion of workers' central role. Marxist theorists such as Braverman have observed that capitalist management systematically strips workers of their skills through the “separation of conception and execution” – a process termed “deskilling” – thereby reinforcing capital's control. Automation and artificial intelligence technologies are now pushing this trend to its extreme. With the proliferation of smart manufacturing and automated processes, vast numbers of roles requiring complex skills and human intelligence are being replaced by machines.

The role of the worker is increasingly shifting from being the “principal agent” of production to that of a “supervisor” and “auxiliary” within machine systems, with their unique skill value and central position in the production process being progressively diminished and dissolved. This trend has generated new contradictions in labour force reproduction: on the one hand, technological advancement imposes higher demands on workforce quality; on the other, automation has displaced vast numbers of workers from production processes or confined them to repetitive, auxiliary roles, severely stifling their potential for comprehensive development.

### **The Intensification of the Contradiction between Productive Forces and Relations of Production**

Marx's historical materialism posits that the contradiction between productive forces and relations of production constitutes the fundamental driving force of social development. As a revolutionary productive force, the advancement of digital

technology is currently experiencing unprecedented and intense conflict with prevailing capitalist relations of production.

The first is the ultimate contradiction between “socialized production” and “private ownership”. Digital technology, particularly the internet, possesses profoundly socialized attributes. The production of knowledge, information and data increasingly relies upon the participation and collaboration of vast numbers of users, forming “socialized labour”. Yet under capitalist relations of production, these productive forces—data, algorithms, platforms—collectively created by society are privately owned and monopolized by a handful of tech giants.

The contradiction between this “socialization of production” and the “private ownership of the means of production” is most acutely manifested in the era of digital capitalism. Every click, every search, every social interaction by users generates value (data) for platform capital without compensation. Yet ownership and profit rights over this data—the core means of production—remain entirely monopolized by the platforms. This is not merely an expression of inequality but a fundamental structural contradiction: backward relations of production (private ownership of data) are becoming a ‘shackle’ hindering the development of advanced productive forces (socialized data production).

Secondly, the intensifying contradiction between technological monopolies and systemic inequality. The centralizing tendencies of capitalism have been amplified to unprecedented levels in our technologically advanced society through the establishment of technological monopolies. Tech giants erect insurmountable moats through patent barriers, technical standards, platform network effects, and data monopolies, thereby extracting excessive monopoly profits. For instance, America's technological hegemony essentially constitutes a monopoly on knowledge and technology. This monopoly not only stifles innovation and fair competition but also entrenches and exacerbates social inequality. The convergence of capital and technology has accelerated the concentration of wealth among a handful of tech oligarchs at an unprecedented pace, while the majority of workers face stagnant wages, job insecurity, and the threat of technological displacement.

### **The Comprehensive Erosion of Human Essence and Freedom**

Marxist philosophy pursues the free and comprehensive development of humanity, positing that human essence lies in free and conscious practical activity. Yet, driven by capitalist logic, the technologist society is eroding human essence and restricting human freedom through increasingly sophisticated means, manifested primarily in the following three aspects:

First, surveillance capitalism and algorithmic governance: from the ‘panopticon’ to the ‘digital cage’. Represented by ‘surveillance capitalism’, this new model of capital accumulation transforms human experience into predictable and controllable behavioral data through ubiquitous data collection and algorithmic analysis, thereby generating profit. Under this paradigm, human free will and autonomy face severe threats.

The illusion of choice: Through “selection architecture” and personalized recommendations, algorithms subtly shape users' preferences, perceptions and decisions, leading people to mistakenly believe they are exercising choice whilst actually navigating predetermined algorithmic pathways. Human freedom is narrowed to mere consumer choice, whilst critical thinking and reflective capacity are drowned in an endless stream of information and entertainment content.

The automation of social control: algorithmic governance, as a new form of power, is permeating every facet of social life, from credit scoring to the allocation of public services. This mode of governance reduces complex social issues to data and models, with decision-making processes that are opaque and unchallengeable. It risks fostering new forms of discrimination and bias, creating an efficient, automated “digital cage” that firmly locks individuals into specific social positions.

Secondly, the reproduction of the “one-dimensional man”<sup>1</sup>. Hegelian philosopher Herbert Marcuse once criticized advanced industrial societies for moulding individuals into ‘one-dimensional beings’ through technological rationality, stripping them of their capacity for negation and critique. In our technologised society, this trend has intensified. Technological applications such as social media and short-video platforms cater to humanity's craving for instant gratification and fabricate false social recognition, ensnaring people within the ‘spectacle’ of virtual worlds. While technology creates a world of apparent affluence, comfort, and convenience, it simultaneously fosters an ‘affirmative’ culture that stifles humanity's potential for fundamental questioning and resistance against the established order.

Thirdly, the technological society further deprives individuals of their freedom through the self-reinforcing nature of technology. Technology possesses an inherent capacity for self-amplification; its advancement increases human demands for action, leading to the erosion of liberty. Technology enslaves humanity. Whilst affording convenience, it strips away individual liberty, confining human freedom within technological constraints. This self-reinforcement restricts human action, gradually eroding liberty until technology becomes an irreversible, overarching force in human existence. Driven by capitalist logic, the technician society systematically curtails human freedom through technological alienation, control, and self-reinforcement. This process alienates human essence, deprives individuals of liberty, and ultimately leads to the complete loss of human freedom.

### **The Reproduction of Ecological Contradictions in the 'Technological Society'**

Digital ecological civilization represents the advanced stage of ecological civilization's digital transformation. As an extension of the new form of post-industrial civilization, it primarily stems from profound reflection on the shortcomings of traditional industrial civilization's instrumental rationality and a return to value-based rationality. Throughout the development of digital civilization, attention to the limitations of instrumental rationality has become a focal point. We are currently

---

<sup>1</sup>[US]Marcuse, H. E. Translated by Zhang Feng. *One-Dimensional Man*. Chongqing: Chongqing Publishing House, December 1988.

in a transitional period from industrial civilization to digital civilization, fundamentally driven by the dual contradictions inherent in industrial civilization: its progressive aspect, where mechanized production liberates human labour; and its destructive aspect, where resource exploitation under capitalist logic triggers ecological crises. With the advancement of the Fourth Industrial Revolution, digital technologies are rapidly permeating all spheres of the economy, society, and culture, propelling profound transformations in modes of production, lifestyles, and governance. Technological instrumental rationality manifests as the efficient utilization of digital technologies. On one hand, it places excessive emphasis on efficiency and utilitarianism; on the other, the widespread application of digital technologies has elevated technological rationality to dominance while marginalizing value-based rationality. Consequently, the proposal of a digital ecological civilization not only inherits the technological advancements and economic achievements of industrial civilization but also, through the empowerment of digital technologies, propels green and low-carbon development. This achieves a profound integration of ecological civilization with digital civilization, representing the organic fusion of ‘civilization's digitization’ and ‘civilization's ecologization’.

Marxist ecological philosophy, serving as the theoretical foundation for the evolution of digital ecological civilization, reveals the deep-seated mechanisms underpinning the progression of civilized forms through dimensions such as material transformation, labour mediation, and critique of the capitalist mode of production. Marx and Engels consistently examined the relationship between humanity and nature within concrete social formations, probing the roots of ecological crises to identify their crux in the capitalist mode of production and its institutional framework. Adhering to the principle of ‘growth or perish,’ this system employs brutal and predatory means to transform all natural forces into productive capital. This underscores that digital technology must not be viewed solely as a production tool; rather, it demands emphasis on the dynamic equilibrium between nature's primacy and human agency. This technological iteration is driving a fundamental transformation in productive forces: agricultural civilization relied on land and labour, with low ecological impact; industrial civilization centred on technology and capital, leading to high pollution; whereas digital ecological civilization, grounded in data and computing power, achieves green empowerment through precise resource allocation, completing an ecological leap in new-quality productive forces.

### **Digital Metabolic Rupture and Ecological Crisis**

The ecological contradictions of the technocratic society represent not merely an extension of traditional ecological crises, but a “digitized” extension of digital technology itself. At its core lies the digitization of “metabolic rupture” and the irreversibility of ecological crises. The staggering energy consumption of digital infrastructure and the pollution from electronic waste; digital technology, seemingly “virtual”, is in fact reliant upon immense flows of matter and energy. Marx noted in *Dialectics of Nature* that the “metabolism” between humanity and nature forms the foundation of human

survival. Yet the technical society accelerates resource extraction, energy consumption and waste circulation, thereby extending the ‘metabolic rift’ into the digital realm. For instance, the staggering energy consumption of modern data centers and electronic devices, coupled with electronic waste pollution, shifts the ecological crisis from the “physical” to the ‘digital’ plane.

The structural contradictions inherent in the capitalist system further exacerbate the ecological crisis. O'Connor's theory of the ‘Second Contradiction’ posits that capitalism induces ecological crises through ‘capital's plunder of nature’ and ‘institutional tensions’<sup>1</sup>. The ‘digital extension’ of digital technologies has intensified this contradiction: digital capital further reinforces the plunder of nature through algorithmic optimization, data monopolization, and similar means. Far from resolving the root causes of the ecological crisis, the ‘digital extension’ of digital technologies may instead exacerbate its irretrievable.

The ecological contradictions of our technological society demand resolution through dual approaches: institutional critique and technological ethics. Marx's theory of ‘metabolic rift’ emphasizes that the ecological crisis stems from the structural contradictions of capitalism, necessitating a fundamental transformation of production relations to reconfigure the relationship between humanity and nature. However, the ‘digitization extension of digital technology presents this contradiction in contemporary society through more complex forms: the tension between technology and institutions, and the impasse in practical pathways. Resolving this contradiction requires transcending technical fixes to achieve a unity of institutional reconstruction and ecological ethics. These demands prioritizing ecological justice and resource equity while preventing technological alienation.

### **The Paradox of Green Capitalism**

Green capitalism, as an adaptation of capitalism, seeks to address ecological issues through technological optimization and green technologies. However, its fundamental purpose remains serving capital accumulation, incapable of resolving the inherent contradictions within the capitalist system. For instance, while technological progress may enhance efficiency, the profit-seeking nature of capital leads to increased resource consumption, thereby creating the ‘Jevons Paradox’. The Jevons Paradox, proposed by 19<sup>th</sup> century economist William Stanley Jevons, posits that technological advances improving resource efficiency may paradoxically stimulate demand growth through reduced costs, ultimately increasing overall resource consumption. This theory manifests particularly distinctly within the digital technology sphere. For instance, while block chain technology is employed in ‘green transition’ initiatives such as carbon trading, its computational resource consumption (e.g., data centre energy usage) may negate its ecological benefits.

This phenomenon reveals the intricate relationship between technological advancement and resource consumption. Enhancements in technical efficiency have

---

<sup>1</sup>Hu Yixuan, ed. *Chinese Environmental Sociology 2020-2021* [M]. Nanjing: Hohai University Press, 2022.10. p.38]

failed to resolve the fundamental issue, potentially exacerbating resource pressures instead. Capital leverages digital technologies for a purported ‘green transition,’ yet gains in ecological efficiency are negated by the Jevons Paradox—where technological progress paradoxically stimulates greater resource consumption. For instance, while digital technologies appear ‘green,’ their production, usage, and disposal processes remain reliant on substantial resource expenditure. For instance, while block chain technology is employed in carbon trading, its computational resource consumption may negate its ecological benefits.

When capital undertakes a ‘green transition’ through digital technologies, it faces profound challenges from the Jevons Paradox. Capital pursues profit maximization, deploying technological advances to optimize production processes and reduce resource costs. Yet efficiency gains may stimulate demand expansion, leading to increased resource consumption. For instance, while block chain technology is employed in carbon trading, its computational resource consumption may negate its ecological benefits, creating a vicious cycle involving technology, capital, and resources. Under the logic of capital, technological progress is harnessed to expand production scale rather than resolve ecological issues. The proliferation of digital technologies may stimulate consumption growth, leading to increased resource consumption rather than reduction.

### **The Technological Amplification of Ecological Inequity**

The digital divide intersects with the ecological divide, whereby the negative ecological consequences of a technological society are disproportionately shifted onto the Global South and marginalized communities. For instance, the “green transition” of digital technologies may exacerbate global ecological injustice, compelling nations in the Global South to shoulder greater ecological burdens. Technological optimism obscures the fundamental contradictions inherent in the capitalist mode of production. Marxist critique contends that the root cause of the ecological crisis lies in the logic of capital, not technology itself. The emancipation potential of technology must be realized through transforming relations of production, not through reliance on technology alone.

The convergence of the digital divide and the ecological divide stems from global structural inequalities and imbalances in resource allocation. The formation of the digital divide stems from the uneven development of global digital infrastructure. Developed nations, leveraging technological advantages and capital accumulation, dominate the research, development, and application of digital technologies. Conversely, developing countries face constraints in resources, funding, and policy frameworks, hindering their access to equitable digital technologies. For instance, developed nations employ patent barriers to restrict developing countries' access to green technologies, resulting in prohibitively high costs for renewable energy projects and perpetuating a vicious cycle of ‘technology premium—development stagnation’. Moreover, while digital technologies' ‘green transition’ serves environmental governance, their production, usage, and disposal processes remain resource-

intensive. The benefits of these technologies are predominantly reaped by developed nations, exacerbating global resource inequality.

The convergence of the digital divide and the ecological divide manifests as power imbalances and resource allocation disparities in technological application and resource distribution. While the 'green transition' of digital technologies holds promise, its implementation frequently overlooks the practical needs of Global South nations. For instance, developed countries restrict developing nations' access to green technologies through technological monopolies and knowledge barriers, relegating them to a passive role in addressing climate change and ecological governance. Concurrently, the 'green transition' of digital technologies may exacerbate inequalities in resource distribution.

The convergence of the digital divide and the ecological divide has led to global inequalities in ecological responsibility and challenges to sustainable development. While the 'green transition' of digital technologies holds promise, its implementation yields markedly divergent outcomes across nations. Developed countries, leveraging technological superiority and capital accumulation, dominate global green technology R&D and deployment. Developing nations, constrained by resource, financial, and policy limitations, struggle to attain equivalent ecological governance capabilities. This inequality creates an imbalance in the distribution of global ecological responsibilities: developing countries shoulder greater ecological burdens, while developed nations evade partial obligations through technology and resource transfers.

### **The Transcendental Logic of Digital Ecological Civilization: The Technological-Philosophical Transformation of the Marxist Ecological Perspective**

Finally, on the paradigm shift towards a digital ecological civilization. This new form of civilization, integrating digitization with ecological principles, represents not merely technological advancement but a pivotal milestone in humanity's civilization transformation. Digital ecological civilization is by no means a by-product of technological application, but rather the 'third form of civilization' humanity has entered following agricultural and industrial civilizations. Its core paradigm lies in the reconstruction of the civilization foundation: through gene-level integration of digitization and ecologization, it forms a tripartite evolutionary model of 'technology-institutional-cultural' convergence. The distinctive feature of the digital ecological civilization paradigm is the dialectical unity of technological instrumental rationality and ecological value. Digital ecological civilization represents not a mere superimposition of technology, but a civilizational leap grounded in new-quality productive forces. Its essence lies in reconfiguring the mutually constitutive symbiosis between humanity, digital systems, and nature. Digital ecological civilization achieves ecological consciousness through technological means, transforming nature to serve humanity. This journey encompasses: Ecological transformation at the productive forces level, driven by digital technologies that reshape production elements; Structural reorganization of the civilizational system, transcending the binary 'human-nature' framework to establish a trinity of 'human-digital-nature'; -Charting a new civilizational path towards digital ecological justice.

In the 21st century, digital technology and ecological crises have become the two pivotal variables shaping the future trajectory of human society. Against this backdrop, the concept of ‘digital ecological civilization’—as a deepening and contemporary elaboration of Xi Jinping’s ecological civilization thought—is garnering increasing attention. It not only positions digital technology as an instrumental means for ecological governance but also heralds an entirely new form of civilization. From the perspective of Marxist philosophy, the evolution of any civilization fundamentally hinges upon transformations in modes of production.

In the philosophies of Hegel and Marx, “transcendence” constitutes a dialectical concept embodying a triple significance: abolition, preservation, and elevation. The “logic of transcendence” within digital ecological civilization unfolds precisely within this framework. It signifies the negation of the negation of the fragmented state of humanity—disconnected from nature, labour, and its own essence—under the dominance of capitalist logic. On one hand, it seeks to overcome the ecological imbalances wrought by industrial civilization; while simultaneously embodying an aspiration to transcend the systemic contradictions of capitalism, pointing towards a more equitable and sustainable future society. This transcendental logic is not a technologically predetermined path, but rather a dialectical process fraught with inherent contradictions and struggles. This paper will conduct an in-depth analysis of three core dimensions of this complex process within the framework of Marxist ecological theory, particularly its concepts of ‘humanized nature’ and ‘material metabolism.’

### **The Reconfiguration of Production Relations and Modes of Labour by Digital Platforms: Duality of Transcendence and Alienation**

As the most quintessential form of productive organization in the digital age, digital platforms are reshaping relations of production and modes of labour with unprecedented depth and breadth, vividly embodying the dialectical duality of transcendence and alienation.

As the platform for the “digital factory”, it embodies the deepening and generalization of alienation. Far from being a neutral technological tool, the digital platform has evolved into a new paradigm of capital accumulation termed “platform capitalism” by scholars. Under this paradigm, traditional industrial-era employment relationships are being transformed or even dissolved, yet labour alienation manifests in more covert and pervasive forms.

Firstly, the transformation of ownership over the means of production and data exploitation. Data has emerged as the new critical means of production. Platform capital appropriates data generated by users on their platforms through user agreements resembling a “enclosure movement”, either without compensation or at minimal cost, com-modifying it to generate substantial profits. This constitutes a novel form of exploitation targeting the vast ranks of “non-hired digital laborers”. The ‘free labour’ or ‘by-product labour’ expended by users during socializing, entertainment, and consumption is integrated into the chain of capital appreciation.

This renders Marx's theory of the ‘social factory’ – wherein society itself becomes a factory for capital accumulation – a more vivid reality in the digital age.

Secondly, the algorithmic control of the labour process and the de-skilling of workers. Platforms employ algorithms to break down complex labour processes into standardized, quantifiable micro-tasks, enabling precise monitoring and rationalized management of the labour process. Whether it concerns ride-hailing drivers' routes and order acceptance or delivery riders' timings, all are subject to the strict constraints of algorithmic discipline. This control proves more potent and invisible than traditional factory assembly lines, reducing workers to ‘appendages of algorithms’ who face risks of ‘deskilling’ and “fragmentation” while experiencing a severe erosion of labour autonomy. This constitutes the latest manifestation of Marx's theory of ‘alienated labour’ in the digital age: workers' activities no longer belong to themselves but become alienated and coercive.

Finally, the blurring of production relations and the socialized transfer of risks. The platform economy has spawned numerous non-standard forms of employment, with platforms often positioning themselves as ‘intermediaries’ connecting supply and demand rather than “employers”. This shifts responsibilities traditionally borne by employers—such as social security and labour risks—onto individual workers and society. This ‘pseudo-self-employment’ model obscures the fundamentally unequal power relationship between platforms and their workers.

In essence, the transcendent logic of digital ecological civilization manifests at the level of production relations as a profound strategic contest: whether to permit platform capital to deepen digital alienation, or to consciously harness platform technologies to advance the democratization and socialization of production relations, thereby laying the economic foundations for progress towards a higher form of civilization.

### **New Forms of Ecological Ethics in the Digital Age: From the ‘Disruption of Material Metabolism’ to the Possibility of ‘Information Ecological Symbiosis’**

One of the core concepts of Marxist ecological thought is the theory of the “rupture in the material metabolism” expounded by John Bellamy Foster. This theory contends that capitalist agriculture and industrialized production have disrupted the essential material cycles between human society and nature, leading to ecological crises such as soil depletion and environmental pollution. The advent of the digital age has given this ‘rupture’ new forms, while simultaneously creating possibilities for constructing a new ecological ethics.

Digital Utopians frequently overlook the material foundations of the virtual realm. In reality, colossal data centers, global network infrastructure, and the production and disposal of electronic devices consume vast quantities of energy and material resources, generating staggering carbon footprints and electronic waste. This myth of the immaterial nature of the information world obscures the profound, novel “material metabolic rupture” underlying the digital economy. On the one hand, we relish the conveniences of digital living; on the other, its material costs are externalized onto global ecosystems and marginalized regions. Thus, ecological

ethics in the digital age must fundamentally be a materialist ethics. It demands we pierce the virtual facade to confront and responsibly address the heavy material and energy footprints underpinning digital technologies – precisely the contemporary application of Marx's materialist conception of history.

Alongside the risks lie immense opportunities. Digital technologies offer unprecedented tools and possibilities for repairing the “disruption of material metabolism” and constructing a new ecological ethic, with an “information-ecological symbiosis” ethos now emerging.

Firstly, from macro-level monitoring to micro-level perception, we are reshaping the connection between humanity and nature. Digital technologies such as satellite remote sensing, the Internet of Things, and big data analytical enable us to monitor changes in global ecosystems with unprecedented precision and breadth, supporting scientific decision-making and targeted governance. More significantly, digital media are creating new emotional and ethical spaces. For instance, through live webcam feeds of wildlife or digital interactive installations that simulate natural processes, the public can forge new affective connections with distant, non-human nature. This fosters ecological care and responsibility that transcends utilitarianism.

Secondly, the rise of “technological ecology” and the expansion of ethical agency. Digital technologies are no longer merely external tools, but are deeply embedded and co-constitutive elements of our living environment. The emergence of this “techno-natural” hybrid demands that we broaden the scope of ethical concern beyond the purely “natural” to encompass complex “digital ecosystems”. This extends beyond human users to potentially include algorithms, AI, and even flora and fauna subject to digital management and influence. This expansion of ethical horizons resonates with Marx's concept of “humanized nature” – that nature is always shaped by human practice. Today, this shaping increasingly occurs through digital media.

Thus, the transcendental logic of digital ecological civilization manifests, at the ethical level, as a dialectical sublimation: it must both critically examine the new material consumption and ecological risks brought about by digital technology, and actively harness its potential to construct an “information-ecological symbiosis” ethic capable of bridging the “rupture in material metabolism” and fostering mutual information exchange and emotional resonance between humanity and all things.

### **The Value Relationship Between Virtual Space and the Real Natural World: The Extension of Practice and the New Dilemma of Value Measurement**

The rise of virtual spaces poses profound challenges to Marxism's conception of practice and theory of value. How should the value of virtual objects be measured? What relationship exists between activities within virtual worlds and the labour practices that transform the real natural world? Which holds greater value: the virtual realm or the real natural world? These questions are pivotal to understanding the transcendent logic of digital ecological civilization.

From the perspective of Marxist value theory, the value of a commodity originates from the undifferentiated human labour crystallized within it. The value of

virtual goods—such as gaming equipment and digital artworks—is likewise rooted in human labour: the coding of programmers, the creativity of designers, and the online activities of players, collectively termed ‘digital labour’. Yet the value of virtual spaces does not materialize ex nihilo. Its existence and operation depend absolutely upon the material foundations of the real world: servers, power grids, fibre-optic cables, rare earth minerals, and so forth. Without the material production and energy supply of the physical realm, the virtual world would collapse in an instant.

Thus, the relationship between virtual space and the real natural world is not one of mutual substitution and opposition, but rather a dialectical relationship between derivative and foundation, superstructure and economic base. The value of the real natural world is primary and foundational, providing humanity and the virtual world with the most fundamental conditions for existence (use value).

The transcendent logic of digital ecological civilization demands that we properly address this value relationship. This necessitates vigilance against the “virtual fetishism” driven by capitalist imperatives—where the value of the virtual realm is elevated above the real world, and obsession with symbolic consumption in the virtual sphere obscures the ecological crises of our physical existence. Thus, the practical implication of transcending towards digital ecological civilization lies in correctly navigating the relationship between the virtual as a tool and nature as an end in itself.

Simultaneously, it entails redirecting the function of virtual spaces from capital-dominated entertainment consumption and value extraction towards serving as instrumental entities dedicated to the fundamental purpose of fostering a ‘community of life between humanity and nature’. This shift necessitates a fundamental re-evaluation of the overarching design principles governing the digital economy, ensuring technological advancement serves the holistic welfare of humanity and nature rather than pursuing unrestrained capital appreciation.

## **Objections and Replies**

*The Questioning of the Technological Instrumentalism — Technology itself is Neutral; The Issue Lies in its use rather than in Technological Rationality*

A common objection stems from the perspective of instrumental rationality. This view holds that technology is, by its very nature, a neutral means or tool, the value of which depends entirely on the user’s intentions. Issues such as the alienation of ecological governance and data monopolies brought about by digital technology do not stem from the technology itself, but rather from its improper use by specific social actors (such as capital owners). Consequently, directing criticism at ‘technological instrumental rationality’ itself commits the fallacy of essentialism, overlooking the inherent malleability and openness of technology as a product of human practice. From this standpoint, the core task of building a digital ecological civilization should be to regulate the behaviour of technology users, rather than to engage in a philosophical critique of technological rationality.

This objection touches upon a central debate in the philosophy of technology and deserves serious consideration. However, the instrumentalist view of technology

overlooks a profound insight found in the traditions of Marx and the Frankfurt School: technology is not a purely neutral tool existing in isolation from social relations, but rather a material force that is shaped within the framework of capitalist relations of production and, in turn, shapes those social relations.

Firstly, from a Marxist perspective, technology itself embodies specific social relations. In his analysis of machine-based large-scale industry in <Capital: Critique of Political Economy>, Marx pointed out that machines are not capital in themselves, but the manner in which they are utilized under specific historical conditions—namely, as a means of extracting surplus value—transforms them into a form of capital. Similarly, the data algorithms and intelligent systems within digital technology are not merely neutral tools; they may be imbued with specific value assumptions from the very outset of their design: efficiency takes precedence over fairness, quantification over quality, and control over autonomy. Secondly, the instrumentalist view of technology fails to explain why, under different social systems, the alienating manifestations of digital technology exhibit striking similarities. As Deng Jia points out, once new technologies are “incorporated into the trajectory of capital accumulation, they form a collusion between technological rationality and the logic of capital, shackling human development within a reified structure centred on data, and causing a reversal of the subject-object relationship between humans and objects.”<sup>1</sup> This suggests that the problem is not merely a matter of ‘bad users’, but rather that there is a structural affinity between the logic of capital and technological rationality. Merely regulating user behaviour without addressing the collusive relationship between technological rationality and the logic of capital amounts to treating the symptoms rather than the root cause.

Secondly, from the perspective of the distinction between the descriptive and the normative, the core argument of this study is not that ‘technological rationality is inherently evil’, but rather that ‘within the framework of contemporary capitalist relations of production, technological rationality manifests a series of alienating characteristics’, and that ‘we should transcend this alienation and construct a new paradigm that embodies the dialectical unity of digital ecologization and ecological digitization. This multi-layered approach avoids the pitfall of essentialization technology, whilst retaining the sharp edge of its critique.

*The Challenges of Technological Determinism: Digital Technology is Precisely the Key to Resolving the Ecological Crisis*

The second line of opposition stems from a technological solution's perspective. This view holds that, in the face of an increasingly severe global ecological crisis, digital technology is precisely the key to solving the problem, rather than the problem itself. Artificial intelligence can optimize energy distribution, big data can monitor environmental pollution, and intelligent systems can improve resource utilization efficiency. Some scholars have pointed out that the construction of a digital ecological civilization is precisely the ‘inevitable trend of digital technology

---

<sup>1</sup>Deng Jia. A Theoretical Examination of Subjectivity in Digital civilization [J]. Marxist Studies, 2025, (10): 134–144.

driving the evolution and development of ecological civilization’; digital technology should therefore be used to empower the construction of an ecological civilization and enhance the modernization of ecological and environmental governance.<sup>1</sup>

This objection serves as a reminder that we must not succumb to simplistic techno-pessimism or Luddite. However, it confuses two distinct levels of analysis: technology as a problem-solving tool, and technology as a logic for reshaping social relations. Firstly, this study has never denied the positive role of digital technology in ecological governance. On the contrary, the paper explicitly proposes to ‘embody the dialectical unity of “digital ecologization” and “ecological digitization”, which is precisely an affirmation of technology’s role in empowering ecological governance. The problem lies in the fact that technological solution-ism often presupposes a technologically neutral utopia: that as long as technology is sufficiently advanced, ecological problems can be resolved within a technological framework without needing to touch upon existing relations of production and social structures.

Secondly, from both descriptive and normative perspectives, the fallacy of technological solution-ism lies in jumping directly from the descriptive premise that ‘digital technology can solve ecological problems’ to the normative conclusion that ‘we should therefore rely entirely on technology to solve ecological problems’. This study advocates a different normative stance: whilst actively utilizing digital technology to empower ecological governance, we must maintain a critical reflection on technological rationality, guard against technological alienation, and ensure that technological development serves the value objective of harmonious coexistence between humanity and nature.

*A Defense of the Theory of Digital Ecological Technocracy: Technological Governance as a Complement to, Rather Than a Threat to, Democratic Politics*

A third objection may come from defenders of the theory of digital ecological technocracy. Given the urgency and complexity of the ecological crisis, specialised technical governance is argued to be more efficient and scientific than popular democracy.

This objection touches upon a central issue in contemporary political philosophy: the relationship between the rule of technical experts and democratic deliberation. In response, three levels of consideration may be offered.

Firstly, this study does not deny the importance of specialized knowledge in ecological governance. In the face of complex issues such as the climate crisis and biodiversity loss, specialized scientific knowledge and engineering technology are indispensable. However, the question is: what happens when technocratic governance is elevated from a ‘means’ to a ‘logic’? Some scholars argue that efforts to stabilize society through technical solutions may, in fact, trigger new crises of legitimacy, the consequences of which further reinforce the trajectory of technocratic rule. This suggests that the expansion of technocratic governance is not a neutral improvement in efficiency, but rather a political process involving power structures and social legitimacy.

---

<sup>1</sup>Tian Jia. Building a Digital Ecological civilization: Rationale, Developmental Challenges and Implementation Pathways [J]. Journal of Beijing Forestry University (Social Sciences Edition)

Secondly, the selection of technological solutions inherently involves value judgement. Which environmental issues should be prioritized? What kinds of technological solutions are acceptable? Who bears the costs of technological change, and who reaps the benefits? These questions cannot be answered solely by the expertise of technical specialists; they must be addressed through public debate and democratic deliberation. Research by Zhang Mingjun and Yang Yushan indicates that, in the era of digital and intelligent civilization, the reform of governance systems requires “promoting the harmonious coexistence of institutional values and achieving a balance between technological rationality and ethical values.”<sup>1</sup> This means that technological governance must be embedded within a broader framework of values and democratic processes, rather than replacing them.

Thirdly, from a descriptive perspective, this study acknowledges that the theory of digital ecological technocracy represents a trend currently unfolding in contemporary society; from a normative perspective, this study argues that this trend requires critical scrutiny rather than unconditional acceptance. This represents a profound understanding of the relationship between technological rationality and humanistic values. Consequently, the normative stance of this study is not to ‘reject technological governance outright’, but rather to ‘acknowledge the positive role of technology whilst upholding the guiding principles of humanistic rationality, thereby preventing technological rationality from becoming the ultimate objective and operational logic of digital ecological civilization’.

### **Conclusion: The Transcendental Logic of Digital Ecological civilization: An Unfinished, Open Dialectical Process**

A critical examination of technological alienation in the digital age ultimately leads to a more fundamental theoretical and practical question: how might we construct a paradigm of digital ecological civilization that embodies the dialectical unity of ‘digital ecologization’ and ‘ecological digitization, whilst transcending the instrumental rationality of technology? Proceeding from a Marxist philosophical perspective, this study seeks to provide a theoretical response to this proposition by tracing the trajectory of the transformation of technological instrumental rationality from the industrial civilization to the digital age, analyzing the manifestations of digital technological alienation and their social roots, and engaging in a critical reflection on emerging governance models such as the ‘theory of digital ecological technocracy’. However, as any serious critical theoretical inquiry must acknowledge, this response does not offer a closed, definitive answer, but rather initiates an unfinished, open dialectical process—the transcendent logic of digital ecological civilization gradually takes shape precisely through this ongoing critique, reflection and practical exploration.

At the level of discontinuity, alienation in the digital age exhibits three new characteristics: first, the concealment of alienation—whereas alienation in industrial civilization manifested in visible forms such as factory chimneys and the roar of

---

<sup>1</sup>Zhang Mingjun, Yang Yushan. The Iterative Leap in National Governance Models in the Era of Digital and Intelligent civilization [J]. Tianjin Social Sciences, 2025, (04): 32–41.

machinery, digital alienation is embedded within the invisible symbolic operations of algorithms, data flows and intelligent systems, making it difficult for people to perceive the process of their own disciplining and reification whilst enjoying the conveniences of technology; Second, the generalization of alienation—where industrial alienation was largely confined to the realm of production, digital alienation permeates every aspect of daily life, from consumption and social interaction to emotions and leisure, all of which are subject to datafication and algorithmic processing; third, the Subjectivization of alienation—users are no longer passive objects of alienation, but through actively producing data and participating in platform interactions, they become accomplices in their own alienation. This ‘voluntary servitude’ constitutes the most profound paradox of digital alienation.

How can we move beyond the current alienation caused by technology and construct a paradigm of digital ecological civilization that embodies the dialectical unity of ‘digital ecologization’ and ‘ecological digitization? The answer to this question requires transcending the binary opposition between technological optimism and technological pessimism, and moving towards a dialectical, transcendent logic. ‘Digital ecologization’ entails embedding ecological thinking, ecological values and ecological principles throughout the entire process of digital technology design, application and governance, ensuring that digital development serves the value objective of harmonious coexistence between humanity and nature; ‘ecological digitization, meanwhile, involves actively utilizing digital technology to empower ecological governance, thereby enhancing the intelligence and precision of ecological and environmental protection. The dialectical unity of these two concepts requires us, whilst affirming the positive role of technology, to maintain a critical reflection on technological rationality and guard against technological alienation. Specifically, this paradigm shift encompasses at least three dimensions: Firstly, a shift from a ‘technology-centred’ to a ‘human-centred’ approach – ensuring that technological development is always guided by the values of the free and comprehensive development of humanity and the harmonious coexistence of humanity and nature, rather than taking efficiency, growth and optimization as its ultimate goals; secondly, a shift from ‘technological domination’ to ‘democratic deliberation’—incorporating technological governance into the framework of public discourse and democratic decision-making, so that the selection of technological solutions, the assessment of technological risks, and the distribution of technological benefits are subject to the scrutiny of public reason; and thirdly, a shift from the ‘logic of capital’ to the ‘logic of ecology’—transcending the narrow perspective of capital accumulation to establish the guiding role of principles such as ecological priority, sustainability and inter-generational justice in technological development.

This paper systematically extends Marxist theories of alienation and the tradition of critique of capital into the digital age, providing a sharp intellectual tool for understanding the nature of digital technology and its social effects, this study insists on examining technology from the perspective of social relations and relations of production, revealing the social roots of the alienation of digital technology—namely, the structural collusion between technological rationality and the logic of capital. Furthermore, this paper does not merely offer an abstract critique of technological alienation, but delves into concrete social realities to reveal the

multiple manifestations of digital technology's alienation within the framework of contemporary capitalism. From the technological alienation of ecological governance, to the 'closed capital ecosystem' constructed by data monopolies, and the waning of value rationality, it sketches a complex panorama of technological alienation in the digital age. Perhaps the most significant contribution of this study lies in providing a conceptual framework grounded in a transcendent logic for the construction of a digital ecological civilization. Finally, at the core of this framework is the dialectical unity of 'digital ecologization' and 'ecological digitization—opposing.

## References

- Deng J (2025) A theoretical examination of subjectivity in digital civilization. *Marxist Studies*, (10), 134–144.
- Habermas J (1999) *Technology and science as ideology*. Shanghai: Xuelin Publishing House, p. 108.
- Hassan R (2020) The condition of digitality: A post-modern Marxism for the practice of digital life. London: University of Westminster Press, pp. 35–72. <https://doi.org/10.16997/book44.c>
- Hu Y (ed.) (2022) *Chinese environmental sociology 2020–2021*. Nanjing: Hohai University Press, p. 38.
- Marcuse HE (1988) *One-dimensional man*. Translated by Zhang F. Chongqing: Chongqing Publishing House.
- Marenko B, Haselager P (2021) Marx in the smart living room: What would a Marx-oriented approach to smart objects be like? In: *Designing smart objects in everyday life: Intelligences, agencies, ecologies*. London: Bloomsbury, pp. 169–184.
- Sun B (2024) The triple logic of digital ecological civilization construction for Chinese-style modernization. *Reform*, (10), 62–77.
- Tian J (n.d.) Building a digital ecological civilization: Rationale, developmental challenges and implementation pathways. *Journal of Beijing Forestry University (Social Sciences Edition)*.
- Tian J (n.d.) Construction of digital ecological civilization: Emergence logic, development challenges and promotion paths. *Journal of Beijing Forestry University (Social Sciences Edition)*.
- Zhang M, Yang Y (2025) The iterative leap in national governance models in the era of digital and intelligent civilization. *Tianjin Social Sciences*, (04), 32–41.