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The View of Technology in *Dialectics of Nature* and Its Implications for the Development of New Quality Productive Forces

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Abstract

Technology serves as a crucial intermediary in the interaction between humans and nature, bridging specific scientific advancements with the principles of socialist philosophy. The *Dialectics of Nature* offers a profound view of technology, providing valuable theoretical guidance for the development of science and technology (S&T) in China's new era. It underscores key perspectives for fostering new quality productive forces: the cyclical evolution of S&T demands continuous innovation to drive industrial transformation; the growing trend of interdisciplinary integration points to new directions for future industries; and the intrinsic connection between technology and society highlights the need for a focused and balanced approach to innovation, ensuring the harmonious development of science, technology, and society.

Keywords

View of technology; new quality productive forces; *Dialectics of Nature*.

1. Introduction

Dialectics of Nature experienced delays during its creation but stands as a completed and seminal contribution to the socialist theoretical system. It explores critical issues such as the view of nature, the philosophy and methodology of S&T, and the social implications of tech advancements. These themes form the framework of *Dialectics of Nature*. This landmark work elucidates the materialist dialectical laws governing the natural world. By analyzing the intricate relationships between science, technology, nature, humanity, and philosophy, *Dialectics of Nature* provides profound theoretical insights and valuable guidance for the advancement of S&T in the new era.

2. The Foundation of View of Technology in *Dialectics of Nature*

Understanding the concept of technology is the foundation for exploring a deeper view of its role and implications. By clearly defining "what technology is", we can examine its relationships with other domains, its developmental laws, its impacts, and more, thus forming a comprehensive and systematic view of technology (VOT).

The term "technology" (technē) in Ancient Greek originally referred to skill, craft, and ability. As a historical category, technology is one of humanity's oldest social and cultural phenomena, predating the emergence of science. The behaviors and phenomena associated with technology appeared in human societies long before science did. The understanding of the essence of technology has evolved through various stages: from fragmented conceptions during ancient agricultural civilizations, to a dependent understanding in modern industrial societies, and

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eventually to a more systematic understanding in the era of modern tech civilization. Today, the VOT is widely viewed as a theoretical framework that reveals its essence, its relationship with nature and society, and the series of impacts it generates.

The *Dialectics of Nature* rarely directly mentions the term "technology", but the content related to technology is implicitly included within the frequently referenced concept of "natural science". As is stated, "In particular, after the mighty advances of natural science in the present century, we are more and more getting to know, and hence to control, even the more remote natural consequences at least of our more ordinary productive activities."[1]. The term "control" here is not a theoretical elaboration of natural science, but rather its practical application, which involves aspects of "technology". Thus, it does not specifically distinguish between science and technology. Instead, whenever the application of science or mentions terms like "labor", "production", and "tool" is discussed, it is in fact addressing technology. "The tool implies specific human activity, the transforming reaction of man on nature, production."[2]. The emergence of S&T guides and alters human production and life. In terms of the relationship between technology and society, it is believed that natural science drives philosophical progress, tech development changes human intellect, industrial technology propels philosophers forward, and the alienation of technology has its roots in the capitalist system.

3. Overview of the View of Technology in *Dialectics of Nature*

Dialectics of Nature does not merely impose the laws of dialectics onto nature from an external perspective. Rather, it seeks to "discover these laws from nature and elaborate them from nature,"[3] thus enriching the content of dialectical materialism. Its methodology, deeply materialist and dialectical, highlights that the laws of dialectics are inherent in nature and must be revealed through scientific exploration. The VOT is not isolated but serves as a bridge connecting scientific practices with the broader framework of socialist philosophy, embedding tech development within the evolving relationship between humanity, nature, and society.

The exploration of technology through dialectical materialism underscores its role as more than just tools or techniques; it is an integral part of historical and material processes shaping human existence and societal progress. This perspective highlights how tech advancement interacts dynamically with production, culture, and social systems.

3.1. The Social Nature and Functions of Science and Technology

Natural science and social practice are deeply intertwined, with natural science providing the theoretical foundation for social development, and social practice both constraining and driving the advancement of S&T. This interplay highlights the dual influence of production practice and societal structures on tech evolution.

3.1.1. Production as the Driving Force of Science and Technology

Some historical analysis identifies production as the primary driver of scientific and technological advancement. It is observed how, after the intellectual stagnation of the Middle Ages, science experienced a remarkable revival, attributing this to the influence of production: "If, after the dark night of the Middle Ages was over the sciences suddenly arose anew with undreamt-of force, developing at a miraculous rate, once again we owe this miracle to production."[4] The role of material production as the crucial foundation for scientific progress is emphasized: "If society has a technical need, that helps science forward more than ten universities."[5] This perspective highlights how the material conditions of production, including the tools and methods available, determine the pace and scope of tech innovation. Social production practices also create evolving demands that push the boundaries of scientific research and technological development. As production practices grow more complex, they create demands for advanced scientific knowledge and technical solutions, initiating a feedback

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loop: production needs drive technological advancements, which in turn enhance production capabilities. This synergy has been especially evident since the Industrial Revolution, where the demands of industrialization accelerated S&T breakthroughs. The resulting advances transformed societies, solidifying production as the driving force behind revolutionary changes in human history.

3.1.2. The Constraints and Influences of Social Factors and Systems on the Development of Science and Technology

While production acts as the primary driver for technological innovation, the specific trajectory of S&T is heavily influenced by the broader social, political, and economic systems in which they develop. S&T are never free from social influence, and political and economic systems, cultural practices, and institutional frameworks profoundly shape the direction and outcomes of scientific endeavors. For example, during the Renaissance and the Reformation, new intellectual movements challenged the restrictive norms of medieval feudal society, which had previously suppressed scientific inquiry. These periods, marked by intellectual freedom and a focus on empirical observation, enabled scientific exploration to flourish. The shift toward a more rational and empirical approach to understanding nature laid the foundation for the scientific advancements that followed. However, while these shifts opened up new opportunities for science, they also highlighted the ways in which social systems—such as feudalism—limited the development of scientific thought. Under capitalism, the situation becomes more complicated. While capitalism has historically provided the material conditions for technological development, its profit-driven motives can distort the priorities of scientific inquiry. It is recognized that, under capitalism, science often serves the interests of profit, rather than the pursuit of knowledge for its own sake. In this system, research is frequently geared toward producing immediate financial returns, which can stifle long-term, fundamental scientific research that may not have immediate monetary benefits. The profit motive directs attention toward technologies that promise quick financial rewards, which may limit the scope of exploration and hinder groundbreaking research that addresses broader societal needs.

"Communism is the genuine resolution of the conflict between man and nature and between man and man."[6] Under a socialist system, the constraints imposed by capitalist systems could be overcome, leading to a more favorable environment for S&T advancement. In a socialist system, the profit motive is removed, allowing science to be pursued for the benefit of humanity, not for the enrichment of a few individuals or corporations. This means that research and tech innovations can be more freely directed toward solving pressing social issues, such as improving public health, reducing poverty, and addressing environmental challenges. In such a system, S&T development can become truly emancipatory, as it is freed from the confines of capitalist profit-making and instead focused on human well-being and societal progress.

The social systems within which science operates thus have a profound impact on the direction and pace of technological development. The capitalist system, despite its role in fostering technological innovation, also imposes limitations that prevent the full realization of science's potential. Socialism, by contrast, promises a more liberating and expansive environment for scientific inquiry and technological progress, where the ultimate goal is human flourishing rather than profit accumulation.

3.2. The Roots of Technological Alienation and Its Resolution

The concept of technological alienation explores the complex relationship among human technology, the natural world, and society. Unlike the analysis of the alienation of science under capitalism from a class perspective in *Economic and Philosophic Manuscripts of 1844*, which emphasizes class struggles and the exploitation of labor, *Dialectics of Nature* broadens the scope by integrating the environmental and ecological dimensions of technological alienation. It links the misalignment between tech progress and the natural world's processes of self-regulation

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to the root causes of alienation, offering a more holistic view that connects humanity's disconnection from nature with the broader consequences of unchecked technological growth. The root causes of technological alienation are intertwined with the limitations of human cognition and the complex nature of the world itself. Historically, human understanding has been limited in its ability to fully grasp the intricacies of natural processes, which makes it difficult for technology to align harmoniously with the environment. This alienation results in a disconnection between the technological advancements of humans and the ecological balance required for sustainable development. *Dialectics of Nature* underscores this by discussing how technology, particularly in the capitalist system, has been misused, causing an imbalance that creates long-term damage to both human society and the natural world.

3.2.1. The Natural Dimension of Technological Alienation

At the heart of *Dialectics of Nature*'s analysis is the view that technological alienation is not solely the product of social or economic structures, but also a consequence of the inability of human societies to harmonize technological development with the natural world. It argues that technological advancements often take place without adequate understanding or consideration of nature's regulatory systems, leading to ecological disruptions. Unlike early human societies, which operated in closer alignment with nature's rhythms and balance, modern technology—particularly within the capitalist system—has become a force that operates against nature, rather than in cooperation with it.

As is stated, human cognition has been limited in its ability to fully comprehend the complex and interconnected systems of the natural world. As a result, technological progress has often been driven by an incomplete understanding of the consequences of human intervention in natural processes. *Dialectics of Nature* illustrates that while humans have developed technologies capable of harnessing the forces of nature, they have also created systems that disrupt these forces and upset the natural balance. This disconnection between human technology and ecological stability is a form of technological alienation—one that arises from an ignorance of nature's self-regulating mechanisms.

3.2.2. Capitalism and Technological Alienation

Significant emphasis is placed on the capitalist system as the root cause of technological alienation. Under capitalism, tech development is primarily driven by the pursuit of profit rather than a concern for the broader well-being of humanity or the environment. Capitalists, in their relentless quest to maximize profits, use technology not as a means to improve society or the environment but as a tool to extract value from both labor and nature. This profit-driven focus leads to technological applications that prioritize short-term financial gains over long-term sustainability, creating an imbalance between human activity and the natural world.

In agriculture, for example, tech improvements such as mechanized farming and the use of chemical fertilizers are frequently employed to increase output and reduce labor costs. However, these technologies often come at a significant ecological cost. Capitalists exploit natural resources, including land and water, to fuel economic and urban expansion, without considering the long-term consequences of over-exploiting these resources. This exploitation is not limited to labor but extends to the land itself: "exploit not only labor but also the land", as technological improvements in agriculture are harnessed for profit rather than for the benefit of nature or humanity's long-term well-being.[7] This approach leads to practices that are not only harmful to the environment but also unsustainable in the long run.

When tech development is driven by profit motives, it leads to an unsustainable consumption of natural resources, resulting in irreversible damage to ecosystems. The overexploitation of natural resources, such as forests, water bodies, and soil, is a form of technological alienation that distances humans from their eco-roots. As "nature will take its revenge on us"[8], when humans misuse nature through unrestrained tech advancement, they will eventually face the

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consequences in the form of eco-crises, such as climate change, biodiversity loss, and environmental degradation.

3.2.3. Aligning Technology with Nature's Laws

Despite the recognition of the destructive tendencies inherent in capitalist technological practices, *Dialectics of Nature* maintained an optimistic view of the potential for technology to serve humanity in a beneficial way. It did not advocate for the cessation of technological progress but instead called for a more responsible approach to tech development—one that aligns human technology with the objective laws of nature. In order for technology to serve the common good and ensure sustainable development, it must respect the natural laws that govern ecological balance.

It is envisioned a society where technological progress is guided by an understanding of nature's self-regulation and sustainability, rather than the unchecked exploitation of resources for immediate profit. Tech development should not lead to exploitation or imbalance but should aim to enhance the overall well-being of both humanity and the environment. This approach would require a shift away from the capitalist model, which prioritizes profit over eco-wellness, to a system in which tech advancements are used to support and restore the nature.

To achieve this, society must adopt a more comprehensive VOT—not as an isolated tool for control and production, but as an integral part of the natural world. In this view, the development and use of technology should be guided by principles of ecological harmony and sustainability. For instance, tech innovations should be developed with the understanding that they should not only benefit human society in the short term but should also contribute to the long-term wellness of the planet. This would require a shift in the way technology is valued and utilized, moving away from exploitative practices to a more holistic, environmentally conscious approach.

3.3. The Role of Technology in Serving Human Society

The human-centered view of S&T places human needs at the core of technological advancement, emphasizing the role of innovation in fulfilling human aspirations. *Dialectics of Nature* clearly aligned with this perspective, arguing that technological progress should be driven by the needs and desires of humanity, aiming to achieve freedom, holistic development, and well-being for all individuals. It saw technology as a tool that, when used appropriately, could enhance human life, support ecological balance, and foster sustainable societal progress.

3.3.1. Human-Centered Technological Innovation

Tech innovation, from a human-centered standpoint, is not an end in itself but a means to improve the quality of life for individuals and societies. *Dialectics of Nature* argued that true tech progress is measured not by the mere increase in production or the expansion of industrial capacities but by its ability to contribute to human freedom and well-being. Human progress meant more than just material wealth; it involved a holistic development that addressed both the physical and mental needs of individuals.

In this view, technology should be developed with the aim of enhancing human capabilities, fostering personal growth, and promoting social harmony. It should be directed toward the needs of the people rather than serving the interests of a few elites or corporations. This vision of technology as a servant of human society contrasts sharply with the capitalist use of technology, which often places profit above human welfare. By focusing tech innovation on human needs, society could achieve a more equitable and fulfilling development for all.

3.3.2. Harmony Among Humanity, Nature, and Technology

The necessity of maintaining harmony between human society, nature, and technology is evident, and tech development has the potential to either disrupt or enhance the balance between humanity and nature. The misuse of technology, especially when it disregards eco-

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considerations, can lead to catastrophic consequences for both the environment and human civilization. *Dialectics of Nature* cautioned against unchecked tech exploitation of natural resources, warning that the failure to respect nature would eventually result in "nature's revenge," a concept explored through historical examples.

Civilizations like Mesopotamia and ancient Greece, where excessive environmental exploitation dominated, ended up with ecological collapse. In Mesopotamia, the overuse of irrigation systems and deforestation led to soil salinization, making the land unproductive. Similarly, ancient Greece's overreliance on timber resources for shipbuilding and construction resulted in severe deforestation, leading to ecological degradation and the eventual decline of certain city-states. These examples demonstrated the dangers of tech advancement when it is pursued without regard for the ecological consequences.

In this context, *Dialectics of Nature* called for a responsible approach to technological development that prioritizes sustainable management of natural resources. Technology, in this view, should not be a force that depletes the earth's resources for short-term gain but should instead work in harmony with nature's cycles, ensuring long-term environmental stability and the well-being of future generations.

3.3.3. Capitalism and the Misuse of Technology

Dialectics of Nature also critiqued the ways in which technology was misused under capitalism, where technological innovations were often driven by the desire for profit and control rather than a commitment to social welfare. Under capitalism, technological advancements are typically introduced to increase efficiency, reduce costs, and maximize profit margins, often without considering the social and ecological consequences. In this system, technology becomes a tool of domination rather than liberation.

Capitalism transformed technology into a means of exploiting the working class, deepening social inequalities. For example, new technologies in factories were often designed to increase productivity while reducing labor costs, leading to harsher working conditions, longer hours, and lower wages for workers. The capitalists who owned the means of production reaped the benefits of technological progress, while workers bore the negative consequences, including job insecurity and physical harm from dangerous machines.

Moreover, *Dialectics of Nature* sees technology as a mechanism through which capitalists exerted control over both the workforce and natural resources. Instead of being used to empower workers or improve the lives of ordinary people, technological advancements under capitalism were often utilized to consolidate the power of the capitalist class, increase their wealth, and reinforce social hierarchies. This is a misuse of technology, which, when aligned with capitalist interests, failed to contribute to the collective good and instead exacerbated inequality and exploitation.

Despite the critique of capitalist misuse, an optimistic vision of the potential for technology to serve humanity should be maintained when it is aligned with collective interests, thus fostering a socialist society where technological progress would not be driven by profit motives but by the aim of improving the collective well-being of society. In such a society, technology would serve to elevate the material and spiritual well-being of all individuals, rather than a select few.

Dialectics of Nature argued that in a socialist system, technological innovations could be harnessed to address human needs in a way that promotes equality, freedom, and sustainable development. Technological advancements, when directed toward the common good, could lead to higher living standards, reduced work hours, and greater social mobility. They could also be used to enhance cultural and intellectual development, allowing individuals to pursue their passions and reach their full potential.

The key to achieving this vision was ensuring that technological development was not left in the hands of capitalists who prioritized profit over human welfare but was instead guided by

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the interests of the entire society. Technology serves as a tool for liberation, capable of breaking the shackles of exploitation and oppression, provided it was used in ways that supported the collective well-being and harmonious development of society.

4. Insights from *Dialectics of Nature* for the Development of New Quality Productive Forces

In 2023, the concept of "new quality productive forces" was introduced, highlighting the importance of fostering strategic industries and cultivating emerging sectors to enhance development momentum. This concept reflects the innovative application of the view of S&T to China's realities. It integrates socialist insights with the challenges of modern development, demonstrating a synthesis of theoretical foundations and practical needs In today's world, technological innovation has become a key pillar for enhancing national comprehensive strength. Technological innovation today is a cornerstone of national strength, granting strategic advantages to those who master its development and application. [9] The emphasis on new quality productive forces underscores the need to balance innovation and continuity, short-term objectives and long-term goals. *Dialectics of Nature* offers valuable perspectives on this transformation. By acknowledging the interplay of construction and deconstruction in technological progress, its dialectical approach provides insights for navigating the complexities of creating new quality productive forces while addressing challenges of sustainability, equity, and societal advancement. These principles serve as a guide for strategic decision-making and value alignment in advancing high-quality development in the new era.

4.1. Navigating Technological Cycles—Innovation as a Driver of Industrial Transformation

Technology follows a cyclical trajectory, progressing through stages of emergence, rapid development, maturity, and eventual decline or transformation. For example, traditional industrial technologies often require upgrading or reinvention in response to the advent of emerging technologies. Given the current state of traditional industries, how should we approach this challenge?

The development of new, high-quality productive forces inevitably brings about significant changes to traditional industries. However, this evolution does not entail abandoning or neglecting traditional industries. As the backbone of a modern industrial system, traditional industries remain crucial, especially in China, where they constitute over 80% of the manufacturing sector.[10] Thus, the transformation and upgrading of traditional industries are pivotal to the construction of a modern industrial system. The key to unlocking this transformation lies in spearheading tech innovation. China's national leadership has emphasized that "science and technology are the primary productive forces, talent is the primary resource, and innovation is the primary driving force." Throughout history, tech innovation has served as a cornerstone of economic growth and productivity breakthroughs. From the steam engine to electricity and computers, every major technological revolution has propelled the development of societal productive forces.

In today's era, achieving new, high quality productive forces hinges on leveraging technological innovation. This requires a dual focus on driving societal transformation and enabling industrial restructuring to meet the demands of modern development. Policymakers, industry leaders, and frontline producers must recognize the central role of innovation in the broader modernization process. By embedding innovation into every facet of modernization, stakeholders can expand and deepen pathways to foster new momentum, open up novel fields, and lead the emergence of transformative sectors.

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4.2. Sustainable Utilization of Natural Resources—Principles of Local Adaptation

"Nature provides the materials for labor, and labor turns these materials into wealth"[11]. This insightful statement highlights the dialectical relationship between nature and labor. Nature offers the essential raw materials for human production, while human intelligence and effort transform these materials into wealth, giving them both practical utility and market value. In this interplay, raw materials and labor are mutually dependent. Nature not only supplies abundant resources but also lays the groundwork for various productive activities. As potential productive forces, natural resources underpin human material civilization, and their rational and effective utilization is vital for driving economic growth. However, the uneven geographic distribution of natural resources, along with varying regional economic conditions, necessitates a tailored approach to resource utilization. Nations and regions must adapt to local conditions, leveraging their unique resource endowments and addressing their specific developmental needs. This approach allows for the development of production models that align with local realities, fostering balanced and sustainable progress.

High-quality development is the foremost task of new quality productive forces, hence the implementation of a "head start strategy"[12]. High-quality development not only drives economic growth but is also intricately linked to the rational utilization of natural resources. Ensuring a stable resource supply, maximizing efficiency, and minimizing waste are essential to achieving this goal.

Technological innovation and industrial upgrading are critical in this process. By advancing energy conservation, emission reduction, and resource recycling, new development paths can emerge. Beyond economic wealth creation, equal emphasis must be placed on environmental protection, striving for a harmonious balance between ecological sustainability and economic progress. Adopting efficient and green production methods allows for economic development while safeguarding the environment, paving the way for sustainable development.

In this virtuous cycle, resource utilization, wealth creation, and ecological protection reinforce each other, driving society and the economy toward a healthier and more balanced trajectory. By adhering to the principle of adapting to local conditions, regions can unlock their unique potential, achieve high-quality growth, and contribute to a sustainable future for all.

4.3. Interdisciplinary Synergy—Technological Convergence as a Foundation for Future Industries

According to *Dialectics of Nature*, technological development tends to exhibit trends of convergence and integration. This observation remains profoundly relevant today, as technological convergence and interdisciplinary integration have become defining features of modern progress. Data, in particular, has emerged as a core resource and a pivotal driver of economic development. The "new" in new quality productive forces is not only reflected in S&T-driven innovation but also in the novelty of production factors, industrial models, and driving forces. The deep integration of technologies such as big data, artificial intelligence, and cloud computing has provided robust support for the vigorous growth of new-quality productive forces.

Similarly, *Dialectics of Nature*'s insights into interdisciplinary integration remain highly instructive. The intersections and overlaps among disciplines like physics, chemistry, and biology have been a consistent theme throughout the history of scientific and technological advancement. For instance, the integration of artificial intelligence and the Internet of Things enables smart devices to collect and process data with unprecedented efficiency, while the fusion of biology and information technology has propelled breakthroughs in fields such as gene sequencing. These developments underscore that the growth of new-quality productive

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forces requires not only adapting to emerging trends but also actively fostering the integration and interaction of diverse technological fields. Encouraging cross-industry and cross-disciplinary collaboration can break down barriers between disciplines and technologies, paving the way for synergistic innovation and transformative progress.

4.4. Harmonizing Technology and Society—Comprehensive Deepening of Reforms

In *Dialectics of Nature*, it is emphasized that tech development does not occur in isolation; it is deeply intertwined with social demands and production practices. Social needs often serve as a catalyst for technological advancements, steering development toward solutions that address practical challenges. For instance, in the energy sector, the evolution of new quality productive forces must prioritize technologies that simultaneously meet society's energy demands and environmental sustainability. By addressing energy crises and environmental concerns, these advancements can stimulate innovative business models, drive industrial transformation, and contribute to a green, low-carbon, and harmonious society.

Productivity remains the fundamental driver of societal progress, and the relations of production must evolve in harmony with the needs of productivity. As is noted, "technological development is influenced by the social environment." For new quality productive forces to flourish, it is essential to establish a supportive social framework that includes policies, institutional mechanisms, and cultural norms conducive to innovation. The significant breakthroughs achieved thus far owe much to ongoing reforms aimed at dismantling outdated systems and mechanisms. Comprehensive deepening of reforms is, therefore, not just desirable but imperative to sustain and accelerate the growth of new quality productive forces.

Equally important is the need to assess the social impacts of technological advancement. While fostering innovation, it is critical to anticipate and address the societal effects—both positive and negative—of emerging technologies. For example, the rapid development of information technologies has raised concerns about data privacy and security risks. This highlights the necessity of balancing technological progress with ethical considerations and social accountability.

By aligning technological development with societal needs and establishing robust mechanisms for reform and oversight, we can ensure that the advancement of new quality productive forces contributes to sustainable, equitable, and inclusive development. This holistic approach underscores the importance of integrating tech innovation with broader social goals, creating a virtuous cycle of progress and well-being.

4.5. The Role of Theoretical Thinking in Guiding Technological Innovation

"To stand at the highest peak of science, a nation cannot afford to be without theoretical thinking for even a moment."[13] This insight underscores the critical role of theoretical thinking in understanding and guiding tech innovation. The evolution of technology is deeply rooted in the study of natural sciences, through which humanity has uncovered the intrinsic laws of the natural world. The application of these laws drives tech progress, and a profound grasp of them enables transformative advancements.

Historically, traditional manufacturing enterprises often relied on existing technologies for repetitive production, neglecting the principles and methods for improvement. This lack of theoretical research stunted their ability to adapt to dynamic market environments and intensifying competition, relegating them to low-value production. These experiences highlight the inefficiencies of focusing solely on practical applications without engaging in theoretical reflection. In today's rapidly evolving context, it is imperative to prioritize theoretical thinking, delving deeply into the principles, developmental trends, and internal logic underlying tech

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innovation. Only by doing so can we guide the development of new quality productive forces toward revolutionary breakthroughs and strategic advancements.

The concept of new quality productive forces encapsulates the integration of scientific innovation and high-quality development. It critiques traditional production models while heralding a new form of societal progress aligned with the aspirations of modern civilization. By embedding theoretical reflection into the innovation process, we can ensure that tech advancements contribute meaningfully to this broader vision.

To fully harness the potential of S&T, it is essential to revisit classical works for guidance. Revisiting socialist theories in the context of China's specific realities offers valuable insights into the interplay between technology, society, and nature. This approach enables a nuanced understanding of the contemporary value of VOT, aligning it with the goals of high-quality economic development in the new era of socialism with Chinese characteristics.

5. Conclusion

In conclusion, the dialectical perspective on technology, as explored in the Dialectics of Nature, offers profound insights into the relationship between technology, society, and nature, and serves as a crucial guide for the development of new quality productive forces. By understanding the social functions of science and technology, we recognize how production acts as both a driving force and a constraint, influenced by social systems, economic structures, and political contexts. Technological alienation, rooted in both natural dimensions and capitalist structures, emphasizes the need to realign technology with the laws of nature, ensuring it serves the common good rather than perpetuating exploitation.

The role of technology in advancing human society is clear—it must be centered on human needs and foster harmony between humanity, nature, and technology. However, under capitalism, technology often misaligns with these values, leading to detrimental effects on society and the environment. The insights from the Dialectics of Nature provide critical direction for technological development, emphasizing the importance of human-centered innovation, sustainable resource use, and interdisciplinary cooperation.

Looking forward, the principles derived from dialectical materialism encourage the development of new quality productive forces that prioritize innovation, ecological sustainability, and social harmony. The synergy of technological convergence, coupled with deepening reforms and the guidance of theoretical thinking, will ensure that technology is harnessed to create industries that benefit all, fostering a more equitable and sustainable future. Ultimately, the dialectical view of technology not only enriches our understanding of its social and natural roles but also provides a roadmap for integrating technological progress with the ethical and ecological demands of the modern world.

6. Funded Projects

1.2024 Hunan Provincial Graduate Research Innovation Project, *Research on the STS Thought in the 1844 Manuscripts of Economic and Philosophic Manuscripts and Its Contemporary Implications*;

2.2024 Graduate Research Project of the College of Marxism, Hunan Normal University, *Study on the STS Thought in the 1844 Manuscripts of Economic and Philosophic Manuscripts* (Project No.: MY202405).

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