An Examination of the Deep Integration of Technology and Culture in the Digital Age from the Perspective of Historical Materialism

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Abstract: *In the digital age, the deep integration of science and technology with culture is essentially a contemporary manifestation of the fundamental contradictions in society. The dialectical relationship between social existence and social consciousness in historical materialism reveals their intrinsic connection. The exponential leap in technological productivity, the lag in cultural relations of production, and the adaptive adjustments of the superstructure create tension, leading to structural contradictions such as a rupture in value paradigms and insufficient technological empowerment. Only by dialectically grasping the dialectical laws governing the movement of productive forces and relations of production, and between the economic base and the superstructure, and by fully leveraging the supporting role of science and technology and the guiding role of culture, can we achieve a dialectical unity between technological rationality and humanistic spirit, injecting new momentum into the evolution of human civilization.*

Keywords: Digital age, Deep integration of science and technology with culture, Historical materialism.

1. Introduction

The "Decision of the CPC Central Committee on Further Deepening Comprehensive Reform and Promoting Chinese-style Modernization" adopted at the Third Plenary Session of the 20th CPC Central Committee proposed to "explore effective mechanisms for the integration of culture and technology and accelerate the development of new cultural formats." [1] Historical materialism holds that social existence determines social consciousness, and social consciousness has a counter-effect on social existence. The vigorous development of science and technology in the digital age, as an important social existence, has given rise to social consciousness such as science and technology culture that are compatible with it, and these consciousnesses have further promoted scientific and technological progress and social development. Facing the new era and new journey, it is of great significance to carry out the new cultural mission, build a culturally strong country, a science and technology strong country, and promote Chinese-style modernization.

2. The Theoretical Implications and Value Exploration of the Deep Integration of Science and Technology Culture in the Digital Age

Historical materialism holds that social existence refers to the material aspects of social life, including the natural environment, population factors and material production methods. Social consciousness refers to the spiritual aspects of social life, including political and legal thought, morality, art, religion, philosophy, etc. The dialectical relationship between the two is that social existence determines social consciousness, social consciousness has a counter-effect on social existence, and has relative independence [2]. With the advancement of the intelligent wave, the new characteristics of social existence have provided a broad space and strong impetus for the integration and innovation of science and technology and culture, while the diversification and openness of social consciousness have provided rich materials

and sources of inspiration for the integration and innovation of science and technology and culture. As an important part of social existence, science and technology interact with culture, a form of social consciousness, and jointly promote the progress of society.

2.1 The Theoretical Implications of the Deep Integration of Science and Technology with Culture ─ Based on the Principle of the Dialectical Relationship Between Social Existence and Social Consciousness

2.1.1 Social existence determines social consciousness: the shaping of culture by technological development in the digital age

Social existence not only determines the source, content, and development of social consciousness, but also, in the context of intelligentization, the rapid development of modern technologies such as the internet, big data, artificial intelligence, and blockchain constitutes a significant transformative factor in contemporary social existence. These emerging technologies have profoundly changed people's modes of production, communication, and lifestyles, thereby shaping the corresponding culture.

From a production perspective, intelligent production models bring efficiency, precision, and automation, fostering a technological culture that values innovation, efficiency, and collaboration. In terms of communication, digital technologies have broken down the limitations of time and space, creating an open, shared, and diverse technological culture. The intelligent transformation of lifestyles, such as the widespread adoption of smart homes, mobile payments, online education, and telemedicine, has increased people's reliance on technology, cultivated a pursuit of quality in technological products and services, and fostered curiosity and acceptance of new technologies.

2.1.2 Social consciousness reacts to social existence: the role of culture in promoting technological development and social

progress in the digital age.

Social consciousness has a reactive effect on social existence, and it also possesses its own agency and unique developmental laws; its development is not always completely synchronized with that of social existence. With the rapid development of emerging technologies such as generative artificial intelligence, people's lifestyles and ways of thinking have undergone tremendous changes, but the transformation of cultural concepts and social customs requires time. Furthermore, some deep-seated values and thought patterns possess strong stability and will not change immediately with technological advancements.

Advanced culture provides spiritual motivation and intellectual support for scientific and technological development. The scientific thinking and rational spirit advocated by scientific and technological culture help cultivate high-quality scientific and technological talents and enhance society's scientific and technological innovation capabilities. Culture also influences the transformation and application of scientific and technological achievements. At the same time, culture has a significant impact on social values and behavioral norms. Value concepts that align with the core socialist values guide people to focus on the overall and long-term interests of humanity in the development and application of science and technology. Conversely, erroneous ideas that ignore ethical and moral norms in the research and application of intelligent technologies can lead to the distortion of scientific and technological development and hinder scientific and technological innovation and sustainable social development.

2.2 Exploring the Value of Deep Integration of Technology and Culture in the Digital Age

The deep integration of technology and culture is profoundly changing the overall layout and industrial ecosystem of my country's cultural development, and its importance in the historical process of building the modern form of Chinese civilization is becoming increasingly prominent. The Decision points out that we should "focus on building a socialist cultural power." Faced with various risks and challenges in the digital age, culture is an important source of strength. We must base ourselves on the strategic goals of the new cultural mission, promote the deep integration of culture and technology, and thus promote high-quality development and cultural prosperity.

2.2.1 Technology empowers culture and builds a new era of digital culture.

The integration of technology and culture has provided new means and platforms for cultural innovation. Digital technologies have made the creation, dissemination, and consumption of cultural products more convenient and diversified. Digital museums, digital libraries, and digital film and television have improved the efficiency of cultural product dissemination and user experience through digital technologies. At the same time, the development of intelligent technology has also provided new forms of expression and content for cultural innovation. For example, the application of technologies such as virtual reality and augmented reality

in the cultural field has injected new vitality into cultural innovation and created contemporary artistic works.

2.2.2 Culture shapes science and technology, leading the development of new quality productivity

The deep integration of science and technology with culture is a new path for developing new quality productivity in the new era. "The most significant feature of new quality productivity is innovation, which includes innovation at the level of technology and business models, as well as innovation at the level of management and systems." [3] Culture is not only an important driving force for education, but also an intrinsic driving force for talent development. At the same time, it provides core support for scientific and technological progress and intellectual support for the development of new quality productivity. In today's era, people's demand for richer and more personalized cultural experiences has prompted continuous innovation and upgrading of science and technology. Advanced cultural concepts have also guided the innovative development of science and technology in shaping mainstream values.

2.2.3 Deep integration of science and technology with culture to promote high-quality development

The integration and innovation of science and technology and culture has opened up a new path for high-quality development in the new era. The deep integration of science and technology and culture is a unified process of the culturalization of science and technology and the technologicalization of culture, which can promote the high-quality development of both [4]. The combination of science and technology and culture creates more attractive high-quality cultural products and services, and enhances the added value and market competitiveness of the cultural industry. At the same time, the integration and innovation of science and technology and culture can enhance the cultural literacy and scientific and technological level of society, guide the healthy development of science and technology and culture, pay more attention to sustainable development, and thus promote high-quality development and comprehensive social progress [5].

3. Multiple Dilemmas and Reflections on the Deep Integration of Technology and Culture in the Digital Age

In the digital age, the deep integration of science and technology with culture faces multiple obstacles from the perspective of historical materialism. At the value level, the conflict between technological rationality and humanistic values stems from the contradiction between social existence and social consciousness. At the practical level, the lack of technological empowerment and the failure of cultural guidance reflect the imbalance between the development of productive forces and relations of production, and between the economic base and the superstructure. The alienation of relations of production exacerbates resource misallocation and imbalance of interests, hindering the process of deep integration.

3.1 The Opposition and Deviation Between Technological

Rationality and Humanistic Values

From the perspective of historical materialism, the rupture in the technological and cultural value paradigm of the digital age stems from the contradictory movement between productive forces and relations of production. Technology, as the primary productive force, drives rapid social change; while culture, as social consciousness, possesses relative stability and a tendency to lag behind. When digital technologies reshape production methods, traditional cultural value systems struggle to adapt quickly, leading to a conflict between technological rationality and humanistic values, creating a deeply intertwined conceptual dilemma that urgently requires proactive reform of social consciousness to achieve harmony and unity.

Traditional cultural values are rooted in the production practices of agricultural and industrial societies, emphasizing the inheritance of experience, collectivism, and humanistic care; while digital technologies follow a value logic of prioritizing efficiency, data supremacy, and instrumental rationality. This difference in value orientation has become increasingly prominent in the process of digital industrialization and industrial digitalization, leading to an intensified conflict between technological rationality and humanistic values. When algorithmic recommendation systems erode cultural diversity and data monopolies threaten human subjectivity, the deep integration of technology and culture falls into the predicament of a value paradigm rupture.

3.2 Inadequate Technological Empowerment: Low-Quality and Inefficient Support for Cultural Innovation

Historical materialism emphasizes the decisive role of productive forces in relation to production relations and the superstructure. In the digital age, science and technology, as the primary productive force, should provide strong and efficient support for cultural innovation. However, in reality, although science and technology are developing rapidly, in the field of cultural innovation, the application of many new technologies remains superficial and fails to fully explore cultural connotations and achieve in-depth innovation. Taking virtual reality (VR) and augmented reality (AR) technologies as examples, in cultural exhibitions, performances and other scenarios, these technologies bring a certain novel experience, but often lack a systematic sorting and creative transformation of cultural content, resulting in cultural products having more form than content, making it difficult to truly touch the cultural emotions and spiritual needs of the audience, and failing to effectively promote cultural innovation to a higher level. As a result, the supporting role of science and technology in cultural innovation has not been fully utilized, and the positive driving effect of productive forces on the superstructure is insufficient [6].

3.3 The Failure of Cultural Guidance: The Low Correlation Between Cultural Innovation and Technological Progress.

Culture, as an important component of the superstructure, plays a value-guiding and innovation-inspiring role in technological progress. However, currently, there is a lack of

close correlation between cultural innovation and technological progress. On the one hand, the achievements of cultural innovation have not been effectively fed back into scientific and technological research and application. For example, elements such as philosophical thought and artistic aesthetics in traditional culture have not been fully absorbed and utilized in the design of technological products and the planning of technological development paths, resulting in technological products lacking cultural depth and failing to form unique cultural identities and competitive advantages in technological competition. On the other hand, mainstream cultural innovation has failed to promptly and deeply consider and guide the social and ethical issues brought about by technological development, leading to a certain degree of blindness in technological development, deviating from the people-centered development direction, hindering the healthy development of science and technology culture within the correct mainstream cultural framework, impeding mainstream culture from achieving innovation and dissemination through science and technology culture, and hindering the construction of a unified, harmonious, and vibrant science and technology culture integration system.

3.4 Alienation of Production Relations: The Low-Output Effect of Resource Misallocation and Interest Imbalance on Integrated Innovation

The digital age has provided a wealth of data resources and advanced creative tools for cultural creation, but from the perspective of the production relations of historical materialism, the production relations of cultural creation have not been rationally optimized. At present, a few excellent works such as "Black Myth: Wukong" and "Nezha 2" have used advanced technology to combine with the excellent traditional Chinese culture, innovated the forms of cultural expression and dissemination, and enhanced the dissemination power and influence of cultural products. However, high-quality content is still scarce in the current cultural market. A large amount of technological resources have been invested in the creation of homogenized and fast-food cultural products, resulting in the misallocation of technological resources. At the same time, issues such as the distribution of interests and creative discourse power between creators and the main bodies of production relations such as technology platforms and capital have also restricted the enthusiasm of creators to carry out in-depth cultural innovation with the help of technology, making it difficult for cultural creation to make full use of technological advantages to achieve substantial breakthroughs in content, failing to meet the growing demand for high-quality culture among the people, and hindering the deep integration of technology and culture in terms of content innovation [7].

4. Exploring the Materialist Approach of Deep Integration of Technology and Culture in the Digital Age

With the surging tide of digital intelligence, the deep integration of technology and culture has become a key issue of our time. Historical materialism reveals that the movement of the fundamental contradictions in society is the fundamental driving force of historical development. Against this backdrop, analyzing the dilemmas of integrating

technology and culture, and exploring paths for their deep integration and innovation, is not only a deepening of theory but also a practical requirement for promoting social progress.

4.1 Reshaping the Value Field: The Reconciliation and Coexistence of the Contradictions between Technological Rationality and Humanistic Values from the Perspective of Historical Materialism

Historical materialism emphasizes that social existence determines social consciousness, while social consciousness also possesses the active power to react upon social existence. The conflict between technological rationality and humanistic values in the digital age is essentially an externalization of the contradiction between the rapid changes in social existence and the relative lag in social consciousness. Resolving this dilemma requires a systemic reconstruction of the value field from three aspects: First, based on the dialectical unity of productive forces and relations of production, humanistic value goals should be incorporated into the institutional design of digital technology research and development. A collaborative innovation mechanism of "technology-ethics" should be established, transforming humanistic principles such as the protection of cultural diversity and the maintenance of human subjectivity into algorithm design norms and data governance standards, thereby promoting the transformation of technological rationality from instrumental to value-based.

Secondly, we should leverage the relative independence of social consciousness and reshape value consensus based on the foundation of excellent traditional Chinese culture. We should combine philosophical ideas such as "the people are the foundation of the state" and "the unity of knowledge and action" with the efficiency logic of digital technology to construct a digital cultural value system with Chinese characteristics, promoting the creative integration of technological rationality and humanistic values through critical inheritance. Thirdly, we should strengthen the counter-effect of the superstructure by guiding value reconstruction through a dual approach of policy and regulation and cultural education. We should improve legal norms in the field of digital culture and establish an algorithm ethics review system; simultaneously, we should carry out nationwide digital literacy education, cultivating compound talents with both technological thinking and humanistic sentiments, providing institutional guarantees and main support for the integration of science and technology with culture, and ultimately achieving a reconciliation and symbiotic development between technological rationality and humanistic values.

4.2 Deepening the Empowerment of Technology: The Leap in Quality and Efficiency of Technological Innovation in Enabling Cultural Innovation from the Perspective of Historical Materialism

In the digital age, addressing the underutilization of technological progress's supporting role in cultural innovation, a materialist approach is needed. On the one hand, we must focus on the role of the economic base in relation to the superstructure; on the other hand, we must leverage the superstructure's feedback effect on productive forces, thereby

deepening the synergistic innovation of technological empowerment and cultural content exploration. First, we should strengthen the top-level design of the integration of science and technology with culture, clarifying the goals and pathways for technology to empower cultural innovation. Through policy guidance and financial support, we should promote deep cooperation between technology companies and cultural institutions, establish joint innovation laboratories, and conduct research on the application of cutting-edge technologies in the cultural field. Second, we must strengthen the systematic organization and creative transformation of cultural content. Utilizing big data, artificial intelligence, and other technologies, we should conduct in-depth mining and analysis of cultural resources, constructing cultural knowledge graphs to provide rich materials and creative sources for cultural innovation. Combining virtual reality (VR) and augmented reality (AR) technologies, we should create immersive and interactive cultural experience products, achieving deep integration of cultural content and technological means, enhancing the appeal and influence of cultural products, and creating more high-quality cultural products.

Finally, we should focus on talent cultivation and team building, cultivate high-quality compound talents with both scientific and technological literacy and cultural sentiment, and provide solid talent support for science and technology to empower cultural innovation. Through the collaborative innovation of deepening technology empowerment and exploring cultural connotation, we should promote the transformation of science and technology support for cultural innovation from low efficiency to high quality, give full play to the positive driving effect of productivity on the superstructure, and promote the prosperity and development of cultural innovation. On the one hand, we should strengthen strategic investment in digital technology research and development. The government should play a macro-control role, set up special funds, guide enterprises to increase R&D investment, promote scientific research institutions and universities to focus on the technical needs of the cultural field, concentrate on tackling core technologies such as intelligent protection of cultural resources and data privacy security, build a collaborative innovation mechanism of industry, academia, research and application, and establish a technology innovation incentive system to provide policy and financial support for breakthrough achievements. At the same time, guided by the core socialist values, we should cultivate a positive and healthy digital culture ecosystem, give full play to the value guidance role of advanced social consciousness on technological innovation, eliminate the risk of technological alienation, and ultimately achieve the resonance of science and technology and cultural innovation. [8]

4.3 Superstructure-driven: A Paradigm Reconstruction of Cultural Innovation Leading Technological Progress from the Perspective of Historical Materialism

Historical materialism emphasizes the active response of the superstructure to the economic base and the development of productive forces. Addressing the dilemma of the weakened correlation between cultural innovation and technological progress, it is necessary to reconstruct the value logic and practical path of cultural leadership using dialectical thinking.

First, we must activate the guiding function of culture as a conceptual superstructure, transforming the philosophical wisdom of holistic thinking and harmony from excellent traditional Chinese culture into scientific and technological ethical norms and R&D guidelines. This will inject humanistic values into areas such as artificial intelligence ethics and data governance, correcting value deviations in technological development.

Secondly, strengthen the guarantee role of the institutional superstructure, and guide the direction of scientific and technological research and development to meet the needs of social development and humanistic value goals through policy tools such as establishing a cultural and technological integration innovation fund and improving the technology ethics review mechanism. Finally, build a two-way interactive mechanism of "cultural innovation - scientific and technological practice" to promote the transformation of cultural achievements into scientific and technological design language. For example, integrate traditional aesthetic elements into the interface of intelligent products and use cultural narratives to optimize algorithm recommendation logic. At the same time, use new problems in scientific and technological development to provide realistic materials for cultural innovation, promote the spiral rise of culture and technology in the contradictory movement, and finally realize the positive guidance and coordinated development of the superstructure on scientific and technological productivity [9].

3.4 Optimization of Production Relations: Institutional Unveiling of the Deep Integration of Science, Technology, and Culture from the Perspective of Historical Materialism

Historical materialism emphasizes the counter-effect of production relations on productive forces. The scarcity of high-quality content in the field of cultural creation is essentially a result of the mismatch between production relations and the development of digitalized productive forces. Solving this dilemma requires addressing the core elements of production relations: First, reforming the allocation mechanism of the means of production, establishing a "demand-oriented" science and technology resource allocation system through policy guidance, setting up a special fund for cultural and technological integration, and prioritizing the investment of advanced technologies such as artificial intelligence and big data in creative projects with cultural depth and value, thereby reversing the current resource misallocation.

Secondly, reconstruct the power relationship between the main creators, improve the copyright protection and creators' rights protection system, promote the formation of a new type of production relationship of equal cooperation between platforms, capital and creators, give creators the leading role in content planning and technology application, and stimulate innovation enthusiasm. Finally, optimize the distribution pattern of interests, build a distribution mechanism that "unifies social benefits and economic benefits", and guide capital to flow to the field of high-quality cultural creation through tax incentives, copyright dividends and other means. Through the systematic adjustment of production relations,

realize the precise connection between scientific and technological resources and cultural innovation needs, release the deep empowering effect of digital technology on cultural content production, and promote the spiral rise of science and technology culture in the movement of contradictions [10].

Acknowledgments

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