



The Predicament and Future of Science and Technology Ethics from the Perspective of Modernity

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Abstract. In modern society, science and technology play a fundamental role. When it comes to the incongruity between scientific and technological development and social ethics, academic discussions are often limited to existing social norms and legal systems. Examined from the perspective of modernity, immoral behaviors in scientific research and technological application reveal deep defects in modern production modes, political logic, and aesthetic characteristics. To solve these problems, the key lies in breaking the thinking limited by the framework of modernity, starting from changing the production mode of scientific research and technological application, abandoning the undesirable regulations in modern politics, and re-examining the humanistic value in technological aesthetics.

Keywords: Modernity, Technology Ethics, Ethics, Scientific Research Production, Aesthetic Viewpoint.

1 Introduction

In modern society, the rapid advancements in science and technology have become integral to addressing challenges in production and daily life. However, these advancements often present a "double-edged sword" effect, where the benefits are accompanied by significant ethical dilemmas. The intertwining of "technological value theory" and "technological risk theory" underscores the new challenges faced by traditional technological ethics in the contemporary era. This paper, titled "The Predicament and Future of Science and Technology Ethics from the Perspective of Modernity," aims to explore these ethical dilemmas through the lens of modernity, examining how modern production modes, political structures, and cultural aesthetics contribute to these issues.

The ethical challenges in science and technology are multifaceted, encompassing research misconduct, fraud, and unethical practices in applied fields. These issues are not merely isolated incidents but are symptomatic of deeper systemic problems inherent in modern production methods and political logic. For instance, The division of labor in modern production can foster a range of irresponsible behaviors, while the pursuit of economic gains often leads to unethical practices. Moreover, the political dimensions

of technology further complicate these ethical issues, as technological advancements are frequently intertwined with political agendas and power dynamics.

This paper argues that to address these ethical challenges, it is crucial to break free from the constraints imposed by the framework of modernity. This involves rethinking the production modes of scientific research and technological applications, abandoning undesirable regulations in modern politics, and re-examining the humanistic value in technological aesthetics. By doing so, we can pave the way for more ethical and responsible advancements in science and technology, ultimately contributing to a more just and equitable society.

The following sections will delve into the modernity dilemma of science and technology ethics, critique the ethical issues established by modern modes of production and political domination, and propose ways to transcend these challenges. Through this comprehensive examination, the paper aims to provide a nuanced understanding of the ethical landscape in contemporary science and technology and offer pathways for future ethical advancements.

2 The Modernity Dilemma of Science and Technology Ethics

2.1 The Dilemma of Research Misconduct and Fraud Research Misconduct and Scientific Fraud Represent the First Manifestation of Contemporary Ethical Dilemmas in Science and Technology

The division of labor in modern production can foster a series of irresponsible behaviors. The "era of big science" institutionally emphasizes the recognition of original discoveries and rewards the original work of researchers, which can tempt some to overlook academic ethics, and sometimes, researchers may not even realize they have crossed the permitted boundaries. This irresponsible behaviors typically manifests in two ways: misconduct and fraud. Misconduct involves selectively publishing research conclusions that fit predetermined results while ignoring or manipulating data that contradicts these conclusions. Fraud involves more egregious acts such as fabricating data, plagiarism, and tampering with others' research results. Incidents like the Schön scandal in the United States, the Hwang Woo-suk scandal in South Korea, and the Yoshitaka Fujii scandal in Japan have severely impacted academic ethics and the international research system.

Ethical issues in research are not isolated incidents. In a 2009 study, as many as one-third (33.7%) of scientists admitted to engaging in questionable actions that compromise scientific integrity, and less than 2% of scientists claimed to have committed serious violations such as data fabrication or falsification at least once. According to two recent studies, the proportion of academic misconduct has even increased in recent years. Earlier in 2022, a large survey of Dutch scientists found that 8% admitted to fabricating or altering research results. Whether the real figure is closer to 2% or 8%, even such a relatively small group can have a significant impact on the integrity of science. In this context, there has been a recent shift in academic focus towards the

emphasis on research ethics. Vocabulary statistics from the journal *Science and Engineering Ethics* indicate an increasing emphasis on specific technological ethical issues. Since 2007, the focus on medical ethics has gradually been replaced by research ethics, particularly after 2012, with articles primarily concentrating on research ethics and involving many emerging technological ethical issues.[1]

2.2 The Dilemma of Unethical Practices in Applied Fields Unethical Practices in Applied Fields Represent the Second Manifestation of Contemporary Ethical Dilemmas in Science and Technology

At the end of 2018, the gene-edited babies incident involving He Jiankui became a focal point of domestic and international public opinion. He Jiankui and his team, through self-funded and deliberate evasion of oversight, used gene-editing technology to conduct human embryo gene-editing activities, ultimately resulting in the birth of two genetically modified babies. This incident had severe adverse consequences, leading to criminal penalties for He Jiankui and two team members. It also posed a significant challenge to the current consensus and tacit understanding of scientific ethics, sparking intense public concern about gene-editing technology. Before the application of human gene-editing technology, related technologies such as gene therapy, gene enhancement, and gene design had already been questioned by many scholars, religious groups, and the public, and were labeled as unethical. Scholars like Sparrow Robert generally believe that contemporary biological gene intervention measures still need to address "key ethical and legal issues." [2] First, gene interventions bring unpredictable health risks to life, and the effects of decades of gene screening applications still require time to be tested against the backdrop of the long history of human evolution. Second, gene interventions bring concerns about the destruction of biodiversity. On one hand, gene screening itself undermines the foundation of natural selection in evolutionary theory; on the other hand, the tendencies of the era interfere with human choices, leading to a convergence of human genes and ultimately resulting in severe consequences for the loss of biodiversity. Third, gene interventions carry the risk of "dehumanization," as humans, as a species in nature, have their independent attributes, with intellectual advantages over other species and certain natural disadvantages, and genetic modifications to compensate for human disadvantages necessarily prompt a rethinking of the essence of humanity.

3 The Modernity Critique of Science and Technology Ethics

3.1 The Ethics of Science and Technology Established by Modern Modes of Production

The ethical issues in science and technology are a problem of modern modes of production. Leo Strauss believes that modern humans have abandoned the religious paradise and strive to establish a terrestrial paradise through modern production methods.

[3]Max Weber, on the other hand, argues that the modern mode of production originates from the capitalist spirit nurtured by Protestant Christianity, which has changed traditional human ethics and propelled the development of modernity issues. [4]Technological workers, as real entities in society, also face the same issues encountered by workers in other fields.

Modern production, characterized by the division of labor, is conducted to expand capital. At the national level, governments aim to develop the economy by maintaining economic growth and expanding new economic growth points, establishing different departments to manage operations. At the societal level, the pursuit of maximum capital returns dominates, with wealth expansion as a core value concept. Individual value is measured by the amount and speed of wealth accumulation, emphasizing the division and collaboration of industrial chains. From the perspective of individuals and families, individuals strive for social mobility, while families seek to enhance consumption. Notably, the modern production method aimed at capital expansion, characterized by "commodity fetishism" and "alienated labor," does not aim at enhancing human freedom or moral perfection but rather contradicts it to some extent. This is also true for modern production in science and technology:

Modern scientific research production is economically oriented. On one hand, scientific activities pursue economic value, and on the other, researchers generally seek personal economic gain. The modern scientific and technological system is a product of institutionalization, with major driving forces for research coming from funding, with governments and corporations being significant contributors. This funding can also be seen as a resource allocation serving economic development. Economist Paul Samuelson suggests that the four wheels driving economic and social development are land, capital, labor, and technology. Among these, technology's contribution is increasingly significant, and the allocation of resources towards technology does not necessarily see natural growth, thus requiring governments and corporations to use the "visible hand" to allocate resources, directing key production elements towards technological and scientific development. [5]This pursuit of economic benefits in modern scientific activities inevitably involves significant pursuit of interests, leading to unethical practices as previously mentioned. On the other hand, for individual researchers, pursuing reasonable economic value is a necessity for survival in modern society. Scientific activities are both objective activities of humans and capital, with research work gaining a spiral dynamic from the interaction of humans and capital. Under the influence of this "capitalist ideology," scientific outcomes, treated as tradable commodities, naturally give rise to numerous unethical behaviors, further damaging traditional ethical values in human society.

Modern scientific research production is based on teamwork. Marx, in his discussion on the division of labor in *The German Ideology*, mentioned, "Any new productive force, as long as it is not merely a quantitative extension of known productive forces (e.g., land cultivation), will lead to further development of the division of labor".[6] Modern scientific production has evolved to a highly specialized division of labor, far different from the traditional "scientist workshop" production model. The "impersonal" modern management style undoubtedly improves work efficiency but

also leads to "irresponsibility," where specific individuals are only responsible for their own tasks and not for the overall outcome.

Modern scientific research production is evaluated based on results. Under modern logic, scientific outcomes, treated as commodities, inherently place more importance on the results than the production process. From the initiation of research projects to mid-term reviews and final assessments, qualified results are necessary to justify the project's existence; otherwise, it signifies project failure, and the project bearers will face corresponding consequences. This evaluation standard is not inherently problematic, but at the same time, no one can deny the value of unexpected findings or even the value of failed experiments. However, in a result-oriented research system, outcomes that do not meet expectations are often overlooked, and even during the project initiation phase, projects with slightly lower feasibility struggle to secure funding.

3.2 The Ethics of Science and Technology Under Modern Political Domination

Political technology. In modern society, individuals are positioned as the subjects of society, which is both a political characteristic of modern society and a path of liberation that has continued from the Enlightenment era. From divine right to popular sovereignty, the legitimacy of political techniques has always been a focus of ethical studies. In other words, the question of whether "techniques of governance" can be used in modern society has become a significant issue. The use of political techniques is a power relationship issue that has continued from ancient times. Can power relationships be eliminated? Foucault and Marx took different philosophical paths on this issue. Foucault viewed "political technology" as an eternal mode based on traditional ways of ruling individuals, concluding that even in modern society, humans cannot escape power relationships or ruling history. [7] Instead of discussing the legitimacy of modern power relationships, it is better to seek better ruling techniques and hope that political technology can transcend the era and move towards a postmodern political art.

The politics of technology. Since state politics and technological progress share the same origin, can we find a metaphysical image in the operation of technology that is similar to the logic of state political operation? Firstly, from the original characteristics of technology, technology possesses a political ontological mode of operation. "Exiting the natural state" is a characteristic of modern society. Roberto Esposito differentiated the ancient and modern understandings of "existence": in ancient concepts, existence was understood as "natural" matter, while in modern political concepts, existence was understood as a "self-determined" subject. [8] The shift from "natural" to "self-determined" reflects a change in ontological research in modern society, from what exists, who exists, and the standards of what exists. Since Kant's "Copernican revolution," human epistemology has undergone a transformation, shifting from "object approaching subject" to "subject understanding object," accompanied by the rise of human "legislation for nature," continuously elevating human subject status, ultimately affecting modern ontological research. Under this premise, technology is not just an objective pursuit or practice of truth; instead, the attribute of technology as a purposive tool for

humans is further strengthened. What technology researches, what technology practices, and the direction of technology operation have all become tools of modern politicalization.

However, it is worth noting that in modern society, technology as a political "instrumentality" differs significantly from the "instrumentality" during the religious philosophy period. Today's science and technology are not the servants of contemporary politics but have shown certain political attributes in their development and naturally gravitate towards these attributes in operation. Secondly, from the theoretical burden of technology, technology inherently belongs to the political philosophy outcomes of natural philosophy. As early as in ancient Greece, technology contained implications of power. In ancient Greek mythology, technology was, in a sense, considered a power belonging to the gods. In the pre-Socratic period, technology, as a dubious overreach, even faced resistance. During Plato's era, due to the shift towards political philosophy, "technology" became a concrete "art of knowledge" and became an important basis for distinguishing social classes. In *The Republic*, Plato believed that the god who created the idea of a bed was the highest; the next best was the craftsman who made the bed, possessing more of the idea of the object; the lowest was the painter who painted the bed, possessing less of the idea of the object, and all of this was determined by human rational ability. [9]

3.3 The Aesthetic Confinement of Science and Technology Ethics in Modernity

The reproduction of technological production has become the ideological basis of modern aesthetics. Humans are the sum of social relationships. In modern society, the way humans understand, perceive, and judge the world is influenced by the logic of developed industrial society, not solely belonging to their natural human nature, and aesthetic standards gradually converge, forming a new universal aesthetic framework. Traditionally, the most direct manifestation of human aesthetic characteristics was art. However, early in modern society, Hegel recognized that art had a declining trend, inevitably losing its sacredness.[10] According to his dialectical understanding, this decline not only marked the end of an old era but also signified the beginning of a new era. For individuals, the newly shaped sensibility is also a generative existence. Although it may be less noticeable, the operational logic of large factories, networks, and shopping malls in the technological production model shapes people like traditional ideologies. People naturally respond sensually according to these standards, and logic that contradicts the logic of technological production is considered "outdated" and "inefficient." Accompanying the production methods and production relationships at a specific level of productivity becoming the new moral standards, adherence to traditional ethics becomes a "dissonance."

The symbolic significance of technological products consolidates the ideological basis of modern aesthetics. Technological products exist as intellectual outcomes, but once they gain independence, they also react to ways of thinking. In Hegel's sense, this belongs to a type of "symbolic art." Thinkers like Baudrillard and Bourdieu further

uniquely proposed the symbolic logic of consumerism, which, while reflecting the alienation of consumption, also directly carries human aesthetic tastes. People increasingly focus on the symbolic meaning of objects in aesthetics. However, it is worth noting that this type of aesthetic experience defined by technological products is not unique to modern society but runs through the complete historical narrative of human civilization. Myths, language, and history all existed as symbols in traditional societies. Unlike traditional societies, the vigorous development of science and technology in modern society has accelerated the process of symbolization, making this characteristic more apparent and variable. Philosopher Ernst Cassirer of the Marburg School summarized symbols' three functions: universality, variability, and abstraction. [11]The universality function reflects that symbols are not limited to specific products but are universally applicable tools, as Hegel said: "Grasping some universal ideas to deal with individual situations"[12]; the variability function reflects that a symbol can represent multiple or various technological products; the abstraction function shows that the relationship between technological abstractions and human aesthetics can transcend specific sensual technological products and exist, transcending intellectual outcomes and entering the level of ways of thinking. The reason why the aesthetic characteristics of modernity should be transcended in the ontological sense of aesthetics is that they neither conform to traditional aesthetic ethics nor align with the historical development direction of human liberation. When modern society's science and technology narrow the distance between ordinary people and art, it is necessary to realize that the flourishing of aesthetics under the backdrop of modern technology brings a duality of spiritual liberation and suppression. Adorno meaningfully called it "the world willing to be deceived," pointing out that modern art has become a pursuit of profit, made possible by modern technology.[13] At the same time, Benjamin, in *The Work of Art in the Age of Mechanical Reproduction*, also concluded through his study of the film industry that film was born for reproduction and dissemination, and using original film has no more significance than using reproduced film, which to some extent dissolves the guilt of "plagiarism." [14]

4 Transcending Modernity in the Ethics of Science and Technology

4.1 Achieving Breakthroughs in Modern Research Methods

Breaking through modern research methods is fundamental to transcending ethical issues in science and technology.

Firstly, it is essential to perfect the legal system related to scientific research. According to Marxist views, laws should be established based on the examination of material relations and continuously adjusted in practice. Good laws should strive to protect human rights to freedom and align with the direction of human liberation. Rights should be recognized and guaranteed by law. The European Union has established dignity as a principal right in the *Charter of Fundamental Rights of the European Union*, and France has stipulated related content in its *Bioethics Law*. [15] In contrast, China's

research legislation still has significant room for improvement within its three major legal systems: Currently, within the administrative law system, research norms mainly rely on regulations issued individually or jointly by universities and ministries related to research, while specialized legislation at the National People's Congress level is limited to the *Science and Technology Progress Law of the People's Republic of China*, which vaguely defines unethical behaviors, making it difficult to form clear and reasonable factual determinations. Within the civil law system, the *Civil Code of the People's Republic of China*, promulgated in May 2020, marks a milestone, especially the provisions on *Technology Contracts* in Chapter 20 of Part Three and *Tort Liability* in Part Seven, which, combined with judicial interpretations, can more clearly determine civil tort actions related to research. However, whether the parties in a civil lawsuit can initiate litigation is also a critical issue; on one hand, the parties may not be aware of the infringement, and on the other hand, they may be reluctant to initiate litigation due to social relationships, litigation costs, and other reasons. Within the criminal law system, whether and how to criminalize ethical issues in research is a highly controversial issue in the legal community, but it is encouraging that the work on criminal responsibility for ethical issues in science and technology is being orderly carried out in the amendments to the criminal law. Therefore, on the legal system level, it is necessary to actively protect the legislative achievements of current research laws and improve the related legal systems, establish independent written laws for research management, and strengthen judicial relief and public interest litigation to increase the legal costs of unethical behaviors in science and technology.

Furthermore, it is crucial to adhere to the chief scientist responsibility system and pursue a path that unifies team-based and scientist-centered research. Previous discussions have addressed the "responsibility-free" pitfalls brought by "depersonalization," and avoiding these pitfalls requires learning from some advanced countries' practices. The American research system formed in the 20th century represents the modern research system, with university research centers, corporate industrial labs, and government-managed large scientific labs leading the development of the global research system and representing the era of big science team research. After entering the "Industry 4.0 era," the American "apprenticeship" system has shown a trend from low-end manufacturing to scientific research and high-end manufacturing, and research institutions have gradually increased the scope and intensity of "apprenticeship" applications. [16]Similarly, Germany, which tends to train essential employees internally, has expanded the apprenticeship system to research and high-end industries after entering the Industry 4.0 era, aiming to change the traditional research system. [17]Although standardizing research ethics is not the fundamental reason for Western countries like the United States and Germany to implement the new industrial era apprenticeship system, this exploration of de-"flat" research undoubtedly helps scientists clarify their moral responsibilities within the team and society, thereby alleviating the "responsibility-free" issues of modern research ethics.

4.2 Abandoning the Shackles of Modern Politics

Transcending the traditional relationship between politics and technology and transforming political technology into political art is an essential part of overcoming ethical issues in science and technology. Foucault views the essence of the state as a collection of political technologies and sees the transformation of state forms as changes in political technologies. In ancient societies, the monarch was the center of state power, hoping to use political technologies to achieve "panoptic rule" and become an all-seeing, omnipotent ruler, possessing the Platonic sense of "the art of controlling arts." In modern societies, the conditions of high technology support the atomized family structure, rapid information exchange, and complex industrial structures, making the primitive "panoptic rule" unsustainable. Political technology has shifted from "core-style discipline" to "holistic discipline," turning the entire society into an object of discipline, a form of Foucauldian "panopticism" ruling technique. However, the most thorough reflection on modern political technology concludes that the best politics should not include technical support, including law, because factors inherent in humans always occupy a dominant position in the development of social ethics. We should actively explore the ideological resources of Marxist foundational theories and excellent traditional Chinese culture, explore strategies for science and political governance under the new form of human civilization, avoid repeating the problems of Western modern political technology and technological politics, make humans the masters of technology, ensure that technological development follows the correct path of human liberation, and further pursue the art of politics.

4.3 Achieving a Return to Essential Critique in Aesthetic Concepts

Firstly, contemporary society needs to look back at the original fundamentals of classical aesthetics and reshape the solemnity of technological beauty. In modern society, when technological products become purely commercial goods and technology practitioners become purely wage laborers, the solemnity of technological beauty is greatly diminished. In a sense, the scientific and technological research results of the classical era were displayed as works of art, while the research results of modernity are displayed as commercial products. Looking back at the early primitive societies, artworks were often created to evoke a sense of solemnity during rituals, and solemnity was one of their original attributes. Like artworks, technological achievements also carry the responsibility of human aesthetic reflection. Therefore, breaking the alienation of technological products, clarifying the solemnity of technological beauty, and reshaping the solemnity of technological beauty are the first steps in solving the modern ethical dilemma of science and technology.

At the same time, it is necessary to grasp the tension between truth and value, reflecting the restrained beauty of technology and the beauty of nature. The ancient Chinese philosopher Zhuangzi valued harmony with nature and advocated the beauty of "conforming to heaven" and "forgetting the suitability of suitability." Heidegger pointed to the essence of science as originating from ancient Greek metaphysics, emphasizing that science is not truth itself but a construction within the realm of truth.

[18]Further, science aims to pursue truth, and innovation is an inevitable characteristic of technology. However, unrestricted creation and improper pursuit of a scientific utopia will inevitably harm real humans. Bringing the heavenly realm of science down to earth is an essential path for the ethical development of science and technology. It is necessary to abandon the ideas of "scientific religion" and "technological determinism," respect nature, and respect the existing social order. It is also important to recognize that technological creation and natural creation are not contradictory but mutually promoting and dialectically developing relationships.

5 Conclusion

To date, the dilemmas of modernity have become a pervasive issue across human society. Constrained by modern production methods, political domination, and aesthetic confinement, the transgressions and deceptions in the field of scientific research, as well as the unethical applications in practice, have not been effectively overcome in modern society. To transcend the ethical dilemmas of science and technology, the most fundamental step is to change production methods to prevent inappropriate behaviors. The essential path forward involves altering human logical rules, liberating individuals from the logic of modernity, and transforming political technology into the art of politics. Most fundamentally, a transformation in aesthetic concepts is required, allowing individuals to return to the essence of beauty at the aesthetic level and reclaim the human brilliance that is continually lost in modern society.

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