SCIREA Journal of Management
ISSN: 2995-777X
http://www.scirea.org/journal/Management
February 22, 2025
Volume 9, Issue 1, February 2025
https://doi.org/10.54647/management720112

Ethical Governance and Countermeasures of Emerging Technologies

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Abstract

Since the 21st century, the continuous emergence of disruptive technologies and the rapid development of science and technology have brought disruptive changes to human life with the background of interdisciplinary integration. Emerging technologies are developing rapidly, and the mature development of many cutting-edge technologies has placed them at the forefront of today's social development. However, with the continuous development of emerging technologies, China's ethical construction of science and technology is somewhat lacking and lagging behind the pace of the development of emerging technologies. This article first effectively analyzes the connotation and characteristics of emerging technologies, and then analyzes how emerging technologies may raise some unprecedented ethical issues. This indicates that we must upgrade traditional technology management to technology ethics governance, and further regulate and guide the development of technology.

Key words: emerging technologies;technological ethics;ethical risks;AIGC; Chatgpt

1. Introduction

In the 21st century, emerging technologies such as genetic engineering and AIGC are constantly emerging, showing strong uncertainty and suddenness, which has attracted attention and research from all sectors of society. The emergence of emerging technologies has enabled the public to enjoy a more convenient life, but it has also brought many uncontrollable factors to human society and brought about a series of ethical issues that people never expected. The frequent emergence of emerging technologies is a double-edged sword for the development of human society. It presents a series of important challenges to humanity, which are closely related to people's way of life and have an undeniable impact on ethical order. This is a necessity of the 21st century, and we must respond accordingly., Emerging technologies are difficult to prevent and control properly. The formation of ethical consensus can guide the formulation of technology governance policies and laws and regulations. Therefore, it is necessary to prevent and control emerging technologies, and the legitimacy of any technology should withstand ethical and moral scrutiny. The research on risk governance of emerging technologies is aimed at regulating their rational development, better integrating them with society, and bringing positive impacts to society.

2. Analysis of Emerging Technologies

It was not until the end of the last century that "Emerging Science and Technology" was proposed as a clear concept, and the Mack Institute for Technological Innovation in the United States officially established the "Emerging Science and Technology Management Research Program", hoping to comprehensively understand the problems of emerging science and technology through this research. The researchers of the institute pointed out that emerging technologies mainly refer to innovative activities that can change existing industries or open up new industries, and need to be based on science.

When studying emerging technologies, the following characteristics need to be considered: first, emerging technologies are new and evolve rapidly; second, applications related to emerging technologies have never directly evolved into advanced technologies in social development; third, the knowledge related to emerging technologies shows cross

disciplinary characteristics, and the cross disciplinary nature makes it difficult to identify which specific discipline a technology belongs to; fourth, emerging technologies have multiple innovation directions because they have interdisciplinary characteristics, so the development of emerging technologies can represent many related fields and therefore have diversified characteristics.

The main characteristics of emerging technologies are mainly concentrated in their suddenness and strong uncertainty

2.1 The emergence of emerging technologies

And the emergence of this emerging technology mainly points to the fact that emerging technologies are not simply emerging. An entity is considered novel relative to a theoretical foundation if and only if it is impossible to use the theoretical tools provided by that foundation to deduce the existence of the entity - a standard often expressed as' unpredictability '.

And this sudden emergence mainly has four characteristics: 1. Emerging technologies are things that suddenly appear and have a qualitative difference from existing technologies, such as the recent emergence of ChatGPT and various AI paintings; 2. The presentation of new things has suddenness, as if suddenly appearing from a black box; Taking AI painting, a recent hot topic, as an example, these two explosive artificial intelligence technologies seem to have suddenly appeared in front of people. Although Nvidia released the StyleGAN model in 2018 to automatically generate high-quality images, the sudden explosion of AI painting did occur in 2022, with various AI painting websites and WeChat mini programs emerging one after another, suddenly appearing in people's sight. Thirdly, the emergence of emerging technologies is often difficult to predict, possibly due to the relatively diverse elements involved and the presence of uncertainty. ChatGPT will be launched at the beginning of 2023, and although it is mainly presented as a chat software to the public, its future development still has strong uncertainty; Fourthly, the emergence of new things usually has a significant impact on social development, and the emergence of emerging technologies such as artificial intelligence led by AIGC to generate content has led to a series of social issues such as intellectual property challenges, security challenges, ethical challenges, etc.

Diversified emerging technologies, such as ChatGPT and cloning technology, are obscure and difficult for most humans to understand, and have essential differences from traditional technologies, requiring professional knowledge learning. The development of emerging technologies usually emerges before people are mentally prepared, and has a significant impact on people's lives without their knowledge. The emergence of emerging technologies will lead to our inability to accurately predict and regulate them, which will result in the immature development of emerging technologies and cause a series of harmful behaviors to society and nature.

2.2 The uncertainty of emerging technologies

The uncertainty of emerging technologies is another major characteristic. In today's world, people are still not 100% certain about the laws of natural development, and there are many fields in nature that humans have never explored or have not delved deeply into, and their understanding can only stay on the surface without delving into the essence. Even if facing mature technology now, scientists cannot guarantee that this technology will develop in a positive direction in the future, let alone control it. In this situation, we no longer have confidence. Many times, technology experts do not have a full grasp of the specific status of scientific research achievements, including development direction, maturity time of technology, and security issues, and a series of detailed questions about technological development.

Starting from the 21st century, the Fourth Industrial Revolution has unfolded on a large scale, utilizing information technology to promote industrial transformation, which is the era of intelligence. Diversified technological innovation has led to the emergence of new products and services, bringing subtle changes and profound adjustments to human society while enjoying convenient services. However, the continuous emergence of emerging technologies and their corresponding regulatory mechanisms are very outdated, and the speed of related regulation and prevention and control is difficult to match. The risk factors, likelihood, and impact level contained in emerging technologies are difficult to pay attention to and regulate, which makes it difficult to ensure whether the impact brought by emerging technologies is in line with society. If the risk scale, impact level, and channels caused by emerging technologies cannot be handled through the current risk management

system, the current governance system's ability to control subsequent disasters will be affected

The significant reduction will result in incalculable losses due to a series of adverse effects such as long-term social risks and economic stagnation. All of this has cast a veil of uncertainty over the vision of technology benefiting the people.

3. Ethical risks of emerging technologies

The core of risk awareness lies not in the present, but in the future. In a risk society, the past has lost its power to determine the present. Its position has been replaced by the future, and therefore, non-existent, imaginary, and virtual things become the 'reasons' for current experiences and actions. The development of emerging technologies is a double-edged sword for human society. On the one hand, it will promote the healthy development of human society, but on the other hand, it will trigger unknown ethical risks, and even pose a threat to the survival of human populations. Specifically, if AI technology can free humans from ordinary labor and devote more energy to technological innovation, but if the development of artificial intelligence gradually gets out of control and breaks free from human control, it is highly likely to have a huge impact on human production and life.

Von Neumann once proposed the concept of technological singularity, stating that at an unknown point in the future, the development of technology would become uncontrollable or even irreversible, and it would be difficult to predict the state of human survival and development. At present, the hypothesis of the technological singularity of "intelligence explosion" is most widely popular, which theoretically suggests that this work will lead to the singularity of artificial intelligence, where "artificial superintelligence" surpasses human cognitive abilities. Famous physicist Hawking has repeatedly spoken out to the whole society, stating that humanity may ultimately be eliminated by artificial intelligence. The emergence of AI painting, such as the recent series of AIGC artificial intelligence products, has had a strong impact on the profession of artists. Taking the AIGC field as an example, the most profound impact it may bring is ethical risk.

American philosopher of technology James Moore once proposed a law that "with the

technological revolution, social impact increases, and ethical issues also increase," which is known as Moore's Law in the field of technological ethics. He believes that this phenomenon may not only occur because more and more people are being influenced by technology, but because technology will provide more possibilities for various actors. The ethical issues brought about by the AIGC of emerging technologies will not only affect many people, but as a revolutionary AI technology tool, there will also be more ethical risks due to its use by various actors.

For example, AI painting algorithms may lead to racial discrimination. The output of AIGC is composed of a vast database of human works, and there exists algorithmic discrimination in this algorithm. The issue of algorithmic discrimination has always been an ethical problem that is difficult to avoid in the innovation and application of artificial intelligence. Although some people believe that training pre trained models with more comprehensive data and parameters can avoid the problem of algorithm discrimination. However, AIGC based on pre trained models still faces serious discrimination issues. For example, current research has shown that pre trained language generation models can reproduce harmful social biases and stereotypes, such as GPT-3 which exhibits obvious religious based biases and gender discrimination. Previously, YannicKilcher's GPT-4chan, trained with 130 million hate speech, challenged the bottom line of Internet speech with foul words and hate prejudice, and was called "the most evil model in history".

And ChatGPT, which will be launched at the end of 2022 and become popular in early 2023, has also revealed its ethical risks. The first group of people who used ChatGPT to commit crimes have emerged. For example, hackers integrated OpenAI's GPT-3 model into the channel of the instant messaging software Telegram. With this operation, hackers can use ChatGPT "remotely" through Telegram to bypass security regulations. Previously, a post titled 'ChatGPT - The Benefits of Malicious Software' was circulated on foreign dark web hacker forums. The creator of this post shared the entire process of using ChatGPT to create and steal program code. According to the operation process, ChatGPT can generate a program that can extract, compress, and transmit 12 types of files in a relatively short period of time.

In addition to information theft, ChatGPT can also help hackers generate attack software and

ransomware. According to the Financial Times, a SIM swapping attack script generated with the assistance of ChatGPT has recently begun to spread on the internet. SIM swapping attack, also known as identity theft attack, works by breaking through the control of mobile phone companies over phone numbers, swapping phone numbers from the original holder's SIM card to the SIM card controlled by the attacker, thereby controlling the victim's mobile phone. Ransomware generates multi-layer encryption software through ChatGPT to remotely lock the victim's computer, and benefits from charging the victim a "ransom" for the locked computer.

4. Preventing Ethical Risks in Emerging Technologies

4.1 Colin Gridge's dilemma

Emerging technologies are closely related to the development of human society and may ultimately become an important driving force and major factor in the development of human society. Science and technology, as the first element of social productivity, is beyond doubt. However, while promoting social progress, how to effectively control various potential risks in the development of emerging technologies is a widely concerned issue.

David Kollingridge proposed the famous concept of the "Kollingridge Dilemma" -1. Information Dilemma: The social consequences of a technology cannot be anticipated in the early stages of its technological life. 2. Control dilemma: When unwanted consequences are discovered, technology often becomes a part of the entire economic and social structure, making it difficult to control. That is to say, in the early stages of the development of emerging technologies, if people cannot make reasonable predictions about the series of risks it may cause, then if technology develops to a certain stage and its impact exceeds people's expectations, then this technology has undergone a qualitative change and has fully integrated into the social system. When people realize the various risks brought by this technology at this time, it is difficult to control the technology without laboratories and factories, and it consumes a lot of manpower, material resources, and financial resources to achieve the expected results. And the example given by Korlingridge is an example of the development of automobiles. In the early days of the invention of automobiles, people did

not anticipate the various negative impacts that automobiles would bring, such as the environmental problems caused by the use of gasoline and the road paving

Various environmental issues, safety concerns of autonomous driving, etc. When people realize the emergence of such problems, not only is technology itself difficult to control, but the damage to the environment is also irreparable.

4.2 The necessity and urgency of ethical governance in emerging technologies

On March 20th, the General Office of the Communist Party of China Central Committee and the General Office of the State Council issued the "Opinions on Strengthening the Governance of Science and Technology Ethics". Science and technology ethics are the value concepts and behavioral norms that need to be followed in carrying out scientific research, technological development and other scientific and technological activities, and promote science and technology

An important guarantee for the healthy development of technology and industry. At present, with the rapid development of scientific and technological innovation in China, the ethical challenges faced by science and technology are increasing. However, there are still problems with the governance of science and technology ethics, such as incomplete institutional mechanisms, imperfect systems, and uneven development in various fields, which are difficult to meet the practical needs of scientific and technological innovation development.

Ethics "is derived from the Greek word" ethos ". The problems that ethics needs to solve are both numerous and complex, but the fundamental issue is only one - the relationship between morality and interest, that is, the relationship between "righteousness" and "interest". Ethics, like fairness, justice, and selfishness, can evaluate human behavior and promote relationships between individuals. As a branch of ethics, technological ethics refers to the ideological and behavioral norms governing the relationships between humans and society, humans and nature, and humans and humans in technological innovation activities. It stipulates the values, social responsibilities, and behavioral norms that technology workers and their communities should abide by.

Currently, ethical issues arising from emerging technologies are constantly emerging, and science and technology are becoming a source of risk. Preventing risks cannot be separated from new science and technology, which constantly prompts people to rethink the

relationship between humans and nature. Producers and consumers of complex technologies have varying levels of understanding regarding the magnitude of technological risks and whether they can be prevented in different fields. For example, residents living near nuclear power plants are not aware of the safety records of the factory and cannot protect themselves in the event of an accident. Any ethically acceptable risk management system must consider these broad causal variables, outcome variables, and knowledge distribution variables, which also run through the entire scope of hazardous technologies.

The ethical responsibility arising from the rapid development of emerging technologies in modern society can be seen as a comprehensive examination of the moral and responsibility abilities of the actors themselves. The idea of ethical responsibility was first proposed by German sociologist Max Weber. He pointed out that any behavior with ethical orientation must comply with the relevant principles of belief ethics or responsibility ethics. In Germany, 20

In the latter half of the century, as the most influential philosopher of the time, Jonas' critique of the ethics of science and technology was highly representative

Sex. He has had the brutal experience of two world wars and witnessed the enormous impact of technology, the double-edged sword, on humanity

Disaster. He pointed out, "A sense of ethical responsibility is essential in a corrupted era

Jonas believed that the ethical significance of human behavior is closely related to the nature of technological activities, and that nature is no longer responsible

Elephant, but the foundation of responsibility itself. People must shoulder unlimited responsibility for the natural world and the future of humanity. Responsibility ethics is a philosophical study on the issue of value rationality and obligations. It is an ethics of human shared responsibility for coexistence and symbiosis, and also an ethics oriented towards the future development of technology. "Only behavior based on responsibility has moral value." It starts from the goals of social benign operation, sustainable development, and harmonious development, and examines how individuals or organizations should act to fully demonstrate their value and achieve self realization. The ethics of responsibility emphasizes the sense of responsibility that humans have towards nature and others, and also provides important ethical theoretical support for building corresponding forms of civilization for the future. As

an ideal social behavior, it balances the objective requirements of both value rationality and purpose rationality. The clearer one knows, the more one acts. Reaching ethical or value consensus at the conceptual level, and guiding specific behavior with ethical consensus at the practical level, has become a necessary path for the green development of technology.

5. Principles of Ethical Governance Strategies for Emerging Technologies

The emergence and uncertainty of emerging technologies have led to numerous and difficult ethical issues in their innovation, research and application, which are beyond the scope of traditional technology management. Therefore, we must elevate technology management to technology ethical governance. We cannot use traditional ethical governance methods in the past to regulate emerging technologies. Propose a standard for evaluating the right or wrong of actions, decisions, and policies taken in the innovation, research and application of emerging technologies, that is, to establish the basic ethical principles of technological ethical governance.

Firstly, the well-being of individuals should be given top priority. We prioritize this ethical principle to emphasize that the fundamental purpose of developing technology is to enhance human well-being. That is to say, people are in good physical, mental, intellectual, emotional, social, economic, and environmental conditions. The fundamental purpose of developing technology is to help people achieve good conditions in all these aspects. The principle of prioritizing the well-being of individuals is consistent with China's "people-centered" development philosophy. Enhancing human well-being means minimizing the risks and maximizing the benefits that technological innovation may cause to people and the environment. Due to the coexistence of benefits and risks in intervention measures based on technological innovation, the principle of "human well-being" requires us to conduct a careful and meticulous ethical review of scientific research plans, evaluate the risk benefit ratio, and examine whether scientific research plans reflect respect for people. The ethical principle of "human well-being" includes both present and future generations of people, thus including intergenerational justice issues; well-being requires people to be in good social and environmental conditions, thus also including respect for people. Protecting the environment

and promoting social development.

Furthermore, one must be responsible. The word 'responsible' here has multiple meanings. One significance is that we should develop these technological undertakings responsibly, which means: firstly, we must adhere to scientific integrity and oppose misconduct in innovation and research and development; At the same time, when it comes to humans, we need to protect the subjects and other stakeholders as humans, safeguard the interests of future generations of humanity, care about the welfare of animals with sensory abilities, and protect the environment from pollution, destruction, and erosion when it may affect the environment. Another meaning is that when there are incidents that harm people and damage the environment, we can trace who is responsible, that is, we can hold them accountable and hold them accountable until they can be held legally responsible according to the corresponding legal provisions.

Then, transparency must be ensured. Transparency is the best way to prevent researchers from violating scientific integrity, harming the physical and mental health or interests of subjects and consumers, and other unethical behaviors. It is also an effective method for ethical and legal governance, as well as preventing violations of ethical norms and legal regulations. To ensure that regulators and supervisors supervise it.

Finally, we need to strengthen public participation. Encourage more public participation, involve humanities and social science scholars with professional knowledge, public representatives, and civil organizations concerned with technological innovation in the upstream scientific research decision-making process, and strengthen public understanding and trust in science.

6. Conclusion

In today's society, the dual nature of emerging technologies is evident, and people are faced with choices in front of them. Contemporary people have gradually begun to realize the significant dual impact of emerging technologies on society. On the one hand, emerging technologies can bring many benefits to human society and promote continuous progress and development. On the other hand, people are also actively predicting the ethical risks brought

by emerging technologies, although it is still difficult to predict at present. Therefore, in the face of emerging technologies with uncertainty and suddenness, we should adopt a more positive attitude towards them and accept them, rather than just being manipulated by emerging technologies or simply rejecting them.

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