Reorganization, Game and Match: Elements of Science and Technology Policy in "The Wandering Earth"

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Abstract: "The Wandering Earth" series of movies, as a classic in Chinese science fiction films, not only contains literary fantasies but also embodies many elements of technology policy. This paper analyzes the elements of technology policy reflected in the plot of the "The Wandering Earth" series, based on the analysis framework of "subject+instrument+ethics." It compares these elements with real-life examples, conducts specific analysis of different elements, depicts the ways in which different policy elements function, and provides three feasible recommendations for the optimization of technology policy in reality: flexible restructuring of the subject, ethical considerations, and appropriate instrument selection.

Keywords: Science fiction movie; Policy elements; Policy subject; Policy ethics; Policy instruments

1. Introduction

Along with the continuous development of science and technology in human society, the research and formulation of science and technology policies have become increasingly important. Effective policies can accelerate the promotion of science and technology for the benefit of people's lives and the convenience of society. The judicious use of technology can also better achieve policy objectives.

In 2019, the science fiction movie The Wandering Earth was released in theaters. Four years later, the release of The Wandering Earth 2 drew a similarly large audience. In the movie, the aging sun is expanding and about to engulf the earth, and all mankind comes together to take the earth on a wandering journey. As a critically acclaimed science fiction movie, "The Wandering Earth" not only has realistic and vivid visual effects and an up-and-down storyline, but also embodies realistic science and technology policies in its embedded topics of power confrontation, collective decision-making, and science and technology use and management. Technology is an indispensable element in a program of this magnitude. To maximize the concentration of global power, effective management and command is necessary. In the movie, "coalition government", "digital life", "dungeon qualification lottery", "the construction of planetary engines" and so on are all embodiments of the elements of science and technology policy.

Science fiction comes from reality. This paper is based on the science and technology as the "protagonist" of the science fiction movie and the reality of science and technology policy corresponds to the development of the use of related elements to build the role of science and technology policy framework, and is expected to be able to reflect the reality of the contradictions, triggering the reality of the thinking, and to provide realistic suggestions of the discussion.

This paper analyzes science and technology policy from the perspective of elements in theory, discusses the role of different elements in the framework, the current problems and countermeasure suggestions, expands the way of research on science and technology policy, and provides a structured understanding of science and technology policy; In practice, it provides experience for continuously strengthening the practice of science and technology policy. To a certain extent, science fiction works can reflect the real society, and this study takes this as an entry point to grasp and integrate typical cases and summarize the lessons learned. By sorting out the basic elements of science and technology policy, this paper is conducive to the selection of elements of science and technology policy according to the actual situation in practice, which is conducive to the optimization of science and technology policy.

2. Past research on elements of science and technology policy

Elements are components of a system, and the elements that make up a policy are usually categorized as being divided into subjects, objects, instruments, values, etc. In the case of science and technology policy, the object of the policy is science and technology itself, and the value is to promote science and technology and create social and economic benefits. At the same time, along with the development of science and technology, ethical issues have gradually become one of the elements to be considered in science and technology policy, which serves as the boundary of human moral outlook to build a framework for the development of science and technology and play with technology. At present, there are more studies on policy elements, but they are mainly focused on macro aspects, and some studies on specific areas are concentrated on medical policies, grassroots governance, etc. , with fewer studies on science and technology policies. The analysis in this paper starts from the three aspects of science and technology policy subjects, instruments, and ethics, and builds an analytical framework of "who", "in what framework", and "what means to use".

The subject of science and technology policy, as the core element of the science and technology policy system, refers to the individual, group or organization that is directly or indirectly involved in the whole process of policy and is the issuer of policy actions. [1]There are different policy subjects in different parts of the policy process, e. g. the subject in the formulation part can be just the government, while the implementation part may include a wider range of social subjects. The specific subject of science and technology policy should correspond to the resources needed and the goals pursued by science and technology policy.

The instruments of science and technology policy are the means and mechanisms adopted to realize the policy objectives, and they are the bridge connecting the objectives and results.[1] An ideal science and technology policy should select appropriate instruments for effective implementation of the policy program.[2] Different scholars take different ways of dividing policy instruments, and what is widely used now is the classification of Roswell and Zeigfeld according to the focus of policy: demand-type instruments, environment-type instruments and supply-type instruments,[3] and the analysis of policy instruments in this paper will also take this kind of classification, and on the basis of which the different types of policy instruments will be further classified. Demand-based instruments include government procurement and service outsourcing, as well as price subsidies, demonstration projects and market shaping; environmental instruments are mainly centered on industry technical standards, laws and regulations, taxation and other elements, and some studies consider target planning to be an important environmental focus; and research on supply-based instruments is mainly centered on human resources such as talent, land, information, infrastructure, capital and public services. As the specific means and methods adopted to achieve policy goals, science and technology policy instruments will be the focus of analysis in this paper.

The continuous progress of science and technology is also challenging human ethics and gradually becoming an element that science and technology policies have to pay attention to, as the Global Perspectives on Ethical Guidelines for Artificial Intelligence identifies 84 moral and ethical guidelines on AI. Some scholars categorize the ethical dilemmas of public policy into the conflict between instrumental rationality and value rationality, the conflict between "expert politics" and public participation, the impasse between sectoral interests and public interests, and the imbalance between information monopoly and the "digital divide",[4] which is aimed at the macro-public policy, and has not yet established the relevant ethical rules and legal systems for specific scientific and technological fields, which is believed to be due to the fact that the ethical problems caused by science and technology are still at the primary stage, and the dilemmas need to be hypothesized and prejudged in a trial-and-error manner.[5]

Current research on the elements of policy focuses mainly on macro policies and popular specific areas such as health care and education, and less on science and technology. In the existing research, practical policy instruments are the focus of academic research, and the more fixed policy subjects and ethics are often neglected. In this paper, we will use the existing perspectives and theories of public policy instruments and policy instruments in other fields to analyze science and technology policy instruments, and at the same time, we will study the subject and ethics as the elements of science and technology policy system.

3. Elements of science and technology policy in the wandering earth and realistic reflection

3.1. Subjectival elements of science and technology policy

In this paper, the subject of science and technology policy is defined as an individual, group or organization that is directly or indirectly involved in the whole process of science and technology policy. The policy subject is the key factor of the whole policy system, and from the perspective of the whole world, the government is in a dominant position among the policy subjects, which is also true for science and technology policy.

[Plot 1] ". . . . . . In the face of this extinction, humanity has shown unprecedented unity. In order for more people to survive, the United Government decided to push the entire planet out of the solar system and fly to a new home 4. 2 light years away . . . . . . "

In the face of different policy objectives, it is important to have subjects of the corresponding size. The "Wandering Earth" program is ostensibly a great escape plan, but in reality it implies an urgent science and technology policy. Unlike reality, the results of this policy to promote scientific and technological development need to be applied immediately, and policy support, scientific and technological research and development, and scientific and technological application are required to be carried out almost simultaneously. The most important feature of this science and technology policy is that it is "global", and its goal is to realize the "Wandering Earth" plan for all mankind, which requires the pooling of resources and strength of all mankind.

Compared to the real United Nations, the coalition government in the movie has higher authority and stronger appeal to concentrate global resources to implement this policy, break down the traditional national barriers, and transfer and centralize part of the national competence, which reflects the reorganization and adjustment of the main body of the policy in the face of different goals.

As the name suggests, reorganization of the main body refers to the splitting and combining of structures by the issuer of the act according to the actual needs, and consequently generates changes in terms of competence, responsibilities, functions, etc. , in order to better adapt to reality and solve problems. Reorganization is one of the manifestations of "concrete analysis of specific problems", and institutional reform is a vivid manifestation of reorganization.

3.2. Instrumental elements of science and technology policy

This paper adopts the concept of science and technology policy instruments as "specific means and modalities used to achieve science and technology policy objectives", which focuses on "objectives" and emphasizes the choice of instruments for specific science and technology policy objectives.

3.2.1. Demand-based instruments

Demand-based instruments are not much represented in the film series; the biggest need in the plot is disaster, and the government serves as a hub to centralize information and power to centralize demand and drive science and technology policy, but global engineering, government procurement, outsourcing of services, demonstration projects, and other instruments are essential outside of the plot.

[Plot 2] In the first part, when humanity believes that there is no hope of saving the Earth, the United Government opens up access for Han Duo Duo to deliver a speech on the theme of hope, thus calling on all of humanity to make another effort to restore the planetary engine to operation.

Emotions and Advocacy. Emotional empathy and advocacy are important elements of science and technology policy in the face of the planetary crisis. In reality, many science and technology policies also adopt emotional advocacy strategies. For example, describing and propagating the difficulties faced by patients elicits people's sympathy and consequently supports technological research and development in the medical field. Similarly, promoting the importance of national defense and military strength generates people's understanding and support for military equipment technology research and development. Proper use of emotional and advocacy strategies can facilitate the smooth implementation of science and technology policies.

3.2.2. Environment-based instruments

[Plot 3] "Mankind has since embarked on a 2, 500-year-long wandering journey to a new home 2, 500 light-years away. "

Goal Planning. Finding a new home through science and technology and allowing human civilization to continue is the ultimate goal of the Wandering Earth program. Scientists and policy makers have planned detailed time nodes for each step, such as using the gravitational slingshot of the sun and Jupiter when approaching Jupiter, etc. These plans are reasonable in line with human logic, and allow individuals to see the feasibility of the policy to ensure the implementation of the momentum. 2020 China released the "14th Five-Year Plan" five-year development plan. In 2020, China released the five-year development plan of the 14th Five-Year Plan, which defines the key frontier areas for the development of science and technology in the next five years, and points out the direction and goals.

[Plot 4] Protagonist Liu Peiqiang breaks into the control room to prevent the AI system MOSS from destroying the space station in order to stop its plan to abandon the Earth, MOSS: ". . . . . Your behavior has seriously violated the provisions of Article 5, Paragraph 24 of the Wandering Earth Act, freezing all of your permissions . . . . . . "

Laws and regulations. The plot reflects the Wandering Earth Act which protects scientific and technological achievements and imposes penalties on those who destroy them. This reflects the development of supporting laws and regulations. In the process of the continuous development of science and technology, issues such as science and technology patents and the protection of scientific and technological achievements will continue to emerge, which will have an important impact on the achievement of the goal, and the establishment of a supporting system of laws and regulations will be able to safeguard the interests of all the main parties. After the Shanghai Stock Exchange set up a science and technology innovation board for the first time in 2019, the China Securities Regulatory Commission issued a series of regulations such as the management measures to provide legal support.

3.2.3. Supply-based instruments

[Plot 5] ". . . . . Humans Pour All Their Resources Into Building 10, 000 Planetary Engines on Earth's Surface . . . . . . "

Resource Provision. In the movie, the planetary engine is a giant machine that powers the Earth through fusion, and building such a huge machine and making it work requires gathering global power, which requires a unified subject, the coalition government, to coordinate resources from various regions. The reality is that the components of Chinese-made airplanes, space shuttles, and other technological products come from different countries, which reflects the subject's ability to deploy resources to achieve its goals.

[Plot 6] ". . . . . First Navigators depart for the Navigator International Space Station . . . . . . " "Navigator families automatically gain an entry into the Dungeons . . . . . . "

Talent development. Operating the station's instruments aboard the Navigator requires proficiency, and to that end, the Coalition Government trains the Navigators. In the movie, all the Navigators were taken to the training base and trained daily in skills such as overcoming gravity and operating instruments. At the same time, the United Government also provides safeguards for the navigators, such as the navigators' family members can automatically get a chance to enter the dungeon. This reflects that science and technology policies should not only cultivate talents, but also maximize the elimination of their worries, so as to give greater play to the role of talents.

[Plot 7] ". . . . . Humans have poured all of their resources into building 10, 000 planetary engines on the surface of the Earth . . . . . . Beneath each of these planetary engines, matching dungeons are constructed . . . . . . "

Infrastructure and public services. In addition to the construction of information systems, the construction of supporting underground cities, and facilities such as the "Beijing Root Server" in the movie plot, these facilities are the embodiment of the infrastructure provided by the Government, which is the basis for the realization of scientific and technological objectives, and is an important instrument of scientific and technological policy. In reality, the equipment of science and technology research and development organizations throughout the country is a manifestation of infrastructure construction, and the public services provided by the Government, such as information and communication, are indispensable elements for the promotion of scientific and technological development.

3.3. Ethical elements of science and technology policy

Ethical issues run through the Wandering Earth movie series, with disaster forcing humans to

abandon their humanity to a certain extent to make choices. At the beginning of the Wandering Earth program, one of the conditions is to rapidly reduce the population, because the capacity of the dungeon is limited, screening and giving some people the qualification to enter the dungeon is a tricky ethical issue, and mankind finally chose the way of drawing lots. The drawing of lots to determine life and death seems to be contrary to human ethics, but in the face of the continuation of human civilization, ethics has to give way to the needs of science and technology.

In the movie, the Earth suffers crises such as solar helium flash, Saturn gravity, space elevator, etc. , and the ending seems to imply that all these are measures taken by MOSS, an artificial intelligence system, in order to prevent human beings from continuing their plan of wandering the Earth by retaining only the space station. As an AI system with computing power far exceeding that of human beings, MOSS is a result of technological development and contributes to the human's Wandering Earth program to a certain extent, but MOSS's excessive rationality in the face of the human's existential crisis contradicts with the human's emotional perception, i. e, ethics. In the face of MOSS's attempts to stop the program, the human race chooses to stick to the ethical bottom line, while MOSS is forced to give up the program that is more likely to succeed.

Currently, the reality of science and technology represented by artificial intelligence has also challenged human ethics, however, whether it is the defeat of human chess players by AlphaGo and the rise of ChatGPT, or artificial interference with genetic sequences and the application of artificial stem cells, human ethics are playing with the challenges of scientific and technological development, and the optimal choice can only be made based on the analysis of specific situations.

4. Conclusions

4.1. Flexible and rational reorganization of subjects

In the face of different specific problems, it is necessary to build science and technology policy bodies at different levels and with different scopes of power, and the several reforms of national institutions carried out in China are the reorganization of policy bodies in response to the development of the times and targeting the needs of the times. The reorganization of the main body is not only as simple as the change of departments, but more importantly, how to realize the authority of the main body of the policy and how to organically combine the functions, so that science and technology policy to achieve better results.

4.2. The ethical game of advance and retreat

Human behavior drives the development of science and technology, and the development of science and technology is also constantly updating human concepts. In the face of the impact brought about by the continuous development of science and technology on human ethics, it is also necessary to analyze specific problems in concrete terms, so that we can adhere to the ethical bottom line while maintaining a flexible strategy, and find a suitable choice in the interplay between ethics and the development of science and technology.

4.3. Effective and appropriate instrument matching

For science and technology policy, the right instruments are necessary. Governments often tend to adopt rational and behavioral logic instruments, but irrational and emotional instruments can also produce good results. There is no superiority or inferiority of policy instruments, but there are different appropriate instruments for different problems, and the choice of instruments for the actual situation can better achieve the goal.

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