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Study of the Environmental Ethical Responsibilities of Engineers

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Abstract: With the evolution of the times and the rapid development of science and technology, our living environment has undergone great changes, and these changes are inseparable from our engineering activities. While the development of modern engineering activities brings us convenience, it also brings many uncertainties to the current natural and social environment. Among them, engineers, as the most important part of engineering activities, have a more direct impact on the environment. This paper describes the current situation faced by engineers and the challenges of environmental ethics to engineers by investigating relevant background information. Immediately after that, it analyzes in depth the ways for engineers to realize their environmental ethical responsibilities and the significance of their formation, so that they can balance engineering activities and the environment and try to find the optimal solution.

Keywords: Engineering Activities; Engineers; Environmental Ethical Responsibility.

1. Introduction

1.1. Background of Research on Environmental Ethics for Engineers

Environmental problems are those arising from the destruction and pollution of the environment caused by the engineering activities carried out by mankind in order to survive and develop. In earlier times, the impact of human beings on the environment was still very limited, and the impacts at that time did not have a greater impact on the restoration of the ecosystem.

In engineering activities, engineers, as their central role, have the most obvious impact on the environment. They are both beneficiaries of social and environmental benefits and solvers of problems affecting the natural environment. Our country is currently in a period of rapid economic development and social transformation, the disturbing interests and temptations are even more compelling, in the face of these, engineers need great stamina to resist the external disturbances. In the practice of engineering activities, engineers are highly required to be able to embody a good spirit of environmental ethical responsibility.

And the environmental ethical responsibility of engineers has important theoretical value and practical significance. "Engineers must place the safety, health, and welfare of the public first, and strive to observe the principles of sustainable development in the performance of their professional duties". --This is what the ASCE, the American Society of Civil Engineers, states in its revision of the code[1].

1.2. Current Status of Domestic and International Research

1.2.1. Current Status of Domestic Research

So far, China's theoretical training system for relevant engineers has not yet been perfected, and we need to create a positive learning atmosphere, broaden our horizons, and lay a solid foundation for the training of better quality engineers. Let man and nature live in greater harmony. And what we are currently facing has triggered many scholars to discuss.

Chen Wanqiu (2006)[2]believes that, compared with other attributes of the profession, the activity attribute of engineers is to utilize relevant knowledge and technology to transform the environment, so engineers need to assume more environmental ethical responsibilities in engineering activities. Xiao Xianjing (2009)[3]believes that every component of engineering activities should bear the corresponding environmental ethical responsibility, and engineers, as an important part of them, have a very important role in engineering activities. The problems arising from engineering activities and their impacts are closely related to engineers. Wang Qingqing (2009)[4]believes that due to the continuous occurrence of engineering activities, the responsibility of engineers who are active in engineering activities has also attracted the attention of the public. In addition, in order to realize the environmental ethical responsibilities of engineers, there is a need to adopt appropriate methods to guide and supervise them.

1.2.2. Current Status of Foreign Research

Engineers are professionals who are required to design, manage and supervise various types of environmental improvement in engineering activities, and are engaged in the protection of the natural and social environments. And in this process, engineers need to use the least amount of resources to achieve the rational use of resources and maximize the use of resources to reduce the impact of engineering activities on the environment.

Hardy (1984)[5]argues that the ability of engineers to regulate the environment affects human survival and development, and that humans are extremely destructive; if the boundaries between humans and the environment are clear, this could have incalculable consequences for people. Harris et al. (2006)[6]believe that if people do something consciously, then they should take responsibility for it. And engineering activities not only improve the environment, but also may cause environmental degradation. Therefore, engineers, as one of the core roles of engineering activities, should take the responsibility. To create a harmonious environment for human survival and development.

2. Relevant Conceptual Analysis

2.1. Concept of Engineer

Early engineers were people who produced and used mechanical weapons. The word "engineering" first appeared in Europe in the 18th century[7]and referred to the manufacture of weapons, while engineers were specialists in the development and manufacture of weapons. Slowly, the field of service of engineers expanded. At the end of the 19th century, a number of engineers' associations were formed in developed countries as the number of engineers increased. They recognized engineers as the mainstay of technological change and as environmental influencers[8]. As the society progresses from engineering technology to the electronic age, large scale infrastructure is applied to the production of machines and provides the material basis for technological change. Professional engineers are required to perform all aspects of engineering activities and engineers, as important players, have a vital role in the organization, design, control, implementation and supervision of engineering.

Engineers, as the core of engineering activities, are also its organizers, designers, controllers, implementers and supervisors. In contrast to other professions, the main activity of engineers is to be responsible for environmental ethics, and therefore they act extensively on the environment.

2.2. The Concept of Environmental Ethics

Environmental ethics was introduced in the 1940s as a solution to the environmental problems facing mankind. On the one hand, in engineering activities, human beings cause damage to the environment; on the other hand, human beings are responsible for the consequences they cause by maintaining and improving the environment. Thus a new environmental ethical responsibility has been formed, thus influencing engineers to optimize and be responsible for the environment in engineering activities.

Environmental ethics focuses on promoting the harmonious relationship between human beings and human beings and human beings and nature, so as to promote the sustainable development of ecology. The emergence of environmental ethics aims to promote the harmonious development of people and the environment, so that people can establish environmental awareness, more standardized and strict requirements for their own resource conservation. At the same time, the object of environmental ethical responsibility is also the moral relationship between man and the environment, talking about the process can not be separated from the scope of environmental science, not to mention the violation of the objective laws of the environment[9], or else all lose their significance.

Environmental ethics, as a new form, makes it even more important for engineers to fulfill it consciously and thus develop a sense of responsibility, starting with each engineer himself. It also lays the foundation for the development of environmental ethical responsibility for engineers, which is bound to occur with the development of society. And environmental ethics thinkers believe that even if there are various different ideas in the making, different three views need to think about the environment having a moral nature.

It can be noticed that in the recent past, the development of engineering activities has caused extremely bad and serious impacts on the environment, jeopardizing biodiversity and harming human interests, making challenges and opportunities for the survival and development of human beings. If these problems are to be solved highly demanding level of engineers, it also requires engineers to be responsible for environmental ethics. At the same time, this forces engineers to break away from tradition, step out of their comfort zone, and have a long-term perception of the environment, as well as to take responsibility for environmental ethics and protect the environment on the ground. Therefore, we need to strengthen the sense of social responsibility of individuals and promote the concept of environmental ethical responsibility of engineers in a comprehensive manner.

3. Status of Engineers Taking on Environmental Ethics

3.1. Serious Environmental Damage in Engineering Activities

As society continues to develop and engineering activities are carried out, the environment is directly or indirectly affected, resources are depleted in large quantities, and environmental problems continue to arise, greatly affecting the ecological balance. In order to accelerate the progress of society, human beings are constantly intercepting environmental resources, which in the process has created an extremely bad ecological crisis.

Since the development of modern times, people have begun to realize that nature's resources are not inexhaustible, and have begun to reflect on the destruction of the environment by human activities, and the impact of engineering activities on the environment is more serious in comparison. People and the environment are both a whole and independent individuals, both of them influence each other, and the environment and the survival and development of human beings are closely related. Therefore, everyone has the obligation and responsibility to maintain the environment.

In the modern high-speed development of society, engineers should use the relevant professional technology to transform nature, and bear the responsibility, objectively and impartially exercise the rights of engineers, so as to reduce the negative impact of human engineering activities on the environment[10].

3.2. Lack of Relevant Environmental Awareness among Engineers

Until now, it can be found that our engineers are still unfamiliar with the content of environmental ethics and lack of relevant environmental awareness, which corresponds to the sense of responsibility is also relatively indifferent. Therefore, in order to alleviate the impact of engineering activities on the environment, it is urgent to enhance the awareness of environmental protection among engineers.

"One of the Challenger engineers was told on the morning of the flight day that there was ice on the launch pad that day and that there was an option to delay the launch. But they chose to launch anyway. Then he didn't know about cryogenic ring conditions, lacked environmental awareness and expertise[8]and didn't realize the risks involved. And that's a tragedy that none of us want to see happen.

If engineers carry out engineering activities without any conceptual awareness, they may damage the environment. Therefore, in order to balance the relationship between engineering activities and the environment, engineers should fully consider the problems according to their own specialties, adapt to the local conditions, synthesize various possible

problems according to the actual situation, and assume the corresponding environmental ethical responsibilities. When making decisions, the engineer's decision is also very important, from the overall macro perspective, to analyze the various factors affecting the avoidance of decision-making errors.

3.3. Neglect of Ethical Responsibility on the Part of Engineers

First, all material resources in engineering activities come from the environment as a large system, and material resources in turn contribute to the environment through engineering activities. Secondly, engineering activities are dependent on natural resources, and without the environmental background, engineering activities may lack the carrier for implementation. And engineers, as an important subject of engineering activities, shoulder the responsibility of protecting the natural environment, restoring the ecological balance as well as sustainable development[11].

Most engineers make decisions based on economic efficiency, which to a large extent affects the environment and to a greater or lesser extent constrains the harmonization between the environment and the economy. Before an engineering activity is carried out, engineers should analyze and evaluate the activity, investigate the problems that may arise if the activity is developed, and then react quickly to them and propose solutions. If a good engineer is environmentally responsible, he or she will naturally reduce the risk of decision-making in every process, thus avoiding risks. At the same time, the analysis and evaluation must be comprehensive and multifaceted, showing the positive aspects of the engineering activity.

4. Ways for Engineers to Respond to Environmental Ethics

4.1. Enhancement of Engineers' Awareness of Environmental Ethics

Albert Einstein once said, "In our time, engineers bear a particularly heavy moral responsibility." [12]Therefore, engineers should establish a firm and correct concept, cultivate a sense of self-responsibility for environmental ethics, examine the relationship between engineering activities and the environment from a professional point of view, and enhance the awareness of environmental ethics, believing that the two can be developed organically under the joint efforts of all.

However, in the process of cultivating the correct consciousness of engineers, first of all, it is necessary to abandon the old traditional stubborn misconceptions and set up correct values in line with contemporary times; at the same time, it is also necessary to cultivate engineers with specialized knowledge, so the comprehensive quality of engineers is required to be high. The knowledge that engineers have needs to be adjusted and adapted in time with the changes.

In addition, the Internet and other media can also be used to broaden the channels of public participation, and jointly build a bridge to protect the environment, in which everyone should participate. In addition, through education is also very important, can be set up in the universities and colleges "people-oriented, moral education" concept, to create a team of engineers from the heart, will be deeply rooted in the people's mind. In my opinion, everyone should not be alone, but should actively participate in the process, and establish the consciousness that everyone is responsible for the protection of the environment. When carrying out various engineering activities, engineers should reasonably take into account the interests of all parties.

4.2. Enhancement Establishment of Relevant Institutional Norms

Legal orientation is particularly important in China. China established the relevant legal protection system late, one after another promulgated the "Environmental Protection Law", "Environmental Impact Assessment Law" and "Regulations on Environmental Protection of Construction Projects"[13], so as to establish the relevant laws and regulations to protect the environment. Engineers should strictly follow the laws and regulations, so as to better maintain the ecological balance in the environment, enhance the efficiency of resource utilization and maximize the benefits. The establishment of these laws and regulations aims to better regulate the behavior of engineers, which is more conducive to the realization of a benign relationship between environmental protection and engineering activities. However, it can be observed that the protection of the environment is not yet comprehensive and there are still many loopholes.

Similarly, in the process of engineering activities, if the economic and technical factors are only considered from a single aspect, without protecting the ecological environment, it may result in a serious waste of resources and environmental pollution problems. These aspects show the lack of environmental ethics of engineers. Therefore, it is necessary to strictly implement the relevant national policies and regulations on the environment. First of all, the responsibilities of engineers should be further clarified, and the definition of each item should be clear, and the authority and responsibility should be clearly defined. Secondly, from the social level, departments at all levels should actively cooperate with their superiors and reinforce the importance of protecting the environment in the process of engineering activities, and more deeply supervisory and monitoring departments at all levels should perform their respective duties.

4.3. Change Traditional Concepts and Promote Green Construction

In the past, human beings have always considered the development of the social economy and the protection of the natural environment to be two contradictory aspects, and have therefore seriously damaged the environment in order to develop the economy. However, if the correct guidance is given when to carry out engineering activities not only benefits socio-economic development, but also protects the environment from the root, this type of engineering activities can be a link between the development of socio-economy and the protection of the natural environment.

This requires people to use the materials and energy that exist in the present in new ways. This pursuit of sustainable operations is defined as green engineering and recognizes that engineers play an important role in the practical application of sustainable principles in everyday life [14]. By changing people's traditional concepts, accepting the new things of the day, and advocating green construction for engineering activities, not only can we improve the quality of our products, but we can also reduce environmental pollution and waste of resources, which advances the development of the economy

and protects the environment at the same time.

5. Implications for the Formation of Environmental Ethics for Engineers

5.1. Respect for Nature and Promotion of Sustainable Development

Engineers should be aware of the relevant environmental ethics and take on the environmental ethical responsibilities that are incumbent upon them, and as important players in engineering activities, they should always be mindful of whether or not their actions will have an impact on the environment. Compared with ordinary people, engineers should shoulder a heavier burden in protecting the environment and promoting sustainability. In the course of engineering activities, it is important to respect nature, to follow the laws of nature and, on that basis, to follow the laws of nature. For example, it is important to reduce the use of disposable items, and to take practical actions to protect the environment, starting from the smallest things around us and monitoring ourselves.

It is believed that it is only after a series of serious environmental problems that mankind has realized the importance of the environment. The ecological value of sustainable development of human beings is much higher than the economic value of the society, and when human beings carry out engineering activities, they should firstly consider what kind of impact will be caused to the environment after the engineering is carried out, and secondly consider its economic significance. Engineers need to enhance their awareness of environmental protection and actively fulfill their environmental ethical responsibilities, which are of vital importance to the environment. Therefore, it is important to respect nature while promoting sustainable development and the progress of human society.

In conclusion, in engineering activities, facing the ever-changing environment, engineers should be more rigorous in adapting to the environment, adjusting themselves, respecting nature and protecting nature. The principle of sustainable development is the principle of adapting to the present, which highly requires engineers to pay attention to the sustainability under the environment and try to balance the relationship between the environment and engineering activities.

5.2. Harmonization of Human and Environmental Development

There are many factors affecting human development, but the most fundamental is also the environment and resources. Some human's wrong consciousness may greatly damage the development condition of the environment. Therefore, human beings should respect the nature and take the responsibility to protect the environment. And engineers automatically join in intervening when human beings carry out engineering activities, optimize human behavioral activities, consider the problem from more aspects, reduce the damage to the environment, and finally can achieve a win-win purpose. At the same time, environmentally friendly engineering activities can also promote the harmonious development of mankind and society.

Engineers, as the core of engineering activities, whose behavior affects all steps in the activities, can positively influence all social classes if they carry out environmental protection. Therefore, in order to realize the harmonious development of human beings and the environment, it is very important for engineers to protect the environment. In terms of adjusting the relationship between human beings and the environment, human beings are required to take the responsibility of caring for the environment when they can fully utilize the environmental resources, while environmental protection is carried out because human beings are endlessly exploiting and destroying the environmental resources. By balancing the relationship between human beings and the environment, solving environmental problems and maintaining ecological relations, it is possible to realize the harmonious development of human beings and the environment.

References

[1] Zhou Guangjuan. Analyzing the environmental ethical responsibility of engineers[J]. Science and Technology Innovation Herald,2008, (34): 91.

[2] Chen Wanqiu. On the Environmental Ethical Responsibility of Engineers [J]. Science, Technology and Dialectics, 2006, Vol. 23 (5): 60-62+93+111.

[3] Xiao Xianjing. On the Environmental Ethical Responsibility of Engineering Community[J]. Ethics Research,2009, (6): 65-70.

[4] Wang, Qingqing. Engineers and Environmental Ethical Responsibility[J]. Journal of Yichun College,2009, (1): 19-21.

[5] (US) J.T. Hardy; translated by Tang Jianwen. Science, technology and environment [M]. Beijing: Science Popularization Press, 1984.

[6] (US) Charles E. Harris, (US) Michael S. Pritchard, (US) Michael J. Rebins; Translated by Hangqing Cong, Qi Shen et al. Engineering Ethics Concepts and Cases 3rd Edition [M]. Beijing: Beijing Institute of Technology Press,2006.

[7] Yunxia Wang. The Ecological Turn of Engineers' Ethical Responsibility[J]. Journal of Henan Normal University (Philosophy and Social Science Edition), 2007, Vol. 34 (2): 45-49.

[8] Li Juan. Research on environmental ethical responsibility of engineers [D]. Hefei University of Technology,2012.

[9] Xu Yue. Research on environmental ethical responsibility of road engineers [D]. Nanjing Forestry University,2013.

[10] Li Lifei. A study of environmental ethical responsibility of engineers[J]. Popular Standardization,2022, (9): 107-109.

[11] Xi Furong, Li Hao. Exploration of environmental ethical responsibility of engineers[J]. Anhui literature (the second half of the month), 2013, (8): 129-130.

[12] Chen Yunquan, Yin Dengxiang, eds. The new scientific and technological revolution and social development [M]. Beijing: Science Press,2000.

[13] Zhang Zonglin, Mao Shoulong, eds. Letters and Visits, Public Governance and Policy Proceedings of the Annual Conference on Public Policy [M]. Beijing: Economic Management Press, 2017.

[14] Karner, Alex A. Daniel A. Vallero, P. Aarne Vesilind, Socially Responsible Engineering: Justice in Risk Management. [J]. Science & Engineering Ethics,2010,Vol.16(2): 415-417.