

Study on the Game of Carbon Disclosure under the Perspective of Philosophy of Science and Technology

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Abstract: The society gradually pays attention to carbon information disclosure, and it is very important for human beings to pay attention to carbon information disclosure and the formulation of a series of regulations in their actions on climate issues, but some enterprise subjects ignore carbon emissions and falsely disclose carbon information based on the principle of profit maximization, which leads to the difficulty of solving environmental problems. From the perspective of philosophy of science and technology, this paper tries to study the game strategy and information asymmetry among enterprises in different situations by taking information asymmetry as an entry point through game theory and Bayes' theorem, further analyze the negative impacts of false disclosure of enterprises and the chaos caused by the tragedy of the commons, etc., and analyze and interpret them through the theory of environmental justice and environmental ethics, and finally analyze and interpret them from the aspects of reducing information asymmetry. Finally, we summarize and reflect on the aspects of reducing information asymmetry, introducing environmental system and formulating industry norms.

Keywords: Game Theory; Environmental Ethics; Tragedy of the Commons; Carbon Disclosure.

1. Introduction

The promulgation of important documents such as the United Nations Framework Convention on Climate Change has played a significant role in the global promotion of a low-carbon economy. The '30-60' goals of 'carbon peak' and 'carbon neutrality' have been included in the Chinese government's annual work report, showing that the Chinese government attaches great importance to the development of a low-carbon and green economy. This shows that the Chinese government attaches great importance to the development of a low-carbon and green economy. Since the 1990s, more and more governments, social enterprises and the public have been paying more and more attention to information disclosure. A very important part of the actions taken by mankind to combat climate change has been the emphasis on carbon disclosure and the formulation of a series of regulations.

Enterprises, as part of the market subject under the low-carbon economy, in particular, it is the part of the micro subject that can be called the backbone, especially the heavy polluters, state-owned enterprises, listed companies and energy enterprises and other types of enterprises activities in all aspects are closely related to the carbon emissions, and will irreversibly participate in the low-carbon economy to fulfill their due obligations. However, in the process of carbon emissions trading and information disclosure, stakeholder enterprises aim to maximize their own interests, and are very likely to disclose inaccurate, unfair or even intentionally conceal relevant information and other behaviors that are not conducive to orderly carbon information disclosure.

Therefore, in the current situation, this paper starts from the perspective of philosophy of science and technology, tries to study the game strategy and information asymmetry between enterprises in different situations by taking information asymmetry as an entry point through game theory and Bayes' theorem, further analyzes the negative impacts of false

disclosure of enterprises and the chaos caused by it, analyzes and interprets it through the theory of environmental justice and environmental ethics, and finally concludes and thinks about it from the aspects of reducing information asymmetry, constructing a social contract, introducing an environmental system and developing a social norm.

2. Inter-firm Game of Carbon Disclosure

The initiative of corporate carbon disclosure is relatively low because corporate carbon disclosure behavior will have a certain negative impact on corporate value, because corporate carbon disclosure behavior has a certain disclosure cost, which will reduce corporate earnings and discourage investor confidence. More and more enterprises find opportunities and challenges from environmental pressure and tend to disclose more carbon information; some scholars believe that the emission of greenhouse gases, such as SO_2 and CO_2 , need to bear the corresponding cost of penalties, and for the sake of the complete record of accounting information, the enterprise will reflect such costs in the financial statements. In addition, the pressure from governmental environmental protection departments is also a major factor for enterprises to disclose carbon information, the strengthening of governmental regulation makes enterprises with high carbon emissions face higher risks of lawsuits, but adequate disclosure of carbon information can reduce the potential risks of lawsuits.

Game Theory is used to study the decisions and equilibria of subjects weighing the effects of the actions of other subjects, and to determine decisions by calculating the expected utility of each subject. Philosophers and economists share an interest in the conditions and strategies for maximizing utility, and philosophers are particularly concerned with the logical justification of a subject's behavior and often justify it by reference to its expected utility.

Bayes' theorem is a mathematical formula for calculating conditional probabilities, and it figures prominently in

subjectivist and Bayesian approaches to epistemology, statistics, and inductive logic. Subjectivists who insist that rational beliefs are governed by the laws of probability rely heavily on conditional probabilities in their theories of evidence and models of empirical learning. Central to this is Bayes' theorem, which simplifies the computation of conditional probabilities and articulates important features of the subjectivist position. Indeed, the central insight of the theorem is that the hypothesis is confirmed by any data whose truth may be true. Bayes' theorem suggests that a theory can be more fully confirmed with a variety of evidence than with a particular piece of evidence, because there is a tendency for diminishing returns in terms of effectiveness when a theory is confirmed with a single piece of evidence.

In the 70s and 80s, a large group of philosophers began to extend Bayes' theorem from the field of statistical reasoning to the more general inductive reasoning and the study of scientific methodology, attempting to use the framework of Bayes' theorem to analyze some of the basic concepts of scientific methodology, such as corroboration, evidence, and acceptance, and to participate in the debates on the hot issues in the philosophy of science, such as cuspus Dion's holism, the role of theories, and the problem of positivism, etc., to Solving the difficult problems that have long plagued philosophers of science, such as the dodo paradox, Goodman's paradox, etc., formed a kind of comprehensive agenda for the study of scientific reasoning. In the 1990s, scholars, in their monographs on the study of Bayes' theorem, called Bayesianism the most promising way to comprehensively and univocally study induction, corroboration, and scientific reasoning. Jiang Tianji believes that scientists in the process of studying the natural world depending on how to obtain and receive laws or theories, that is, the problem of scientific reasoning, is the central problem of scientific methodology, this problem has two aspects: how to discover and how to prove and discover and prove the laws or theories on the basis of what rules, his Bayesian reasoning methodology is exactly the treatment of the central problem of scientific methodology.

Bayes' theorem denotes by $P(\frac{h}{e})$ the probability of a hypothesis h based on evidence e , by $P(\frac{e}{h})$ the probability assigned to evidence e when the hypothesis h is assumed to be correct, by $P(h)$ the probability assigned to h in the absence of knowledge about e , and by $P(e)$ the probability assigned to e in the absence of any assumptions about h being correct. Thus, Bayes' theorem can be written as follows.

$$P(\frac{h}{e}) = P(h) \frac{P(\frac{e}{h})}{P(e)}$$

$P(h)$ is called the a priori probability because it is the probability assigned to the hypothesis before the evidence is taken into account, and $P(\frac{h}{e})$ is called the posteriori probability, which is the probability after the evidence e is taken into account. Thus, this formula tells us how to change the probability of a hypothesis based on a particular piece of evidence to give it some new modified probability. The formula shows that the scaling factor $\frac{P(\frac{e}{h})}{P(e)}$ will modify the prior probability $P(h)$ according to the evidence e .

If e is a corollary of h then the factor will obtain a maximum value of 1, if non- e is a corollary of h then the factor will obtain a minimum value of 0. The extent to which a given

piece of evidence supports a hypothesis is proportional to the extent to which that hypothesis anticipates that piece of evidence.

Bayes' theorem suggests that a theory can be more fully substantiated with a variety of evidence than with a particular piece of evidence, because there are diminishing returns in terms of the effect of substantiating a theory with a single piece of evidence. Therefore, under information asymmetry, the dynamic game process of disclosing carbon information among firms is similar to the dynamic process of Bayes' theorem where the probability goes from zero to one.

This paper combines the central idea of Bayes' theorem with dynamic game theory to analyze and study the probability problem that improves with the increase of reliable information obtained, and thus conducts research for studying the dynamic game situation between enterprises and the strategies and expected returns that eventually reach Nash equilibrium.

The information asymmetry of corporate carbon information disclosure exists between enterprises, between enterprises and society, between enterprises and the state and other subjects, and this information asymmetry usually produces negative impacts such as vicious competition, theft of business secrets and false disclosure. Taking the idea of Bayes' theorem as the starting point, we analyze the changes of corporate revenue and strategy between enterprises with more and more reliable information by designing a dynamic game with incomplete information, and calculate the corporate revenue and strategy when the equilibrium game is reached.

(1) Inter-firm games without external intervention

a. Game hypothesis

The analysis restricts the market to voluntary disclosure of carbon information by enterprises only, without third-party auditors, government regulation, etc. This model divides all enterprises into class A and class B, which are no different except for the behavior of disclosing carbon information or not disclosing carbon information. The assumptions of this game are as follows:

Assumption 1: The actors in this game are class A enterprises and class B enterprises, and both of them are limited rational subjects with the same basic return of R_C .

Assumption 2: The actors have 2 kinds of choice strategies in the game.

Class A enterprises can choose to disclose or not disclose carbon information, i.e., the game strategy space $U_A=(U_{yA}disclosure+U_{nA}non-disclosure)$ of class A enterprises; class B enterprises can choose to disclose or not disclose carbon information, i.e., the game strategy space $U_B=(U_{yB}disclosure+U_{nB}non-disclosure)$ of class B enterprises. Simultaneous decision-making among enterprises and the absence of a subject to take an action after mastering the actions of another subject.

Hypothesis 3: The proportion of firms choosing to actively disclose carbon information is P . Therefore, the proportion of firms not actively disclosing carbon information is $1-P$.

Assumption 4: The enterprise disclosure of carbon information requires labor and management expenditures, and the two enterprises involved in the game have the same expenditures for the disclosure of carbon information, and the expenditures are specified as C .

Assumption 5: the enterprise that discloses carbon information will obtain such as social reputation, export priority and other benefits, the benefit can be regarded as the enterprise disclosure of carbon information to obtain additional benefits, and the two enterprises involved in the game of the additional benefits are the same, the benefits will be monetized as r , and $r > C$.

b. Analysis of dynamic games

Based on the description of the above assumptions can be obtained from the payment matrix of the two-party game subjects of class A enterprises and class B enterprises, and a dynamic game model is obtained, as shown in Table 1.

Table 1. Payment matrix of two parties of class A enterprises and class B enterprises

		Class B Enterprises	
		U_{yB} (disclosure)	U_{nB} (non-disclosure)
Class A Enterprises	U_{yA} (disclosure)	R_c+r-C, R_c+r-C	R_c+r-C, R_c
	U_{nA} (non-disclosure)	R_c, R_c+r-C	R_c, R_c

Expected benefits of disclosing carbon information in all cases:

$$U_y = (R_c + r - C)$$

None of them disclose the expected benefits of carbon information:

$$U_n = R_c$$

Average earnings:

$$\bar{U} = Pr - PC + R_c$$

P and $(1-P)$ are actually functions of time t , so we construct the replica dynamic equation $F(P)$:

$$F(P) = \frac{dP}{dt} = P(U_y - \bar{U}) \\ = P(P - 1)(C - r)$$

$$\text{Make } \frac{dP}{dt} = 0$$

It can be concluded that $P_1 = 0$ or $P_2 = 1$,

(i) When $P_1 = 0$, bring in $F'(P)$,

$$F'(P) = r - C$$

From the precondition $r > C$, it follows that at this point $F'(P) > 0$, a non-stationary state.

(ii) When $P_2 = 1$, bring in $F'(P)$,

$$F'(P) = C - r$$

From the precondition $r > C$, it follows that the steady state is at this point $F'(P) < 0$.

It can be seen that, on the one hand, under the premise that the benefits of disclosing carbon information are greater than the expenses, the proportion of enterprises disclosing carbon information shows a trend of gradual increase until P increases from 0 to 1 to reach a steady state; on the other hand, the dynamic game process shows that with the multiple asymmetric disclosure of the game between the enterprises, each of them obtains more and more information, the information reliability is more and more reliable, which tends to reach the Bayesian equilibrium state, where the enterprise's benefit reaches the maximum, i.e., all the enterprises have adopted the strategy of 'disclosure of carbon information'.

(2) Inter-firm gaming with the introduction of carbon audits
a. Game hypothesis

It is assumed that the state introduces a policy that requires auditors to audit corporate carbon disclosure when

conducting annual audits of corporations, and that auditors are able to exercise due diligence. The assumptions of this game are as follows:

Assumption 1: The actors in this game are class A enterprises, class B enterprises, and both are limited rational subjects, with the same basic return of R_c .

Assumption 2: The actors have 2 kinds of choice strategies in the game.

Class A enterprises can choose to disclose or not to disclose carbon information, i.e., the game strategy space $U_{A=(U_{yA} \text{ disclosure} + U_{nA} \text{ non-disclosure})}$ of class A enterprises; class B enterprises can choose to disclose or not to disclose carbon information, i.e., the game strategy space $U_{B=(U_{yB} \text{ disclosure} + U_{nB} \text{ non-disclosure})}$ of class B enterprises. Simultaneous decision-making between the two types of enterprises and the absence of one subject to take action after mastering the actions of the other subject.

Hypothesis 3: The proportion of firms choosing to actively disclose carbon information is P . Therefore, the proportion of firms not actively disclosing carbon information is $1-P$.

Assumption 4: Enterprises' disclosure of carbon information requires additional labor, management expenses, and auditing expenses, and the cost is the same for enterprises in categories A and B. This cost is specified as C_1 .

Assumption 5: Enterprises disclosing carbon information will obtain additional benefits such as social reputation, export priority, etc. The benefits can be regarded as the additional benefits obtained by enterprises disclosing carbon information, and the additional benefits of the two enterprises participating in the game are the same, monetize this benefit as r , and $r > C_1$.

Assumption 6: The enterprise does not disclose carbon information or intentionally misstatement is audited out will generate potential losses, such as loss of goodwill, loss of export and import trade rights, fines, etc., will monetize the gain as S_1 .

b. Analysis of dynamic games

Based on the description of the above assumptions can be obtained from the payment matrix of the two-party game subjects of class A enterprises and class B enterprises, and a dynamic game model is obtained, as shown in Table 2.

Table 2. Payment matrix of two parties of class A enterprises and class B enterprises

		Class B Enterprises	
		U_{yB} (disclosure)	U_{nB} (non-disclosure)
Class A Enterprises	U_{yA} (disclosure)	R_c+r-C_1, R_c+r-C_1	R_c+r-C_1, R_c-S_1
	U_{nA} (non-disclosure)	R_c-S_1, R_c+r-C_1	R_c-S_1, R_c-S_1

Expected benefits of disclosing carbon information in all cases:

$$U_y = R_c + r - C_1$$

None of them disclose the expected benefits of carbon information:

$$U_n = R_c - S_1$$

Average earnings:

$$\begin{aligned} \bar{U} &= P * U_y + (1 - P) * U_n \\ &= Pr - PC_1 + PS_1 + R_c - S_1 \end{aligned}$$

Construct the replication dynamic equation $F(P)$:

$$F(P) = \frac{dP}{dt} = P(U_y - \bar{U})$$

$$= P[R_c + r - C_1 - (Pr - PC_1 + PS_1 + R_c - S_1)]$$

$$\text{Make } \frac{dP}{dt} = 0$$

It can be concluded that $P_1 = 0$ or $P_2 = 1$,

(i) When $P_1 = 0$, bring in $F'(P)$,

$$F'(P) = -C_1 + r + S_1$$

From the precondition $r > C_1$, we have $-C_1 + r + S_1 > 0$, at which point $F'(P) > 0$, a non-stationary state.

(ii) When $P_2 = 1$, bring in $F'(P)$,

$$F'(P) = C_1 - r - S_1$$

From the precondition $r > C_1$, it can be seen that $C_1 - r - S_1 < 0$, at this time $F'(P) < 0$, a steady state. That is, under this condition, enterprises will actively choose to disclose carbon information and gain benefits while reducing the possibility of being penalized.

It can be seen that in the process of information exchange and dynamic game between enterprises, after the introduction of carbon audit that strictly implements carbon information disclosure policies and regulations, the influence of carbon audit and policy regulation based on the carbon audit between enterprises and due to the fact that the carbon audit brings more reliable and accurate information to enterprises and improves their information asymmetry. As a result, enterprises tend to reach the Bayesian equilibrium state through the dynamic game quickly, so as to achieve the state of Nash equilibrium of enterprises with the greatest benefits, in which all enterprises adopt the strategy of 'disclosing carbon information'.

3. Negative Impacts of False Carbon Disclosure

False carbon disclosure can have negative impacts mainly in the form of tragedy of the commons, destruction of social conventions, environmental ethics and pollution problems, creating larger social, ethical and environmental problems.

(1) False carbon disclosure creates a tragedy of the commons

In the absence of ethical constraints and rules, enterprises that are required to disclose carbon information and have the

obligation to save carbon will falsify carbon information and create pollution without any concern, which is precisely the free-riding behavior of enterprises, and will ultimately lead to the tragedy of the commons due to the limited ability of the environment to regulate itself and the fact that more and more enterprises are ignoring the environmental problems. In addition, although groups and industries have a certain ability to restrain enterprises from violating rules and morals, that is, each enterprise has a certain 'common sense of morality', under the tendency of its profit-seeking attribute, it will eventually lead to enterprises violating morality in order to maximize their own interests, resulting in the occurrence of the 'tragedy of common sense of morality'. The occurrence of 'common sense moral tragedy'.

In the broadest sense, free-riding companies reap the benefits of excess carbon emissions without paying the corresponding costs of governance and maintenance. With a healthy and unpolluted environment as an important collective good, and carbon emissions as a key factor affecting that environment, excess carbon emissions by free agents, i.e., corporations, will inevitably result in an inadequate supply of an already scarce healthy and unpolluted environment, requiring other agents to bear the excess costs of these corporate behaviors. This is a compelling application of the logic of collective action, and the application of this logic is of great significance in that the adverse impacts, economic and environmental consequences of such actions are so dire that they require the adoption of laws, rules and regulations to govern the behavior of the subjects involved.

(2) Destruction of social conventions by false carbon disclosure

With the development of carbon dioxide emission and storage technology and the increase in the demand for carbon emissions by enterprises, the information asymmetry between enterprises regarding the demand for carbon emission rights and the disclosure of carbon information has led to vicious competition, uncontrolled appropriation of resources, disregard of carbon emission agreements and other improper behaviors among enterprises around the right to emit carbon and carbon information. Enterprises based on self-interest and desire to occupy resources, environmental pollution and internal competition and other improper behavior will lead to the entire micro market and even the macro environment involving all carbon emissions into a state of disorder, which will lead to chaos and instability.

From the perspective of enterprises' false disclosure of carbon information, when enterprises truthfully disclose carbon information and reasonably use carbon emission rights among themselves, their abilities are equal from this perspective, which generates the equality of hope to achieve the purpose of normal production and operation. However, due to the profit-seeking nature of enterprises, in the absence of policy constraints, the additional revenue generated by enterprises consists of the reduced environmental costs and increased production value of carbon dioxide emissions, and

this part of the additional revenue belongs to a kind of ‘expansionist’ behavior, and if this kind of situation occurs, other enterprises coexisting with them will choose to steal emissions because their interests are infringed upon, and falsely disclose carbon information. In this case, it will not only create vicious competition in carbon information disclosure and carbon emissions trading, but also aggravate the problem of environmental pollution.

In this paper, we believe that the scientific and technological policy on carbon information disclosure issued by the state can be used to restrain the illegal behavior of the subject under this policy and protect the reasonable and legitimate rights and interests of the subject. Enterprises need to disclose carbon information under the political, legal and institutional constraints in various forms of free disclosure, the form of disclosure, the use of methods and units of measurement can be freely chosen, but must be in accordance with the law and regulations to truly disclose the relevant information and data.

(3) Environmental aspects of false carbon disclosure

The asymmetry of information, self-interest, expansion of market share, competition for the right to speak, and unhealthy competition among enterprises that are required to disclose carbon information have led to inaccuracies in the processing, verification, and release of data and uses of carbon information to the public by those enterprises, further deepening the ethical problem of environmental pollution brought about by carbon dioxide and other gases. If the problem of environmental pollution is ignored, problems similar to the ‘tragedy of the commons’ will occur, and the essence of the tragedy of the commons lies in the seriousness of the continuous deterioration of the situation. , regulation and moral constraints to solve the problems of misuse of carbon emission rights, false disclosure of carbon information and so on.

In addition, based on the principle of environmental justice, enterprises with large carbon emissions are obliged to purchase carbon emission rights and disclose carbon accounting information regularly and accurately, as well as assume the corresponding environmental obligations, in order to obtain the qualification of carbon emissions and the qualification of using carbon emission rights. False disclosure of carbon information by enterprises does not fulfill their obligations, but they still use carbon emission rights and emit carbon to nature, which is against the principle of environmental justice.

The main task of environmental ethics is to outline people’s moral obligations with regard to environmental issues and to address human responsibility for the environment and why. Despite its human-centeredness, anthropocentric environmental ethics plays a role in the extension of moral status, an extension that does not extend to the non-human natural world, but rather to humans who do not yet exist. Granting moral status to future generations is considered necessary because many environmental problems, such as climate change and resource depletion, will have a far greater impact on future humans than on present humans. Moreover, it is clear that actions and policies adopted by our present generation will have a significant impact on the well-being of future individuals, and on the basis of these facts, some philosophers have grounded their environmental ethics in a responsibility to future generations.

Inheriting the transcendental idealistic and humanistic views of nature, Engels expounded the ethical relationship between nature and man from the perspective of materialistic history. He believed that nature is antecedent to human beings and human society, and that nature is the precondition and foundation of human existence and all his practical activities. Therefore, human beings are the unity of mobility and passivity in nature, human beings change the environment, and the environment also influences human beings, and they form a two-way interactive relationship in practical activities. Engels’ transformation of his understanding of the ethical relationship between human beings and the natural world is the concrete embodiment of his practical materialist ecological view of nature, which contains rich ecological ethical thoughts and is an important part of Engels’ ecological ethical thoughts.

The formulation of a reasonable, effective and perfect carbon information disclosure policy and the implementation of regulatory rights and obligations to solve the problem of environmental pollution are not only the practice and development of Engels’ ethical relationship between nature and human beings and his materialist concept of ecological nature, but also an important way to solve the current environmental problems caused by information asymmetry, contract violation among enterprises and blind profit-seeking, and are also in line with the ethical requirements implicit in Xi Jinping’s thought on ecological civilization. It is also in line with the ethical requirements implied by Xi Jinping’s idea of ecological civilization.

4. Policy Recommendations

This paper studies the issue of carbon information disclosure under the perspective of philosophy of science and technology, and puts forward relevant policy suggestions from three aspects, in order to guide enterprises and other micro-bodies to disclose carbon information in an orderly and fair manner, and to improve the carbon information disclosure policy system.

(1) Clarify carbon disclosure policies to improve information asymmetry

On the one hand, due to the existence of information asymmetry between enterprises, the process of carbon information disclosure between enterprises can be reflected through dynamic games. In the above study, inaccurate disclosure of carbon information due to asymmetric information between enterprises not only harms their own interests, but also aggravates the pollution of the environment. Through the dynamic game process, it can be seen that, due to the addition of carbon auditing organizations, the reliable information obtained by enterprises increases, thus reducing their information asymmetry, and enterprises can reach the Nash equilibrium with a faster dynamic game process, i.e., a win-win situation.

On the other hand, the policy level clarifies the principles and methods of enterprise carbon information disclosure, and introduces the carbon audit system can effectively reduce the information asymmetry. Under the environment of policy regulation and carbon audit system, the reliability and information quantity of policy information, audit information and other subject information acquired by enterprises will be greatly increased, which will help improve the information asymmetry of enterprises, and due to the pressure of policies

and regulations, enterprises will also adopt legal and compliant strategies to disclose carbon information truthfully and accurately and fulfill their environmental obligations.

(2) Construction of an ecological social contract and implementation of the issue of attribution of rights and responsibilities

Carbon information disclosure and the use of carbon emission rights are dealt with through an ecological social contract, i.e., a social contract formed in accordance with the relationship between human beings and nature, and human beings and society as reflected in the ecological governance indicators, under which the social contract covers the interdependent relationship between human beings and nature, and emphasizes the protection of the ecological environment, as well as the promotion of the richness and diversity of life on earth, and takes into account the common interests of the society, and which is a new and rational model, an ecological social contract is The ecological social contract is an institutional model based on ecological protection and social contract. The use of carbon emission rights and the disclosure of carbon information are both closely related to the ecological environment, so the construction of an ecological social contract can help to realize the regulation of carbon information disclosure and the dual-carbon goal.

Through the formulation of public policies, support for technological innovation and reform of social governance mechanisms that support technological innovation, a democratic and equal ecological social order can be realized, so that the behavior and goals of social subjects and policies can be based on compliance with the social contract and the enjoyment of rights while fulfilling the corresponding obligations, and the construction of a fair, equal and healthy social contract can be carried out.

In the theory of ecological social contract, it is necessary to actively guide the participation of the relevant subjects, which are both enterprises and individuals who are generalized and abstracted when signing the contract, as well as specific enterprises and individuals in specific social and historical practices. The subject of the ecological social contract is neither an isolated enterprise and individual nor the sum of enterprises and individuals. In addition to being universalized and abstracted in the assumed state of nature, this subject is a real and historical enterprise and individual in a concrete society with various connections with other subjects. The ecological social contract theory points to the fact that businesses and people are both abstract and real subjects, but in any case, these subjects are equal to each other, and the social and carbon disclosure system is examined from the perspective of equality.

(3) Implementing corporate environmental responsibility and establishing norms for industry sanctions

The formulation of relevant contracts and policies needs to be based on a grasp of the concept of environmental ethics. In improving the conditions for their own survival and development, human beings need to deal with the harmonious relationship with nature because, compared with other factors in the natural environment, other factors lack a sense of autonomy and can only adapt passively to all the laws of nature. In other words, compared with human beings who have subjective initiative, other factors are in a passive and subordinate position, while human beings, on the contrary, are in a dominant position in the environment. However, this

dominant position of human beings only indicates that human beings are characterized by a dynamic adaptation to the laws of motion of the environmental system, not that they have a master-slave relationship with the environment and can ignore the interests of the environment. On the contrary, it is precisely because human beings have such a subjective initiative that they should treat the environment well and constrain their behavior within the scope of not destroying the normal operation of the environmental system. Treating the environment well means maintaining, perfecting and developing life, keeping the original dynamic balance of nature, correctly handling the interests of human beings and all living matter, and realizing the purpose of symbiosis between the two.

Therefore, in the development of carbon disclosure as a representative of the social contract and policy is precisely in line with the requirements of the environmental ethical concept, to play the subjective initiative to deal with the relationship between man and nature, deal with the dynamic balance between enterprise development and environmental governance, so as to achieve the goal of harmonious coexistence between man and nature.

In addition, in the modern environmental governance system, the corporate environmental responsibility system represented by the carbon information disclosure system can become an important initiative to optimize the relationship between government and enterprises. First of all, from the perspective of the enterprise, the rich theory and practical experience shows that the pursuit of economic interests of enterprises and the maximization of environmental protection interests are not necessarily contrary. The construction of enterprise environmental responsibility system to realize the balance of interests between economic development and environmental protection as the fundamental goal, to 'win-win' and sustainable development as the basic concept, not only to the pursuit of environmental public interests for the purpose, but also to fully consider the enterprise as a market entity of the survival and development needs. From the perspective of environmental governance, corporate environmental responsibility is still essentially a self-regulatory behavior of enterprises, if the lack of necessary government intervention may lead to new market failures, affecting the effectiveness of environmental governance. Therefore, in the environmental governance system, corporate environmental responsibility must be a kind of self-regulation with constraints.

In the self-regulatory government-enterprise interaction model, corporate environmental responsibility as a self-regulatory tool, complementary to government regulation. Under the government-enterprise cooperation mode, the government leads and supervises the relevant industries to establish norms through coercive means, improves the internal supervision system of the industry, improves the sanctioning methods, and gives full play to the government's function of supervision and coercive force, which strongly promotes carbon information disclosure and environmental protection policies.

5. Conclusion

This paper is based on the background that human beings pay attention to environmental problems such as climate change gradually, while some enterprise subjects ignore carbon emission and disclose carbon information falsely

based on the principle of profit maximization, which leads to the difficulty of solving environmental problems. From the perspective of philosophy of science and technology, through the game theory and Bayes theorem method to information asymmetry as an entry point to study the game strategy and information asymmetry between enterprises in different situations found that the information asymmetry between enterprises due to the false disclosure of carbon information which leads to inter-enterprise information asymmetry and then produce vicious competition, the tragedy of the commons, and other negative impacts and caused by the chaotic situation, in the introduction of the introduction of strict implementation of the policy of auditing of the carbon audit, the information asymmetry is significantly improved, and the equilibrium of the game between enterprises will be realized faster. And through the environmental justice theory and environmental ethics to analyze and interpret the consequences of false disclosure of carbon information by enterprises, and finally summarize and reflect on the reduction of information asymmetry, the introduction of environmental systems and the development of industry norms, in order to provide valuable theoretical references and support for the realization of environmental policy and social contract represented by the orderly disclosure of carbon information.

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