

Game in Copenhagen Climate Conference and Future Political Paths of Countries to Control Global Warming

He Zhu, Li Zhang*, Beiyun Mei
Huzhou College, Huzhou, Zhejiang, 313000, China
*Corresponding Author

Abstract: The 12-day United Nations Climate Change Conference in Copenhagen (the Copenhagen Conference) ended in near failure on 19 December 2009, postponing the conclusion of what was supposed to be a binding agreement on emissions reductions until the Mexico conference in 2010. In retrospect, the Copenhagen Conference, which has been described as the most important international conference since 1945, was marked by the prominence of China and the United States, the weakened capacity and willingness of the European Union, and a clear trend of division among the three major groups, some countries had begun to show the so-called "Sino-US joint governance" in addressing climate change(CC). The meeting was characterized by a series of ups and downs in terms of commitments, technical and financial assistance from developed countries to developing countries, and the argument of advocate or against MRV (Measurable, reportable and verifiable), all of which are reminiscent of Game Theory. Based on the Game Theory model, this article analyses the roles and positions of each country or group in the negotiation of the Copenhagen Climate Conference, and through the analysis of the game model, the article puts forward some policy paths for countries to control global warming in the future so as to turn the global CC cooperation from responsibility to action, and urging countries actively promote the low-carbon economy and fulfill international commitments.

Keywords: Game Theory; Climate Politics; the Copenhagen Climate Conference, Kyoto Protocol; the Bali Road Map; Policy Paths

1. Background of Climate Change

1.1 Global Warming Caused by Human Activities

90% of the global temperature rise is caused by human activities. At the first World Climate Conference held in Geneva, Switzerland in 1979, scientists warned that the increase in atmospheric carbon dioxide concentration would lead to global warming, and CC was first put on the agenda as an issue of international concern.

In 1988, the United Nations Intergovernmental Panel on Climate Change (IPCC) was established with the task of assessing the state of CC and its impacts [1]. Since its establishment, the IPCC has published four assessment reports on CC, and the process of developing these reports had represented a gradual increase in human understanding of CC. During this time, there were some agreements in the scientific and business communities that the warming the planet was experiencing was part of a larger natural climate fluctuation and not due to human activity. However, the IPCC's Fourth Assessment Report, published in 2007, states that it is more than 90% likely that global temperature increases are caused by human activity.

1.2 Carbon Dioxide Emissions and the Greenhouse Effect

When people burn fossil minerals for energy or when forests are cut down and burned, they release carbon dioxide and many other greenhouse gases into the atmosphere. Due to the fact that these greenhouse gases are both highly absorbent of long-wave radiation reflected from the earth and highly transmissive of solar visible light[2], it is commonly known as the "greenhouse effect" because of their strong absorption of infrared radiation from the ground, which results in global warming.

The effects of global warming will cause sea levels to rise, permafrost and glaciers to melt, and global precipitation patterns to shift. These changes will jeopardize the ecosystems' delicate balance as well as human habitat and food sources. [3].

2. International Climate Negotiations and the Evolution of the Climate Regime

Since CC is a global issue, the international community has been studying and addressing it since the second half of the 20th century. As the concept of "globalization" has been given new meanings, it has become the consensus of all countries in the world to reverse the trend of global warming and leave future generations with a viable and sustainable environment. The international climate negotiations and the evolution of the climate regime have evolved through three phases of development.

2.1 Phase I

The first phase started with the negotiation of the United Nations Framework Convention on Climate Change (UNFCCC) in 1990, the document was signed in 1992 and entered into force in 1994. At this stage, a legal document was formed to establish the ultimate goal of international climate governance and a set of basic principles.

Since its inception, the UNFCCC has involved 185 countries from around the world and has held eight successful Conferences of the Parties (COP) with the participation of all Parties. However, the COP have not developed concrete and feasible measures for the integrated governance of CC.

2.2 Phase II

The second phase began with discussions at the first COP in 1995 to develop a protocol, and the legally binding Kyoto Protocol (the Protocol) was agreed in Japan at the 3rd Conference of the UNFCCC in 1997, which entered into force in February 2005.

For the first time, this phase set legally binding quantitative emission reduction targets for the Protocol Annex I countries (developed countries and countries with economies in transition) and introduced three flexible mechanisms: emissions trading (ET), joint implementation (JI) and the Clean Energy Development Mechanism (CDM). For

non-Annex I countries, that is, developing countries in general, the Protocol does not set specific emission reduction obligations, but requires reporting of total emissions and information on emission reductions and the promotion of green technologies.

The Protocol established the principle of "common but differentiated responsibilities". This principle includes a 5% reduction target for developed countries from the 1990 level in the first commitment period of the Protocol, as well as the principle of voluntary and autonomous emission reductions for developing countries. As the Protocol has very limited emission reduction targets, the Kyoto mechanism has limited the implementation year of the reduction targets to 2012. The signing of the Protocol was a major step forward in the fight against global warming, and the issue of the obligations of the emerging powers among developing countries to reduce emissions and the cost of their own emission reductions became the focus of attention of developed countries, especially the United States. In March 2001, the US announced its withdrawal from the Protocol, which brought the international climate negotiations to a deadlock for a while.

2.3 Phase III

The third phase was marked by the launch of the "Post-Kyoto era" of climate negotiations in November 2005, known as the "Post-Kyoto era" after the expiry of the first phase of the Protocol in 2012. During this phase, the UN needed to consider a new international climate agreement.

The 13th COF to the UNFCCC was held in Indonesia in 2007 under the Protocol and resulted in the Bali Road Map. It distinguished between Annex I countries and developing countries and provided for negotiations on both tracks of the UNFCCC and the Protocol, henceforth adopting a two-track approach to climate negotiations in the "Post-Kyoto era". The two-track approach was also the framework for negotiations at the UNFCCC. The Bali Road Map stipulates that a fresh global climate agreement must enter into force in 2013, so the Copenhagen Conference held at the end of 2009 was seen as a deadline for international negotiations, to which all parties had given elevated anticipations.

In the "Post-Kyoto era", countries are at different levels of development and have very different interests. On the one hand, each country has its own views on how to establish a fair and equitable global governance framework for CC, how to provide and exchange technical assistance, how to distribute the benefits and how to bear the costs, etc., while on the other hand, they are all in pursuit of an equitable institutional arrangement, fearing that their national interests will be sacrificed in the bargaining process of the international system, so the international negotiations have been trapped in a "prisoner's dilemma" [4], and there is still a great deal of uncertainty as to when this stage will be completed.

In the "Post-Kyoto era", an international consensus has been formed to develop a low-carbon economy to address the climate challenge. For any nation, the issue of CC is a multiple choice, or even a dilemma, in the face of contradictions between real and long-term interests, national and global interests. National interests are viewed as self-interest when international interests are prioritized due to pressure from public opinion worldwide. Thus, building a responsible national reputation is seen as the primary incentive choice. The development of climate negotiation diplomacy, financial assistance and technology transfer, and the formation of an international carbon trading market have linked climate issues to negotiations on international political, economic and social issues. Hence, bringing climate negotiations into the incentive mechanism of global conventional negotiations will become an important development trend of the international climate system.

3. The Game in the Copenhagen Climate Negotiations

Since the start of the Copenhagen process, and especially at the Copenhagen Conference, the positions and behaviors of the parties seem to have changed profoundly in the international climate political landscape: from a trinity of the Umbrella Group, the EU and the G77 & China to a dominant emissions role for the two superpowers. Firstly, the different negotiating positions of the US and China have come into focus. With the US and China emitting more than 20% of the global total annually, making

them the emissions superpowers, the international community wants the UN to stop its behavior and take responsibility for leading the global response to CC. We hope that China will put pressure on the US and other developed countries to push for a global climate agreement. Second, the EU's ability and willingness to move the negotiation process forward has declined. From all sources, there was little to see or hear about the EU's presence in Copenhagen, with Li Cheng, director of the John Thornton China Center at the Brookings Institution, saying, "The EU has not played an active role in pushing the negotiations; it has just kept pushing developing countries and the UN to the forefront of the negotiations." EU member states have differing views on emission reduction commitments and funding. The Umbrella Group was formed with the overall aim of resisting ambitious plans to reduce emissions, but in Copenhagen its members were increasingly divided in the face of powerful "international opinion". Japan said it was a problem if some developed countries had to meet their obligations under the Kyoto Protocol while others could not. According to Russian President Dmitry Medvedev: "The world's largest economic powers, arguably the main emitters of greenhouse gases, should immediately make the necessary commitments and comply strictly. For the G77 & China, the biggest change at Copenhagen was the creation of the BASIC, which in part reflects the growing divide among developing countries.

It was as a result of the above-mentioned changes in the international climate political situation that an argument - "Sino-US joint governance" - was widely disseminated during the Copenhagen Conference. If we only look at it from the perspective of international cooperation, the idea of "Sino-US joint governance" has indeed greatly contributed to the orderly development of cooperation. For one thing, the United States is the only superpower in world economics and politics, and if they are willing to promote international cooperation in the climate field with due responsibility, then this cooperation is already to some extent halfway successful, as the development of the Kyoto Protocol has proved. On the other hand, China, the world's third largest economy, one of the five permanent

members of the United Nations and the largest developing country containing 20% of the global populace, cooperates with the United States. Only China and the United States already control more than 40% of global annual greenhouse gas emissions. In the political process, they can drive both developed and developing countries. But the US and China have very different understandings and attitudes to "Sino-US shared governance".

The intensive 13-day process in the Copenhagen Conference showed that the global debate was focused on the key word "regime", i.e. whether the basic framework of the climate regime should be adhered to. This was recognized by the international community in the UNFCCC and the Kyoto Protocol. During the conference, Western developed countries such as the US and the EU repeatedly tried to step out of or bypass this framework. The "dual track" refers to a two-track negotiation mechanism, in which some countries signed the Bali Roadmap within one year, and on the other hand, developed countries signed the Kyoto Protocol and complied with its provisions and commit to achieving quantified emission reduction targets after 2012: on the other hand, developing and developed countries (mainly the United States) that have not signed the Kyoto Protocol must take further measures to address CC within the framework of the UNFCCC.

However, since the Bangkok negotiations, proposals by the EU and some developed countries for a dual-track and single-track negotiation, which seek to abolish the Kyoto Protocol altogether, have been strongly opposed by many developing countries. The "principles" refer to the principles of "common but differentiated responsibilities", "equity" and "sustainable development". These three principles came under considerable political pressure from Western countries during the Conference. "Consensus" mainly refers to: (1) developed countries should take responsibility for historical and current high per capita emissions and make medium-term quantified emission reduction commitments; (2) developing countries should reduce greenhouse gas emissions as much as possible and make efforts to adapt to CC with the support of financial resources and technology

transfer from developed countries according to their national conditions;(3) developed countries should provide financial support to developing countries and establish an effective financial mechanism; (4) an effective institutional mechanism should be established to promote the transfer of environmentally friendly and climate-friendly technologies to developing countries, so as to strengthen the capacity of developing countries to cope with CC. In addition, the outcome document of the Copenhagen Conference should include a common vision for long-term cooperation, mitigation, adaptation, financing and technology transfer, and take fully into account the special needs of least developing countries, small island districts and African countries in relation to CC.

After all, the global game is mostly focused on specific issues such as emission reduction commitments, funding and technology transfer. The US commitment to reduce emissions is clearly too low, and there is still room for the EU to further increase emissions reductions. Conversely, developing countries should not be burdened with mandatory emissions reductions that are not commensurate with their level of development and capacity. The UN Secretariat estimates that developing countries will need US\$100 billion per year by 2030 to combat CC [5]. Developed countries should provide long-term and effective financial support for developing countries to address CC and establish institutional mechanisms to provide, distribute, use, manage and transfer environmentally sound emission reduction technologies to developing countries.

During the conference, the parties to the dispute were unable to support each other and the focus of the game failed to reach consensus. In the middle of the meeting, the black box actions of the West were continuously exposed, causing anger among developing countries and heating up the atmosphere between the two sides of the dispute for a while.

4. Future Policy-making Paths for Countries to Control Global Warming

Appropriate responses to CC affect our overall progress in social and economic spheres, the fundamental interests of our people and the well-being of people around the world. Faced with the serious challenges and international

pressure to address CC, countries around the world should combine addressing CC with implementing the concept of scientific development, implementing sustainable development strategies, accelerating the construction of a resource-saving and green society and building an innovative one [6], focusing on developing the economy, focusing on energy conservation and optimizing the energy structure. Strengthen ecological protection and construction, rely on scientific and technological progress, strive to control and slow down greenhouse gas emissions, and continuously improve the ability to adapt to CC.

4.1 Coping with CC must be Incorporated into the Legalization Process

We should accelerate the promulgation of the CC treaty, specify the responsibility for addressing CC, clarify the basic policies and original system of each country to address CC, take CC as an important strategy for global development, establish an international cooperation system and mechanism to address CC, give full play to the leading role of each country in addressing CC, clarify the duties and division of labor in tackling CC, and coordinate the actions of each country to address CC. We will standardize the creation and execution of special CC plans, incorporate emission reduction targets as mandatory indicators into the medium-term and long-term development plans of all countries, incorporate measures to address CC into national economic and social development plans and long-term development strategies, and incorporate them into national social development plans and annual plans [7]. Laws related to CC also need to provide for a unified system for the dissemination of scientific assessment and policy information on CC.

4.2 Vigorously Develop and Promote Climate-friendly Technologies and Develop a Low-carbon, Green and Circular Economy

Global low-carbon socio-economic development is changing, and low-carbon economic development has become a world trend. Actively addressing CC and controlling greenhouse gas emissions provide good

opportunities for global economic transformation, scientific and technological innovation and sustainable development, and will help upgrade the world's industrial structure, enterprise technological innovation and enhance national core competitiveness. Exploiting the huge market potential and new economic growth points needed for a low-carbon economy may be an important strategic opportunity for the development of all countries in the future. Each country should seriously study and formulate national low-carbon economic development plans, and through planning and improving low-carbon development concepts and approaches, reduce the rate of carbon emission growth in the development process through technological innovation and development mode transformation. Establish regional development models and industrial development models for low-carbon economic development that use carbon intensity as an assessment indicator. Use low-carbon labels to encourage enterprises to accelerate the adoption of advanced technologies and product restructuring, and establish a carbon emissions statistics monitoring and management system to effectively implement CC measures.

4.3 Infrastructure Development in Vulnerable Areas should be Strengthened to Enhance Comprehensive Capacity to Adapt to CC

In response to CC, mitigation and adaptation must go in parallel.

As a developing country severely affected by CC, it should attach great importance to adaptation to CC, formulate a national CC adaptation strategy as soon as possible, improve government-led disaster response and risk management mechanisms, sectoral linkages and social participation, and enhance integrated disaster monitoring and prediction capabilities and early warning. Regional sustainable development strategies should be developed based on the evolutionary patterns and carrying capacity of regional climate, resources and environment. The relationship between population and economic distribution and climate, resources and the environment should be coordinated [8]. There is a need to strengthen comprehensive assessments of the impacts of CC, strengthen capacity building

for agriculture, forestry, water resource management and adaptation to CC in coastal and ecologically fragile areas, attach great importance to climate and disaster risk assessment in economic construction and urban and rural construction, strengthen scientific planning and design of infrastructure and major projects, and strengthen the engineering basis for addressing CC and risk.

4.4 Actively Exploring Market Mechanisms and CC Mechanisms

Developed countries have long been addressing CC, with relatively well-established institutions and mechanisms, and already have great advantages in technology, standards and regulations. Developing countries should develop CC-related standards, monitoring and assessment norms as soon as possible, adopt suitable fiscal, tax, price and financial policies and measures, enhance the required governance and implementation mechanisms, and explore the establishment of domestic carbon trading markets.

Learn from the lessons of international carbon trading mechanisms, explore the development of an emissions quota system and emissions trading market, play the role of a market mechanism for controlling greenhouse gas emissions, study and develop carbon and climate derivatives trading, increase the trading volume and liquidity of related financial assets, encourage financial institutions to develop carbon financing business, actively advocate carbon industry funds, investment-oriented carbon management technology and low-carbon technology development, and support issuing bonds for emission reduction and environmental projects, while accelerating the modernisation of industrial structures, the sustainable use of resources and the innovative development of financial services.

4.5 Strengthen Scientific and Technological Research and Development on CC, and Enhance the Scientific and Technological Soft Power of Countries in Addressing CC

Science and technology are the basis for addressing CC. Each country should formulate strategies and plans for the development of science and technology in response to CC, and strengthen the capacity building of science and

technology innovation in response to CC [9]. Strengthen basic scientific research and technology development in the field of CC, and effectively improve the scientific and technological level of global CC forecasting, prediction and impact assessment; support the research and development, demonstration and promotion of mitigation technologies through multiple channels [10], including adaptation technologies, energy-saving technologies and renewable energy development; and produce a large number of research results that can be recognized by the international scientific and technological community, so as to provide scientific support for countries to respond to CC and international climate diplomacy negotiations.

4.6 Raising Global Awareness of CC Responses

It is important to raise awareness of CC and raise global awareness of the importance and urgency of tackling CC. Encourage conscious participation by all people and voluntary action by companies to promote the concept of energy conservation, environmental protection, healthy and civilized consumption. Strengthen corporate social responsibility by consciously setting and implementing carbon reduction targets and actions [11]. Promote the formation of resource-saving and environmentally friendly corporate production methods, social lifestyles and consumption patterns, and create a favorable atmosphere for the global response to CC.

5. Conclusion

The Copenhagen Climate Conference, as the most important climate negotiation in history, revealed the differences and difficulties in the international community on the issue of global CC. Its failure to reach a binding global agreement has to some extent exposed the challenges of international cooperation, and achieving a globally agreed CC control plan is extremely challenging due to the different interests and development stages of each country.

In terms of policy implementation path, in the future, all countries must incorporate CC into the process of legalization, focus on multilateral cooperation and win-win thinking. All countries should strengthen scientific and technological research and development on

CC, strengthen the scientific and technological soft power of all countries to deal with CC, vigorously develop and promote climate friendly technologies, develop Low-carbon economy, green economy, and circular economy, and strengthen the capacity of CC impact assessment and risk management, Actively exploring market mechanisms and CC mechanisms, formulating long-term low-carbon and adaptive strategies, and accelerating the transformation of the global green economy by continuously strengthening international cooperation, establishing more fair and effective climate governance mechanisms.

In addition, developed countries need to play a leading role in reducing the burden on developing countries and providing technical and financial support. Developing countries need to increase their own emission reduction efforts, take necessary adaptive measures, strengthen infrastructure construction in vulnerable areas, improve their comprehensive ability to adapt to CC, and promote sustainable development. At the same time, in the implementation path of global CC control, attention should be paid to technological innovation and transfer, strengthening the energy revolution, improving energy utilization efficiency, promoting clean energy, strengthening carbon emission monitoring and verification, and increasing cooperation in forestry protection and recovery.

Finally, achieving global CC control requires the joint participation and efforts of all sectors of society. Governments, businesses, civil society organizations, and individuals should raise global awareness of CC response measures, actively participate in emission reduction actions, and jointly move towards a sustainable and low-carbon future.

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