CAAC's Voice and Realization Path in the International Civil Aviation Organization: Based on the Case of China's Participation in the Formulation of Carbon Emission Standards Under the CORSIA Mechanisms

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Abstract: The International Civil Aviation Organization (ICAO) adopted the "Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)" in 2016, establishing a global aviation emissions reduction market mechanism. The rule-making power is dominated by developed countries, leaving China in a predicament of severe imbalance between participation effectiveness and market position. This paper adopts research methods such as case analysis to sort out the process of China's participation in the CORSIA rule negotiations from 2016 to 2023. Thus, analyze the deep-seated reasons for its limited international discourse power: the technological monopoly of Europe and the United States leads to unfair carbon emission accounting, the distribution of council seats solidifies the power pattern, the alliance of Europe and the United States squeezes the negotiation space, and the shortcomings of domestic talents and coordination mechanisms; And through policy analysis and strategic design, a trinity solution of "technology - system - talent institution" is proposed.

1 INTRODUCTION

The International Civil Aviation Organization (ICAO), as the core organization of global aviation governance under the United Nations, has always been responsible for the formulation of international aviation rules and technical standards. With the deepening of the global climate governance process, the issue of aviation carbon emissions has gradually become one of the core issues in the ICAO agenda. In 2016, ICAO adopted the Carbon Offset and Emission Reduction Plan for International Aviation (CORSIA), which established the aviation emission reduction market mechanism at the global level for the first time, marking the international aviation industry has officially entered the era of "carbon neutral" governance. By setting carbon emission baseline and mandatory carbon offset rules, CORSIA has a profound impact on the operating costs, technical routes and even market competitiveness of the aviation industry in various countries. The rule-making right of CORSIA has become a strategic high ground for countries to compete for the discourse power of global aviation governance. At the same time, the rapid development of China's civil aviation industry is in sharp contrast to its passive position under the CORSIA mechanism. By 2023, China has become the "world's second-largest aviation market", with an annual passenger transport volume exceeding 600 million person-times, and the scale of its domestic air route network ranks among the top in the world. However, in CORSIA rules negotiation and standards, the participation of Chinese civil aviation function imbalance and its market position. This paper will focus on the case of China's participation in the setting of carbon emission standards under the CORSIA mechanism, and study the reasons for the limited discourse power of China's civil aviation in ICAO and the countermeasures, so as to lay a foundation for future research.

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2 LITERAYURE REVIEW

2.1 Power of International Discourse and Power Dynamics in International Organizations

Previous studies have focused on the construction of China's international discourse power in the transformation of global governance system, and the enhancement of China's international discourse power: theoretical consciousness, discourse innovation and problem response, the promotion path of China's international discourse power in the context of profound changes unseen in the world in a century, the construction and prospect of international discourse power in the "Global South", and the construction of China's national image in the perspective of international discourse power: Challenges and countermeasures, etc. The importance and status quo of international discourse power, the influencing factors of international discourse power and the way to improve international discourse power are studied. The academic theoretical system on this topic has been gradually improved, and multi-perspective analysis of the problem, combined with actual case studies, makes the research targeted. Rights in international organizations dynamic research, study the developed countries in international organizations tend to rely on technical and economic advantages to build power structure, limited say universal in developing countries. But the deep research in specific areas, the study of international voice for static analysis, less attention to its dynamic change process. This paper will deeply analyze the voice of civil aviation in International Civil Aviation Organization; With the development of the international civil aviation industry and the adjustment of national policies under the CORSIA mechanism, the discourse power of China's civil aviation has changed.

2.2 China's Civil Aviation and Global Governance

Previous studies have focused on the historical evolution, problem causes and countermeasures of China's participation in global governance of civil aviation, and the international perspective of global governance of international aviation emissions -- taking the International Civil Aviation Organization as the center, analyzing the impact of EU GDPR on cross-border civil aviation data, etc. Generalizes the history and present situation and analyzes the facing problems, and explores the significance to improve voice and countermeasures. But past literature for more overall analysis of participating in global governance, the CAAC for CORSIA mechanism under China's participation in the carbon emissions standards of special study is less, the lack of the mechanism of in-depth analysis of the specific challenges facing China. This article will select CORSIA mechanism under the specific process of China's participation in the carbon emissions standards (2016-2023), analysis of the challenges facing China's role in it, say to provide targeted strategy for ascension.

2.3 Air Emissions and Coping Strategies, the CBDR Principle and Aviation Carbon Reduction Mechanism of International Cooperation

Past research has focused on the international aviation carbon reduction measures under the aviation carbon emissions dispute settlement way research, China's response to the principles of the international aviation emissions system, eu "aviation emissions directive" and the Chinese way of dealing with - in the perspective of principle of common but differentiated responsibility, carbon tax adjustment and CBDR principle of consistency of the border, The connotation of "common but differentiated responsibilities" look for research -- in the perspective of the international climate change negotiations, etc.; The mode, current situation and countermeasures of aviation emission reduction were studied. In the study of CBDR principle, the development history and legal status of CBDR principle and the application of CBDR principle in aviation emission reduction are discussed. In terms of the international cooperation mechanism of aviation carbon emission reduction, some cooperation mechanisms led by developed countries fail to fully consider the actual situation and development needs of developing countries. Although the existing research involves the CORSIA mechanism, there are few in-depth studies on the specific process, practical difficulties and coping strategies of China's participation in the formulation of carbon emission standards under the mechanism. This paper systematically studies how China can play its own advantages and play an effective game with other countries within the framework of CORSIA mechanism to enhance the discourse power in the formulation of carbon emission standards.

3 RESEARCH METHODS

3.1 Case Study Method

The process of CAAC participating in the formulation of carbon emission standards under the CORSIA mechanism (2016-2023) is selected as a typical case. The applicability of this method lies in the fact that CORSIA mechanism is a key measure for international aviation emission reduction, which has a profound impact on the aviation industry of all countries. The experience of CAAC in this mechanism is representative. In terms of operational steps, this paper first reviews China's specific actions, proposals and results in the proposal and implementation stages of CORSIA in detail. The reasons behind these actions and results are further analyzed to explore the internal mechanism of the limited discourse power of China's civil aviation industry.

3.2 Historical Analysis

Review the historical process of CAAC's participation in CORSIA mechanism from 2016 to 2023, and summarize the rules and trends from the development and changes in different stages. By studying the different period of China's civil aviation strategy adjustment, the challenge and coping styles, analysis of China's civil aviation say the dynamic process of change, for subsequent improve voice to provide historical experiences for reference.

3.3 Comparative Research Method

To compare the participation of CAAC with that of European and American developed countries in CORSIA mechanism. From the aspects of technical standard formulation, responsibility allocation and rule negotiation, the paper finds out the gap and advantages between China and developed countries, clarifs the position of China's civil aviation in international aviation governance, and provides directions for improving the discourse power.

4 THE DISCOURSE POWER MECHANISM IN THE ICAO

4.1 Constitutive System of Voice Power in ICAO

The voice power in ICAO is not a single dimension of power expression, but a compound system of "hard power, soft power and institutional power", which interact to form structural advantages in rulemaking.

Hard power control mainly includes the technical standards, market size and economic contribution. Among them, technical standards dominate. Technical standards are the material basis of rulemaking, and countries with core technologies can lock in the right of rulemaking through "standard first". The second is market size and economic contribution. Market size determines the scale effect of rule adoption. A country's economic contribution in international organizations, such as the proportion of membership dues and technical assistance funds, will be directly translated into the influence within the organization.

Soft power mainly includes experience in rulemaking, coalition-building and agenda-setting. Rule-making experience means that countries that have been involved in international rule-making for a long time are familiar with the "rule-nesting" strategy and can embed their own interests into technical provisions. Secondly, coalition-building capacity, in which countries expand the concentration of voting power through regional groups or issue alliances; Finally, it is the ability of international agenda setting, in which countries set the priority of controlling issues and guide the rules to favor their own advantages.

Institutional power mainly includes the institutional embeddedness of seats and voting rights. ICAO council consists of 36 States, and those members (States of devoted importance in air transport) accounts for 11 seats, And Category II (States that make the greatest contribution to the provision of facilities for international civil air Navigation) of 12 seats, three members (States ensuring geographic representation) of 13 seats, affect the decision-making participation (1944 Chicago Convention). With equal voting rights but influenced by the power of major powers, the two are embedded in ensuring the operation of ICAO and shaping the power structure.

4.2 Discourse Power Dilemma of Developing Countries

First, they face the dilemma of "technology-rule hegemony" led by the West. Developed countries turn their technological advantages into rules barriers, forcing developing countries to pay high compliance costs.

Second, the problem of "unbalanced distribution of responsibility for emission reduction" is still serious. Western developed countries cover up differences in historical responsibilities with the "global unified market mechanism".

Finally, there is institutional exclusion, the double paradox of the principle of "consensus". The first is "the appearance of procedural justice" : ICAO claims that "consensus" reflects equality, but in practice, developing countries find it difficult to effectively participate in technical details negotiations due to "insufficient technical capacity" and "loose political alliance". Two is "curing system inertia power pattern", ICAO council seat allocation rules power structures after world war ii, the emerging countries to pay high cost of institutional change.

5 TEH LIMITED PERFORMANCE AND REASONS OF CAAC IN THE FORMULATION OF ICAO CARBON EMISSION STANDARDS

5.1 Participation Trajectory Under the CORSIA Mechanism

5.1.1 CORSIA Proposal Stage in 2016: Principled Disagreement and Technological Game

At the beginning of the negotiation CORSIA framework, based on the United Nations framework convention on climate change in China "common but differentiated responsibility" (CBDR) principle, put forward "differentiated responsibilities allocation", claims shall bear the responsibility to historical cumulative emissions of developed countries, developing countries can fulfil his obligations according to national conditions, Adopting "per capita carbon emissions" or "development rights threshold" as the basis for responsibility sharing. But the actual result is CORSIA eventually adopted "based on the market" the global offset mechanism, did not reflect CBDR principle, China proposed by the European and American countries joint veto (IATA CORSIA faced, 2024). At the same time, technical differences became apparent. The carbon emission measurement model "Aviation Emission Dynamic Tool (such as AEDT)" adopted by ICAO is based on the data of European and American aircraft, which is not compatible with the data system of CAAC. As a result, the carbon emission accounting results of Chinese airlines are systematically overestimated.

5.1.2 Implementation Stage from 2018 to 2023: Partial Concessions and Deadlock of Core Rules

With global aviation carbon emissions plummeting due to the COVID-19 pandemic in 2020, China proposed to adjust the CORSIA baseline from "2019-2020 average" to "2019 single year data" to avoid the distortion of emission reduction responsibility by abnormal data ICAO adopted the baseline adjustment , but the responsibility allocation framework was not modified, and China is still required to assume offsetting obligations that match the pre-pandemic market size(IATA CORSIA Handbook,2024).In addition, China's technical standard-setting was sidelined. ICAO has raised the certification barrier for domestic models -- the C919's carbon certification relies on additional reviews from European and US agencies, leading to delays in international market access.

5.2 Analysis of the Deep Reasons for the Restrictions (based on the Power Structure Theory in Global Governance)

5.2.1 Technological Disadvantage: The "Stuck Neck" Dilemma in the Upstream of the Industrial Chain

Western developed countries monopolize aircraft emission reduction technology, engine patents and other core technologies. Such as China sends to the LEAP development series of CJ - 1000 - a 2025 engine planned equipment domestic large aircraft C919, but by 2023, its core components are still faces many technical challenges, lead to the airworthiness certification progress lags behind. The five C919 aircraft delivered are all equipped with the US-French joint venture CFM International LEAP-1C engine (CAAC, 2017). This situation profoundly reflects

China's technical shortcomings in the core field of aviation power. In key technical links, China still relies on foreign supply, which greatly limits the pace of independent development of China's civil aviation industry.

From the perspective of power structure theory, the imbalance of technical power makes CAAC in a weak position in the power game of the establishment of technical standards in ICAO. Due to the technical "bottleneck" dilemma, China lacks sufficient voice and influence when participating in the discussion and rule-making of technology related issues in ICAO, and it is difficult for China to integrate its own technical needs and development interests into international standards.

5.2.2 Political Game: The Suppression of Structural Power Alliance

One is the obstacle of exclusive technology alliances. In the field of global aviation carbon emission reduction technology, political power and technical power are integrated with each other, forming an exclusive structural power alliance. In the case of sustainable aviation fuel (SAF) certification, standards were approved by the American Society for Materials and Testing (ASTM) as early as 2009 (Future Think Tank, 2025). This first-mover advantage has allowed European and American countries to dominate the SAF certification system and build a set of certification rules that benefit them. For the latecector countries in aviation, including China, it is difficult to carry out the certification of the new SAF, which lacks system-level criteria, complicated process and high cost. The use of aviation kerosene experience at the level of physical and chemical characteristics and the lack of safety criteria at the level of engine greatly restrict the development of China's SAF. It also limits the discourse power of CAAC in the field of aviation carbon emission reduction technology.

The exclusive behavior of this technology alliance is a manifestation of the political game in the power structure. By setting unreasonable industry standards and trade barriers, developed countries in Europe and the United States take advantage of their dominant position in the power structure to squeeze the development space of China's civil aviation, and hinder China from obtaining fair competition opportunities and discourse rights in the international aviation market. In the face of such external pressure, CAAC is often in a state of passive defense in the process of negotiation and rule-making due to the lack of strong technical alliance support.

The second is the asymmetry of the decision-making mechanism. For example, the C919 completed its first flight in 2017 and was delivered to airlines in December 2022. Its performance is excellent and the order volume is considerable. In 2024, China invited European representatives to visit China to discuss the issue of the C919's airworthiness certificate, indicating that the C919 has submitted materials and completed relevant flight tests according toprocedures, and hopes that Europe will complete the airworthiness certification by 2025. However, although the EU accepted the application, it delayed the three-stage review process to a maximum of seven years, while Airbus's A320neo took only one year from its first flight to certification. In July 2024, a delegation from the European Aviation Safety Agency (EASA) conducted a field inspection of the C919 and received positive feedback (Global Times, 2024). But then it said certification was "quite difficult" and would take five years at the earliest. Europe and the United States have taken advantage of their dominant position in the international civil aviation airworthiness certification system to delay the certification of the C919, putting China's civil aviation industry at a disadvantage in the relevant decisions of the International Civil Aviation Organization.

Based on the analysis of power structure theory, Europe and the United States take advantage of their dominant position in the international civil aviation airworthiness certification system, there is asymmetry in the decision-making mechanism, and there is a delay in the C919 airworthiness certification, so that China's civil aviation is at a disadvantage in the relevant decision-making of the International Civil Aviation Organization, which reflects the structural power alliance's oppression of other countries in the political game.

5.2.3 Institutional Barriers: Structural Defects in the Ability to Participate in the Rules

First, there is a shortage of relevant talent reserves in China. For example, in 2015, China's entire airworthiness certification team had more than 200 people, while the FAA airworthiness certification system had more than 1,300 people. In addition, there is not a single academician in the field of civil aviation in China, and high-end talents are scarce (CAAC News, 2015). As a result, there is a gap between China and foreign countries in airworthiness certification technology research, standard and specification formulation, and the lack of sufficient professionals to

provide strong support when participating in the rulemaking in the International Civil Aviation Organization, which in turn affects China's discourse power.

From the perspective of power structure, the talent reserve gap reflects China's shortcomings in the power resources to participate in ICAO rulemaking. The lack of professional talents means that China lacks effective participation tools in the power structure, and it is difficult for China to fully exert its influence in the complex international rulemaking process, and it is unable to compete with European and American developed countries in technology and policy level, which leads to the limitation of discourse power.

Secondly, there is a lack of domestic coordination mechanism. At the 69th Annual meeting of the International Air Transport Association (IATA), IATA proposed the resolution of "Achieving Carbon Neutral Growth of Aviation (CNG2020) Strategy" (IATA,2013). At that time, Chinese airlines strongly opposed the resolution, but due to the lack of domestic coordination mechanism, lack of communication and information sharing among airlines, scientific research institutions and government departments, it was impossible to form a unified and powerful strategy in the negotiations. For example, the forecast data of Chinese scientific research institutions on the future development trend of China's aviation industry and the growth of carbon emissions were not provided to government departments and airlines in time, which made it impossible to accurately quantify the emission reduction pressure faced by China's aviation industry in the negotiations.

In the global governance power structure, the lack of domestic synergy mechanisms has weakened the overall competitiveness of China's civil aviation industry. This internal incoordination makes China unable to form a unified force, efficiently integrate resources and formulate strategies in the face of international affairs such as ICAO rulemaking, thus being at a disadvantage in the power game, which further limits the discourse power of CAAC in ICAO.

6 THE PATH TO ENHANCE THE DISCOURSE POWER OF CAAC IN ICAO

First, China needs to make technological breakthroughs and build an independent standard system. Test flight data in 2023 show that the carbon emission data of COMAC C919 is in line with international standards, and its carbon emission per unit seat is 12%-15% lower than that of similar models,) proving its energy efficiency advantage (Wu Guanghui, 2023). China can establish an "Emerging Countries Aircraft Certification Working Group" with ICAO to promote the establishment of a diversified technology evaluation system and break the monopoly of Europe and the United States on the "carbon emissions-technical performance" index. Third, China will set up a special fund for green aviation technology, focusing on supporting the development of new high and new technologies such as the SAF, hydrogen aviation and electric vertical take-off and landing. At the same time, China has strengthened ties at home and abroad and attracted international experts to participate in China's technology research and development.

Second, we need to strengthen institutional empowerment and promote multilateral cooperation and agenda setting. China can refer to the Nationally Determined Contribution (NDC) mechanism of the Paris Agreement and promote the adoption of "differentiated emission reduction pathways" in ICAO. Secondly, through the Green Development Alliance of the Belt and Road Initiative, China can join with countries such as India, which advocates the principle of historical responsibility, and Brazil, which emphasizes the fairness of biofuels, to propose a "dynamic allocation model of carbon emission reduction responsibility", incorporating indicators such as "per capita carbon emissions" and "access to aviation services", and build a "fairness framework for aviation emission reduction". Thirdly, policy linkage should be established. The data of CAAC carbon market should be submitted to ICAO to prove the credibility of its monitoring, reporting and verification system.

Finally, we should strengthen the construction of talents and institutions, and strengthen the original research on the power of discourse. In the discipline setting. It is possible to set up a major of "International Aviation Governance" in civil aviation colleges such as Civil Aviation University of China and China Civil Aviation Pilot Students, and systematically learn relevant courses such as ICAO operation rules, aviation carbon emission measurement, and international climate negotiation strategies. And cooperate with the Geneva Institute of International Relations to carry out the student exchange program, and send talents to the ICAO secretariat for internship, in order to enhance the original research and international competence of talents in the ICAO aviation carbon emission discourse. In addition, special research institutions, such as the "CORSIA Implementation Support Center", have been set up to

provide one-stop services for enterprises in "carbon offset project development" and "international certification application" to reduce compliance costs.

7 CONCLUSIONS

Based on the case of China's participation in the formulation of carbon emission standards under the CORSIA mechanism, this paper reveals the fundamental reasons for the limited discourse power of CAAC in ICAO: technical disadvantage restricting the right to set standards, institutional power imbalance solidifies the discourse power pattern, political game suppressing the negotiation space, and the shortcomings of domestic coordination and talent reserve. China needs to solve the dilemma with the three-in-one strategy of "technology, system and talent organization" 。 At the technical level, accelerate the research and development and certification of domestic core technologies. For example, promote the implementation of key technological achievements such as the domestic large aircraft C919 and the CJ-1000A engine, and break the existing standard barriers through technological innovation; At the institutional level, relying on regional cooperation mechanisms, such as the Belt and Road Green Development Alliance, actively restructure the international aviation rule agenda, promote the adoption of the nationally Determined Contributions (NDC) model of the Paris Agreement by the International Civil Aviation Organization (ICAO), and enhance the say in rule-making. At the level of talent and institutional building, on the one hand, the "International Aviation Governance" major is established in universities to systematically cultivate professional talents. On the other hand, professional institutions such as the "CORSIA Compliance Support Center" are set up to enhance the competitive ability in international aviation affairs. Looking ahead, China's civil aviation should keenly grasp the new trends in international aviation governance, take advantage of the global wave of technological innovations such as hydrogen aviation and electric vertical take-off and landing (eVTOL), and seize the initiative in formulating international aviation standards.

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