

# Research on the Green Transformation Path and Practical Effects of the MICE Industry Under the Dual Carbon Goals

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**Abstract:** Under the guidance of the “dual carbon” strategy, the MICE industry has become a key carbon emission sector due to issues such as high energy consumption of venues and one-time use of exhibition booths. Green transformation is an inevitable choice for the sustainable development of the industry. This paper clarifies the evolutionary logic of three stages in the research on the industry’s green transformation, focuses on four core dilemmas including industry cognition, technology cost, accounting system, and regional balance, constructs a core transformation path of “full-process resource recycling-multi-stakeholder collaboration-digital technology empowerment”, supports with regionally differentiated optimization strategies, and establishes a theoretical framework of “policy orientation-path design-effect evaluation”. The research not only provides implementable full-process carbon reduction solutions for MICE enterprises but also offers decision-making support for relevant departments in formulating policies, helping the industry achieve the unity of environmental, economic, and social benefits, and continuously contributing industrial strength to the dual carbon goals.

**Keywords:** Dual carbon goals; MICE industry; Green transformation; Carbon emission accounting

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## 1. Introduction

### 1.1. Research background

Against the background of the “carbon peaking and carbon neutrality” strategy, green MICE (low-carbon MICE), as a development model that rationally utilizes resources throughout the whole life cycle and minimizes negative environmental impacts, has become the core direction for the sustainable development of the MICE industry. Internationally, Germany focuses on ecological planning, while the United Kingdom has provided mature experiences through practices such as waste classification and recycling<sup>[1]</sup>. Domestically, although the green concept has been popularized through the Beijing Olympic Games and Shanghai World Expo, common problems still exist, such as mismatches between venue construction and market demand, imperfect green supply systems,

and serious resource waste. Additionally, there is a lack of a systematic low-carbon MICE evaluation index system and whole-process management and control mechanism<sup>[1,2]</sup>. Meanwhile, low-carbon MICE needs to run through all links including themes, venues, marketing, and logistics, but the industry still has shortcomings in standardization construction and multi-agent collaboration<sup>[2]</sup>.

## 1.2. Research questions and significance

Based on the practical needs of the green transformation of the MICE industry, this study integrates Chinese and foreign practical experiences and research results of index systems, and explores green MICE transformation paths suitable for China's national conditions. It not only provides targeted support for the standardized and low-carbon development of the industry, filling the gaps in whole-process management and control and standardization construction in China, but also drives low-carbon reforms in related fields through industrial transformation, ultimately helping to achieve the "carbon peaking and carbon neutrality" strategic goals.

## 2. Theoretical basis and analytical framework

Research on the green transformation of the MICE industry has shown a three-stage evolutionary context with the advancement of the concept of sustainable development and the dual carbon strategy. Each stage has distinct characteristics in core goals, theoretical support, and practical focus, and the research focus has gradually expanded from a single dimension to multiple dimensions, upgrading from passive environmental protection to active carbon reduction.

### 2.1. Embryonic stage (2010–2015)

The core goal of research in the embryonic stage (2010–2015) was "reducing environmental damage" with relatively single theoretical support, mainly centered on the 3R principles of circular economy (Reduce, Reuse, Recycle). Sun *et al.* (2012) proposed that green MICE should realize the coordination between industrial development and the ecological environment through rational resource development and the implementation of basic environmental protection measures<sup>[3]</sup>. Tan (2018) further defined the connotation of green MICE, clarifying that it needs to meet three conditions: "harmless services, energy conservation and emission reduction, and intergenerational equity", and for the first time incorporated "sustainability" into the research scope of green MICE, breaking the limitation of "only focusing on environmental impacts"<sup>[4]</sup>. At the practical level, research during this stage mostly focused on the recyclability of exhibition booth materials and the construction of basic environmental protection facilities in venues, without involving quantitative accounting of carbon emissions or multi-agent collaboration mechanisms. The core viewpoints were still confined to the single dimension of "environmental friendliness". Although the depth of theory and practice was insufficient, it laid the foundation for subsequent research.

### 2.2. Development stage (2016–2020)

Entering the development stage (2016–2020), research broke through the single environmental dimension and formed a two-dimensional analytical framework of "economic benefits-environmental protection", with theoretical foundations expanded to Stakeholder Theory and Triple Bottom Line (TBL) Theory. Wei (2013) pointed out that green MICE should cover the whole life cycle, and balance environmental protection requirements and cost control through standardized management to avoid neglecting economic feasibility due to excessive pursuit of environmental protection<sup>[5]</sup>. Cai *et al.* (2019) took the Canton Fair as a case, verified the promoting effect of the

“government guidance-association coordination-enterprise implementation” multi-agent collaboration mechanism on green transformation, and proposed incorporating “economic sustainability and social sustainability” into the green MICE evaluation dimension, further enriching the evaluation system of green MICE [6]. At the practical level, the research focus shifted to actionable measures such as the popularization of green exhibition booths, and the core viewpoint emphasized “synergy between economy and environment”. However, carbon emission reduction was not included as a specific goal in the research scope. Meanwhile, the issue of regional differences began to attract scholars’ attention. The imbalance between eastern regions such as Beijing, Shanghai, and Guangzhou and central and western regions in the implementation of green MICE standards and the allocation of environmental protection facilities became a typical problem mentioned in the research.

### 2.3. Deepening stage (2021–present)

After the proposal of the dual carbon goals, research on the green transformation of the MICE industry entered the deepening stage (2021–present), and the research framework was upgraded to a four-dimensional system of “economy-environment-society-carbon emission reduction”, with the theoretical system further integrating Digital Transformation Theory. Huang *et al.* (2025) defined green MICE as an operation model with “measurable and controllable carbon emissions throughout the whole process”, and proposed that digital technologies such as metaverse and VR can build “zero-carbon virtual exhibitions”, providing a new path for carbon emission reduction in the MICE industry [7]. Data from the China Exhibition Hall Association’s “China Green MICE Development Report (2023)” shows that some domestic exhibitions have reduced carbon emissions through measures such as carbon footprint tracing, but phased carbon emission reduction goals are still unclear, and the industry lacks quantitative research on the contribution rate of digital technologies to carbon emission reduction. The core viewpoints of research during this stage focus on the “integration of dual carbon goals and industrial transformation”, but there are still research gaps, such as the lack of special paths for dual carbon, which have become the core exploration directions of this study.

From the perspective of the evolutionary logic of research viewpoints, research on the green transformation of the MICE industry has undergone a transformation from “passive environmental protection” to “active carbon reduction”: early research emphasized “reducing resource waste”, mid-term research focused on “balancing environmental protection and costs”, and current research focuses on “contributing to dual carbon goals”; the theoretical system has gradually expanded from a single circular economy theory to an interdisciplinary system including circular economy, stakeholder theory, and digital transformation, reflecting the internal logic of “problem oriented-theoretical improvement-practical deepening”. At the same time, there are two major controversial focuses in the research as follows:

- (1) The dispute over regional standards: Eastern regions promote green transformation focusing on smart venues and carbon footprint calculators, while central and western regions focus on the construction of basic environmental protection facilities. Scholars have differences on “whether it is necessary to formulate a unified national dual carbon transformation standard”;
- (2) The dispute over cost-benefit: The initial investment in green transformation is relatively high, and small and medium-sized enterprises generally believe that “short-term benefits are insufficient”. Scholars have not reached a consensus on “whether the government needs to increase subsidies” and “how to reduce costs through economies of scale”. These disputes also provide references for formulating differentiated strategies in this study.

### **3. Practical dilemmas of the green transformation of China's MICE industry**

Although the green transformation of China's MICE industry has started, it still faces multiple practical dilemmas in practice. These dilemmas are concentrated in dimensions such as industry cognition, technology application, and accounting system, and the problems in various dimensions are intertwined, jointly restricting the process of the industry's green transformation.

There is one-sidedness in industry cognition. Currently, the management concepts of MICE competent authorities and organizers are relatively backward, and their understanding of the connotation and paths of sustainable development is not comprehensive and in-depth<sup>[8]</sup>. Some MICE practitioners simply equate "green exhibitions" with "environmentally friendly materials", ignoring key links such as the optimization of exhibition electricity consumption, leading to green practices only remaining on the surface and making it difficult to achieve whole-process carbon reduction goals. At the same time, the management of some enterprises has a "short-term cost-oriented" cognition, that is, in short-term business decisions, they focus on controlling and reducing short-term production and operation costs, believing that green transformation costs are too high and regard them as an additional burden, failing to recognize the value of green transformation for improving enterprises' long-term competitiveness, resulting in insufficient transformation motivation.

The high cost and low adaptability of green technology application have become major obstacles. According to statistics, the market price of green and environmentally friendly materials is generally 15–30% higher than that of traditional materials, and the use of recyclable exhibition props and green and environmentally friendly materials will increase MICE costs by 20–30%<sup>[9]</sup>. In addition, the subsequent operation of venue environmental protection facilities requires a lot of labor and time costs, and the high investment threshold makes it difficult for small and medium-sized enterprises to bear.

The MICE carbon emission monitoring and accounting system is imperfect. Data from the "China Green MICE Development Report (2023)" shows that only 23% of MICE enterprises have established a sound carbon emission monitoring system, and the monitoring scope of most enterprises is limited to direct emissions such as venue electricity consumption and equipment operation during the exhibition. There is a lack of effective management and control over implicit emissions in the whole life cycle such as exhibition frame manufacturing, exhibit transportation, and waste disposal, leading to deviations in carbon emission monitoring results and making it difficult to reflect the real emission level. Furthermore, the number of enterprises with professional carbon monitoring capabilities in the industry is small, and most enterprises lack systematic statistical methods and professional talent reserves, with insufficient basic monitoring capabilities, which cannot provide accurate and reliable data support for the formulation and optimization of green transformation plans.

### **4. Practical paths of the green transformation of the MICE industry under the dual carbon goals**

The green transformation of the MICE industry needs to construct a systematic operation path, relying on whole-process resource management and control, multi-agent collaboration, and digital technology empowerment to promote the industry from scattered exploration to systematic implementation.

Whole-process resource recycling is the core of green operation. A "preparation-execution-conclusion" closed-loop mechanism should be established: promote modular exhibition props in the preparation stage to reduce energy consumption; regulate energy consumption through intelligent systems and set up classified recycling during the exhibition; improve the material recycling and reuse mechanism after the exhibition. Practice has

proved that this model can increase the waste resource utilization rate to 40%. “The core of green design is the ‘3R’ principle, that is, Reduce, Recycle, and Reuse. It not only needs to reduce the consumption of materials and energy and the emission of harmful substances, but also enable exhibition booths and components to be easily classified, recycled, and reused or recycled <sup>[10]</sup>.”

Multi-agent collaboration is an important guarantee for transformation. A “enterprise led-audience participated-association supervised” system should be constructed: enterprises select environmentally friendly materials and implement paperless services; guide audiences to travel green; associations formulate standards and strengthen supervision. “Brand is the soul of the development of the MICE industry. MICE brand equity is divided into three dimensions: brand awareness, brand association, and brand loyalty. Therefore, building a MICE brand can be carried out gradually from these three levels <sup>[11]</sup>.”

Digital technology is a key support for transformation. The Internet of Things (IoT) can monitor energy consumption in real-time and optimize resource allocation; online services reduce paper materials; blockchain realizes carbon footprint tracing. Research shows that the in-depth application of digital technology can significantly reduce carbon emissions, but attention should be paid to the cost adaptability of small and medium-sized enterprises. “Strengthening digital technology empowerment, promoting digital and intelligent transformation, and improving the green efficiency of MICE by building an integrated service platform and immersive exhibition spaces is essential <sup>[12]</sup>.”

Transformation practices have shown multi-dimensional benefits: environmentally, modular exhibition props and intelligent management and control reduce carbon emissions; economically, recyclable materials save costs, and green brands increase re-exhibition rates; socially, MICE activities have become carriers for spreading the concept of sustainable development, driving the extension of environmental protection behaviors to society.

## **5. Optimization strategies for the green transformation of the MICE industry**

In response to the core dilemmas of the green transformation of the MICE industry, it is necessary to construct a collaborative optimization strategy from five dimensions: cost sharing, technological innovation, policy implementation, cognition upgrading, and accounting improvement, forming a comprehensive support system of “policy - industry - market” to promote the in-depth development of transformation.

The cost-sharing mechanism requires the joint efforts of three parties. At the policy level, provide special subsidies for projects using green materials and recyclable exhibition props, and implement value-added tax reduction for enterprises with high recycling rates. At the industry level, clarify the responsibility boundaries of organizers, venue operators, and exhibitors to avoid shirking. At the market level, encourage third-party institutions to provide integrated services such as material leasing, recycling, and carbon footprint accounting, reduce costs through scale, and develop premium green MICE products to form a sound commercial closed loop <sup>[13]</sup>.

Technological innovation and application optimization should advance in parallel. Efforts should be made to promote the large-scale production of green materials by integrating procurement demands through industry associations and establishing long-term agreements with manufacturers to reduce cost premiums. Support should also be provided for the research and development of degradable materials and modular exhibition equipment, with innovation awards and financial incentives introduced to stimulate technological progress. In addition, regional shared platforms for exhibition equipment should be developed to lower procurement and storage costs. Authorities should formulate Digital Technology Application Standards for the MICE industry to clarify technical

requirements for integrated online-offline exhibitions, while encouraging leading enterprises to collaborate with technology firms to enhance technological integration and adaptability<sup>[14]</sup>.

The implementation of policies and standards needs to break through the “last mile”. Based on the “Guidelines for Green Exhibition Operations”, local governments and industry associations jointly formulate regional implementation rules and inspection lists to make standards quantifiable; establish a “hierarchical certification + dynamic supervision” mechanism, link certification results with subsidies and bidding qualifications, and order rectification for non-compliant exhibitions; build a trinity system of “government supervision + industry self-discipline + social supervision” to form a joint supervision force.

Industry upgrading should move beyond the narrow focus on “environmental protection in a single link” and promote the adoption of a whole-process green development concept. For MICE enterprise management, specialized training on dual-carbon policies and green MICE strategies should be organized to emphasize the long-term value of green transformation and correct the misconception of short-term cost orientation. For front-line practitioners in construction, logistics, and operations, practical training should be provided on green material application, energy-efficient equipment operation, and carbon footprint accounting to strengthen operational capabilities<sup>[15]</sup>.

Moreover, the industry should embrace a whole-life-cycle green approach, extending sustainable practices throughout the stages of exhibition preparation, implementation, and conclusion. Supply chain collaboration should be promoted by incorporating low-carbon indicators into supplier selection criteria, encouraging upstream and downstream participants, such as exhibition equipment manufacturers, logistics providers, and hotels, to engage in coordinated green initiatives, thereby forming a collective mechanism for carbon reduction across the entire industrial chain<sup>[16]</sup>.

The carbon emission accounting system needs to improve standards and capabilities. State departments and industry associations jointly formulate the “Guidelines for Carbon Emission Accounting in the MICE Industry”, clarify the whole-life cycle accounting scope and unified methods; promote standardized online accounting platforms to simplify the accounting process; support the development of third-party carbon monitoring institutions and provide subsidies for enterprises purchasing their services. Universities add low-carbon MICE courses, and industry associations carry out special certification training to help small and medium-sized enterprises obtain professional services through talent sharing platforms.

## 6. Conclusion

Under the dual carbon goals, the green transformation of the MICE industry is a dual requirement of high-quality industrial development and ecological civilization construction, which needs to learn from international experience and implement targeted measures in combination with the current situation of regional imbalance. Although the industry faces dilemmas such as cognition, cost, and accounting, it has achieved multi-dimensional benefits through whole-process resource recycling, multi-agent collaboration, and digital technology empowerment. Relying on diversified collaborative strategies to address transformation obstacles, college students can use their professional strengths to participate in practice and spread concepts, inject fresh vitality into the industry’s active carbon reduction, and continuously empower the achievement of dual carbon goals.

## Disclosure statement

The author declares no conflict of interest.

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