Study on the Ecological MICE Model Based on System Dynamics

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Abstract

Ecology is the future developing direction of the MICE industry. This paper uses the basic theory and method of system dynamics to analyze the structural characteristics of the ecological system of MICE industry, as well as the dynamic feedback, and then constructs the basic system dynamics model of the ecological MICE. The research shows that ecological MICE is largely affected by the factors such as MICE enterprise, MICE facilities, MICE environment, MICE industry and the macro policy. Therefore, the ecology of city MICE should focus on these four factors.

Key words: ecological MICE model; ecological exhibition; system dynamics

1. Introduction

As an emerging industry, the development trend of the MICE industry is faster and faster in recent years, and it occupies a pivotal role in the national economy. Therefore, the development of the MICE industry should take into account both the MICE economy and MICE environment. As a MICE development model of low consumption and low pollution, there are many issues worth researching in ecological MICE.

Considering the current domestic research of the development of ecological MICE, there are several main aspects as in the following:

Firstly, some papers give the macro discussion of the ecological MICE industry. For example: In the paper the ecological interpretation of the MICE industry, FANG Zhong and ZHANG Hua-rong give a conclusion that ecological MICE is the best development mode of the current MICE industry in China [1].

Secondly, it is about the detailed analysis of the ecological MICE. Among them, JIANG Jin-bo, LI Na, WANG Xiao-jun give a deep discussion of the issues as the evaluation system of the ecological MICE and its quantitative evaluation method. Besides, they make empirical analysis combined with the Guangzhou International Convention and Exhibition Centre, which lay the foundation of quantitative analysis of ecological MICE [2]. SONG Bing-xue proposes green MICE development model based on the theory of circular economy, and build a more comprehensive evaluation method of the level of development of green MICE [3].

Thirdly, some papers give case study of specific cities and their MICE hall. For example: Through positioning of the city MICE in Hangzhou, GAO Shan analyze that Hangzhou should build green city MICE brand to highlight its urban characteristics, and it should go a way of sustainable development [4]. By researching of the operating mode of the MICE economy of the Binhai New Area, ZHANG Hai-Lin and WEI Ya-li put forward some constructive suggestions from the development of green MICE economy mode. It proves out that green MICE has a great role in promoting regional economy [5].

The researches above lay the foundation of MICE theory including eco-system and its practical guidance. But through the analysis of relevant literature research, there are some shortcomings apparently as follows:

On the one hand, they see the ecological MICE as a single concept. Most of the researches have focused on the impacts of government's macro-economic policies on the development of ecological MICE, and they pay more attention to the internal MICE enterprises. In fact, the ecological MICE is an integrated system including economy, society, energy and environment. It is a common result of the interaction of various internal and external factors. Therefore, it should be comprehensively studied considering the various factors within the system.

On the other hand, the current researches of ecological MICE tend to in favor of qualitative analysis, and the method is simple. As a result, it cannot draw the perfect comprehensive analysis results. In response to these problems, this paper uses system dynamics approach to study ecological MICE. Through the establishment of system dynamics model and dynamic feedback analysis, this paper tries to make a breakthrough in ecological MICE.

System dynamics (abbreviated SD-system dynamics) appeared in 1956, and the founder was Forrest (JW Forrester), the professor of the Massachusetts Institute of Technology (MIT). System Dynamics was originally called industrial dynamics, it was a system simulation method proposed by Professor Forrester to analyze such questions as production management and inventory management within companies. Currently, the system dynamics research scope has been extended to a combination with the associated ecological research. The advantages of using system dynamics method lie in that: Firstly, it is a complex method of system, analysis, synthesis and reasoning approach. Secondly, it uses both qualitative analysis and quantitative analysis, the combination of qualitative and quantitative analysis will give better conclusions.

2. Subsystem analysis of ecological MICE

Ecological MICE involves a broad scope including the aspects of economy, society, ecological environment and so on. According to the content of the development of MICE industry, we can divide the ecological MICE in five subsystems, they are: relevant MICE enterprise subsystem, MICE facilities subsystem, MICE environment subsystem, MICE industry subsystem and macro-policy subsystem. Firstly this paper will take detailed analysis of the various subsystems and using Vensim-PLE software to build the foundation of each subsystem model for further research in the following.

2.1 Relevant MICE enterprise subsystem

Considering from the enterprise level, the factors affecting the development of ecological MICE mainly relate to MICE service providers and operators, exhibitors and visitors, the number of scale enterprises as well as large well-known MICE brand, quality , reputation, technology market , talent market, capital market and so on. The environmental awareness of MICE service providers and operators will have a direct impact on the development of ecological standard of the related MICE enterprises. Correspondingly, the higher the green demand of exhibitors and visitors is, the more green MICE products MICE business will promote, thereby increasing the level of ecological MICE. The more MICE business, the larger the scale and the higher the visibility are, the greater the effect of goodwill will be. Relatively, the more new ecological technologies of MICE in the market, the higher the level of ecological MICE development will be. The stronger the awareness of environmental protection of MICE professionals in the talent market is, the higher the ecology level is. What's more, sufficient funds are also important aspects to support the sustainable development of ecological MICE. Therefore, in the relevant MICE companies subsystem, the listed key factors are all positively correlated with firm-level ecological MICE development. The causal relationship is shown in Figure 1.

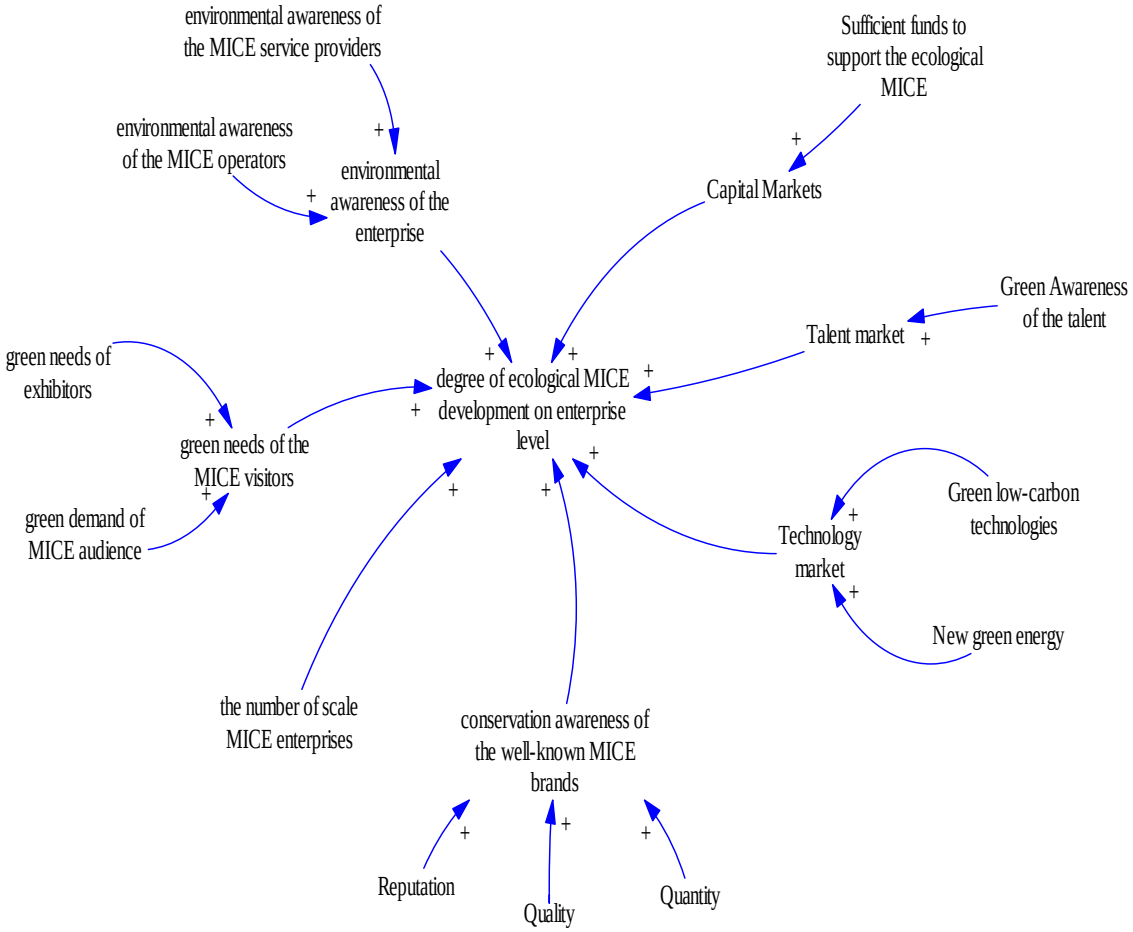

Fig. 1 Causality diagram for relevant MICE enterprise subsystem

2.2 MICE facilities subsystem

From the perspective of ecological hall, the concentration, degree of modernization, conservation awareness, new energy efficiency, water conservation, light conservation, electricity conservation, the amount of garbage after the show, the green level of the hall are all critical to the ecological MICE. The more concentrated the halls are, the less traffic waste there will be. Besides, traffic congestion and traffic distance are both unhelpful to the improvement of ecological MICE facilities. Degree of modernization of the hall is another factor to consider. For example: the use of new low-carbon technologies and ecological facilities can help to improve energy efficiency, in order to achieve ecological. The conservation awareness and behaviors of relevant personnel during the MICE is the primary method to carry out the ecological of the hall. For example: Turn off unnecessary lights during lunch time, set air conditioning to 25 degrees, replace the paper with the digital information data at a meeting, as well as use cash instead of coupons and so on. The awareness and attitudes of relevant staff at work will also play a significant role. Utilization of new energy sources will also determine the level of ecological hall. For example: Whether the hydropower, solar energy is full used, and so on. In addition, the number of garbage after the exhibition and the process to deal with it is also an important indicator. If the used water and materials after the exhibition can be used again, it will greatly enhance the exhibition's ecological standards. Therefore, in this subsystem, the garbage after the show has a negative correlation with the ecological level of the MICE facilities, apart from this, the others are all positively correlated with it. Its causal graph is shown in Figure 2.

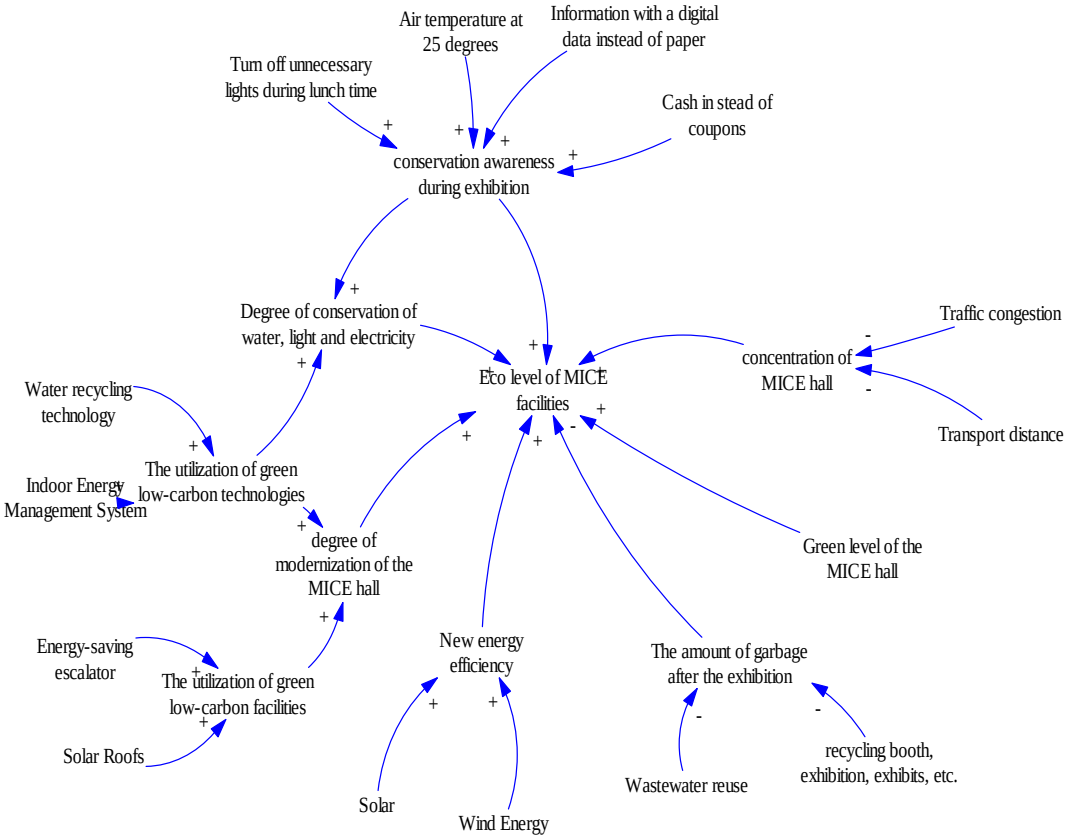

Figure 2. Causality diagram for MICE facilities subsystem

2.3 MICE environment subsystem

MICE environment is the first condition to affect the MICE industry, including: the level of the city's logistics and transport, urban infrastructure, accommodation and catering, MICE professionals' quantity and quality, natural conditions, visibility of the city, city location, the city's foreign trade development level, and so on. The higher the level of the city's logistics and transport, the better the exhibition, you can take measures to reduce costs. The better the city's infrastructure, such as transportation, telecommunication, environment, public facilities and so on, the better the MICE level is. The higher the level of accommodation and catering in MICE industry chain supporting, the more savings there will be. The MICE professionals' quantity and quality, talents' ecological consciousness both directly affect whether or not the ecological MICE develop. Natural conditions are the best way to achieve ecological MICE. The more famous the city is, the more possible it is to attract business, thus virtually producing aggregation effect and promoting the MICE to a higher level. In addition, the location, the city's foreign trade development levels also affect the visibility of the city, thereby affecting whether there are prospects for development. The causal relationship is shown in Figure 3.

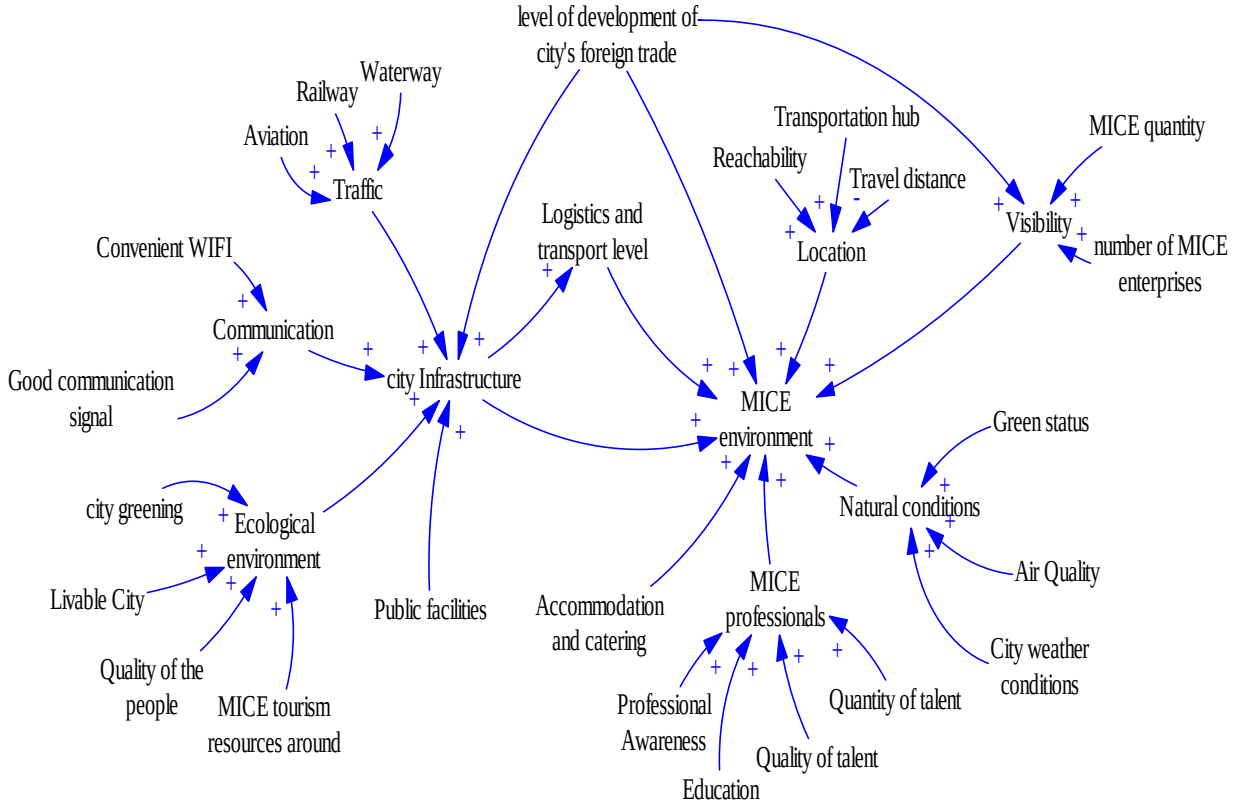

Figure 3. Causality diagram for MICE environment subsystem

2.4 MICE industry subsystem

The level of development of the MICE industry decides the direction of the MICE industry in the future development. And the industry factors include: the maturity of the industry, industrial restructuring, the attractions of other areas and MICE industry concentration, basic industry conditions. The more complete the relevant standards and regulations of MICE association, the better MICE develops. And as a result, the degree of MICE industry concentration is higher. Industrial structure adjustment will affect the size of MICE industry, and it will also affect the size of the relevant industries and exhibits, thus further affecting the MICE industry concentration degree. The development of basic industries is also an important factor to ensure MICE industry concentration degree. The attractions of other regions' MICE counterparts are obstacles for the local MICE to develop. The causal relationship is shown in Figure 4.

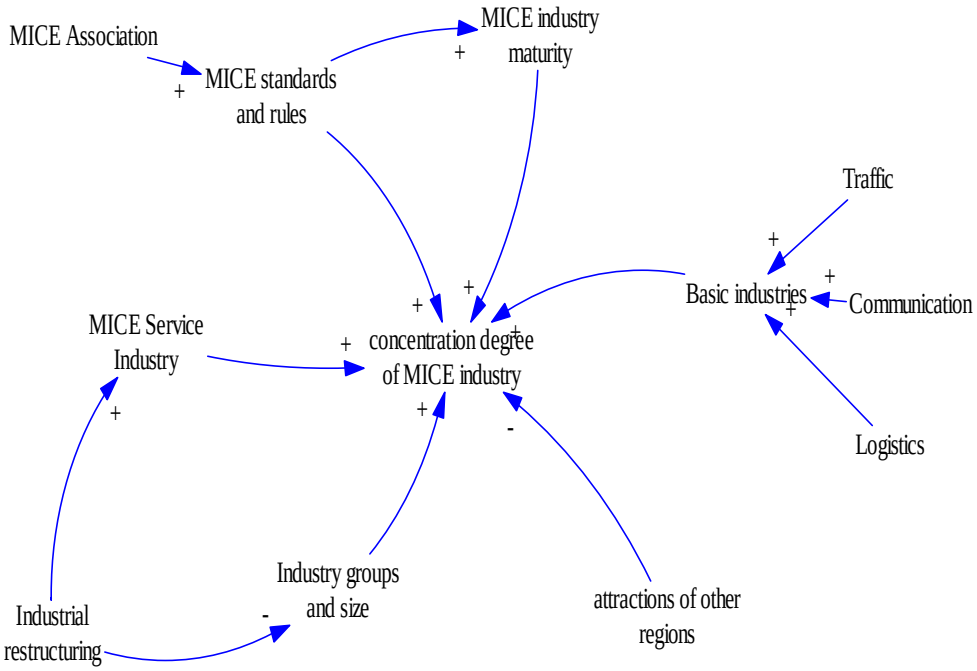

Figure 4. Causality diagram for MICE industry subsystem

2.5 Macro-policy subsystem

Macro-policy subsystem includes policy support, the legal environment, MICE capital investment, MICE credit scale, MICE personnel incentives, land policy, tax incentives, GDP, etc.. A number of related macro-policies will also affect urban MICE development level. Government policy support is an important condition for the development of MICE, such as: tax incentives, MICE credit scale, MICE capital investment and so on all have a direct impact on the initiative of the development of MICE industry. They will also affect the possibilities to consider ecological development. If the associated ecological MICE development regulations can appear as legal provisions, then the level of the development of ecological MICE will greatly improve. Therefore, the legal environment is also an important factor. National economic situation will affect the MICE capital investment, thus affecting the development of the MICE industry. Land-use policies, related MICE personnel incentives, etc. will also affect the initiative of the development of the MICE industry and the awareness and possibilities to consider the development of ecological. The causal relationship is shown in Figure 5.

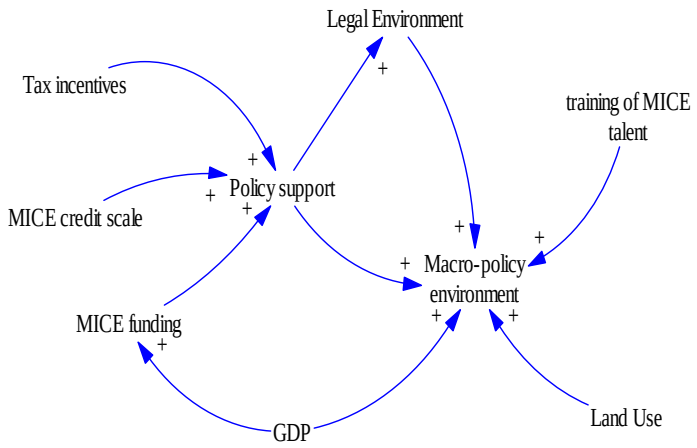

Figure 5. Causality diagram for Macro-policy subsystem

3. Ecological MICE system model construction

From the above analysis of the basic model, it concludes that: Urban ecological MICE development is composed of subsystems such as MICE enterprise subsystem, MICE environment subsystem, MICE facilities subsystem, MICE industry subsystem and macro-policy subsystem. The following comprehensive figure completely reflects the mechanism of city's ecological MICE development among various factors. Figure 6:

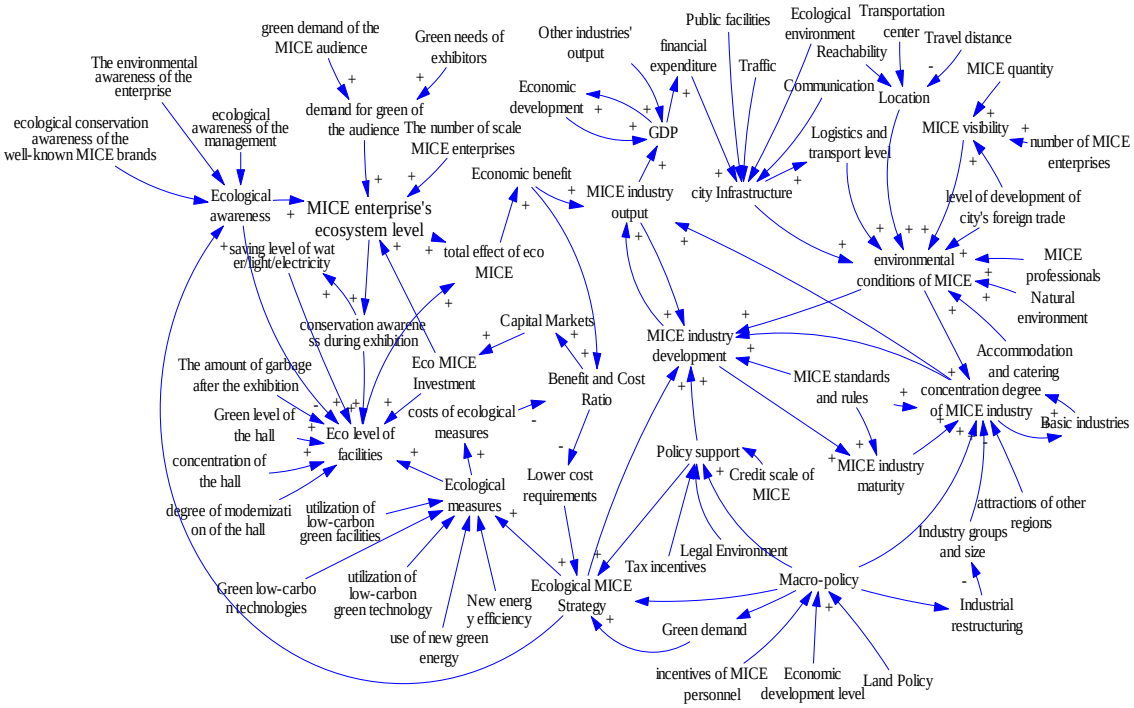

Figure 6. Comprehensive chart for ecological MICE system model

Figure 6 includes many feedback loops, there are three main positive feedbacks and one negative feedback. They are:

Positive feedback 1: MICE industry development +→MICE industry output + → GDP + → fiscal expenditure + →urban infrastructure + →environmental conditions + →MICE industry concentration degree + → MICE industry development. It explains that government spending increases in fixed asset investment for infrastructure construction to improve the environment, so that the city MICE industry can develop better by the concentration of the MICE industry.

Positive feedback 2: capital markets + →ecological MICE investment + →MICE enterprise's ecological level +→ ecological MICE's total benefits + →economic benefit + → benefit and cost ratio +→ capital markets. Description: Investment on ecological MICE enhances the increase of economic efficiency of MICE enterprises. In the long run, it can make the benefit and cost ratio greater, thus promoting capital investment in ecological MICE industry to make ecological transformation.

Positive feedback 3: economic development + → macro-policy + → ecological strategies + →ecological consciousness+ →MICE enterprises' ecological level + →ecological MICE's total effect + →economic benefit + →MICE industry output + → GDP + → economy development. Explanation: To a certain degree of economic development requires the economic to develop environmentally and continuously, so the use of ecological strategy is a must for MICE enterprises to take the road of ecological, and the economic benefits of this can promote economic development.

Negative feedback: economic benefit+ → benefit and cost ratio - → lower cost requirements + → ecological strategies + →ecological measures + →ecological level of the MICE equipment + →total ecological benefits + → economic benefits. Description: When developing to a certain extent, the MICE industry may meet bottleneck: the benefit reduces and results in benefit-cost ratio decreasing. If so, there is a need to promote cost reduction measure to reduce the ecological costs to increase economic efficiency.

4. Countermeasures and suggestions

From the above analysis, different ecological MICE subsystems have different feedbacks to influence the development of ecological MICE through different degrees. Meanwhile, the factors also influence each other. The impact of the various factors and ecological MICE is mutual, meanwhile, each subsystem also has an influence on the other. Therefore, governments and MICE industry association should take into consideration various aspects of the MICE industry to regulate the development of ecological MICE.

Firstly, the MICE enterprise is the primary micro-unit of MICE industry. It is also the mainstay of the development of MICE industry. Therefore, the government and MICE industry association can develop a variety of ecological MICE policies, relevant incentive policies to weaken the tendency that the MICE service providers and carriers just go for profits and reputation despite the consequences of environmental damage and waste of resources. And try to control the waste and destruction caused by hurry to meet the workload.

Secondly, being the MICE venue, a MICE hall is the carrier to realize ecological development. Ecology should be not only kept in mind in the process of design and construction, it should also be considered in the process of exhibiting. The situation should be minimized that things are in good order during the exhibition but are in an overwhelming mess after it. Conditions allowing, absorption of foreign advanced technologies can be adopted, in order to build up more energy-efficient, greener, more ecological new MICE hall.

Thirdly, the city should have necessary excellent conditions to hold MICE. And the MICE environment is the most important element. And among the MICE environment the most important highlight is the basic MICE infrastructure of the city, the MICE industry development and the city's MICE tourism resources. Green cities with excellent ecological conditions are sure to be the highlights of MICE industry, such as Hangzhou.

Finally, the government should also pay more attention to the related incentive policies and personnel training policies to encourage green behaviors in the MICE, improve the professionalism of MICE practitioners. They should also respond to the requirement of the eighteenth National Congress of the CPC to build ecological society, and strive in the last five years to build the MICE industry as a truly green, new, fast-growing industry.

5. Conclusion

System dynamics model is based on well-developed market and industry base. China's MICE market is still in the junior and middle stage, the idea of ecological MICE has just been valued. In this case, necessarily, there is a gap between the analysis of this paper and the reality. But this does not mean that system dynamics model to analyze the ecological MICE does not make sense. Compared with the traditional analysis, the system dynamics model of the ecological MICE emphasizes the interaction of the factors within each subsystem and among each subsystem. Therefore, the introduction of the system dynamics model into ecological MICE has at least three aspects of great application value as the followings: ecological MICE developing trends simulation; ecological MICE policy research and decision analysis ; urban ecological MICE system intrinsic mechanism research .

Of course, the system dynamics model of the urban ecological MICE has significant disadvantages in the promotion and application, they are: the lack of the theoretical understanding of ecological MICE, the difficulty to collect relevant data and the limitation of understanding, etc. These are unavoidable. However, the successful of the application of the system dynamics method in other areas such as the field of tourism, can be used as the experience to follow in the MICE area. It is sure that through continued research, using system dynamics model to study the ecological MICE will certainly obtain practical results.

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