

An empirical study on the relationship between the development of MICE industry and regional economic growth

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Abstract

After analyzing the development of MICE industry to promote regional economic growth from the two aspects of qualitative and quantitative, the mathematical model is established in this paper. After then taking Guiyang Convention and exhibition industry as an example, the related data are brought to verify that the hypothetical mathematical model is correct. Finally conclusion of the empirical research shows that the development of the exhibition industry can promote the regional economic growth.

Key word: *MICE; industry; regional economic; economic growth; linear correlation function*

1 The current situation of the development of MICE

As an emerging service industry, the MICE (Meeting, Incentive, Convention and Exhibition) industry will be important focused and researched for its widely influence surface, highly correlation. According to the relevant statistics of Chinese exhibition economy research institute, the number and area of exhibition is constantly increasing in main cities of China, as shown in the Table 1, leading to the fast development trend in the MICE industry.¹

Table 1 –the statistics about number and area of MICE in main cities in China

Year	The number of exhibition	The area of exhibition(Thousands of square meters)
2010	6200	7440
2011	6830	8120
2012	7189	8990
2013	7319	9391
2014	8009	10276
2015	9283	11798

The development of MICE industry promotes the formation of new economic form, namely MICE economy. The MICE economy is a comprehensive economy, which through holding various forms of conference and exhibition, conveying information, providing services, creating business opportunities based on MICE industry, and improving to traffic, communication, hotel, retail, catering, tourism, advertising,

printing, decoration, logistics, freight and other related industries because of its correlation effect.

2The MICE industry’s contribution to the regional economic development

2.1Direct action of MICE industry to regional economic growth

At present, the development of China's MICE industry pattern mainly has two ways: one pattern is dominated by government, such as large conference, exhibition, BBS and etc.; the other one is market-based operation mode, for example small exhibition, all kinds of academic conferences. Through hosting convention and exhibition, the earnings of organizers, venue providers and other related interest subjects are increased, which promoting the development of the tertiary industry, such as commercial shopping, catering, accommodation, transportation, travel, etc., and increasing area of direct economic benefit and social benefit. The direct effect of MICE to regional economy is shown in Fig. 1.

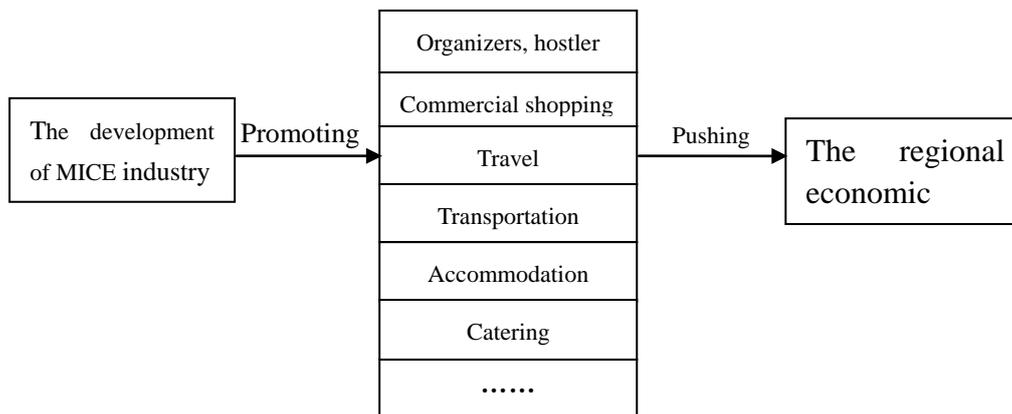


Fig. 1–The direct effect of MICE to regional economy

In addition, the MICE industry's contribution to GDP is mainly lies in the convention and exhibition activities directly driven by investment demand and consumption demand. For example, holding exhibition activities must be pulled on investment demand such as construction of exhibition venues and related facilities, building materials. At the same time, the process of holding exhibition activities led to many products and services demand increasing, such as convention and exhibition companies catering, transport, tourism, shopping, logistics and other industries.

In economics, national income and employment of increment is k times of investment demand and consumption demand increment, what is multiplier effect, using mathematical formula is expressed as: $k = 1 / ((1 - b))$, which k is the multiplier and b is the marginal propensity to consume.

In the process of MICE industry development activities to promote the growth of regional economy directly, MICE industry multiplier = $1 / ((1 - \text{exhibition of added})$

value proportion)), exhibition of added value proportion refers to the amount of total economic income of convention and exhibition activities created, which used for the production and living consumption, if its ratio is bigger, the greater the multiplier.

2.2 Indirect action of MICE industry to regional economic growth

The development of exhibition industry influence on regional indirect economic value higher than the average level in the whole society, and according to Li Tiecheng and Liu Li in the <An Empirical of the Economic Impact of the MICE Industry in China Using Interregional Input-output Models(IRIO)>,the conclusion shows that the central and western regions is relatively backward, output effect brought by the infrastructure investment is greater than the developed eastern region.²So, after analyzing the development of MICE industry to regional economic growth from a macro perspective, it is summarized as follows:

2.2.1 Accelerating the construction of infrastructure and improving regional functions

Qualified exhibition venues, location, hotel with certain receptions, catering, security system, distinctive tourist attractions, and convenient traffic conditions are necessary for holding these large mass activities. In order to promote economic development, many city governments trying hard to completing infrastructure construction for the purpose of obtaining the right to hold large conference, exhibitions, expo, for example the Shanghai world expo, G20 summit and so on. Otherwise, the improvement of urban infrastructure and related facilities has promoted the development of related industries.

2.2.2 Improving the visibility of cities and increasing their overall competitiveness

In the course of holding convention and exhibition activities, which are especially the government-led and large-scale exhibitions, organizers must advertise for the purpose of achieving the desired results, and this advertise involves of regional construction, transportation, economy and humanities environment and so on, meanwhile this advertise also raise awareness of the city.

Before holding exhibition and convention, the infrastructure, environment, municipal services, and other functions would be built and perfect by the government.

2.2.3 Improving the economic structure of the region

According to the configuration of resources in the market competition principle, the development of MICE industry can not only stimulate and drive the development of the tertiary industry, but also put forward request for the first and second industrial entities in the production department, and inform the supply of product types and supply quantity.

At the same time, with the help of the professional exhibition marketing platform, to achieve product promotion, to reduce the transaction cost, mining more trade opportunities, extend the influence of the enterprise, the exhibition industry between enterprise and customer operation process is shown in Fig. 2.

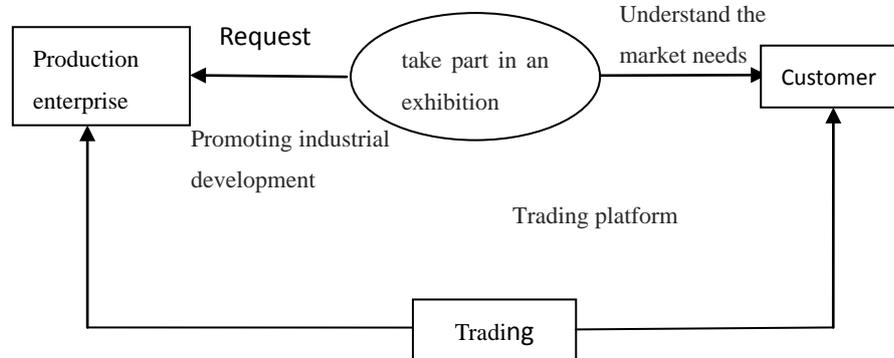


Fig.2–The operation process between enterprises and customers

3. The correlation analysis of exhibition industry and regional economic growth
3.1 Establish a mathematical model of MICE industry to promote regional economic growth

In this paper, two parameters that GDP and the comprehensive economic benefit as results of MICE industry development are chosen as research objects, and the relationship between the growth of GDP and the comprehensive economic benefit of MICE industry is analyzed.

Assuming that the combined economic benefits of the MICE industry contribute to GDP growth, there is a correlation between the two parameters, and the linear correlation function is as follows:

$$Y=a+bX \quad (1)$$

In Eq. (1), Y is GDP, X is comprehensive economic benefit as results of MICE industry development, a, bare the unknown constant. After the mathematical model is established, the specific sample sizes $(X_1, Y_1), (X_2, Y_2), \dots (X_n, Y_n)$ are extracted from the overall (X, Y) , and in the sample X_i is the test value, and Y_i is a random variable. In plane rectangular coordinate system, draw each pair (X_i, Y_i) test value, if these points are distributed near in a straight line, then it is proved that Y and X are linear relationship, accord with the hypothesis function that $Y = a + bX$.³

In Eq. (1), test value and there is always error in linear regression equation, but want to comprehensive minimum error, so using the least square method to appraise and estimate its parameters a and b, shown as Eq. (2)

$$\begin{cases} b' = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i=1}^n (X_i - \bar{X})^2} \\ a' = \bar{Y} - b'\bar{X} \end{cases} \quad (2)$$

Unary linear regression model can reflect the true relationship between X and Y, the

significance is need to test to certify the model, if through significance test, the results show that significant regression relationship between X and Y, the regression equation is proved that a meaningful and can be used in practice. Based on the research purposes of this article, the one-dimensional linear regression model adopts the F test in classical statistics, namely:

$$F = U / \frac{Q}{n-2} \sim F(1, n - 2) \tag{3}$$

The magnitude of the correlation coefficients is verified to prove the degree of linear relationship between two random variables, shown as Eq. (4)

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (Y_i - \bar{Y})^2}} = \frac{L_{XY}}{\sqrt{L_{XX}L_{YY}}} \tag{4}$$

3.2 Take the city Guiyang as an example to verify the relationship between the developments of MICE industry to promote regional economic growth

National MICE industry rapid development, the MICE industry in Guizhou province is also rapidly developed, though, because of many factors, such as the traffic inconvenience, location disadvantage, economic backward and etc. The government of Guizhou province will make the "summer exhibition city" due to its advantage of cool climate and make great efforts and achieve remarkable results. From 2011 to 2015, the numbers of exhibits are held in Guiyang, Guizhou province, the comprehensive economic benefits and the statistics of the city's GDP, as shown in table 2. ⁴

Table 2 –the relevant statistics of MICE in Guiyang from 2011 to 2015

Year	numbers of exhibits	comprehensive economic benefits of MICE (one hundred million yuan)	GDP of Guiyang (one hundred million yuan)
2011	382	7.2	1383
2012	425	45	1700
2013	490	105	2085
2014	681	137	2497
	392	144	2891
2015			
Total		438.2	10556

Scatter diagram is obtained by the relevant data in table 2 as shown in Fig.3, the transverse arguments on behalf of the comprehensive economic benefits of exhibition

industry development, the vertical axis dependent variable on behalf of Guiyang city, and the value of GDP. From the scatter chart, we can see that there is a clear positive correlation between GDP and the overall economic benefit of the MICE industry, and it's going to be an upward sloping line. Therefore, the equation of linear correlation function is used to simulate the relationship between economic benefit and GDP. Bringing the relevant data of table 2 into the Eq. (1), is calculated $a'a' = 12557, b' = 9.8$. So, the regression equation is: $Y' = 1255.7 + 9.8X$.

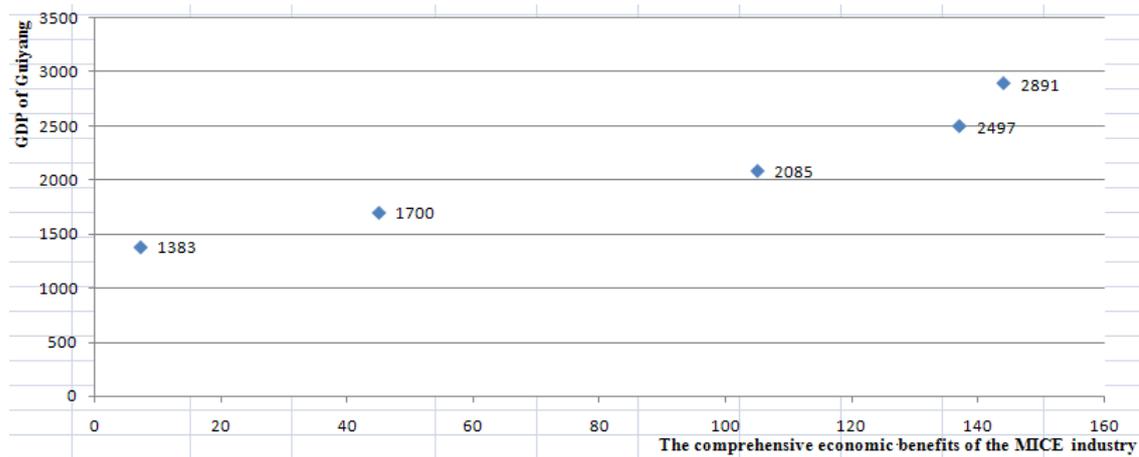


Fig.3–The comprehensive economic benefit of the MICE industry in Guiyang

After achieving regression equation, it is needed for significance test. The significance test of regression equation in this paper using F test, namely $F = U / \frac{Q}{n-2}$, bringing to the relevant data, the result $F = 44.03889$. Take a significant level $\alpha = 0.05$, the degrees of freedom $n - 2 = 3$, check F distribution points indicator, the result is $F_{0.05}(1,3) = 10.13$. Due to the $F = 44.0389 > F_{0.05}(1,3)$, the linear regression of Y to x is significant, and the assumptions of the regression equation is established. The conclusion is that with the increase of the economic growth of the MICE industry, the GDP growth, and the conclusion is in accordance with the theoretical analysis and mathematical model analysis of MICE industry to promote the regional economic growth.⁵

4 Conclusions

Through studying the relationship between comprehensive economic benefits of MICE industry development and the GDP increasing, then system dynamics model is established, and through the relevant data to verify the development of MICE industry promotes the growth of GDP. But the system dynamics model is based on the related data of a scatter diagram to estimate a preliminary function types, and only elected to take samples enough, estimation function to close to real, which the purpose of reducing error between simulation results and the actual situation.

In view of the development of modern MICE industry started relatively late, the related data statistics is not perfect, in terms of empirical research, this paper only collected relevant data of Guiyang exhibition industry from 2011 to 2015. Therefore, unary linear regression equation was used to simulate the results of the future may have a bigger error due to the samples are insufficient.

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