Study on the Development Strategies of Competitiveness of Cultural and Technological Integrated Demonstration Parks

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Abstract—With the rapid development of cultural industry in the worldwide, the construction of cultural and technological integrated demonstration parks has gained attention from governments and academic circle, especially to the issue of keeping the competitiveness and innovative power. Based on the GEM model, this paper makes a quantitative analysis of the competitiveness index system of the cultural science and technology comprehensive demonstration park, and analyzes the impact of different factors on the competitiveness of the demonstration park. The results show that cultural ability, political environment, talent ability and financial support are the sources of the competitiveness of the demonstration park. These four factors have mutual influence and restriction to each other which constitutes the positive feedback to the competitiveness of demonstration parks. Therefore, The innovative development of cultural and technological integration demonstration parks depends on the collaborative relationship of four aspects: the local cultural environment and consumer demands motivate the innovative dynamics; talent strength influenced by the innovative power; capital investment and the support from government accelerate its integrated development.

Keywords—cultural and technological integrated demonstration parks, competitiveness, theory of GEM, evaluation of competitiveness

1. Introduction

At present, the era of knowledge economy, ‘new economy’ which forms with ‘culture’ and ‘science and technology’ has been emerged as a new motivator to natural economy[1]. ‘personalized service’ and ‘consumption-oriented economy’ are also be flourished with the social development. Countries such as the United States, Britain and Japan have given priority to the development of the cultural industry as a pillar industry and promoted its scale and cluster level through various channels[2][4]. Scientific and technological innovation promotes cultural innovation. Under this circumstance, the construction of cultural and technological integration demonstration parks has been undertaking intensively. They gain more and more attention from political and academic angles because they can play the important role of mutual integration and the promotion of culture and science and technology.

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The research on the development of demonstration parks with integration of culture and science and technology is still in the embryonic state,[5][7] especially the research on the innovation power of parks, which is the preliminary basis for formulating policies to support their development. This paper innovatively chose the framework of the existing system dynamics theory as the research basis, using GEM model to the competitiveness index system of cultural and technological integrated demonstration parks. Different from the existing research, this paper adopts a quantitative method, through exploration and analysis, not only discusses the factors affecting the competitiveness of enterprises, but also tries to find the synergistic effect between the innovation driving factors and the mechanism of the demonstration park. Theoretically, we need to identify the key driving factors for the collaborative innovative development of cultural and technological integrated demonstration parks verify the correctness of the key driving factors according to their development all over the world, and explore the driving mechanism of innovation development by establishing the development model of the key driving factors. Then it can provide scientific basis for the formulation of reasonable government policies and promote the optimization and upgrading of industrial structure.

2. Literature review

2.1 The related theoretical basics

Relative research of definition: About the integration of culture, science and technology, scholars think the integrated demonstration parks have exploited a new path of cultural development[8]. It promotes the cultural richness and diversity to meet the increasingly cultural needs of the public. The future of cultural products is the integration of localization and creativity. The integration of culture and technology and the continuous development of market service mechanism are the top priorities of cultural development. Lot of in-depth analysis of the integration of culture and science and technology was made in all over the world and described its future development direction. From the perspective of industrial integration, we should take science and technology industry as the capital and culture industry as the premise to build the culture of science and technology enterprises and improve cultural industry.

However, mainly research is limited to state the important to integrate culture and technology[9], and governments of every nations agree that it necessary to make policies to support the building of demonstration parks. But how to maintain the suitable development is deserved to be researched, especially from the aspects of competitiveness, which protects the vitality of demonstration parks. Therefore, this research aims at the competitive power of the cultural and technological integrated demonstration parks, exploring the motivation and mechanism of innovation sources of integration demonstration parks.

2.2 GEM model

GEM model is the abbreviation of ‘Groundings -- Enterprises -- Markets’ model. It is innovatively developed by British economists Tim Padmore and Hervey Gibson (1998) after Porter's ‘diamond model’, which is mainly used to study the competitiveness of regional industrial clusters[10]. In this model, the competitiveness of industrial cluster depends on three factors, namely ‘basic factors’, ‘enterprises’ and ‘market’. Each element is composed of specific factors, so these elements are also known as three ‘pairs of factors’. The specific components are as follows:

1) ‘factors of pair I’ -- basic factors, including fundamental resources and facilities, refers to the supply factors of cultural and technological integrated demonstration parks, that is, the input factor from the outside of the cluster for the production process of internal enterprises;

2) ‘factors of pair II’ -- elements of enterprises, including ‘suppliers and related auxiliary industries’ and ‘structure and strategies of enterprises’, which are essentially structural elements of the whole system and determine the production efficiency of integrated demonstration parks;

3) ‘factors of pair III’ -- market factors, including ‘local market’ and ‘external market’ factors, refer to the demand factors including public market demand, intermediate demand and enterprise demand within integrated demonstration parks.

3. Building of Competitiveness Evaluation System

3.1 Designing principles of evaluation indicators

This study evaluates the level of the competitiveness of the demonstration parks based on three pairs of competitiveness factors above, and the selected evaluation indicators should conform to the following principles:

1) Guidance indicators

The purpose of constructing competitiveness evaluation index system is to investigate the competitiveness level of demonstration parks integrating culture and science and technology, find out the existing problems in the park, make the management department understand the need for optimization in the park and promote improvement, so as to enhance the competitiveness of integrated demonstration parks.

Therefore, the setting of evaluation index should not be separated from the actual situation and should have appropriate practical guiding significance.

2) Comprehensive indicators

The index system is an organic system with multiple factors. The index system should cover all the components of the competitiveness of cultural and technological integrated demonstration parks and improve the accuracy and reliability of the evaluation with systematic study.

3) Operability

Firstly, the data of evaluation index must be available. The goal of evaluation is to implement it into the real situation and guide the practical activities with index factors. Therefore, the selected indicators should be able to be observed, measured and compared to make it easy to operate in practical work.

3.2 Designing of evaluation indicators

With the principles of designing above, this research had accesses relative references of integrated demonstration parks[11][13], especially considering the characteristics of cultural economy, and designs the evaluation indicators system as shown in table 1.

TABLE 1 Competitiveness Index System Of Cultural And Technological Integrated Demonstration Parks

First-level factors		Second-level factors
Resources	**Natural resources**	S1 ecological environment
	Human resources	S2 labor cost
		S3 creative talent scale
	Capital resources	S4 fixed asset investment
		S5 fund support availability
	Cultural resources	S6 cultural deposits
Facilities	**Hardware facilities**	S7 geographical advantages
		S8 infrastructure
		S9 supporting facilities
	Software facility	S10 public service platform
		S11intellectual property protection
		S12 talent attraction efforts
		S13government guidance
Enterprises	**Related industry development**	S14 supplier scale
		S15 supplier specialization
		S16 related industry maturity
	Industrial correlation degree	S17 industrial chain integrity
		S18 cooperation degree
	Enterprise scale	S19 scale economy competitiveness
	Innovation ability	S20 R&D ability
		S21industry-university-research cooperation
	Management level	S22 enterprise system
		S23 marketing ability
Market	**Market size**	S24 total population
		S25 per capita disposable income
	Market prospect	S26 market potential
	Demand degree	S27 export scale
		S28 external market potential
	Regional brand	S29 product awareness
		S30 product brand recognition

4. Influence Factors of Competitiveness of Cultural and Technological Integrated Demonstration Parks

4.1 Hypothesis of collaborative innovation power of demonstration park

By analyzing and drawing lessons from previous studies and leasing theories, this paper proposes the following four hypotheses for the collaborative innovation ability of demonstration parks:

1) Cultural factors: The cultural background of a region will have an impact on the scale of any economic activity in the process of economic development of the region. As a creative industry, the demonstration park is related to this factor. Therefore, the following hypothesis is proposed in this paper: H1: Cultural factors will affect the innovation synergies of demonstration parks;

2) Political factors: political environment stability, policy support and legal guarantee are crucial to ensure the political environment and resources of the demonstration park. The government has a duty and responsibility to support the development of new industries. Therefore, this study makes the following hypothesis: H2: Political factors will affect the innovation synergies of demonstration parks;

3) Talent factor: The object of the demonstration park is essentially a group of high-end talents with a strong sense of innovation. This paper proposes the following hypothesis: H3: Talent actors will affect the innovation synergies of demonstration parks;

4) Financial factor: Financial support is a key factor in the development of demonstration parks. Therefore, the following hypothesis is proposed: H4: Economic factors will affect the innovation synergies of demonstration parks.

4.2 Source of data

The evaluation variables of collaborative innovation power of demonstration parks were divided into four dimensions, namely, policy dimension, financial dimension, talent dimension and cultural dimension. There are 4 evaluation indicators under each dimension, a total of 16 evaluation indicators (as shown in Table 2). Then, according to the five-component Likert scale, the evaluation indicators are divided into five intervals according to their importance, which are extremely important, very important, medium important, slightly important and not important.

4.3 Statistical analysis of data

The survey is divided into two channels: online questionnaire filling and collection and offline entity interview questionnaire. The survey targets are managers and consumers of demonstration parks. Kronbach's alpha measurements were used in the questionnaire of this study and the correlation value was 0.723.The reliability and validity test and Bartlett's spherical test were conducted on the relevant data, and the KMO values of the scales of resources, facilities, enterprises and markets were all greater than 0.7, indicating that the sample data was more suitable for factor analysis, that is, the correlation between variables was strong. Through exploratory factor analysis, four principal components were extracted from the resource scale, and the rotation results of items were basically consistent with the original design. Two principal components were extracted from the facility scale, five from the enterprise scale, and four from the market scale, which were in line with research expectations. (shown in table 2).

4.4 Confirmatory factor analysis for dynamic indicators system

1) Model identification: The evaluation index system of this study consists of 4 variables, namely, capital index, talent index, policy index and cultural index, with a total of 16 indicators. According to principle T, (q+1) /2=171.

2) Model evaluation: To test whether the assumptions of the model have been established, this study performed a path analysis of the data using maximum likelihood estimation and fixed load methods. During this process, the model is evaluated to ensure the fit and reliability of the model. The analysis results (as shown in Table 3 and Table 4) show that the relative index, absolute index and minimum index reflected in the model fitting index are all within a reasonable range.

TABLE 2 Evaluation Indicatiors And Validity Analysis Table

Dimension	**KMO**	**Explanation Variance**	
Cultural indicators	0.737	79.022%	
long history of culture	Rich cultural resources	Strong cultural atmosphere	Complete facilities
0.832	0.816	0.767	0.857
Talent Indicators	0.835	67.908%	
strong cultural culture	University agglomeration	Adequate supply of talent	prosperity of education
0.881	0.778	0.827	0.803
Policy indicators	0.805	78.614%	
Tax concessions	Public infrastructure construction	Government investment	Financing support
0.819	0.786	0.787	0.834
Financial indicators	0.855	73.605%	
diversified financing Channels	Rich sources of funds	Strong investment atmosphere	
0.763	0.749	0.826	

5. Causal feedback relation analysis of competitiveness

The dynamics of the demonstration park, which is influenced by many factors, can be represented by a causal feedback diagram of the factors of innovation dynamics in the demonstration park. According to the causal feedback diagram, each of the four subsystems forms a positive feedback to the innovation power. On this basis, the SD model is constructed (shown in Figure 1), and the assumptions are as follows: (1) The innovation dynamics of the park will affect the consumers' demand for cultural experience and local cultural atmosphere. (2) The innovation degree of cultural products and the innovation power of the park will affect the talent level and strength of the region. (3) The park's investment momentum is influenced by factors such as innovation. (4) Industrial development indicates that increasing government support will have a stimulating effect on the economy and society. In summary, the four dynamic systems of talent factors, capital factors, political factors and cultural factors must influence, constrain and limit each other.

To realize the synergistic and innovative development of a demonstration park for the integration of culture, science and technology, these four systems must work in tandem to promote innovation and development.

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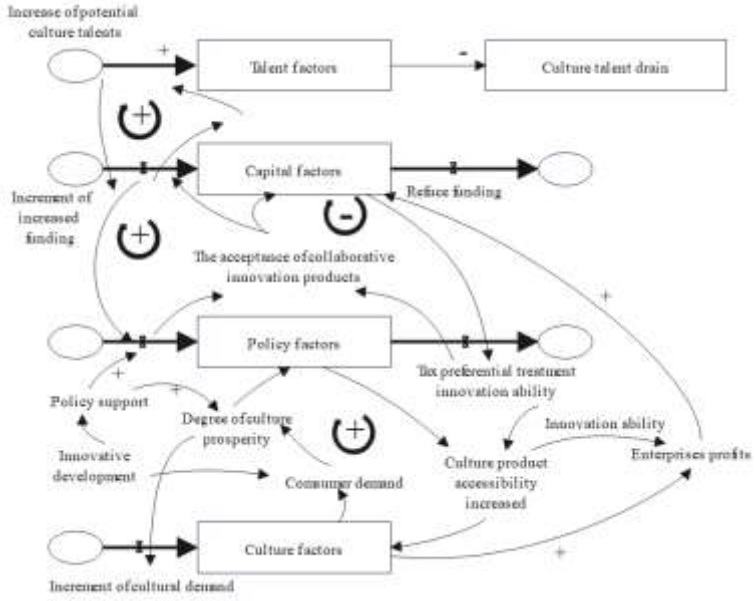

FIGURE 1 SD Model of innovation development

TABLE 3 Evaluation Indicators And Validity Analysis

Latent variable	item	Standardized coefficients	T value	R2
Cultural indicators	1	0.672	10.45	0.526
	2	0.716	8.23	0.426
	3	0.676	8.16	0.325
	4	0.578	8.02	0.621
Policy indicators	1	0.614	9.34	0.432
	2	0.745	8.63	0.537
	3	0.691	9.08	0.533
	4	0.724	10.6	0.291
Cultural indicators	1	0.673	9.13	0.672
	2	0.521	10.68	0.541
	3	0.670	9.07	0.307

	4	0.665	8.74	0.386
	5	0.591	10.45	0.425
Financial indicators	1	0.661	10.36	0.502
	2	0.784	9.57	0.384
	3	0.693	10.79	0.691

TABLE 4 Confirmatory Analysis Results

Fitting	**X2/df**	**RMSEA**	**NFI**	**NNFI**	**CFI**
Results	2.92	0.077	0.97	0.96	0.91
Criteria	∈(2,3)	<0.08	0.9<	0.9<	0.9<
Fitting	RFI	GFI	AGFI	PGFI	IFI
Results	0.92	0.82	0.83	0.64	0.93
Criteria	0.9<	0.8<	0.8<	0.5<	0.9<

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