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Evaluation Research on the Competitiveness of Creative Industry Park Based on Evidence Theory

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Abstract: As the main carrier of creative industry and Creative Park, booming at home and abroad. Scientific evaluation, comprehensive competitiveness of Creative Park, not only contributes to Creative Park better and faster development, but also for the regional competitiveness also plays an important role in. Through the analysis of the Creative Park competitiveness evaluation system and the construction ,to evaluate its competitiveness with the theory of evidence.

Key words: Evidence theory, creative park, competitiveness, evaluation

INTRODUCTION

In the information society and the era of knowledge economy, creative industry has become the mainstream industry. In the rapid development of creative industries at the same time, the localities have set up the Creative Industry Park, which is an effective way to promote the development of creative industries(Chen, 2011). And the sustainable development of Creative Park, creative industry competitiveness is an important factor in the. Therefore, the overall level of Zhejiang province Yiwu City Creative Park competitiveness evaluation accurate and objective analysis, is very useful and necessary. Based on the survey of relevant data to the creative industries and basic agglomeration theory, summed up the evaluation index system of competitiveness of Creative Industry Park of Yiwu City and makes an empirical analysis of Creative Park.

THE EVALUATION INDEX SYSTEM OF THE COMPETITIVENESS OF CREATIVE PARK

Creative park is the industry positioning clear, public service facilities and management system complete, creative atmosphere, with intensive creative intellectual labor, embodied R and D, training, hatching, production, exhibition, trade and other functions, professional park planning production and marketing of creative products (Hua, 2007). To evaluate the competitiveness of Creative Industry Park, we must consider the influence factors of competitiveness of Creative Industrial Park comprehensive, combined with the actual situation of Yiwu City Creative Industry Park, follow the scientific, stability and dynamic binding, contrast, operability, guiding principle, completeness and establish a set of objective and accurate reflection of Creative Industry Park the evaluation system(Dong and Gao, 2010). The index system consists of 4 first level indicators, 14 level two indicators, as shown in Fig. 1.

Service environment are the creative industry park service level and perfect service of good poor characterization. As with other modern service industry, creative industry park has been attaching importance to the construction and improvement of the service environment. On the one hand, service infrastructure, public service platform is the carrier to provide service park, provide enterprises required service environment (Zhu, 2009). On the other hand, in order to meet customer requirements and professional set up the professional services for enterprises, very attractive; at the same time, the network information service for enterprises to play a decisive role of stable operation and growth development. Therefore, this study selects service infrastructure, public service platform, professional services, information level of 4 two level index. Economic benefit is the comprehensive assessment of capital operation ability to the park. One is the construction of infrastructure; service environment cannot do without the support of capital. Two is the technical innovation park requires very high fixed costs, need a large number of research and development funds to support. Therefore, this study selects the scale of operation, profitability and development capacity of 3 two level index. Management innovation is reflected in the property management level and technology R and D and innovation ability, it is the source of sustainable development power park. Consideration from the management level, management level, innovation ability refers to the park to meet the needs of its own development to seek change and advantage of technological innovation, attract core

creative enterprises, strengthen cooperation, improve the independent intellectual property rights, so that the park won the innovation potential, the driving force for sustainable development (Sun and Zhang, 2008). Therefore, the management level, the management efficiency and the innovation ability three two level index. The social aspect, first is the system factor has a great influence on the development of the Creative Industry Park, therefore, Yiwu creative industry park development needs of local government financial support. Secondly, the social influence is the park's intangible assets and brand resources, how to give full play to the park brand advantages, absorb a wide range of government and social resources, crucial for the rapid development of the park. Here, the support of the government, institutions of cooperation, awarding the prize, the attention of the media and four two level indexes.

THE THEORY AND METHOD OF CREATIVE INDUSTRIES PARK COMPETITIVENESS

D-S evidence theory was proposed by Dempster-Shafer, is widely used in artificial intelligence, detection and diagnosis. As a kind of uncertainty reasoning method, it has many advantages, it is the trust function as a measurement, uncertainty can deal with stochastic or fuzzy caused by probability interval, the "don't know" or "not sure" District division. This theory can combine multiple information fusion and the synthesis results accord with the thinking habit of the people, has been widely used in the actual evaluation.

The basic definition of evidence theory.

Definition 1: the complete set of possible answers a problem for U, any two events are mutex event, U elements can be numeric or non numeric variables, you can call U for a recognition framework: U = {X_1, X_2, X_3, ..., X_n}, Type: X_j for a event recognition framework; j = 1, 2, 3, … n: n is the number of elements (Cao *et al*., 2013).

Definition 2: Let U be a recognition framework, A framework for the identification of any subset of U, m as the basic belief function, through the basic belief function can take any subset of mapping U to a value m (A) of [0,1], the basic belief assignment function is m (A) and to meet the M (φ) = 0,

$$\sum_{A\subset U} m(A) = 1, \text{ Where: } m(A) \text{ basic belief assigment for the}$$

event A value, said the degree of trust evidence against A; mφ = 0 said the trust on the empty set is zero;

$$\sum_{A\subset U} m(A) = 1 \text{ said the trust dergee of all propositions and 1}$$

Definition 3: 2^U indicates a set, the trust function Bel: $2^U \rightarrow [0, 1]$; if A|U and to meet the:

$$Bel(A) = \sum_{A\subset U} m(B)$$

the Bel (A) as the basic belief function A, said the evidence against A as trust degree really. If m(A)>0, the A is a function of the focal element of trust(Han and Zhou, 2006).

Combination rules of D-S evidence

- **The two evidence combination rule:** A basic belief assignment function evidence E_1, E_2 recognition under the framework of U two were M1 and M2, focal element are respectively A_i and B_j, D-S synthesis rules:

$$m(A)\begin{cases}\dfrac{\sum_{A_i\cap B_j=A} m_1(A_i)m_2(B_j)}{1-K} & (A\neq\varphi)\\ 0 & (A=\varphi)\end{cases}$$

$$K = \sum_{A_i\cap B_j=f} m_1(A_i)m_2(B_j)$$

Type: reflects the degree of conflict between the evidence; 1/1-k is called the normalization factor. A_i and B_j as the power set of U, Orthogonal M_1 and M_2 is m(A), notes for $m_1 \oplus m_2$.

If K>1, the orthogonal M_1 and M_2 $m_1 \oplus m_2$ does not exist.

- A plurality of evidence combination rule. Let M_1, M_2, … M_n,n basic belief assignment function in the same recognition framework U. If $m_1 \oplus m_2 \oplus m_n$exists, it can also be used for synthesis of D-S theory, the synthesis rule is:

$$m(A)\begin{cases}\dfrac{\sum_{\cap A_i=A 1\le i\le N} m_1(A_i)}{1-K} & (A\neq\varphi)\\ 0 & (A=\varphi)\end{cases}$$

$$K = \sum_{\cap A_i=\varphi 1\le i\le N} \prod m_1(A_i)$$

Using the theory of evidence evaluation steps

Step one: determine the identification framework. Identification of frame type of proposition, through the

study of recognition framework, to study the transformation proposition to set research (Liu *et al*., 2006). Research on evaluation index set and the competitiveness of business park creative literature, determine the recognition framework for:

$$\Theta = [H_1, H_2, H_3, H_4, H_5] = [\text{Perfect, Good, General, Range, Poor}]$$

Step two: Obtain the initial trust value assignment. Initial trust value assignment is the most critical part; it affects the accuracy and validity of decision fusion results.

Step three: According to the initial trust value assignment, the combination rules of D-S evidence theory, calculate the competitiveness of Creative Industry Park of one grade indexes to the trust function recognition framework. and then further fusion level indicators of trust value, get the competitive ability of creative Venture Park compared to the trust degree recognition framework, in order to get the evaluation results of competitiveness of Creative Industry Park

EXAMPLE ANALYSIS

According to the weight of expert opinion and questionnaire survey in Zhejiang province Yiwu City Creative Industry Park of each index for: The first layer weights $\{V_1, V_2, V_3, V_4\} = \{0.465, 0.162, 0.096, 0.277\}$, the weight of each index service environment $\{V_{11}, V_{12}, V_{13}, V_{14}\} = \{0.13, 041, 0.03, 0.43\}$, the weight of each index and economic benefit factors $\{V_{21}, V_{22}, V_{23}\} = \{0.54, 0.30, 0.16\}$, the weight of each index management innovation factors $\{V_{31}, V_{32}, V_{33}\} = \{0.12, 0.23, 0.65\}$, the weight of each index of social factors $\{V_{41}, V_{42}, V_{43}, V_{44}\} = \{0.41, 0.38, 0.08, 0.13\}$. Preference coefficient a =0.92, based on the evidence theory algorithm, the reliability of distribution can be obtained by the system factors. As shown in Table 1-3, shown in Table 4.

The reliability of distribution according to Table 1-4 underlying factors is obtained, then the synthesis of data, get the evaluation of the whole project comprehensive reliability distribution, as shown in Table 5. Table 5 shows, in the evaluation of Zhejiang Province, a creative industry park competitiveness, competitiveness

Table 1: Service environment reliability allocation table

		Basic probility assignment					
Service environment A	Weight normalized value V_{1j}	H_1	H_2	H_3	H_4	H_5	Θ
A_1	0.278	0.0139	0.117	0.083	0.064	0.00	0.7221
A_2	0.877	0.210	0.281	0.228	0.070	0.088	0.1230
A_3	0.064	0.010	0.022	0.020	0.010	0.01	0.9280
A_4	0.920	0.00	0.414	0.368	0.138	0.00	0.0800
Synthesis of credibility		0.034	0.376	0.456	0.900	0.014	0.03

Table 2: Economic factor of reliability allocation table

		Basic probility assignment					
Economic benefits B	Weight normalized value V_{1j}	H_1	H_2	H_3	H_4	H_5	Θ
B_1	0.92	0.147	0.285	0.304	0.046	0.138	0.08
B_2	0.51	0.041	0.209	0.143	0.117	0.0	0.49
B_3	0.27	0.043	0.084	0.089	0.014	0.041	0.729
Synthesis of credibility		0.123	0.342	0.325	0.054	0.103	0.053

Table 3: Management innovation nfactors reliability allocation table

		Basic probility assignment					
Management innovation C	Weight normalized value V_{1j}	H_1	H_2	H_3	H_4	H_5	Θ
C_1	0.17	0.0544	0.0476	0.0391	0.0289	0.0	0.83
C_2	0.354	0.0531	0.1200	0.110	0.0354	0.0354	0.646
C_3	0.920	0.2576	0.2392	0.3128	0.1104	0.0	0.08
Synthesis of credibility		0.249	0.2580	0.3230	0.103	0.004	0.06

Table 4: Social factors influencing the reliability allocation table

		Basic probility assignment					
Social influenc factor D	Weight normalized value V_{1j}	H_1	H_2	H_3	H_4	H_5	Θ
D_1	0.920	0.1564	0.414	0.1656	0.138	0.046	0.08
D_2	0.853	0.0	0.3156	0.307	0.2303	0.0	0.147
D_3	0.180	0.0234	0.0414	0.0774	0.0378	0.0	0.82
D_4	0.292	0.0496	0.114	0.073	0.0555	0.0	0.708
Synthesis of credibility	0.054	0.505	0.232	0.164	0.0158	0.029	

Table 4: Creative industry park comprehensive reliability distribution

		Basic probility assignment					
The first level index	Weight normalized value V_{ij}	H_1	H_2	H_3	H_4	H_5	Θ
A	0.92	0.031	0.346	0.420	0.083	0.013	0.107
B	0.32	0.039	0.109	0.104	0.017	0.033	0.698
C	0.19	0.047	0.049	0.061	0.02	0.001	0.822
D	0.55	0.0297	0.278	0.128	0.09	0.009	0.535
Synthesis of credibility		0.035	0.320	0.444	0.08	0.013	0.108

evaluation trust 50.5% (good) >23.2% (general) >16.4 (poor) >5.4% (good) >1.58% (difference), according to the principle of maximum membership grade, the Creative Industries Park competitivenessas well.

CONCLUSIONS AND IMPLICATIONS

The ability of D-S evidence theory with comprehensive index information, than the single index evaluation more comprehensiveinformation, has been applied in many areas.

The competitiveness of Creative Industry Park evaluation, using D-S evidence theory to build the competitiveness evaluation of Creative Industry Park model from four aspects of service environment, economic benefit, management innovation and social influence and verify the validity and feasibility of the method through the example analysis.

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