Multi-method Utilization Evaluation of E-commerce Incubation Center

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Abstract. This paper addresses the problem of inaccurate utilization rate of e-commerce incubation centers, Indicators based on service environment, service content, service capacity and social impact, develop outcome and condition variable indicators using fsQCA, and derive e-commerce incubation center assessment indicator values through questionnaires. On this basis, the expected value was calculated using linear weighting, the efficacy coefficient was obtained by the efficacy coefficient method, and the closeness was calculated using the TOPSIS method. Finally, the set of expectations, posting progress, and efficacy coefficients are integrated to measure the evaluation value of the utilization rate of the e-commerce incubation center. Further, the empirical analysis determined the problem of underutilization of M incubation centers, with a view to providing new ideas for effectively assessing the utilization status of e-commerce incubation centers.

Keywords: E-commerce incubation center · Utilization rate · Assessment

1 Introduction

Governments at all levels are concerned about the utilization rate of e-commerce incubation centers, as they can effectively support local enterprises and assist regional rural revitalization. Scholars have studied the status of e-commerce incubation centers from different perspectives, such as continuously improving their service capacity and improving the park's utilization rate of the park [1]. To achieve the integration of industry and education, and strengthen the establishment of a long-term operation mechanism and evaluation center for innovation and entrepreneurship, university and enterprise cooperation with e-commerce majors of local universities is carried out to achieve a win-win situation between universities and enterprisest [2, 3].

To improve the utilization rate of e-commerce incubation centers, it is suggested to broaden the channels of investment and financing and build a new comprehensive park development mode that combines "offline park" and "online park". An ecological quality area based on regional public brands should also be established. Additionally, the government should collaborate with e-commerce incubation centers to build a live streaming e-commerce base [4], open up the upstream and downstream industrial chain

and supply chain, and establish a local private traffic pool. The dissemination of digital information to every enterprise in the park and the training of local live streaming talent should be promoted to stimulate the vitality of the park and accelerate the precipitation of industrial clusters [5, 6], ultimately promoting local entrepreneurship and employment. This paper uses multiple methods to evaluate the utilization status of e-commerce incubation center from four aspects, namely, service environment and content, service ability, and social influence. The results of this evaluation will serve as a foundation for improving the utilization rate of the e-commerce incubation center.

2 M Incubation Center Utilization Assessment Process

In this paper, the evaluation indicators for the utilization rate of the e-commerce incubation center include service environment, service content, service system, and social influence. To obtain a understanding of the influence of the change of anthems, the fsQCA method is used in this paper. The data is imported into fsQCA 3.0 software, and the calibrate function in the software is used to calculate the anthems of calibration. Result variables and conditional variable indicators are developed to better ensure data accuracy. The G1 algorithm is used to avoid the loss of information in the data processing stage [7]. The result variable in this paper is the comprehensive score of the development quality of e-commerce incubation centers, which is a continuous variable with an interval of 0 to 1 [3, 8]. The result variables and antecedent conditions are described in Table 1.

Table 1. Result variables and antecedent condition indicators

	Indicators	Abbreviation
Result variables	E-commerce incubation center development quality	DQ
Antecedent conditions	Service capability	SA
	Service content	SC
	Service environment	SE
	Social impact	SI

3 Utilization Evaluation Process of M Incubation Center Based on FsQCA Data Model

In this paper, the data related to the utilization improvement of e-commerce incubation centers' antecedents were obtained through field survey and questionnaire survey. The expected value, closeness, and comprehensive value of each data were calculated using the fsQCA 3.0 software.

Table 2. Cronbach's α coefficient table

Cronbach's α coefficients	Standardize the Cronbach's α coefficient	Number	Number of samples
0.764	0.634	21	45

3.1 Analysis of Sample Characteristics

A total of 48 questionnaires were sent out, and all were completed by either the staff of M e-commerce incubation center or the staff of enterprises in M, ensuring the authenticity and validity of the data sources. The sample size is relatively large compared to the total number of employees in the e-commerce incubation center (63). After excluding invalid questionnaires due to answers not following instructions, containing unreal or illogical content, 45 valid questionnaires and 3 invalid questionnaires were issued.

3.2 Reliability Analysis

The reliability measurement results reflect the stability of the data, i.e., the consistency of the results after multiple measurements of the same target when each measurement method is the same. In this study, SPSS PRO was used to analyze the reliability of the recovered questionnaire data, and Cronbach's internal consistency coefficient (α coefficient) was used to determine the stability of the measurement results. The reliability range is 0–1. Generally, if Cronbach's α coefficient is above 0.9, the reliability of the test or scale is very good. Between 0.8 and 0.9, the reliability is good, between 0.7 and 0.8, the reliability is acceptable, between 0.6 and 0.7, the reliability is normal, between 0.5 and 0.6, the reliability is not ideal. If below 0.5, the questionnaire needs to be rearranged. The reliability measurement results of the questionnaire survey in this study are shown in Table 2.

The value of Cronbach's α coefficient of SPSSPRO's analysis data model is 0.764, indicating that the reliability of the questionnaire is acceptable.

3.3 Validity Analysis

Validity refers to the closeness between the measurement results and the target to be achieved, and it evaluates the validity of the measurement tools. The first is content validity. The scales used in this paper refer to the mature scales used in previous researches on e-commerce incubation centers. During the questionnaire design process, we discussed with the person in charge of e-commerce incubation centers, and modified and adjusted the scale items under their suggestions. Therefore, the final version of the scale has practicability and is good in content validity. Secondly, the first KMO and Bartlett test is carried out on the data; For the KMO test, 0.8–0.9 is more suitable; 0.7–0.8 is suitable; 0.6–0.7 is acceptable; 0.5–0.6 means poor; 0.5 should be abandoned. The KMO value test shows that there is a correlation between the variables of the item. For the Bartlett test, if the significance is less than 0.05 or 0.01, see Table 3 below. The result of KMO test shows that the value of KMO is 0.728. Passing KMO test (KMO > 0.6) indicates that the data is valid and reliable.

Table 3. KMO test and Bartlett test

KMO		0.728
Bartlett test for phericity	Approximate chi-square df p	158.756 36.000 0.000***

Note: ***, ** and * represent significance levels of 1%, 5% and 10% respectively

3.4   fsQCA Operation Method

fsQCA data model operation method: firstly extract the anthracal conditions, import excel table into FSQCA 3.0 software and use calibrate in the software to calculate the anthracal conditions, formulate the result variable and condition variable index, and get Table 1. Secondly, the data of each index in the questionnaire is calculated by linear weighted average method or by calculating its proportion, and its quality score value is obtained. Thirdly, variable calibration. Using fsQCA method can more fully discover the influence brought by the change of anthems and improve the accuracy of data.

Before using fsQCA for analysis, it is a key step to convert conventional variables into fuzzy variables, which is usually called data recalibration and set three critical values on this basis: Full membership, Ambiguity point and Non-membership, this paper decides to adopt the direct method to calibrate the data.The first step is to directly specify three important anchor points, and then convert each condition variable and result variable into fuzzy scores through the "Calibrate" function in fsQCA software. Since the data in this paper are from a questionnaire, there will be bias in the direct test data. Therefore, after considering the distribution of the scores of each variable in all samples, the results of the three anchor points selected in this paper are shown in Table 4:

It can be seen from the results of Table 4, the better e-commerce incubation center does in this respect and the higher utilization rate. The lower value of completely non-subordination is, the bigger problem of this index is, the lower utilization rate or development quality. Other indicators are not attached to the only value, indicating that other indicators have a great impact on the improvement of its utilization rate.

4   The Quality Assessment Process of e-commerce Incubation Center with Multiple Values

In this paper, the data of each index in the questionnaire is calculated by linear weighted average method or by calculating its proportion, and its quality score value is obtained respectively. The quality evaluation of service capability index. Service ability refers to the ability of e-commerce incubation center to provide site, financing, technical guidance and other aspects for enterprises to enter. Helping enterprises to obtain first-hand quality resources is a practical reflection of the service ability of the base. Whether enterprises can get long-term help after entering is also an important aspect that entrepreneurs pay attention to. This paper will reflect the service ability of the business incubator base through three indicators: incubation fund per unit area (incubation area/incubation fund), the number of service managers and the number of business mentors.

Table 4. Variable statistics and calibration anchor points

Variable	Minimum	Mean	Standard deviation	Median	Fully subordinated	Intersections	Compleun affiliatedtely
Unit Area Incubation Fund	2	3.4	0.370	3	4	2.5	1
Number of management and mentors	2	2.3	0.463	2.5	3	2	1
Quality of service personnel	2	2.2	0.400	2.5	3	2	1
Entrepreneurs hip education and training	2	3.1	0.500	3	4	2.5	1
Entrepreneurs hip exchange	2	3	0.048	3	4	2.5	1
Technology Innovation	1	2.6	2.147	2.5	3	1.5	0
Financing services	2	1.4	0.959	3	4	2.5	1

Table 5. Score of service ability and quality of M e-commerce incubation centers

Indicators	Quality
Incubation fund per unit area (years)	0.38
Number of service managers	0.35
Number of start-up mentors	0.36

According to the evaluation of their satisfaction in the questionnaire, the linear weighted average method is used to calculate their quality score. When the quality score is less than the unified standard value 0.5, it indicates poor development quality. The sorting results are shown in Table 5. We can see that the quality evaluation of service capability is poor.

Quality assessment of service environmental indicators. The service environment refers to providing basic space for the settled enterprises to carry out entrepreneurial activities and supporting the space of soft and hard facilities at their own control, which can reflect the cultural concept and service concept of the business incubation base.

It can be seen from Table 6: The score result of service environment quality is obtained according to the area utilization ratio. When the total incubation area is small, the total area utilized by the start-up station is small, and the other sites cover a large area, if the score of the start-up station area quality is less than 0.6, it indicates that the quality evaluation is low.The optimized ranking of service quality index is as follows:

Table 6. Evaluation of service environment quality of M e-commerce incubation center

Indicators	Quality
IArea of start-up station	0.525
Supporting recreational facilities and site area	0.20
Hardware facilities and floor area forentrepreneurial activities	0.233

supporting leisure and entertainment facilities and site area > entrepreneurial activity hardware facilities and site area > entrepreneurial workstation area.

The quality evaluation of service content index. Service content refers to the basic and key services provided by the business incubation base for the enterprises, including entrepreneurship education and training, entrepreneurship exchanges, technological innovation services and entrepreneurship financing services, and solving the problems of entrepreneurship introduction.The quality score of the service content is derived from the original data of the satisfaction score assigned by the researchers, and then calculated by the ratio value calculated by the fsQCA software. When the quality score is less than 0.5, the utilization rate of the service content is not high.

As shown in Table 7: It reflects that M e-commerce incubation Center the optimal ranking of service quality index is entrepreneurship education and training > entrepreneurship exchange > technology innovation service and venture financing service. Among them, the index service quality of solving the problem of introduction to entrepreneurship is > 0.6. The M incubation center has a better performance in solving the problem of introduction to entrepreneurship.

The quality evaluation of social influence index. Social influence refers to the agglomeration effect of the settled enterprises in the incubation of e-commerce, which is conducive to the sustainable development of the center and gives play to its demonstration effect. In this paper, the annual growth of the enterprises in the center, the number of honors, patents, social recognition or the number of featured enterprises reported by the media are taken as the measurement indicators.

As shown in Table 8: The annual number of enterprises settling in, the total number of honorary years and the total number of incubated featured enterprises should be greater than the average annual number, that is the quality score value should be greater than 1, it indicates that the development quality of the enterprise is qualified. The larger the value, the better the development quality, and the higher the utilization rate of e-commerce incubation center resources.

Table 7. Service quality evaluation of M e-commerce incubation center

Indicators	Quality
Entrepreneurship education training	0.42
Entrepreneurship exchange	0.53
Technology innovation services and start-up financing services	0.56
Address the introduction to entrepreneurship	0.87

Table 8. Social influence quality assessment of E-commerce Incubation Center

Indicators	Quality
The annual number of enterprises in the e-commerce incubation center	0.92
Number of honors won	0.88
Number of successful incubated businesses featured	0.90
Number of social recognition and media coverage	0.583

Table 9. Comprehensive evaluation scores of e-commerce incubation center personnel

Indicators(times)score	10	9	8	7	6	5	4	3	2	1	Average score
Service environment	2	3	4	10	13	9	2	0	0	0	6.325
Service capability	1	4	7	12	11	5	3	0	0	0	6.720
Service content	2	6	12	13	6	3	1	0	0	0	7.697
Social influence	1	5	7	8	9	8	4	2	0	0	6.558
Overall rating											6.825

In this paper, Comprehensive evaluation of development quality of e-commerce incubation center. Through the questionnaire, G1 algorithm, linear weighting method and efficacy coefficient method, the development quality of the incubation center is comprehensively calculated and evaluated. G1 method is used to screen out reasonable and effective data and determine the weight of each index. G1 algorithm can better avoid information loss in the process of data processing [7].Secondly, the linear weighting method is used to calculate the relationship between the measured value and the index weight vector to get the expected value. The efficiency coefficient method is used to calculate the coordination relationship between the weight of indicators and the four major aspects of indicators, and the efficiency coefficient is obtained to highlight the coordination level of development between indicators. TOPSIS method (also known as ideal solution method) is used to calculate the degree of closeness, which can comprehensively and objectively reflect the dynamic change of the development quality of e-commerce incubation centers. Finally, the three methods are combined to obtain a comprehensive value to measure the development quality of the e-commerce incubation center.

The result variable of this paper is the comprehensive score of the development quality of e-commerce incubation centers, which is a continuous variable ranging from 0 to 1 [3, 8]. Obviously, the higher the value is, the higher the development quality of e-commerce incubation center I is, and the comprehensive value greater than 0.7 means the development quality is high; otherwise, it is low. Finally, the comprehensive integration score evaluation results of the e-commerce incubation center are shown in Table 10 below:

It can be seen that the development quality of e-commerce incubation center in M city is not high, the utilization rate is not improved enough, and there is a lot of room

Table 10. Results of comprehensive evaluation of result variables

Expected value	Coefficient of efficacy	Degree of closeness	Composite value
0.35	0.042	0.23	0.622 (<0.7)

for improvement. It can be further optimized and improved from the four first-level and quantitative second-level indicators of service environment, service content, service ability and social influence.

5   Conclusions

In this paper, the evaluation of the utilization rate of e-commerce incubation centers is studied, Integrating the advantages and disadvantages of different evaluation methods, using a combination of fsQCA fuzzy analysis, questionnaire research, applying linear weighted average method, TOPSIS method and efficacy coefficient method. Based on the four indicators of service environment, service content, service capability and social influence, the expectation value, posting progress and efficacy coefficient of the e-commerce incubation center are calculated and obtained. Finally, the utilization rate of e-commerce incubation centers is evaluated by combining the combined values of the three, and the utilization status of M incubation centers is empirically analyzed by this integrated method.

The limitations of this paper are mainly in the simple optimization of the service environment, service content, service system, and social influence sub-indicators for the ranking of indicators without in-depth exploration; the strategies to enhance the utilization rate of incubation centers are not clearly proposed in the research, process to further deepen the strategy to enhance the research.

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