

Selection of Investment Mode for Cross-border O2O Channel Construction Based on Cloud Model

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Abstract: In the era of rapid development of the Internet, cross-border electronic commerce is becoming more and more prosperous, and many enterprises are beginning to invest abroad in the form of cross-border online-to-offline (O2O) to explore foreign markets. Under this background, this paper focuses on the choice of foreign investment mode of enterprises when they build cross-border O2O channels, and establishes an appropriate evaluation system of investment mode for cross-border O2O channel construction. On the basis of the evaluation system, Cloud Model is used to analyze and compare Greenfield investment, Joint Venture investment and Merger & Acquisition investment, so as to determine the best investment mode of cross-border O2O channel construction for enterprises. Moreover, cross-border O2O channel management proposals are put forward. This paper can provide guidance and reference for Sichuan-style enterprises or other types of domestic enterprises to choose the investment mode when constructing cross-border O2O channels.

Keywords: Online-to-offline, Cross-border, Foreign investment, Cloud Model, Szechuan sauce enterprises.

1. Introduction

With the acceleration of economic globalization, cross-border O2O, as a new economic growth mode, occupies an increasingly important position in the trade of various countries. At the same time, the Belt and Road Initiative proposed in 2013 has brought important opportunities for China to establish a wider range and higher level of cooperative relations with countries along the route, and created opportunities for the development of intra-regional trade. This not only strengthens the economic exchanges between China and neighboring countries, but also promotes the development of cross-border O2O mode. At present, enterprises in China generally have a strong awareness of going out. Opening up the international market and carrying out transnational marketing have increasingly become the consistent strategic choice of many enterprises in China. Exploring foreign markets and conducting marketing has increasingly become the consistent strategic choice of many enterprises in China.

In the past, there used to be obvious barriers between online sales and offline physical sales. Online sales focus on convenience and cost performance, while offline physical store sales focus on service and experience. Now, the new retail era comes and the boundaries between online sales and offline physical store sales gradually disappear. Online sales and offline sales merge into online to offline. Many enterprises have opened up online and offline channels and laid out O2O experience stores to achieve better development. Cross-border O2O Experience Store allows operators to make full use of data to mine customers' consumption behavior, fully understand customers' needs and abilities, and formulate better sales strategies. At present, some Szechuan sauce enterprises have used online to offline to achieve cross-regional cooperation, which has achieved the effect of online accumulation of attention and consumption flow, offline experience and guided purchase (163.com, 2015). However, at present, there are few studies on cross-border O2O, and the

existing studies mainly focus on O2O or cross-border e-commerce. With regard to O2O researches, Xu et al. (2018) model O2O supply chain with online subsidies service to analyze the influence of demand disruption on O2O supply chain performance and discuss the optimization of O2O supply chain with online subsidies service to face demand disruption. Lee et al. (2022) study the systematic method of defining O2O. Yao et al. (2022) summary and classify the literature on consumer behavior in O2O papers from 2015 to April 2022. With regard to cross-border e-commerce researches, Zhou et al. (2022) study the supply chain risk factors of B2C cross-border e-commerce and put forward avoidance strategies. Ma et al. (2019) propose a framework to investigate the sustainable development of the cross-border online purchase intention. Han and Kim (2019) establish a cross-border electronic commerce dedicated research model that theorizes links between different types of CBEC motivations, information technology use patterns, consumer informedness and purchase intentions. Xiao et al. (2019) analyze the online shopping context that determines consumers' purchase intention and innovatively identifies four cues that promote this consumption behavior in cross-border e-commerce, such as online promotion cues, content marketing cues, personalized recommendation cues, and social review cues. Mou et al. (2019) develop and test a model of the uncertainties and benefits influencing the repurchase intentions of buyers in cross-border e-commerce. Mou et al. (2020) investigate the impact of product description and involvement on purchase intention in a cross-border e-commerce setting from a psychological perspective. These studies all discuss the problems of O2O or cross-border e-commerce separately, but do not study the combination of the two. Tim (2019) select regional cross-border e-commerce experience stores as the research object and analyze the macro and micro environment of marketing and existing problems combined with field research. However, Tim's study only involves the marketing of cross-border O2O. At present, there is no research to discuss the investment mode of cross-border

O2O. The existing research can't guide Szechuan sauce enterprises to choose the investment mode of cross-border O2O channel construction.

To sum up, in view of the lack of current researches and practical needs, this paper focuses on the selection of foreign investment mode when Szechuan sauce enterprises construct cross-border O2O channels, and establishes an appropriate evaluation system of investment mode for cross-border O2O channel construction. On the basis of the evaluation system, it uses Cloud Model to analyze and compare Greenfield investment, Joint Venture investment and Merger & Acquisition investment, so as to determine the best investment mode of cross-border O2O channel construction for enterprises. Then, it puts forward cross-border O2O channel management proposals.

2. Evaluation system of investment mode for cross-border O2O channel construction

According to the characteristics of cross-border O2O channel construction and the actual situation of overseas investment of Sichuan-style enterprises, this paper divides the influencing factors of O2O channel construction investment mode evaluation into enterprise capability factors, host country-specific factors, industrial factors, control and risk factors.

2.1. Enterprise capability factors

Enterprise capability factors include technical capability factor, international operation capability factor and financial capability factor.

a. Technical capability. Technology plays an important role in the development of enterprises. The technological capability of an enterprise can come from its own. Moreover, it also can come from outside. For example, an enterprise can gain technological advantages through Joint Venture investment and Merger & Acquisition investment to ensure the new vitality of products and promote the continuous development of enterprises. In O2O model, when enterprises have obvious technological advantages, enterprises can better control overseas subsidiaries by choosing Greenfield investment. When the technical levels of enterprises are low, Joint Venture investment or Merger & Acquisition investment can enable the enterprises to quickly obtain the supports of advanced technologies.

b. International operation capability. International management ability factor has an important influence on investment mode. Generally speaking, an enterprise's international operation experience is directly proportional to its international operation ability. For an enterprise with high awareness of target market country, more international experience and certain cross-border O2O marketing experience, Greenfield investment should be adopted. Joint Venture investment or Merger & Acquisition investment is adopted for those with low awareness of the target market and weak experience in international operation. Joint Venture investment or Merger & Acquisition investment can enable an enterprise to quickly enter the target market and reduce business risks.

c. Financial capability. The cross-border O2O commodity sales and recovery cycle are long, so the capital requirements of enterprises are high. If the financial capacity of an

enterprise is relatively strong, it can choose to invest in green space. If the financial capacity of an enterprise is weak, it should choose Joint Venture investment in overseas countries with a high degree of economic development, while it should choose Merger & Acquisition investment in overseas countries with a low degree of economic development.

2.2. Host country-specific factors

a. Cultural distance. Cultural differences between the host country and the home country will affect foreign investment decision of an enterprise. When the social and cultural gap between the target market country and the home country is small, Greenfield investment can be adopted. In this way, the enterprise can control the O2O stores. When there is a big gap between the social culture of the target market country and that of the home country, Joint Venture investment or Merger & Acquisition investment enables the enterprise to make use of the channel resources and brand advantages of the host country's enterprise to quickly enter the local market.

b. Policy guideline. Market barriers are obstacles set by the host country of to prevent and restrict the import of various commodities. Greenfield investment can bypass the host country's trade protection and trade barriers, reduce expensive tariffs and transportation costs, and easily gain more international market share. Merger & Acquisition investment is easily restricted by local laws and policies. If the host country's policy of attracting foreign investment is strict, it will create obstacles to Joint Venture investment and Merger & Acquisition investment. On the contrary, if the host country's policy of absorbing foreign capital is relaxed, it will promote them.

c. Economic development level. To build a cross-border O2O experience store, it is necessary to choose the appropriate foreign investment mode according to the local economic development level. If the local economic development level is low, Greenfield investment can be adopted. If the local economy has a high degree of development and the local enterprises have a high operating efficiency, it is more favorable to choose Joint Venture investment or Merger & Acquisition investment. That will enable the enterprise to make full use of local capital markets, financial intermediaries and perfect infrastructure.

2.3. Industrial factors

a. Consumer market. In cross-border O2O mode, if the host country's consumer market is large, and the corporate brand has a certain recognition and popularity, Greenfield investment should be adopted. On the contrary, the enterprise should adopt Joint Venture investment or Merger & Acquisition investment, which will be more conducive to grasping market opportunities and entering the target market.

b. Industry competitors. In cross-border O2O mode, if the host country's market competition is small, an enterprise can choose to Greenfield investment into foreign market. On the contrary, Joint Venture investment or Merger & Acquisition investment will be more conducive for the enterprise to enter the host country's market quickly.

c. Speed Economy. Speed economy refers to the economy in which an enterprise quickly meets the needs of customers and brings excess profits. Joint Venture investment or Merger & Acquisition investment can enable an enterprise to quickly enter the host market, thus gaining speed economy. Relatively speaking, Greenfield investment has the characteristics of

long construction period and long investment return time.

2.4. Control and risk factors

a. O2O store management control right. Choosing Greenfield investment can make an enterprise gain complete control right. Such a simple ownership structure can effectively avoid disputes over ownership and control. Merger & Acquisition investment can make the enterprise have certain actual control right. Joint Venture investment may make the control right fall into the hand of partner. That is not conducive to the implementation of the enterprise's own marketing strategy of O2O.

b. Trade secret security. Choosing Greenfield investment will help an enterprise to take the initiative and avoid the leakage of important technologies and commercial secrets. Joint Venture investment may cause enterprises to lose control of stores and cause the leakage of trade secrets. Merger & Acquisition investment may also lead to low loyalty of former employees, thus revealing the business secrets of enterprises.

Therefore, the evaluation index system of investment mode for cross-border O2O channel construction set in this paper is shown in Figure 1.

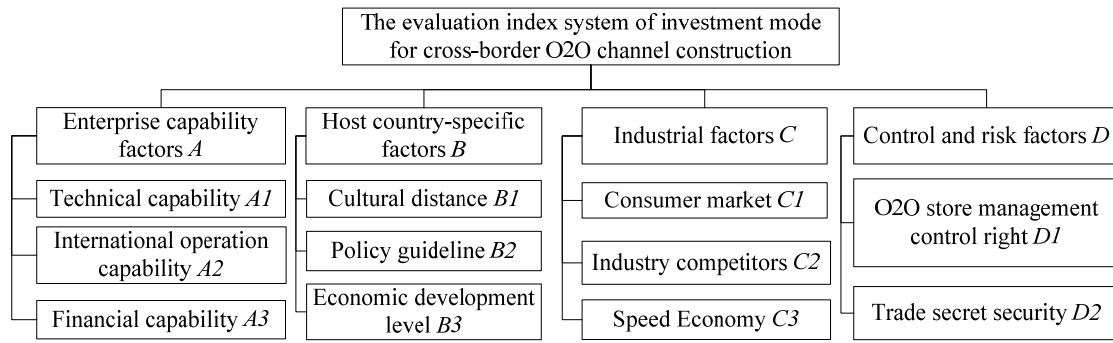


Figure 1. The evaluation index system of investment mode for cross-border O2O channel construction

3. Selection of Investment Mode for Cross-border O2O Channel Construction Based on Cloud Model

3.1. Define Cloud Model

Cloud model is an uncertainty transformation model between a qualitative concept expressed by linguistic values and its quantitative representation. It mainly reflects the fuzziness and randomness of concepts in the objective world or human knowledge. Cloud model has three digital characteristics: Expected value (Ex), Entropy en (En) and super entropy (He). Ex is the expectation of cloud droplets' spatial distribution in universe of discourse, which represents the point value of qualitative concept. It reflects the cloud center of the cloud droplet group. En is the degree of uncertainty, which is determined by the degree of dispersion and ambiguity. It reflects the uncertainty and fuzziness of cloud droplet distribution. He is the uncertainty measure of En. The larger He is, the greater the uncertainty of the model and the greater the thickness of the cloud.

The algorithm steps of forward cloud generator are as follows.

(1) Generate a normal random number \bar{En} with En as expectation and He^2 as variance

(2) Generate a normal random number x with Ex as expectation and En^2 as variance

(3) Calculate membership degree $y = \exp\left(-\frac{(x - Ex)^2}{2\bar{En}^2}\right)$

(4) Combine (x, y) to form cloud droplet

(5) Repeat steps 1~4 until N numbers of cloud droplet are generated

3.2. Data reduction

This questionnaire takes JD Company as the research object. According to the reality of JD Company, combined with 11

influencing factors of investment mode for cross-border O2O channel construction, Greenfield investment, Joint Venture investment and Merger & Acquisition investment are scored. The scoring range is 0~100. Taking Greenfield investment as examples, this paper shows evaluation scores, as shown in Table 1.

Table 1. Scores of Greenfield investment

Scorer Index	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
A1	94	88	79	85	86	96	83	89	90	92
A2	85	85	89	81	76	87	84	68	80	78
A3	90	75	95	70	88	65	81	85	80	86
B1	75	81	80	69	82	85	81	90	83	78
B2	85	89	88	95	91	89	89	87	90	92
B3	90	82	81	85	85	88	83	91	87	86
C1	92	88	90	86	87	81	90	92	85	95
C2	85	75	68	85	80	77	91	89	82	78
C3	88	75	72	79	70	85	78	90	80	82
D1	89	90	95	88	95	96	91	84	92	98
D2	89	92	93	85	90	90	95	88	90	95

3.3. Cloud model analysis and comparison of investment mode for cross-border O2O channel construction

3.3.1. Cloud atlas analysis and comparison of three investment modes of each index

According to the scores of the three investment modes, combined with the principle of Cloud Model, MATLAB software is used to calculate digital characteristic values and generate the cloud model diagrams of each index of the three investment modes. The digital characteristic values of each index of the three investment modes are shown in Table 2. In addition, taking technical ability, international management ability, financial ability and cultural distance as examples, this paper shows the cloud model diagrams, as shown in Figure

Table 2. The digital characteristic values of each index of the three investment modes

Mode Index	Greenfield investment			Joint Venture investment			Merger & Acquisition investment		
	<i>Ex</i>	<i>En</i>	<i>He</i>	<i>Ex</i>	<i>En</i>	<i>He</i>	<i>Ex</i>	<i>En</i>	<i>He</i>
<i>A1</i>	88.2	5.0133	1.2204	80.4	9.0239	0.6262	82.5	5.3893	2.3358
<i>A2</i>	81.3	5.8906	1.8800	90.5	3.1333	0.4879	85.4	5.9156	2.0398
<i>A3</i>	81.5	9.1492	1.6710	89.4	2.2560	0.5370	84.5	4.2613	1.1093
<i>B1</i>	80.4	4.9130	1.6710	89.6	4.2613	1.5977	86.2	4.7125	1.6239
<i>B2</i>	89.5	2.5066	1.1524	81.4	7.4196	2.7677	80.9	7.6452	1.5936
<i>B3</i>	85.8	3.2586	0.4752	80.6	7.4196	1.1992	82.9	5.1386	1.1182
<i>C1</i>	88.6	4.0106	0.6356	81.1	5.8906	1.2741	85.6	5.3642	1.9841
<i>C2</i>	81	6.7679	1.3233	87.6	3.7599	0.7576	84	4.7626	0.9345
<i>C3</i>	79.9	6.3919	1.4603	89.8	2.5568	0.9870	87.4	3.2586	0.3042
<i>D1</i>	91.8	4.2613	0.1392	72.8	7.7204	1.6719	85.3	5.9658	1.2376
<i>D2</i>	90.7	3.0581	0.6611	72.60	6.0159	1.0893	85.7	5.8154	1.5539

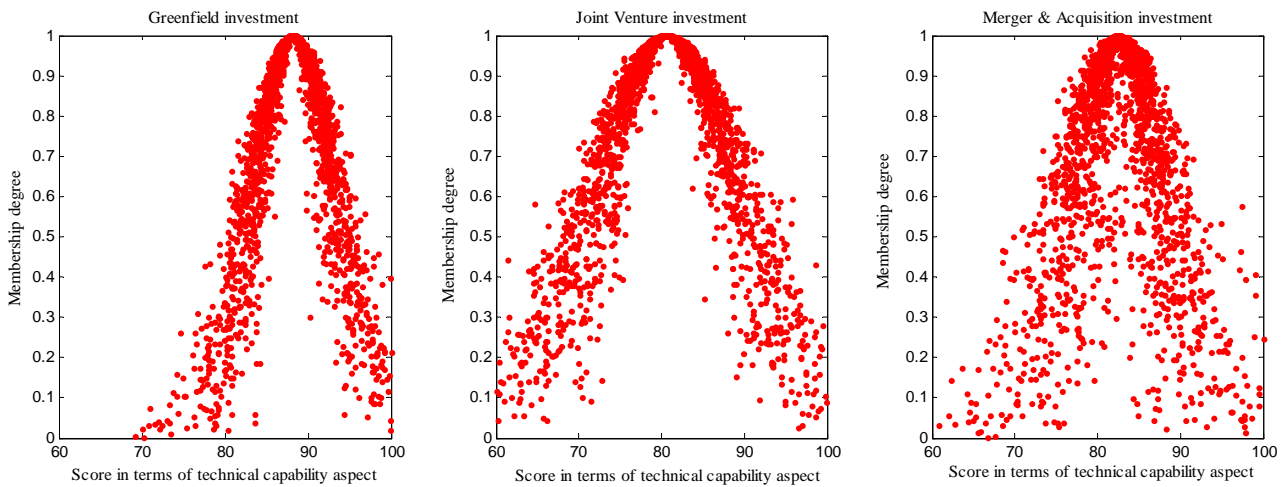


Figure 1. Evaluation cloud diagrams of the three investment modes in terms of technical capability aspect

From Figure 1, we know that the value *Ex* of Greenfield investment is the highest. That shows Greenfield investment is the final choice in decision-making in terms of technical capability aspect. The value *En* of Joint Venture investment is the largest, and the horizontal axis of cloud coverage is relatively large. It shows that the dispersion and ambiguity of Joint Venture investment are relatively high. The value *He* of

Merger & Acquisition investment is the largest, and the thickness of cloud drops is the largest. It shows that the randomness of the membership degree of Merger & Acquisition investment is large, and the uncertainty of choosing Merger & Acquisition investment is high. Therefore, in terms of technical capability aspect, *JD* Company has the ability to carry out Greenfield investment.

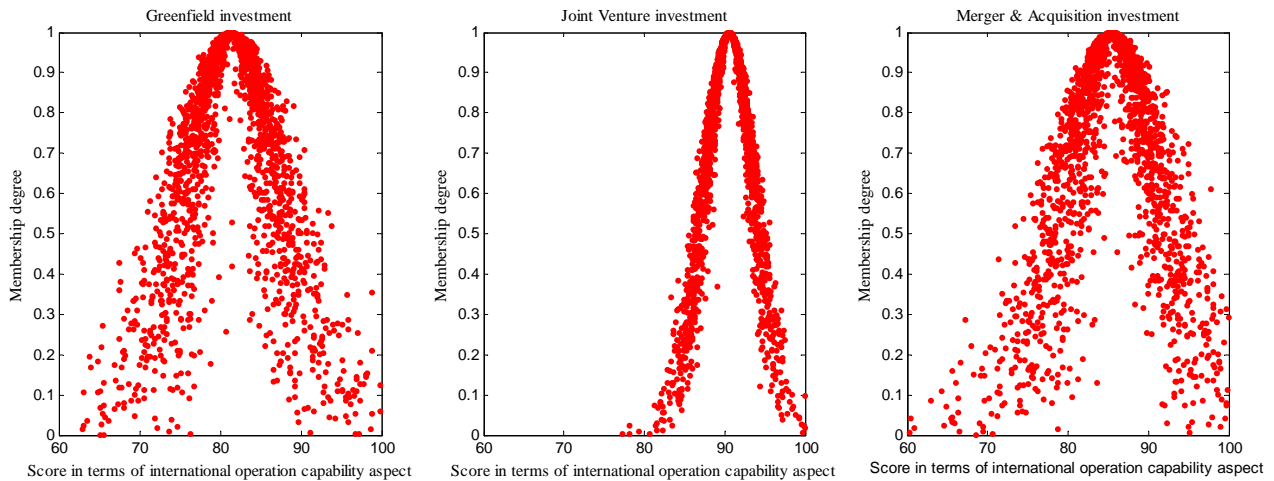


Figure 2. Evaluation cloud diagrams of the three investment modes in terms of international operation capability aspect

From Figure 2, we know that the value *Ex* of Joint Venture investment is the highest. That shows Joint Venture

investment is the final choice in decision-making in terms of international operation capacity aspect. The value *En* of

Merger & Acquisition investment is the largest, and the horizontal axis of cloud coverage is relatively large. It shows that the dispersion and ambiguity of Merger & Acquisition investment are relatively high. The value He of Merger & Acquisition investment is the largest, and the thickness of cloud drops is the largest. It shows that the randomness of the membership degree of Merger & Acquisition investment is

large, and the uncertainty of choosing Merger & Acquisition investment is high. Therefore, Joint Venture investment chosen by *JD* Company is more conducive to quickly entering the international market. In addition, *JD* Company should make full investigation and accurate positioning in foreign markets, and formulate appropriate internationalization strategies.

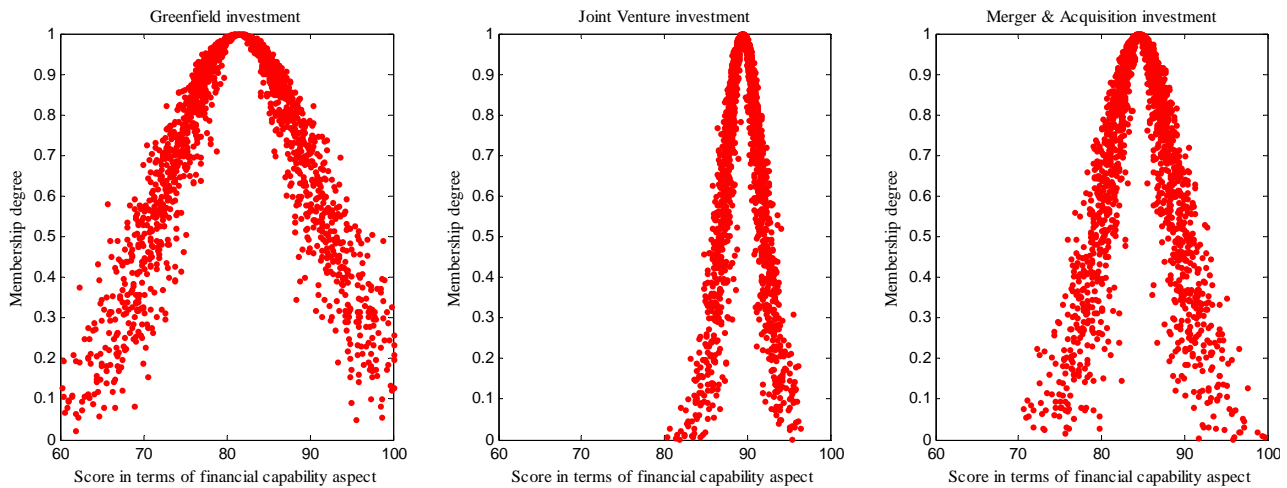


Figure 3. Evaluation cloud diagrams of the three investment modes in terms of financial capability aspect

From Figure 3, we know that the value Ex of Joint Venture investment is the highest. That shows Joint Venture investment is the final choice in decision-making in terms of financial capability aspect. The value En of Greenfield investment is the largest, and the horizontal axis of cloud coverage is relatively large. It shows that the dispersion and ambiguity of Greenfield investment are relatively high. The value He of Greenfield investment is the largest, and the thickness of cloud drops is the largest. It shows that the

randomness of the membership degree of Greenfield investment is large, and the uncertainty of choosing Greenfield investment is high. Limited by the development model and affected by the epidemic in 2020-2022, *JD* Company's business was affected for three consecutive years, and its capital capacity declined. Therefore, Joint Venture investment is more beneficial for *JD* Company to invest cross-border O2O channel.

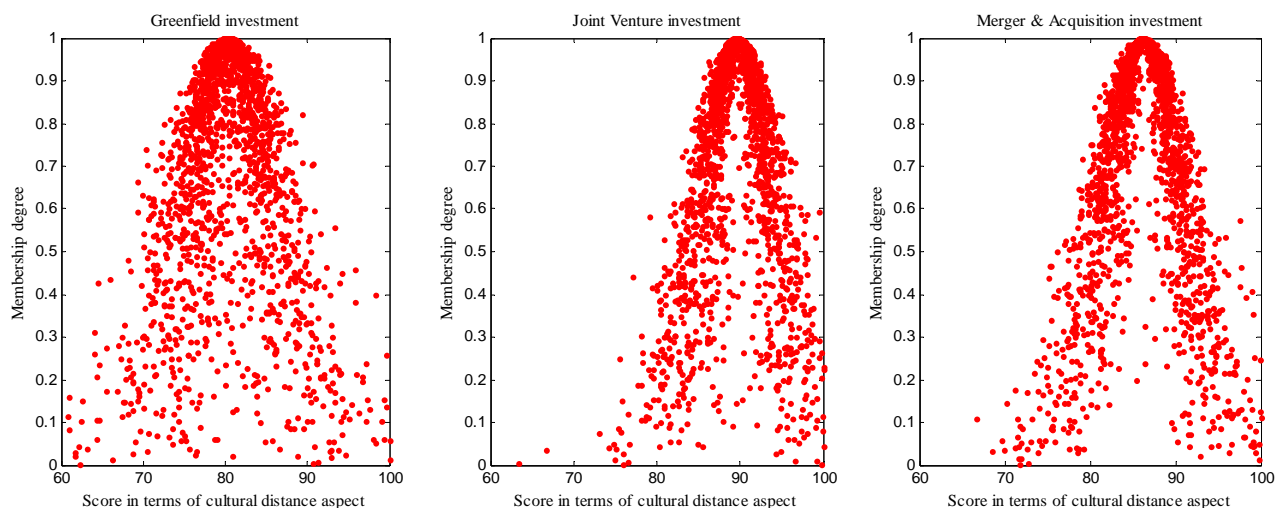


Figure 4. Evaluation cloud diagrams of the three investment modes in terms of cultural distance aspect

From Figure 4, we know that the value Ex of Joint Venture investment is the highest. That shows Joint Venture investment is the final choice in decision-making in terms of financial capability aspect. The value En of Greenfield investment is the largest, and the horizontal axis of cloud coverage is relatively large. It shows that the dispersion and ambiguity of Greenfield investment are relatively high. The value He of Greenfield investment is the largest, and the thickness of cloud drops is the largest. It shows that the

randomness of the membership degree of Greenfield investment is large, and the uncertainty of choosing Greenfield investment is high. *JD* Company prefers to invest cross-border O2O channel in countries with higher economic development level. Although China's traditional cuisine is getting more and more attention in high-end markets such as Europe and America, the local culture is quite different from that of China. Joint venture investment can enable *JD* Company to make use of the channel resources and brand

advantages of host country enterprises to enter the local market quickly.

3.3.2. Analysis and comparison of comprehensive cloud evaluation diagrams of the three investment modes

Table 3. The digital characteristic values

Mode Characteristic	Greenfield investment	Joint Venture investment	Merger & Acquisition investment
<i>Ex</i>	85.3364	83.25455	84.58182
<i>En</i>	5.0201	5.405209	5.293555
<i>He</i>	1.11723	1.181418	1.439536

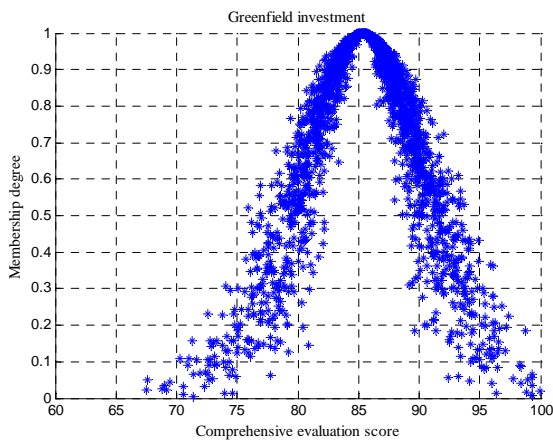


Figure 5. Comprehensive evaluation cloud diagrams of Greenfield investment

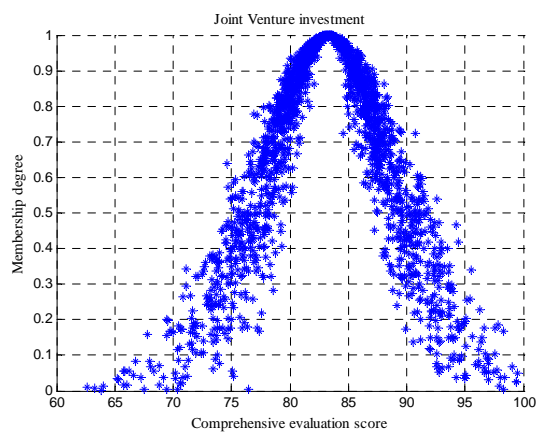


Figure 6. Comprehensive evaluation cloud diagrams of Joint Venture investment

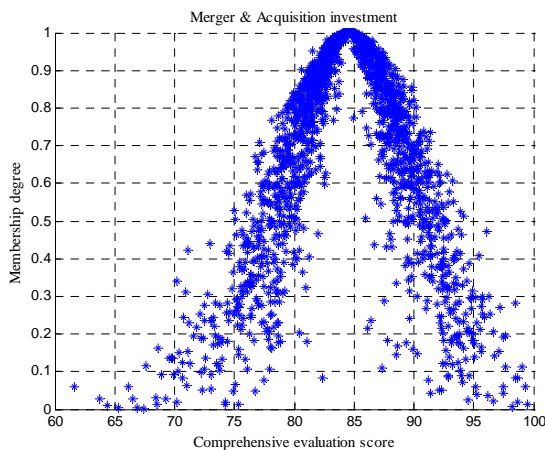


Figure 7. Comprehensive evaluation cloud diagrams of Merger & Acquisition investment

According to Table 3 and Figure 5~7, it can be seen that the value *Ex* of Greenfield investment is the highest, which shows that *JD* Company prefers to choose Greenfield investment mode when investing in cross-border O2O channel construction. *JD* Company is a Szechuan sauce enterprise with a long history, and its strength is relatively strong. In addition, the physical and online retail channels of *JD* Company in China are relatively perfect. *JD* Company's products not only sell well in the domestic market, but also export to dozens of countries such as the United States, Canada, Australia and Japan. *JD* Company is a national key leading enterprise of agricultural industrialization, which integrates research and development, professional production and brand marketing of Szechuan sauce, and has high requirements for the safety of important technologies and commercial secrets. Considering comprehensively, *JD* Company is more suitable to choose Greenfield investment as the foreign investment mode when constructing cross-border O2O channels.

In addition, for *JD* Company, although Joint Venture investment is not the best mode, Joint Venture investment in Cross-border O2O can reduce the cultural distance, absorb the operating experience of foreign enterprises, and obtain higher speed economy. It has great advantages for enterprises that are expanding their business abroad for the first time. Therefore, it is also possible for *JD* Company to invest overseas in Cross-border O2O as a Joint Venture. However, they need to avoid the problems of management control rights and trade secrets, and make relevant agreements and record them accordingly.

4. Suggestions on cross-border O2O channel management

4.1. Strengthen supply chain management measures

Szechuan sauce enterprises can adopt the demand-driven planning model based on real-time demand, and establish an adaptable and agile supply chain. This will help enterprises to adjust their supply chain to adapt to the changing market opportunities and meet the changing market demand. At the same time, Szechuan sauce enterprises should collect product information and form a product database, so as to provide product data support for product R&D and strategic decision. The business plans formulated by enterprises should be consistent with the supply chain strategies. That helps to build a sustainable supply chain.

4.2. Set up a special organization.

Szechuan sauce enterprises should set up special organizations to manage O2O channels, which centralized management and marketing for all sales channels. The interconnection of all data can realize the integration and unified management of order processes in different channels. At the same time, it helps to meet all customers' shopping needs and create a smart shopping experience. Specialized organizations communicate with customers through various channels and digitize customers and their behaviors..

4.3. Prevent channel associated risks

When O2O mode is applied to the terminal of the cross-border channel, it lurks great risks. The combination of online and offline services, the shortage of offline services and the impact of information asymmetry may cause certain business

risks. Szechuan sauce enterprises should guard against the joint risks of cross-border O2O channel. In addition, Enterprises should also do a good job in risk prevention and response mechanisms, such as accurately grasping the operating status of O2O stores, formulating emergency plans and clarifying remedial measures.

5. Conclusion

Nowadays, with the continuous development of Internet technology, the market competition is becoming increasingly fierce. If an enterprise wants to survive for a long time, it should be well prepared for internationalization in addition to managing domestic business. Cross-border O2O is conducive to the promotion of products by enterprises that are exploring overseas markets for the first time. As one of the traditional characteristic foods of China, Szechuan sauce has been loved by foreign consumers in recent years. Therefore, enterprises can promote Szechuan sauce to overseas markets through cross-border O2O channels.

Focusing on the selection of investment mode for cross-border O2O channel construction, this paper takes greenfield investment, joint venture investment and mergers and acquisitions as evaluation objects, and establishes an appropriate evaluation system for cross-border O2O investment mode. Taking *JD* Company as an example, the cloud model is used to analyze and compare these three investment modes, so as to determine the best investment mode of the enterprise. In addition, the evaluation index system and cloud model evaluation method of investment mode for cross-border O2O channel construction established in this paper are universal, and can also be used for reference by other types of enterprises. This paper is expected to provide reference for Szechuan sauce enterprises and other types of enterprises preparing to explore foreign market.

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