Research on Marketing value of Micro-electronic Commerce based on Fuzzy Comprehensive Evaluation

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Abstract

There are three big business tycoon Baidu, Alibaba, Tencent carve up the lion's share of the market in China. However, as there are still many gaps that cannot be taken care of by the giants in e-commerce, micro-e-commerce is looking for opportunities in such an environment and develops. Different from traditional e-commerce, micro-e-commerce is a business model that attaches more importance to social mobile social communication, mainly based on WeChat, weibo and other social media. This paper first analyzes the related research on the marketing value and the influencing factors of the marketing capability of micro e-commerce, and constructs an index system to evaluate the marketing capability of micro e-commerce from the three aspects of brand, timeliness and emotion. Secondly, this paper adopts the method of combination of ahp and fuzzy comprehensive evaluation to empower and evaluate the indicator system, and takes WIS skin care as an example for empirical research, so as to clarify the direction of merchants' efforts and help them improve their marketing competitiveness.

Keywords

AHP, Fuzzy comprehensive evaluation, Micro electronic business, Marketing value.

1. Introduction

Driven by the rapid development of information technology, Internet and social media marketing, thay have become the key development objects which people are more concerned. According to the statistics of CNNIC, as of December 2017, the number of Chinese netizens reached 772 million, exceeding the global average (51.7%) by 4.1 percentage points. The number of mobile Internet users is 753 million, and the usage rate of WeChat friend circle and weibo is 85.8% and 67.5% respectively [1]. It shows that the media platforms for information transmission based on social relations are becoming more and more common and the user scale is getting larger. Therefore, series of media platforms such as WeChat and weibo are not only good platforms for information dissemination, but also more convenient business opportunities for entrepreneurs and merchants. However, with the rapid increase of Internet users, the difficulty of positioning consumers' demands and preferences is further increased, and the production of products satisfying consumers has become increasingly a constraint on the development of many enterprises. Microe-commerce has made full use of the universality and convenience characteristics of emerging social media to solve this kind of big problem successfully for enterprise users.

Currently, there are two concepts for the frequent use of micro-e-commerce: one is the e-commerce behavior based on micro-platforms such as weibo and WeChat; The other is the individual e-commerce behavior based on the individual communication process such as interaction, sharing, comment and wom [2,3]. As for the research on the marketing value of micro e-commerce, some scholars believe that the value of "micro" marketing is mainly reflected in the accuracy of positioning, strong interactivity and low cost. Some scholars also pointed out that micro marketing has obvious disadvantages, such as information fragmentation and garbage information processing [4]. Relatively speaking, relevant research literature on online marketing and social media marketing is more extensive. The research results on WeChat and micro-blog marketing mode, communication mode and characteristics are more obvious [5]. Some scholars have studied the communication mode and

process of social software and explained the marketing value of microblog [6]. With the rapid development of social media, scholars pay more attention to the marketing value of social media. Lu qingyuan [7] proposed that WeChat platform has a very profound impact on the changes of consumers' lifestyle and new consumption environment based on joint relation and multi-function. Many domestic and foreign scholars have conducted extensive and in-depth research on the evaluation of marketing capability from different perspectives, including Vergani et al. proposed to identify influence from the three dimensions of social group identity, professional knowledge and social capital [8]. The influence identification system was constructed from the perspective of user influence and activity [9]. In addition, some scholars also try to explore new thinking direction theoretically. For example, ding hanqing and wang yaping [10] established a marketing value discrimination index system with centrality, activity, cohesion and infectivity as the main dimensions. Yang changchun, wang tianyun and ye shiren [11] established an evaluation index system of influence of opinion leaders on weibo based on media influence, and applied the analytic hierarchy process to give weight to each evaluation index on the basis of expert group decision. Xiao liyan, qi jiayin and he enfeng et al. [12] respectively evaluated and studied the social influence and potential influence of online public opinion. The four dimensions of celebrity, fan, microblog content and platform promotion are also commonly used in the impact evaluation system [13].

To sum up, the research on the influence of social media platforms such as weibo and WeChat has been basically mature. However, the research on the marketing capability of micro-e-commerce of social media platforms is relatively weak at present. Most of the research is still in the stage of theoretical exploration, lacking in-depth empirical analysis. The evaluation results can provide references for merchants to improve brand image and influence, increase sales volume, and provide certain reference for relevant government agencies to supervise and promote wechat business content. Therefore, it is very necessary to use qualitative and quantitative methods to construct the index system of micro-e-commerce marketing capability and make scientific evaluation on it.

2. The Evaluation Index System of Micro-E-commerce Marketing Capability

2.1 Evaluation Indicator System

The evaluation of marketing performance is the last stage, but it is also a crucial stage, which can help micro-e-commerce merchants to analyze the existing problems and reasons in the marketing process and improve their brand awareness and competitiveness. This chapter follows the establishment principle of certain evaluation indexes. Through the analysis of influencing factors of micro-e-commerce marketing performance, it constructs a micro-e-commerce enterprise marketing performance evaluation index system with three levels of indicators and weight values. This article mainly from the brand, timeliness, emotion three main aspects to analyze.

(a) Brand: Compared with taobao, the brand trend of wechat business is more obvious. This paper expounds the marketing capability of micro-e-commerce from two secondary indicators of credibility and originality. Original quality is measured by the number of original articles published, the content richness and the reliability of the content. Credibility ensures the integrity and authenticity of the information provided.

(b) Timeliness: Timeliness refers to the reaction speed, promotion degree and activity of wechat business within a certain period of time, reflecting the value of wechat business marketing through social media platforms. Therefore, the usefulness of marketing strategies through social media platforms is very important. It's measured by time.

(c)Affective: Whether the marketing method can be deeply rooted in people's mind is generally reflected through emotional indicators, which is the core condition representing the degree of user approval. Satisfaction and repurchase rate become one of the dimensions to measure marketing capability. The satisfaction lies in the number of complaints and the return and exchange of goods. User loyalty can reflect customers' buyback and trust of the brand.

Based on the relevant research results at present, this paper attempts to build an indicator system of WeChat public account's marketing capability, which is divided into 3 primary indicators, 7 secondary indicators and 12 tertiary indicators by observing the operation of key WeChat and micro-blog merchants. They are shown in Table 1.

Table 1. Microelectronics Marketing Performance Evaluation Index System

First-level indicators	Secondary indicators	Third-level indicators	Explanation of indicators
Brand	Originality	Original article release	The number of original articles posted on social media platforms.
		Content richness	The richness of content posted on social media platforms, including images, videos, text, etc.
	Credibility	Rating	The average number of times the social media platform publishes content.
		Content reliability	Whether the release of social media platform content is professional and reliable.
Timeliness	Promotion degree	Views	The amount of page views posted by social media platforms.
		Subscription/Amount of Attention	The number of followers or followers of social media platforms.
	reaction speed	The average time for responding to and resolving problems	The average time to resolve and respond to an unexpected situation on social media platforms.
	Activity	Content update frequency	The average cycle of content updates on the WeChat public platform.
		Information volume	The cumulative total of articles posted on social media platforms.
Affective	Attractive	User loyalty	Number of times the same user visited the e-commerce website.
	Customer satisfaction	complaint rate	The number of complaints made by customers due to dissatisfaction in the entire online shopping process.
		Return of goods	The number of the received product‘ returns or exchanges due to dissatisfaction with the size, quality, color, style, etc.

2.2 The Weight of the Evaluation Index.

In this paper, the expert consultation method is adopted to make a unified score for the established indicator system. The results are tested and the weight of each level is calculated by the analytic hierarchy process (ahp) to obtain a reasonable indicator system. In this calculation process, a number of experts were consulted, including doctoral students and teachers of the university, and eight expert evaluation forms were collected. As show in Table 2.

Table 2. Expert Consultation Rating Standard

Scaling	meaning
1	Indicates that two elements are of equal importance
3	Indicates that the former is slightly more important than the latter
5	Indicates that the former is significantly more important than the latter
7	It means that the former is more important than the latter
9	It means that the former is more extremely important than the latter
2,4,6,8	Indicates the median value of the above adjacent judgment
reciprocal	If the ratio of the importance of element i to element j is a_{ij}, then the ratio of the importance of element j to element i is $a_{ji}=1/a_{ij}$

Then, build the judgment matrix. In this paper, the arithmetical average of the expert score was integrated, and the grade was subdivided according to the importance of the index, and the judgment matrix A was constructed by using the average value. The root method is used to calculate the geometric average of the index score of the interval judgment matrix. And the weight of each tertiary indicator is obtained. In this paper, the weight of the three-level index obtained by the score is pushed up to the second-level and first-level index, so as to establish the weight of each level and the overall index.

2.3 Consistency Check.

First, the largest characteristic root is computed: $\lambda_{\max}=\sum_{i=1}^{n}\frac{(AW)_i}{nw_i}$

Then, the formula was calculated according to the proportion of consistency index: $CR=\frac{CI}{RI}$, with $CI=\frac{\lambda\max-n}{n-1}$.

If CR<0.1, the judgment matrix P_i passed the consistency test. Otherwise, P_i needs to adjust the pairwise comparison value. By comparison, all judgment matrices have passed the consistency test. Then, the weight value of the whole index system is established. As shown in Table 3:

Table 3. Random Uniformity Indicators *RI*

Index index	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.38	1.41	1.46	1.49

3. Performance Evaluation of Micro-E-commerce Marketing

3.1 The Method of Fuzzy Comprehensive Evaluation

This paper USES the fuzzy comprehensive evaluation method to define the performance evaluation and improvement direction of micro-e-commerce marketing. Fuzziness is derived from fuzzy mathematics, a term coined in 1965 by L.A. Zadeh in the journal of information and systems. The membership theory of fuzzy comprehensive evaluation method turns qualitative evaluation into quantitative evaluation, weakens the uncertainty in factors, and makes a quantitative evaluation on things or objects restricted by various factors.

3.2 Evaluation Steps

3.2.1 Establish Factor Set, Weight Set and Comment Set

(i) establish factor sets

As can be seen from the index system established in this paper, the first-level indicator brand C_1 is evaluated by two second-level indicators original quality C_{11} and credibility C_{12}, so the second-level

assessment factor set $F=(C_{11},C_{12})$ can be established. Similarly, the evaluation factor sets of secondary indicators C_{11} and C_{12} are $F_1=(C_{111},C_{112})$ and $F_2=(C_{121},C_{122})$, respectively.

(ii) establish weight set

The weight set of secondary indicators $W_1=(w_{11},\ w_{12})=(0.5,\ 0.5)$; The weight set of the three-level index $W_{11}=(w_{111},\ w_{112})=(0.6,\ 0.4)$, $W_{12}=(w_{121},\ w_{122})=(0.3,\ 0.7)$. The specific weight value is indeed calculated through the analytic hierarchy process. However, due to the time relationship, it will be modified through subjective assignment.

(iii) establish comment set

Set up comment set $E=(E_1,\ E_2,\ E_3,\ E_4,\ E_5)$ =(very good, good, general, bad, very bad)

3.2.2 First Order Fuzzy Evaluation

A fuzzy evaluation relationship can be established between the tertiary index and the comment set E, so that each secondary factor set can form a fuzzy evaluation matrix with the comment set, as shown in Table 4 and Table 5.

Table 4. Fuzzy evaluation matrix A_{11}

C_{11}	E_1	E_2	E_3	E_4	E_5
C_{111}	e_{111}	e_{112}	e_{113}	e_{114}	e_{115}
C_{112}	e_{121}	e_{122}	e_{123}	e_{124}	e_{125}

Table 5. Fuzzy evaluation matrix A_{12}

C_{12}	E_1	E_2	E_3	E_4	E_5
C_{121}	e_{211}	e_{212}	e_{213}	e_{214}	e_{215}
C_{122}	e_{221}	e_{222}	e_{223}	e_{224}	e_{225}

3.2.3 Two-level Fuzzy Evaluation

The second-level fuzzy comprehensive evaluation is a comprehensive evaluation of the secondary indicators. In the first-level fuzzy comprehensive evaluation, this study has drawn the fuzzy evaluation matrix A_{11} and A_{12} formed by the fuzzy evaluation of all three-level indicators, and from the above section, we can obtain the order of the importance of the three-level indicators relative to the secondary indicators. , which is the set of weights. Therefore, this study can use the fuzzy evaluation matrix and the weight set to perform the secondary fuzzy comprehensive evaluation. The specific process is as follows:

The original quality C_{11} second-order fuzzy evaluation matrix is A_{11}, the weight set is $W_{11}=(w_{111},\ w_{112})=(0.6,\ 0.4)$, and the evaluation result set of each factor of C_{11} can be obtained according to the formula $r_{11}=W_{11}*A_{11}$.

$$r_{11}=(0.6,\ 0.4)\begin{pmatrix} e_{111}e_{112}e_{113}e_{114}e_{115} \\ e_{121}e_{122}e_{123}e_{124}e_{125} \end{pmatrix}=(r_{111},r_{112},r_{113},r_{114},r_{115})$$

The second-level fuzzy evaluation matrix of the reliability C_{12} is A_{12}, and the weight set is $W_{12}=(w_{121},\ w_{122})=(0.3,\ 0.7)$. According to the formula $r_{12}=W_{12}*A_{12}$, the evaluation result set r_{12} of each factor of C_{12} can be obtained.

3.2.4 Three-level Fuzzy Evaluation

First, the evaluation results set r_{11}, r_{12} of the second-level indicators obtained above are combined into the fuzzy evaluation matrix A_1 of the first-level evaluation indicators, ie,

$A_{11} = (r_{11}, r_{12})^T$.

Next, according to the weight set $W_1 = (w_{11}, w_{12}) = (0.5, 0.5)$ of the first-class index brand C_1, the evaluation result set r1 for each factor of the first-level index C_1 can be calculated, ie,

$r_{11} = (W_1, W_2) * A_{11}$.

Finally, the percentile system evaluation is used to determine the specific value NV of the marketing performance index C_1 of the microelectronics business enterprise. The result can be obtained by the weighted average method. According to the same method, the evaluation results of C_2 and C_3 can be obtained.

4. Empirical Research

4.1 Research Object

One of the keys to verifying the evaluation model constructed above is to select representative objects in the industry, and also to consider whether the actual data of the object can be collected. Therefore, the object chosen for this article is the WIS skin care brand that is primarily marketed through the Weibo social media platform. Because it is a relatively mature and successful brand made by microelectronics. Due to the time, this article only evaluates the brand in the evaluation index, and the rest will be revised and improved in the future.

4.2 Performance Evaluation Procedure

The qualitative indicator data in the evaluation indicators were obtained through the results of the 30 questionnaires designed, and the quantitative data were obtained through the official Weibo of WIS skin care.The results of data collection and collation of all indicators are shown in Table 6.

Table 6. WIS skin care micro-electronics marketing performance evaluation index data

First-level indicators	Secondary indicators	Third-level indicators	Rating				
Brand	Originality	Original article release	10	15	5	0	0
		The Content richness	5	18	5	2	0
	Credibility	Rating	4	15	8	3	0
		Content reliability	3	10	12	4	1

Three levels of fuzzy evaluation of WIS skin care marketing performance

The first-level evaluation results are as follows:

$$A_{11} = \begin{pmatrix} 0.33 & 0.5 & 0.17 & 0 & 0 \\ 0.17 & 0.6 & 0.17 & 0.06 & 0 \end{pmatrix}$$

$$A_{12} = \begin{pmatrix} 0.13 & 0.5 & 0.27 & 0.1 & 0 \\ 0.1 & 0.33 & 0.4 & 0.13 & 0.04 \end{pmatrix}$$

The secondary evaluation results are as follows:

$$r_{11} = W_{11} * A_{11}$$

$$= (0.6,\ 0.4) \begin{pmatrix} 0.33 & 0.5 & 0.17 & 0 & 0 \\ 0.17 & 0.6 & 0.17 & 0.06 & 0 \end{pmatrix}$$

$$= (0.266, 0.54, 0.17, 0.024)$$

In the same way, $r_{12} = W_{12} * A_{12} = (0.115, 0.415, 0.335, 0.115, 0.02)$

The three evaluation results are as follows:

$$r_1 = W_1 * A_1 = (0.5,0.5) \begin{pmatrix} 0.266 & 0.54 & 0.17 & 0.024 & 0 \\ 0.115 & 0.415 & 0.335 & 0.115 & 0.02 \end{pmatrix}$$

$$= (0.1905,0.4775, 0.2525,0.0695,0.01)$$

Finally, a percentage system evaluation is used to determine the specific value NV_1 of the brand performance index C_1 of the micro-electronics business marketing performance. The following results are obtained by the weighted average

$$NV_1 = (0.1905,0.4775, 0.2525,0.0695,0.01) * \begin{pmatrix} 100 \\ 80 \\ 60 \\ 40 \\ 20 \end{pmatrix} = 75.38$$

According to the same method, the specific evaluation result values NV_2 and NV_3 of the time-based C_2 and the affective C_3 can be obtained, and finally the total performance score of the WIS skin care can be obtained.

4.3 Analysis of Comprehensive Evaluation Results

In this paper, the weighted average method is used to determine the specific results of the evaluation object, each evaluation element is assigned, and r is used as a weight. Then, the weighted average of each evaluation element is weighted, and the weighted average value is used as the evaluation result. This article's review set $E = (E_1, E_2, E_3, E_4, E_5)$ = (very good, good, average, poor, very poor), the corresponding rating of the rating (100,80,60,40,20).

4.3.1 Analysis of Secondary Fuzzy Evaluation Results

After the weighted average of the calculation result of the second-level fuzzy evaluation, the specific results of the WIS skin care brand secondary indicators evaluation can be obtained, as shown in Table 7.

Table 7. Weighted average results of secondary fuzzy evaluation

First-level indicators	Secondary indicators	WIS skin care
Brand	Originality	80.96
	Credibility	69.8

From Table 7, we can see that WIS skin care brand has better originality, but its credibility is low. In the future development, it should pay attention to strengthening credibility and take corresponding measures to win the trust of customers while continuing to maintain originality.

4.3.2 Analysis of Evaluation Results of Three-level Indicators

After the weighted average of the calculation results of the first level fuzzy evaluation, the specific evaluation results of the WIS skin care brand index can be obtained, as shown in Table 8.

Table 8. Level 1 fuzzy evaluation weighted average results

First-level indicators	WIS skin care
Brand	75.38

From Table 8, we can see that WIS skin care brand marketing performance is generally effective, so you can adopt customer feedback, celebrity recommendations and other measures to improve the current status.

5. Conclusion

This paper builds a microelectronics marketing evaluation index system and evaluates it based on numerous domestic and foreign microelectronics marketing related research literature. Through the AHP method and fuzzy comprehensive evaluation method, it effectively evaluates the microelectronics business marketing performance. WIS skin care, for example, conducted case studies and concluded. It will provide theoretical support for the improvement of internal marketing influences and the analysis of the advantages and disadvantages of external benchmarking competitors. Ultimately, it will achieve real-time marketing benefits.

The inadequacy of this paper lies in that, because the paper is in the operational exploration stage, the index weight can not be truly assigned through the analytic hierarchy process, so the accuracy of the empirical analysis results requires further practice. At the same time, there are certain flaws in the evaluation methods. Afterwards, the Vague set evaluation methods based on multi-objective fuzzy decision-making proposed by relevant scholars will be explored and implemented. There are other deficiencies in thesis writing. In the future learning and practice will be combined with the suggestions given by the teacher to further modify.

References

[1] Information on http://www.cnnic.net.cn.
[2] Li Xinfu: Research on the status of microblog marketing in Chinese enterprises (Inner Mongolia University 2014).
[3] Wu Yongyi:The feast of microelectronics (Shanghai Information Technology) vol. 06 (2013), 38-43.
[4] Wang Heqin: Marketing Value Exploration of Weibo, Journal of Ningbo Radio & TV University, 10.1 (2012), 4-6.
[5] Yu Yunbao: Research on E-commerce Enterprise Network Marketing Performance Evaluation, (Liaoning University 2014).
[6] Li Dejun: Research on marketing value and utilization strategy of Weibo, (Xiangtan University 2011).
[7] Lv Qingyuan: Wechat Marketing Value in the Age of Big Data (Modern Economic Information) vol 20 (2013), 279-279.
[8] Vergani, Matteo: "Are Party Activists Potential Opinion Leaders." (Javnost - The Public) 18.3 (2011), 71-82.
[9] Liu Zhiming, Liu Lu: Identification and Analysis of Opinion Leaders in Weibo Internet Public Opinion (Systems Engineering 2011).
[10] Ding Hanqing, Li Yafei: Research on the Evaluation Index System of Blog Marketing Value (International Press) vol 8 (2010), 93-98.
[11] Yang Changchun, Wang Tianyun, Ye Shiren: Research on the Evaluation Index System of Weibo Opinion Leaders' Influence Evaluation——Based on Media Influence Perspective (Journal of Information) vol 8 (2014).
[12] Xiao Lijun, Qi Jiayin: Research on Evaluation of Social Impact of Public Opinion Based on Weibo (Journal of Information) vol 5 (2013).