

The Research on Internet Marketing Performance Evaluation of Commercial Banks

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Abstract - With the further development of the Internet marketing in many segments of society, its performance evaluation has also become an important topic in the field of business and academia. In this paper, a performance evaluation index system of commercial banks containing four dimensions was established, including the website performance, the bank performance, the customer relationship performance and the social impact performance. Meanwhile, the system was evaluated by the comprehensive use of the Improved Hierarchy Analysis Method and Fuzzy Comprehensive Evaluation Method.

Index Terms - Commercial Banks, Internet Marketing, Improved Hierarchy Analysis, Fuzzy Comprehensive Evaluation

1. Introduction

With the extensive development of Internet, the network technology has penetrated into different social industries and fields. According to the data issued by China Internet Network Information Center (CNNIC) in the 31th survey report, the number of net users in China have reached 564 million and the Internet penetration rate was up to 42.1% by the end of December 2012. The increasing number of netizens and the excellent characteristics of the Internet make the enterprises use network as a necessary platform and tool for achieving the purpose of marketing. For commercial banks, the Internet marketing is also a valuable and potential field, which is one of the most important ways to expand bank business areas, promote the online financial services, and improve the core competitiveness. Therefore, only by carding and evaluating the ideas throughout the Internet marketing implementation process, can commercial banks better understand the operation effect of the Internet marketing, and constantly adjust or improve their marketing direction and strategy.

2. Constructing Performance Evaluation Index System of Commercial Banks

2.1 Characteristics of Internet Marketing Performance

Different kinds of effective acts are put into practice in order to implement a special goal, is called Performance. A scientific evaluation plays the role of guide of preceding operation, controller of ongoing actions and estimator of afterwards. Traditional evaluation system places emphasis on current financial results, values the result of the evaluation -- such as the growth in corporate profits -- with the characteristics of simplicity and passivity. Internet marketing performance differs from traditional system with multi

objectives, it pursues the expanded marketing scale, the promoted product sales, meanwhile, it tries to improve the satisfaction of the consumers, to increase the level of service, to enhance the image of corporate and so on. It's obviously doesn't work to evaluate corporate performance with financial data simply while the Internet marketing performance shares so many new characteristics [1]. Thus, to evaluate the performance with multi-angle is necessary.

2.2 Establishing Evaluation Index System

To evaluate the effect of commercial banks' Internet marketing performance comprehensively, this dissertation bonds qualitative and quantitative analysis together with the principles of feasible, scientific and systematic. Take the characteristics of commercial banks into consideration, four aspects of performance evaluation -- website performance, bank performance, customer relationship performance and social impact performance -- are constructed specifically [2-4], shown as Table 1.

3. Establishing the Fuzzy Synthetic Evaluation Model

As the target of the Internet marketing performance evaluation of commercial banks is fuzzy and subject to a variety of uncertainties, it is difficult to get an absolutely affirmative or negative answer. In this case, the Fuzzy Comprehensive Evaluation is a reasonable choice, which evaluate the performance by the theories of fuzzy sets and fuzzy logic. Then this paper ascertained the weight of all levels of index by the method of The Fuzzy Comprehensive Evaluation combined with The Analytic Hierarchy Process [5]. The specific process can be divided into four steps: setting up the factor sets, ensuring evaluation sets, confirming weight coefficient, and establishing fuzzy synthetic evaluation model.

3.1 Constructing Fuzzy Factor Set

According to the performance evaluation index system that has been established above, all the factors will be set into four layers. Factor set of the Main criterion layer can be denoted by $X = \{X_1, X_2, X_3, X_4\}$; Set of sub-criteria layer can be denoted by $X_1 = \{X_{11}, X_{12}, X_{13}\}$, $X_2 = \{X_{21}, X_{22}, X_{23}\}$, $X_3 = \{X_{31}, X_{32}, X_{33}, X_{34}\}$, $X_4 = \{X_{41}, X_{42}, X_{43}\}$; and we denote elements layer by $X_{ij} = \{X_{ij1}, X_{ij2}, \dots, X_{ijp}\}$ ($i=1,2,3,4$; $j=1,2,3,4$; $p=1,2,3,4,5,6$).

TABLE 1 Internet Marketing Performance Evaluation Index System of Commercial Banks

Main criterion layer	Sub-criteria layer	Elements layer
Website performance (X ₁)	Website functions (X ₁₁)	Link validity (X ₁₁₁)
		Speed of webpage downloading(X ₁₁₂)
		Content integrity(X ₁₁₃)
		Function comprehensiveness(X ₁₁₄)
		Service effectiveness(X ₁₁₅)
		Safety and reliability(X ₁₁₆)
	Website promotion (X ₁₂)	Ranking and number of search engine(X ₁₂₁)
		Number of links to other sites(X ₁₂₂)
		Number of registered users(X ₁₂₃)
	Site throughput (X ₁₃)	Number of unique visitors(X ₁₃₁)
		Number of repeat visitors(X ₁₃₂)
		Access time(X ₁₃₃)
		page views(X ₁₃₄)
Bank performance (X ₂)	Financial effect (X ₂₁)	Proportion of e-commerce bank revenue(X ₂₁₁)
		Sales rate of well-known brand(X ₂₁₂)
		Profit ratio of sales(X ₂₁₃)
		Business growth rate(X ₂₁₄)
		Sales growth rate(X ₂₁₅)
	Competitive Effect (X ₂₂)	Growth of business consulting(X ₂₂₁)
		Product popularity(X ₂₂₂)
		Brand cognition(X ₂₂₃)
		Market share(X ₂₂₄)
	Service effect (X ₂₃)	Speed of market expansion (X ₂₂₅)
		Efficiency of complaints reply (X ₂₃₁)
		Degree of personalization services(X ₂₃₂)
		Speed of service response(X ₂₃₃)
Customer relationship performance (X ₃)	Customer satisfaction (X ₃₁)	
	Customer permeability (X ₃₂)	
	Old customer retention (X ₃₃)	
	Degree of new customer acquisition (X ₃₄)	
Social impact performance (X ₄)	Economy impact (X ₄₁)	
	Degree of competitor imitation (X ₄₂)	
	Degree of customer influence (X ₄₃)	

3.2 Selecting Evaluation Set

In this paper, we make certain the ranks of evaluation by the evaluation set: $V=\{V_1, V_2, V_3, V_4\}=\{ \text{Excellent, Good, Medium, Poor}\}$. Correspondingly, establishing the score set:

$K=\{100,75,50,25\}$. When evaluate specifically, make certain that different level of performance belong to different score range previously(see Table 2).

TABLE 2 Ranks of the Internet Marketing Performance

Score	>85	61-85	36-60	<35
Rank	Excellent	Good	Medium	poor

3.3 Confirming the Weight of Index by the Improved AHP Method

In order to overcome the subjectivity and the large computing of analytical hierarchy process (AHP), this paper puts forward a new method of weight value determination for the comprehensive evaluation of commercial banks' Internet marketing performance. A new 0-1 scale rule for constructing the fuzzy judgment matrix is introduced and the matrix we construct avoid consistency check [6].

(1) Constructing complementary judgement matrix

Complementary judgement matrices $F=(f_{ij})_{n \times n}$ are constructed in this paper, while the valuation of "f_{ij}" is determined by the rule of 0-1 scale, shown as Table 3.

(2) Building fuzzy consistent matrix

Make summation of complementary judgment matrix

according to the row, it can be denoted by $A_i = \sum_{j=1}^n f_{ij}$, then

using the conversion formula $A_{ij} = (A_i - A_j) / 2n + 0.5$ to transform fuzzy judgment matrix $F=(f_{ij})_{n \times n}$ into fuzzy consistent judgment matrix $A=(A_{ij})_{n \times n}$.

(3) Calculating the weight of index

Through root method, the weight vector of main criteria layer factor is:

$$W=(W_1, W_2, \dots, W_n)$$

TABLE 3 Assignment of the Relative Importance of Attribute

Criticality class	Valuation of f _{ij}
j is more important than i	0
j as important as i	0.5
i is more important than j	1

3.4 Building Fuzzy Evaluation Model

Invite experts to evaluate the different factors in the evaluation index by interviewing or questionnaire survey. Then through the data statistics, we can obtain the degree of membership which is about grade normalization. Finally, we can build a single factor fuzzy evaluation matrix:

$$R = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1n} \\ r_{21} & r_{22} & \dots & r_{2n} \\ \dots & \dots & \dots & \dots \\ r_{m1} & r_{m2} & \dots & r_{mn} \end{bmatrix}$$

r_{ij} represents the frequency distribution of the factor X_i,

and $r_{ij} = P_{ij} / \sum_j P_{ij}$ (P_{ij} means its indicator for j th dimension).

According to the index weight and the single-factor judgment matrix above, we can make following comprehensive judgments:

$$B_i = W_i * R_i, (i=1,2,3,4)$$

$$B = W * R = W * \begin{bmatrix} B_1 \\ B_2 \\ \dots \\ B_i \end{bmatrix} = W * \begin{bmatrix} W_1 * R_1 \\ W_2 * R_2 \\ \dots \\ W_i * R_i \end{bmatrix} = (b_1, b_2, \dots, b_i)$$

4. Application Example

N Bank is one of the earlier representative banks which make efforts to carry out online marketing and have achieved certain results. Now we apply the fuzzy comprehensive evaluation model to evaluating the Internet marketing performance of N bank. Specific evaluation process is as follows:

The first step: calculating the fuzzy weight vectors

(1) Building priority judgment matrix

By using 0-1 scale method, we can build pairwise comparison judgment matrix according to Table 4:

TABLE 4 The Judgment Matrix under General Objective Layer

	X ₁	X ₂	X ₃	X ₄
X ₁	0.5	0	0	1
X ₂	1	0.5	1	1
X ₃	1	0	0.5	1
X ₄	0	0	0	0.5

Then the complementary judgment matrix under the general objective tier is: $F =$

$$F = \begin{bmatrix} 0.5 & 0 & 0 & 1 \\ 1 & 0.5 & 1 & 1 \\ 1 & 0 & 0.5 & 1 \\ 0 & 0 & 0 & 0.5 \end{bmatrix}$$

(2) Building fuzzy consistent matrix

By using the conversion formula $A_{ij} = (A_i - A_j) / 2n + 0.5$, we can build a fuzzy consistent matrix as follows:

$$A = \begin{bmatrix} 0.500 & 0.250 & 0.375 & 0.625 \\ 0.750 & 0.500 & 0.625 & 0.875 \\ 0.625 & 0.375 & 0.500 & 0.750 \\ 0.375 & 0.125 & 0.250 & 0.500 \end{bmatrix}$$

(3) Determining the weight of each index

Through root method and normalization processing of data, the weight vector of main criteria layer factor is:

$$W = (0.2169, 0.3527, 0.2854, 0.1450)$$

Similarly, the weight vector of sub-criteria layer factor is:

$$W_1 = (0.3348, 0.4543, 0.2109),$$

$$W_2 = (0.4429, 0.3515, 0.2056),$$

$$W_3 = (0.2169, 0.2858, 0.3627, 0.1450),$$

$$W_4 = (0.3348, 0.2109, 0.4543)$$

The weight vector of index layer factor is:

$$W_{11} = (0.2113, 0.1550, 0.1207, 0.1516),$$

$$W_{12} = (0.3348, 0.2109, 0.4543),$$

$$W_{13} = (0.2854, 0.3527, 0.2169, 0.1450);$$

$$W_{21} = (0.1556, 0.2012, 0.1094, 0.2879, 0.2488),$$

$$W_{22} = (0.1110, 0.2863, 0.2009, 0.2009, 0.2009),$$

$$W_{23} = (0.2109, 0.4543, 0.3348)$$

The second step: fuzzy comprehensive evaluation

The jury consists of 20-person such as bank staff representatives, user representatives and experts. Then we build a fuzzy evaluation matrix of each factor according to the scores given by the jury. This article only take website performance for an example (Table 5) and give a specific evaluation process. The rest are directly given evaluation results (Table 6).

TABLE 5 The Results of Website Performance Evaluation (Unit: person)

	Excellent	Good	Medium	Poor
Link validity	10	4	4	2
Speed of webpage downloading	3	5	9	3
Content integrity	4	7	7	2
Function comprehensiveness	7	4	5	4
Service effectiveness	2	5	6	7
Safety and reliability	10	7	2	1

According to Table 5, we can obtain a membership matrix as follows:

$$R_{11} = \begin{bmatrix} 0.50 & 0.20 & 0.20 & 0.10 \\ 0.15 & 0.25 & 0.45 & 0.15 \\ 0.20 & 0.35 & 0.35 & 0.10 \\ 0.35 & 0.20 & 0.25 & 0.20 \end{bmatrix}$$

$$B_{11} = W_{11} * R_{11} = (0.3386, 0.2680, 0.2524, 0.1411)$$

According to Table 6, we can calculate:

$$B_{12} = W_{12} * R_{12} = (0.4881, 0.2560, 0.2105, 0.0454)$$

$$B_{13} = W_{13} * R_{13} = (0.3582, 0.2860, 0.2491, 0.1067)$$

$$B_1 = W_1 * R_1$$

$$= W_1 * \begin{bmatrix} B_{11} \\ B_{12} \\ B_{13} \end{bmatrix} = (0.4106, 0.2663, 0.2327, 0.0904)$$

$$\text{Similarly, } B_2 = (0.3383, 0.3286, 0.2114, 0.1235)$$

$$B_3 = (0.2252, 0.3037, 0.3574, 0.1141)$$

$$B_4 = (0.1909, 0.3440, 0.4335, 0.0316)$$

In terms of the whole bank level, the matrix is as follows:

$$B = W * R = (0.3003, 0.3102, 0.2899, 0.1003)$$

Finally, the evaluation result:

$$Z = B * K^T = 70.3$$

TABLE 6 Data Samples

	Excellent	Good	Medium	Poor
Links validity	0.50	0.20	0.20	0.10
Speed of webpage downloading	0.15	0.25	0.45	0.15
Content integrity	0.20	0.35	0.35	0.10
Function comprehensiveness	0.35	0.20	0.25	0.20
Service effectiveness	0.10	0.25	0.30	0.35
Safety and reliability	0.50	0.35	0.10	0.05
ranking and number of search engine	0.60	0.20	0.20	0.00
number of links to other sites	0.5	0.25	0.25	0.00
Number of registered users	0.40	0.30	0.20	0.10
Number of unique visitors	0.55	0.30	0.15	0.00
Number of repeat visitors	0.15	0.25	0.40	0.20
Access time	0.45	0.35	0.10	0.10
page views	0.35	0.25	0.30	0.10
Proportion of e-commerce bank revenue	0.35	0.25	0.25	0.15
Sales rate of well-known brand	0.40	0.30	0.15	0.15
Sales profit	0.35	0.30	0.20	0.15
Business growth rate	0.35	0.45	0.10	0.10
Sales growth rate	0.20	0.30	0.30	0.20
Growth of business consulting	0.30	0.30	0.20	0.20
Product popularity	0.20	0.35	0.30	0.15
Brand cognition	0.55	0.30	0.10	0.05
Market share	0.35	0.35	0.20	0.10
Speed of market expansion	0.20	0.30	0.40	0.10
Efficiency of complaints reply	0.65	0.15	0.15	0.05
Degree of personalization services	0.50	0.30	0.15	0.05
Speed of service response	0.15	0.45	0.25	0.15
Customer Satisfaction	0.25	0.3	0.35	0.10
Customer Permeability	0.25	0.2	0.35	0.20
Old customer retention	0.20	0.35	0.35	0.10
Degree of new customer acquisition	0.20	0.40	0.40	0.00
Economy impact	0.10	0.40	0.50	0.00
Degree of competitor imitation	0.10	0.35	0.40	0.15
Degree of customer influence	0.30	0.30	0.40	0.00

5. Results Analysis

According to the overall score of N bank, we can conclude that its Internet marketing performs well. By deep analysis, we find that N bank attaches more importance to the website maintenance and high grade profit than the customer relationship management and social influence. Analyzing the

defects of it's current Internet marketing strategies, there are two main reasons: first, the financial industry competition is so intense that N bank has to focus their attention on the pursuit of the diversity of products/services to gain comparative advantage, but not on the implementation of the customer-orientation idea, thus avoiding the phenomenon of homogeneity[7]; Second, the commercial bank Internet marketers, are generally guested by the network technicians, or by the traditional marketing personnel who are familiar with financial market proficiency, lacking interdisciplinary talents who are familiar with financial knowledge and also mastering computer network technology as well[8].

As to the existing problems in N bank, in combination with the practical situation of commercial banks, this paper puts forward the following improvement countermeasures:

(1) To improve customer service of the online bank.

In network services, the bank should overall plan a series of comprehensive customer service programs such as online financial management, online payment, online customer service and call center, dealing with complaints and so on. In addition, they also have to maintain close contact with customers through the establishment and implementation of Customer Relationship Management (CRM) system, thus making customers enjoy more convenient and flexible online financial services.

(2) To strengthen the talent team construction.

on the one hand, we have to strengthen the training management for the bank staff and carry on dynamic professional skills training for the relevant personnel to improve their technology skills and comprehensive ability to handle business; On the other hand, we must bring along outstanding talents from those in the society in line with the bank work to our advantage.

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