Analysis of mobile terminal examination product market

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Abstract

This article mainly focuses on the market share and development trend of the mobile end product, establishes a reasonable mathematical model, estimates the reasonable price range of the mobile end product, and predicts the potential market share of the mobile end product. By comprehensively considering the main factors affecting the mobile terminal's product and the product's reasonable pricing model, the specific analysis of the feasibility of the product launch of the mobile terminal, provides a good proposal for the formal launch of the product.

Select Qingdao as the research object, fully consider the economic and social conditions and the characteristics of postgraduate education, and evaluate the feasibility of launching the product of the postgraduate entrance examination. This is a question about the establishment of an evaluation model. The AHP is used to determine the level of the factors that affect the product of the postgraduate entrance examination. An expert survey method is used to obtain a judgment matrix, and then the impact coefficient of each level factor on the product placement is calculated to determine the product launch. Conduct feasibility analysis.

At the same time, in the end, the paper evaluates the advantages and disadvantages of the model, improves and popularizes each model, and analyzes the application prospects of some models in other fields.

Keywords

Mobile product, mathematical model, influencing factors.

1. The establishment and solution of mobile product model

From the problems to be solved and the assumptions made on the issues, based on the overall analysis of the problems, the problems are analyzed and solved in detail. Thus, Model I, Model II, Model III and Model IV and Model V were established for the problem.

Model I-PCA

Based on the needs of the problem, this model uses SPSS to extract a number of major components that are of great relevance to mobile research products from a number of related issues, and to derive important factors that affect the product development of the products.

Model II, III - neural network model and regression model

Through the use of regression models and neural network models from the two major aspects of the payment capabilities and benefits of students and product suppliers, using MATLAB programming to identify the factors and weights related to the reasonable price of the product, to establish a reasonable postgraduate products Price model.

Model IV - Grey Prediction Model

Under the premise of obtaining data and changes in previous years, this model firstly calculates the function of the occupancy rate change over time, and at the same time uses MATLAB to solve, and obtains the correlation coefficient in the function, and infers the future market. Share.

Model V-level analysis model

This model divides the influencing factors of the feasibility of product launch into a hierarchical structure, uses the expert research method to obtain the scale between the two, and obtains the

response weights through the judgment matrix and programming using MATLAB, and finally puts forward the Suggest.

1.1 Analysis of the model

Data mining based on data, to identify the main factors affecting the development of mobile products. The principal component analysis method is used to extract the major components that have a great influence on the development of the product. Then, based on the correlation between each factor and the principal component, the main factors affecting the product development of the graduate students are extracted.

1.2 Solution to the model

The development of mobile-phone products involves many factors, and the analysis is becoming more complicated under the influence of gender, age, number of postgraduates, reasons for the postgraduate study, the city where the students are studying, and the type of postgraduate students. Therefore, we adopt the master The component analysis method finds out the main factors that affect the development of the product for the mobile terminal. Principal component analysis, also known as principal component analysis, was first proposed by Holtelling in 1933. Principal component analysis is a multivariate statistical analysis method that uses dimensionality reduction ideas to convert multiple indicators into a few comprehensive indicators.

The data is imported into SPSS, and the character type data is converted into numeric values using the automatic encoding function. Assume that there are 23 indicator variables for principal component analysis: $x_1, x_2, x_3 \cdots x_{23}$, The value of the j indicator of the i evaluation object x_{ij}. Convert each indicator x_{ij} into standardized indicator x_{ij}

$$x_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j}, \ (i = 1,2,...,p) \tag{1}$$

Among them: $\bar{x}_j = \frac{1}{n}\sum_{i=1}^{n} x_{ij}$, $s_j = \frac{1}{n-1}\sum_{i=1}^{n}(x_{ij} - \bar{x}_j)^2$, ($j = 1,2,...,p$), which is $\bar{x}_j$, s_j the sample mean and sample standard deviation for the j indicator.

Calculate the correlation coefficient matrix R

$$R = (r_{ij})_{p*p} \tag{2}$$

In the formula: $r_{ij} = 1$, $r_{ij} = r_{ji}$, r_{ij} It is the correlation coefficient between the i index and the j index.

2) Calculate eigenvalues and eigenvectors

Calculate the eigenvalues of the correlation coefficient matrix R Characteristic value $\lambda_1 \geq \lambda_2 \geq ... \geq \lambda_P \geq O$, Corresponding feature vector $u_1, u_2, ..., u_p$ Among them: $u_j = (u_{1j}, u_{2j}, ..., u_{np})^T$, m new indicator variable consists of eigenvectors

$$\begin{cases} y_1 = u_{11}x_1 + u_{21}x_2 + ... + u_{n1}x_n \\ y_2 = u_{12}x_1 + u_{22}x_2 + ... + u_{n2}x_n \\ .... \\ y_m = u_{1m}x_1 + u_{2m}x_2 + ... + u_{nm}x_n \end{cases} \tag{3}$$

Among them: y_1 Is the first principal component, y_2 Is the second principal component..., y_m Is the m principal component.

Select $p(p \leq m)$ component and calculate the comprehensive evaluation value

Calculate the variance contribution and cumulative contribution of the eigenvalue $\lambda_j (j=1,2,...,m)$
Said:

$$b_j = \frac{\lambda_j}{\sum_{k=1}^{m} \lambda_k} \quad (j=1,2,...,m) \tag{4}$$

Information contribution rate for main component y_j;

$$\alpha_p = \frac{\sum_{k=1}^{p} \lambda_k}{\sum_{k=1}^{m} \lambda_k} \tag{5}$$

Calculate the composite score;

$$z = \sum_{j=1}^{p} b_j y_j \tag{6}$$

Among them b_j The information contribution rate for the j principal component can be evaluated based on the overall score.

1.3 Results of Principal Component Analysis

By extracting 9 principal components with a eigenvalue greater than 1, it is shown that there are 9 factors that have a large correlation with product development, and then 8 factors with the greatest correlation with 9 principal components are found according to the component matrix, thus determining the impact Eight main factors in product development: gender, age range, reasons for graduate school entrance examination, type of candidates, reasons for selecting online channels to find out about postgraduate studies, type of postgraduate tutoring classes, average time spent per day, and average length of time spent on the PC each day.

2. Mobile product reasonable price range

This article deals with two aspects that are most closely related to prices: candidates themselves and Kaoyan products themselves. Regression model and neural network model were established separately, and coefficients and weights related to candidates themselves and the product itself were determined. Finally, a two-factor model was integrated to establish a reasonable price range for the postgraduate products; and the potential market share of the products for mobile appraisal was predicted. Using the grey prediction model, we collected the data of previous years to obtain the market share of the mobile terminal's products in the past 4 years. Then the gray prediction model was used to solve the relationship between market share and time, thereby achieving a market share of the product. prediction.

2.1 Solution to the model

The price of the mobile terminal examination product is related to the student's ability to pay and the profitability of the mobile terminal examination product. We will consider these two aspects comprehensively to obtain a relatively compromised and reasonable standard for the development of the mobile terminal examination product. The regression model and the neural network model are used to estimate the reasonable price range of the product.

2.2 The feasibility of putting mobile products into the market

According to the requirements of the topic, Qingdao was selected as the research object, and the economic, social conditions, and characteristics of postgraduate education were fully taken into account to evaluate the feasibility of launching the product of the postgraduate entrance examination. This is a question about the establishment of an evaluation model. The AHP is used to determine the

level of the factors that affect the product of the postgraduate entrance examination. An expert survey method is used to obtain a judgment matrix, and then the impact coefficient of each level factor on the product placement is calculated to determine the product launch. Conduct feasibility analysis.

The development of the mobile terminal product involves many factors. Compared with the general evaluation process, the analytic hierarchy process has higher objectivity. When there are multiple factors, the scale workload is too large, which may cause confusion in judgment. For such problems, in the case of too many factors, we can appropriately eliminate the next factor, so as to reduce the scale of work, try to avoid confusion, to identify the main factors affecting the development of mobile products.

(1) Constructing a judgment matrix

Let us now compare the magnitude of the influence of the factors on a certain factor. We use an expert survey method to compare the factors using 1 to 9 digits and its reciprocal scale to compare the factors and establish a judgment matrix. The results are shown in the table:

Table 1 Evaluation results

A	B1	B2
B1	1	4
B2	1/4	1

B1	C1	C2	C3
C1	1	2	4
C2	1/2	1	2
C3	1/4	1/2	1

B2	C4	C5	C6
C4	1	3	1
C5	1/3	1	1/3
C6	1	3	1

(2) Total sorting of weights

Using MATLAB software to solve the program, the maximum eigenvalues of the judgment matrix A and the corresponding eigenvectors are obtained. The vectors are normalized to obtain the weights. The results of the AHP are shown in the table below:

Table 2 Total weight results

	B1	B2	W
	0.8	0.2	
C1	0.5715		0.4572
C2	0.2857		0.2286
C3	0.1428		0.1142
C4		0.4286	0.0857
C5		0.1429	0.0286
C6		0.4286	0.0857

That is, the same level of the corresponding factor for the relative importance of the level of the order of the weight. Select the first three with the highest weight: the price of the product on the mobile end of the postgraduate exam> quality> the duration of the lecture.

(3) Model consistency test

Consistency check on the judgment matrix: calculation of consistency index $CI = \dfrac{\lambda_{max} - n}{n-1} = 0.019525$。

The RI value of the average random agreement index varies with the value of n, as detailed in the following table:

Table 3 Indicators

n	1	2	3	4	5	6	7	8	9
R I	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

For this research question n=3,RI=0.58.

$$CR = \frac{CI}{RI} = 0.017 < 0.10 \tag{6}$$

Therefore, although the judgment matrix is not strictly consistent with the matrix, it is acceptable to check the consistency ratio of the test and obtain the consistency of the matrix. Can more truly reflect the impact of each element on the mobile end of the product.

3. Evaluation and Promotion of Models

The advantages of the model:

1) Use a variety of mathematical software such as SPSS, MATLAB, make each other to learn from each other and make the final result more accurate.

2) Conduct a tangible analysis of the problem and solve the problem with an accurate and appropriate model.

3) Establish a model in relation to reality to make the results more persuasive and versatile.

Disadvantages of the model:

1) The consideration of the factors affecting the desired object is not too comprehensive and will cause deviation from the actual situation.

2) The collected data cannot be guaranteed to be completely accurate, and it also has an impact on the solution results.

4. Improvement of the model

Analytic hierarchy process has high objectivity. When there are many factors, it is easy to cause confusion in judgment. Given this situation, we can sieve out some minor factors to avoid confusion. Gray prediction refers to the use of the GM model to estimate the development and change of the system behavior characteristics. It can also estimate the time when the abnormal behavior of the behavior features occurs, and study the future time distribution of events occurring in a specific time zone. and many more. However, the requirements for relevant data are relatively rough, which leads to less accurate results. The main advantage of neural networks lies in its powerful nonlinear simulation capabilities. Therefore, we should continue to test the neural network model in practice to improve the model.

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