

An Empirical Study on Evaluating Marketing Ability of Food Processing Enterprises in Saudi Arabia

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Abstract
Marketing ability plays a significant role for increasing the competitiveness of food processing enterprises in the Kingdom of Saudi Arabia. A good marketing ability helps enterprises to survive and sustainably develop in the ever-changing market with intense competition. The objective of this research attempts to identify the marketing ability of Saudi food processing enterprises. Specially, this research mainly builds the evaluation index system of marketing ability and empirically analyzes the evaluation process of the marketing ability based on the improved gray correlation. The gray correlation improved algorithm is based on the slope similarity between two vectors. In addition, according to the existing research and previous literature of marketing ability, this study considers the evaluation index system of marketing ability consisting of timeliness of marketing concept, utilization of marketing information, marketing strategy, marketing profits and marketing implementation.
Keywords: marketing; marketing ability; gray correlation analysis; evaluation index system
DOI: 10.7176/JESD/13-6-02
Publication date: March 31st 2022

1. Introduction

The marketing ability is crucial to the sales of enterprise products and the establishment of enterprise brand. The excellent marketing ability can help to improve the brand effect of enterprises and increase the market share of enterprise products, thereby bringing more profits and better enterprise image. The marketing ability initiatively guides the mass consumption concept with certain marketing methods to adapt to the changes in the market and strive to realize the competitive advantage of enterprise products. Either way, the marketing ability is the comprehensive reflection of the enterprise decision-making ability, adaptability, competitiveness, and sales ability. It is necessary to implement the evaluation of the enterprises marketing ability and find out the deficiencies to improve, thus ensuring the efficient marketing ability, which means that a set of scientific and feasible marketing ability evaluation index system shall be developed. This research will comprehensively consider the impact factors of marketing to build a set of marketing ability evaluation index system. According to the improved gray correlation, this research will also give a comprehensive evaluation method of marketing ability and empirically analyze the effectiveness and operability of this method.

2. Evaluation Index System of Marketing Ability

Based on the different scholars' studies on the evaluation index system of marketing ability, this research designs a system that can be roughly evaluated from the following aspects.

(Index 1) Timeliness of marketing concept: There must be guiding role and practical significance of marketing concept for any company. The performance of enterprises marketing ability will be influenced by the contemporaneity and traceability of the enterprises marketing concept. Due to repaid changes of customer demands for products, it is necessary for the enterprises to follow the changes of marketing concept timely. Therefore, the enterprises marketing concept can keep pace with the times.

(Index 2) Utilization of marketing information: In current information explosion era, any activity cannot be separated from the collection, organization and use of relevant information. Similarly, as an enterprise, it is important to timely recognize the customer's demand and organize the useful information for their product marketing. For the marketing activities, only the marketing strategy guided by the correct and relevant information and started from the customer demands can be accepted by the public. This can present the effect of product sales and corporate brand building. In a word, the efficient use of marketing information is a key for the enterprises to enhance their marketing ability.

(Index 3) Marketing strategies: Marketing stagey mainly refers to the main directions and approaches of enterprises marketing. On the other hand, the marketing strategy is the marketing plan of the enterprises developed based on their own product characteristics and product market share in the whole industry. Scientific marketing strategy should clarify the advantages of enterprises, and focus on the penetration ability and stress the main tasks in marketing activities.

(Index 4) Marketing benefits: Marketing benefits mainly refer to the profits of product sales and other benefits brought by the enterprises marketing. The main purpose of marketing is to sell products, increase the sales volume, expand the market share, constitute the own brand. Only better marketing ability can bring greater marketing

benefits.

(Index 5) Marketing implementation: A good marketing plan must be implemented well and then the actual marketing effects will be presented after the implementation. In the process of marketing activities, it is necessary to implement the plan designed in advance without reduction in effect. Only the product marketing and promotion strictly carried out according to the design plan can bring better returns. If some requirements in the actual marketing implementation are ignored, there will have many problems for the product promotion and marketing in the later stage, making the final marketing benefits shrink. Therefore, the impact of marketing implementation on the enterprises marketing ability cannot be overlooked.

Through the above analysis, it turns out that in the process of enterprises marketing ability evaluation (see Figure 1 below). There are mainly five influencing factors involved, namely (Index 1) timeliness of marketing concept, (Index 2) utilization of marketing information, (Index 3) marketing strategy, (Index 4) marketing benefits, and (Index 5) marketing implementation.

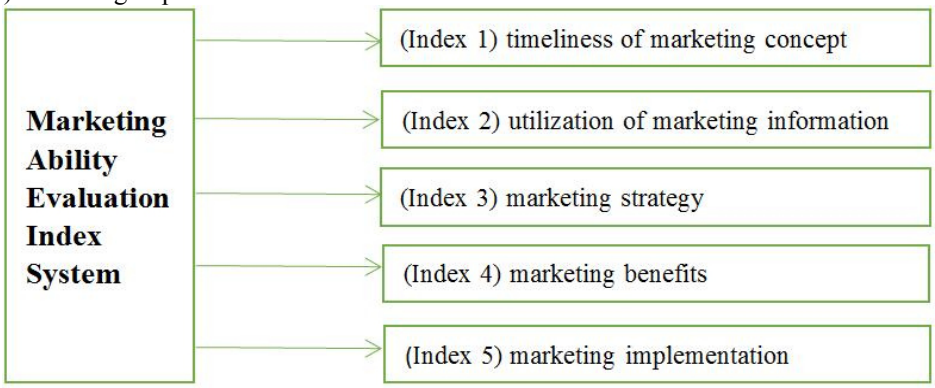

Figure 1. Marketing ability evaluation index system

3. Methods of Gray Correlation to Evaluate Marketing Ability

The economy cannot develop without the sustainable growth of enterprises. The evaluation of the enterprises marketing ability is a critical part of the economic management and economic policy formulation. Meanwhile, the feedback on the evaluation results is also a benefit to guide the long-term development of the enterprises. In this research, ten Saudi food processing enterprises in Riyadh city are selected as the research sample. The marketing experts are required to evaluate the marketing ability of these ten enterprises. The above five evaluation indexes (Index 1) ─ (Index 5) and centesimal system is adopted for the evaluation scale. Through the statistics and results calculation from the expert group, the average value of the group experts is used as the final evaluation value. And the final evaluation information is shown below:

$$X=\begin{bmatrix} 19.3431 & 49.6552 & 72.7113 & 79.4821 & 13.6519 \\ 68.2223 & 89.9796 & 30.9290 & 95.6843 & 21.1757 \\ 30.2746 & 82.1629 & 83.8496 & 52.2590 & 89.3898 \\ 54.1674 & 64.4910 & 56.8072 & 88.0142 & 19.9138 \\ 15.0873 & 81.7974 & 37.0414 & 17.2956 & 29.8723 \\ 69.7898 & 66.0228 & 70.2740 & 97.9747 & 66.1443 \\ 37.8373 & 34.1971 & 54.6571 & 27.1447 & 28.4409 \\ 86.0012 & 28.9726 & 44.4880 & 25.2329 & 46.9224 \\ 85.3655 & 34.1194 & 69.4567 & 87.5742 & 26.4781 \\ 59.3563 & 53.4079 & 62.1310 & 73.7306 & 98.8335 \end{bmatrix}$$

In the sequencing process of the enterprises marketing ability, there is an ideal scheme. The closer the evaluation results of each enterprise to the ideal scheme, the stronger the marketing ability of that enterprise. The gray correlation can be used to explain the similarity between marketing ability and ideal scheme of each enterprise through describing the geometric similarity between two vectors. The calculation formula of gray correlation is:

$$r(X_i, X_0)=\frac{1}{n}\sum_{k=1}^{n}\xi_i(k)$$

Where:

$$\xi_i(k)=\frac{\min\limits_j\min\limits_k|x_0(k)-x_j(k)|+\rho\max\limits_j\max\limits_k|x_0(k)-x_j(k)|}{|x_0(k)-x_i(k)|+\rho\max\limits_j\max\limits_k|x_0(k)-x_j(k)|}$$

$\rho\in(0, 1)$ is resolution coefficient, and $X_0=\{x_0(1), x_0(2), \ldots, x_0(n)\}$ is reference series, $X_i=\{x_i(1), x_i(2), \ldots, x_i(n)\}$ is the i-th comparison sequence.

It can be seen from the calculation formula of gray correlation that although the gray correlation can describe the similarity between evaluation value of marketing ability and the ideal scheme of each enterprise, different gray correlation values can be obtained for different resolution parameters. There is likely a case that ρ value is different and the gray correlation appears reverse, disturbing the evaluation results. In addition, the gray correlation cannot satisfy the symmetry, which is inconsistent with the characteristic that the correlation of the sequence should satisfy the symmetry. Therefore, it is necessary to improve the calculation of gray correlation to avoid such defects.

First, the ideal scheme of the enterprises marketing ability needs to be calculated. The general ideal scheme shall be the optimal for each evaluation index. Considering that these five evaluation indexes are efficacious indicators, should be the larger the better. Therefore, when the improved evaluation method of gray correlation is adopted, the maximum value of each evaluation index is selected to constitute the reference sequence:

$X_0=\{86.0012\ \ 89.9769\ \ 83.8496\ \ 97.9747\ \ 98.8335\}$

When the gray correlation is used to explain the similarity between the marketing ability of Saudi food processing companies and the ideal scheme, it means that geometrical characteristics is required to be similar. In fact, this is also required that the slope shall be as similar as possible. For the discrete data, the difference can be regarded as the slope of the discrete data. Hence, when gray correlation of the enterprises marketing ability and the ideal scheme is calculated, the difference of the ideal solution should be calculated firstly. Therefore, the difference is:

$y_0(1)=0$, $y_0(i)=x_0(i)-x_0(i-1)$ $(i=2,3,\ldots,n)$

Then the difference of the ideal scheme obtained is:

$Y_0=\{0\ \ 3.9757\ \ -6.1273\ \ 14.1251\ \ 0.8588\}$

The same principle is used to calculate the difference of each valuation vector of Saudi enterprise marketing ability. For the marketing ability evaluation value of the i-th enterprise, let the difference calculation formula is：

$y_0(1)=0$, $y_i(j)=x_0(i)-x_i(j-1)$

The matrix obtained by the difference of the final evaluation value vector of all enterprises marketing ability is:

$$Y=\begin{bmatrix}0 & -36.3460 & -17.2656 & -4.3675 & -84.3228\\ 0 & 3.9757 & -59.0479 & 11.8347 & -76.7990\\ 0 & -3.8383 & -6.1273 & -31.5906 & -8.5849\\ 0 & -21.5102 & -33.1697 & 4.1646 & -78.0609\\ 0 & -4.2038 & -52.9335 & -66.5540 & -68.1024\\ 0 & -19.9784 & -19.7029 & 14.1251 & -31.8304\\ 0 & -51.9784 & -35.3198 & -56.7049 & -69.5338\\ 0 & -57.0286 & -45.4889 & -58.6167 & -51.0523\\ 0 & -51.8818 & -20.5202 & 3.7246 & -71.4966\\ 0 & -32.5933 & -27.8459 & -10.1190 & 0.8588\end{bmatrix}$$

In order to overcome the defects in the calculation of the original gray correlation, the statistics knowledge is combined and the average variance is introduced to redefine the calculation formula of the gray correlation. Therefore, the mean value and mean variance of the ideal scheme and evaluation vector of marketing ability for each enterprise should be calculated respectively. The mean value of the ideal scheme is:

$$\bar{X}_0=\frac{1}{5}\sum_{j=1}^{5}x_0(j)=91.3272$$

$$\sigma_{X0}=\sqrt{\frac{1}{4}\sum_{j=1}^{5}(x_0(j)-\bar{X}_o)^2}=6.8308$$

Similarly, the mean value and mean variance of evaluation vector of the marketing ability for each enterprise can be calculated in the following:

$\bar{X} = (46.9687 \quad 61.1976 \quad 67.5875 \quad 56.6768 \quad 36.2188$
$74.0411 \quad 36.4554 \quad 46.3234 \quad 60.5988 \quad 69.4941)$
$\sigma_X = (30.0008 \quad 33.8558 \quad 25.3935 \quad 24.4996 \quad 27.0323$
$13.5253 \quad 11.0593 \quad 24.1035 \quad 28.6570 \quad 17.9896)$

After the mean and mean variances of the evaluation vector are determined, the correlation coefficient of evaluation vector between the i-th enterprise x_i and the ideal x_0 is,

$$\xi(x_0(j), x_j(j)) = sign(y_0(j) \times y_i(j)) \frac{1}{1 + \left\| \left| \frac{y_0(j)}{\sigma_{x0}} \right| - \left| \frac{y_i(j)}{\sigma_{xi}} \right| \right\|}$$

Where $X_i=(x_i(1), x_i(2),\ldots,x_i(5))$, $X_0=(x_0(1), x_0(2),\ldots,x_0(5))$, j=2, 3,…, n, and sign (x) is the symbolic function $sign(x) = \begin{Bmatrix} 1(x>0) \\ 0(x=0) \\ -1(x<0) \end{Bmatrix}$. With the sample data, the correlation coefficient calculates as follows:

$$\xi = \begin{bmatrix} 0 & -0.4703 & 0.6924 & -0.8642 & -0.2637 \\ 0 & 0.9688 & 0.3827 & 0.9553 & -0.3077 \\ 0 & -0.9381 & 0.9009 & -0.5151 & -0.7578 \\ 0 & -0.5578 & 0.4499 & 0.8828 & -0.2399 \\ 0 & -0.9343 & 0.3537 & -0.3165 & -0.2856 \\ 0 & -0.4181 & 0.4300 & 0.5742 & -0.2999 \\ 0 & -0.1786 & 0.2462 & -0.1717 & -0.1376 \\ 0 & -0.3048 & 0.3629 & -0.3196 & -0.3226 \\ 0 & -0.3669 & 0.6310 & 0.5227 & -0.2876 \\ 0 & -0.3668 & 0.4138 & -0.7938 & 0.9715 \end{bmatrix}$$

Lastly, calculating the average of the correlation coefficient of each Saudi food processing firm, the gray correlation is acquired. The gray correlation of marketing ability for the i-th enterprise and the ideal scheme is:

$$n_i = \frac{1}{4} \sum_{j=2}^{5} \xi(x_0(j), x_j(j))$$

The data is brought into the calculation to get the gray correlation of the marketing ability of ten Saudi enterprises, as shown in Table 1.

Table 1. Improved gray correlation between marketing ability of ten enterprises and the ideal

Enterprise	X1	X2	X3	X4	X5
Correlation	-0.9058	1.9991	-1.3101	0.5350	-1.1827
Enterprise	X6	X7	X8	X9	XI0
Correlation	0.2863	-0.2417	-0.5841	0.8291	0.2248

Generally, the greater the gray correlation, the stronger the enterprises marketing ability. By comparing the results listed in Table 1, the marketing ability of ten enterprises can be ranked as:
X2 > X9 > X4 > X6 > X10 > X7 > X8 > X1 > X5 > X3
That is, the marketing ability of ten enterprises is finally evaluated and the result shows that the second enterprise has the best marketing ability, followed by the ninth and fourth.

4. Conclusion

The capability of marketing plays an indispensable role in keeping and increasing the competitive edges of enterprises. Not only the economic policy-makers but also Saudi enterprises are supposed to improve the marketing assessing to continually enhance the marketing ability of companies. For enterprises with better marketing

capability, they ought to continue to develop. While for the enterprises with poor marketing capability, they must timely assess their marketing capabilities in order to figure out and take measures toward the problems of marketing process. From this research, the whole marketing ability of Saudi food processing companies in Riyadh is laggard. There is an obvious distinction in marketing ability among diverse firms. Therefore, to comprehensively raise the marketing capability and marketing performance, it needs to implement new policy, invest more capital, and adopt updated technology. Only by improving the enterprises marketing ability can ensure the products enter the market smoothly and the enterprises develop sustainably. Meanwhile, the development of the enterprises can strengthen regional competitiveness and promote the growth of the regional economy.

The evaluation of marketing capability for enterprises is a secular and repetitive process. This requires a set of scientific and easy-to-operate evaluation system, thus saving the costs for the enterprises and making it easy for them to accept appraisals. Based on the traditional gray correlation modeling, this study presents the improved evaluation method of gray correlation. It can availably remove the shortcomings of the traditional one. After straight-forward calculating and easily operating, it offers a dependable technique for assessing the marketing capability of Saudi food processing enterprises. The evaluation indicator of enterprises' marketing ability constructed in this research is the overall system, which means that it is widely used. However, because of the various products in different industries, the product characteristics should be comprehensively considered for the marketing ability evaluation. Some other relevant evaluation indicators that can reflect the product characteristics need to be added and together with the evaluation indexes built in this study. They form a new assessing index system for the marketing ability of enterprises in specific industries before the evaluation with the use of the gray correlation method illustrated in this research.

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