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Study on technological competitiveness of China-owned brand enterprises

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ABSTRACT

With the rapid development of our economy, our country market by seller's market to a buyer's market, entered the era of relative surplus of material production. Market structure is undergoing profound changes, the brand competition has become an important means of competition, it is enterprise management plays a more and more important role. However, at present our country brand present situation is not optimistic, overall brand competitiveness is weak. Therefore, the brand competitiveness evaluation not only has theoretical significance, but also has the important practical significance. In this paper, we investigate the problems for evaluating the technological competitiveness of China-owned brand enterprises with 2-tuple linguistic information. We utilize the 2-tuple weighted average (TWA) operator to aggregate the linguistic information corresponding to each alternative and get the overall value of technological competitiveness of China-owned brand enterprises, then rank the alternatives and select the most desirable one (s) by using the overall value. Finally, an illustrative example is given to verify the developed approach and to demonstrate its practicality and effectiveness.

KEYWORDS

Evaluation; Linguistic information; 2-Tuple weighted average (TWA) operator; Technological competitiveness; China-owned brand enterprises.



INTRODUCTION

Since the 1990 s, with the development of economic globalization, China has entered the era of brand competition. Brand competition is brand as the means of market competition, is the product competition development to a higher stage of the form. Brand competition in order to improve the market share and obtain monopoly profit purpose, not only includes the price competition, and inclusion the non-price competition, the specific performance in the enterprise resources, enterprise personnel, product quality, technology, information, service, product reputation of competition. The result of brand competition will be the size of the brand, the brand competitiveness is the important embodiment of enterprise comprehensive strength^[1-4]. The existed papers comprehensive use of economics, management, marketing, psychology, sociology, communication, and so subject knowledge system analysis, the empirical analysis and normative analysis, the combination of qualitative and quantitative analysis method to study the enterprise brand competitiveness. This paper defines the connotation of brand competitiveness, characteristics and classification, explore the enterprise competitiveness, core competitiveness and brand competitiveness of the related mechanism. Core competence is an important part of enterprise competitiveness, and brand competitiveness is the core competitiveness of the part, also is the form. Today, the brand competitiveness has become the symbol of national economic competitiveness, a country have the amount of top class brand determines the economy of the country competitive strength, therefore, how to promote the brand competitiveness has become the national development strategy important constituent. Through decades of reform and opening up, China has become a veritable "world factory", a manufacturing power, but the brand competitiveness is relatively weak, how the manufacturing power to the brand has become a big change in front of people a big problem. Therefore, the brand competitiveness has the important practical significance^[5]. First of all, based on the related literature at home and abroad to study the basis of summing up the brand competitiveness is divided into brand competitiveness and brand competitiveness within the outgoing that within the brand competitiveness is through the enterprise system internal elements integrated into the ability of the enterprise, including product, price, distribution channel, promotion and dissemination and enterprise institutional arrangements, enterprise management, technology, human capital and entrepreneurship, innovation, enterprise culture and radiation effects, etc. Brand outgoing competitiveness is through the enterprise system integration and external factors into ability, including industry, government policy, culture and education system and external union, etc. Within the brand competitiveness belong to enterprise controllability ability, enterprise can through the internal system integration to improve brand competitiveness within, and brand outgoing competitiveness is the enterprise uncontrollability ability, enterprise often can according to changes in the external environment to make timely adjust. Based on this, in this paper, the characteristics of brand competitiveness has made comprehensive analysis, studies suggest that brand competitiveness has eight characteristics, namely: long-term strategic, difference, profitability and dynamic, ductility, encouraging, integration, competitive. Secondly, in this paper, the brand competitiveness of the core driving factors and mechanism to make analysis, think that the brand competitiveness of the core driving factor is the customer value, based on customer value and customer purchase behavior after the relationship between the customer loyalty and brand competitiveness and the relationship between brand competitiveness, the existed paper demonstrated the core factors driving mechanism. On the basis of grey advantage model of brand competitiveness core driver factor importance order to have the certain reference value, and with milk brands, for instance, the model demonstration. Again, in the brand core competitiveness based on the analysis of the driving factors from the Angle of customer value construct brand competitiveness evaluation index system, and based on the grey system theory building brand competitiveness level gray system evaluation model. The last, by using the established evaluation index system and evaluation model of the market in chengdu milk three brand competitiveness evaluating, compare the three kinds of milk brand brand competitiveness difference. Show that the hierarchy gray system evaluation method has strong maneuverability and practicability^[6-9].

The aim of this paper is to investigate the problems for the evaluating technological competitiveness of China-owned brand enterprises with 2-tuple linguistic information. Then, we utilize the 2-tuple weighted average (TWA) operator to aggregate the linguistic information corresponding to each alternative and get the overall value of technological competitiveness of China-owned brand enterprises, then rank the technological competitiveness of China-owned brand enterprises and select the most desirable one (s) by using the overall value of the technological competitiveness of China-owned brand enterprises. Finally, an illustrative example is given.

PRELIMINARIES

Let $S = \{s_i | i = 0, 1, \dots, t\}$ be a linguistic term set with odd cardinality. Any label, s_i represents a possible value for a linguistic variable, and it should satisfy the following characteristics^[10-16]:

(1) The set is ordered: $s_i > s_j$, if $i > j$; (2) Max operator: $\max(s_i, s_j) = s_i$, if $s_i \geq s_j$; (3) Min operator: $\min(s_i, s_j) = s_j$, if $s_i \leq s_j$. For example, S can be defined as

$$S = \{s_0 = \textit{extremely poor}, s_1 = \textit{very poor}, s_2 = \textit{poor}, s_3 = \textit{medium}, s_4 = \textit{good}, s_5 = \textit{very good}, s_6 = \textit{extremely good}\}$$

Definition 1. Let β be the result of an aggregation of the indices of a set of labels assessed in a linguistic term set S , i.e., the result of a symbolic aggregation operation, $\beta \in [0, t]$, and t the cardinality of S . Let $i = \textit{round}(\beta)$ and $\alpha = \beta - i$ be 2 values, such that $i \in [0, t]$ and $\alpha \in [-0.5, 0.5]$; then α is called a symbolic translation [10-14].

Definition 2. Let $S = \{s_1, s_2, \dots, s_t\}$ be a linguistic term set and $\beta \in [0, t]$ be a value representing the result of a symbolic aggregation operation; then 2-tuple that expresses the equivalent information to β is obtained with the following function:

$$\Delta [0, t] \rightarrow S \times [-0.5, 0.5] \tag{1}$$

$$\Delta(\beta) = \begin{cases} s_i, i = \textit{round}(\beta) \\ \alpha = \beta - i, \alpha \in [-0.5, 0.5] \end{cases} \tag{2}$$

where $\textit{round}(\cdot)$ is the usual round operation, s_i has the closest index label to β and α is the value of the symbolic translation^[10-14].

Definition 3. Let $S = \{s_1, s_2, \dots, s_t\}$ be a linguistic term set and (s_i, α_i) be a 2-tuple; a function Δ^{-1} can be defined, such that, from a 2-tuple (s_i, α_i) it return its equivalent numerical value $\beta \in [0, t] \subset R$, which is obtained with the following function^[10-14]:

$$\Delta^{-1} : S \times [-0.5, 0.5] \rightarrow [0, t] \tag{3}$$

$$\Delta^{-1}(s_i, \alpha) = i + \alpha = \beta \tag{4}$$

STUDY ON TECHNOLOGICAL COMPETITIVENESS OF CHINA-OWNED BRAND ENTERPRISES

Famous marketing experts Larry Light once pointed out: "the future marketing is the brand of war - brand against each other for the length of competition, business and investors will recognize the brand is the company's most valuable assets, with market has much more important than factory, the only way to have the market is the market advantages brand." With the market competition increasingly worse, the brand has become the enterprise in the market the most stable business elements of brand strategy, will become the most enterprises participate in market competition, and obtain the competitive advantage of the inevitable choice. Brand ecological strategy as the brand of research in the field of front, has become a hot topic studied by many scholars. Yet in the current China's theoretical research present situation, mostly due to a theoretical discussion, thus difficult to in the process of practice to the enterprise to form the correct guidance. Therefore, only to explore a suitable for enterprise management need brand ecological strategy mode, and construct a scientific competitiveness evaluation methods, can we truly guide enterprise to implement the brand strategy of ecological concrete practice. In this section, we consider the problems to evaluate technological competitiveness of China-owned brand enterprises with 2-tuple linguistic information. Let $A = \{A_1, A_2, \dots, A_m\}$ be a discrete set of China-owned brand enterprises, and $G = \{G_1, G_2, \dots, G_n\}$ be the set of attributes, $\omega = (\omega_1, \omega_2, \dots, \omega_n)$ is the weighting vector of the attribute G_j ($j = 1, 2, \dots, n$), where $\omega_j \in [0, 1]$, $\sum_{j=1}^n \omega_j = 1$. Suppose that $\tilde{R} = (\tilde{r}_{ij})_{m \times n}$ is the decision matrix, where $\tilde{r}_{ij} \in \tilde{S}$ is a preference value, which takes the form of linguistic variables, for the alternative $A_i \in A$ with respect to the attribute $G_j \in G$.

In the following, we apply the 2-tuple weighted average (TWA) operator for evaluating technological competitiveness of China-owned brand enterprises with 2-tuple linguistic information. To get the best China-owned brand enterprises, the follows steps are involved:

Step 1. Transforming linguistic decision matrix $\tilde{R} = (r_{ij})_{m \times n}$ into 2-tuple linguistic decision matrix $\tilde{R} = (r_{ij}, 0)_{m \times n}$.

Step 2. Utilize the decision information given in matrix \tilde{R} , and the TWA operator

$$z_i = (r_i, a_i) = \Delta \left(\sum_{j=1}^n \omega_j \Delta^{-1}(r_{ij}, a_{ij}) \right)$$

to derive the overall preference value \tilde{r}_i of the China-owned brand enterprises A_i .

Step 3. Rank all the China-owned brand enterprises A_i ($i = 1, 2, \dots, m$) and select the best one (s) in accordance with z_i ($i = 1, 2, \dots, m$). If any alternative has the highest z_i value, then, it is the most important China-owned brand enterprises.

NUMERICAL EXAMPLE

The brand competitiveness has been clear and fuzzy concept. Since the 1990 s, along with the global economic competition further enlargement, China's entry into the era of brand competition. Brand competence includes the enterprise in the resources and capacity, technology, management, marketing, human resources comprehensive advantages, is the formation and realize the enterprise sustainable growth of the power source, is the enterprise core ability of the external performance. On brand competitiveness objective and scientific, and the comprehensive evaluation, and help enterprises to know the status of brand in the market, and explore the way to improve the brand competitiveness. In

this section, we present an empirical case study of evaluating the technological competitiveness of China-owned brand enterprises. The project's aim is to evaluate the best enterprise from the different companies of technological competitiveness of China-owned brand enterprises, which provide alternatives of enterprise. The technological competitiveness of China-owned brand enterprises of five possible enterprises $A_i (i=1,2,3,4,5)$ is evaluated. Assume that an enterprise newly identified an investment with technological competitiveness of China-owned brand enterprises, and in order to maximize the expected profit, we need to determine the technological competitiveness of China-owned brand enterprises of the five enterprises so as to choose the optimal one. The investment company must take a decision according to the following four attributes: G1 is the debt paying ability; G2 is the operation capability; G3 is the earning capacity; G4 is the development capability. The five possible China-owned brand enterprises $A_i (i=1,2,3,4,5)$ are to be evaluated using the linguistic term set

$$S = \{s_0 = \text{extremely poor}(EP), s_1 = \text{very poor}(VP), s_2 = \text{poor}(P), s_3 = \text{medium}(M), s_4 = \text{good}(G), s_5 = \text{very good}(VG), s_6 = \text{extremely good}(EG)\}$$

by the three decision makers under the above four attributes (whose weighting vector $\omega = (0.30, 0.10, 0.20, 0.40)^T$), and construct, respectively, the decision matrices as follows :

$$R = \begin{matrix} & G_1 & G_2 & G_3 & G_4 \\ \begin{matrix} A_1 \\ A_2 \\ A_3 \\ A_4 \\ A_5 \end{matrix} & \begin{pmatrix} s_3 & s_4 & s_3 & s_6 \\ s_2 & s_2 & s_1 & s_1 \\ s_4 & s_5 & s_2 & s_5 \\ s_6 & s_3 & s_4 & s_2 \\ s_2 & s_1 & s_5 & s_6 \end{pmatrix} \end{matrix}$$

In the following, we apply the 2-tuple weighted average (TWA) operator for evaluating technological competitiveness of China-owned brand enterprises with 2-tuple linguistic information. To get the best China-owned brand enterprises, the follows steps are involved:

Step 1. Transforming linguistic decision matrix $\tilde{R} = (r_{ij})_{4 \times 5}$ into 2-tuple linguistic decision matrix

$$\tilde{R} = (r_{ij}, 0)_{4 \times 5} \text{ as follows}$$

$$R = \begin{matrix} & G_1 & G_2 & G_3 & G_4 \\ \begin{matrix} A_1 \\ A_2 \\ A_3 \\ A_4 \\ A_5 \end{matrix} & \begin{pmatrix} (s_3, 0) & (s_4, 0) & (s_3, 0) & (s_6, 0) \\ (s_2, 0) & (s_2, 0) & (s_1, 0) & (s_1, 0) \\ (s_4, 0) & (s_5, 0) & (s_2, 0) & (s_5, 0) \\ (s_6, 0) & (s_3, 0) & (s_4, 0) & (s_2, 0) \\ (s_2, 0) & (s_1, 0) & (s_5, 0) & (s_6, 0) \end{pmatrix} \end{matrix}$$

Step 2. Utilize the decision information given in matrix \tilde{R} , and the TWA operator, we get the overall preference value $z_i = (r_i, a_i)$ of the China-owned brand enterprise A_i .

$$z_1 = (s_3, 0.22), z_2 = (s_2, 0.41), z_3 = (s_1, 0.34)$$

$$z_4 = (s_5, -0.27), z_5 = (s_4, -0.38)$$

Step 3. Ranking all the China-owned brand enterprises $A_i (i=1,2,3,4,5)$ in accordance with the $z_i (i=1,2,3,4,5): A_4 \succ A_5 \succ A_1 \succ A_2 \succ A_3$, and thus the most desirable China-owned brand enterprises is A_4 .

CONCLUSION

In the increasingly fierce competition environment, how to develop the effective brand portfolio strategy, set up the brand of reasonable structure to integrate enterprise brand resources, is the enterprise development must solve the problem. And in the integration process of brand, brand structure setting is the key problem. The enterprise needs to build the most suitable for win the competitive advantage of the brand structure, because the unreasonable structure of brand for consumers to enterprise products have a negative impact on the cognitive. Therefore, the choice of a set of effective brand structure integrated evaluation method to brand integration has the vital role. With the rapid development of our economy, our country market by seller's market to a buyer's market, entered the era of relative surplus of material production. Market structure is undergoing profound changes, the brand competition has become an important means of competition, it is enterprise management plays a more and more important role. However, at present our country brand present situation is not optimistic, overall brand competitiveness is weak. Therefore, the brand competitiveness evaluation not only has theoretical significance, but also has the important practical significance. In this paper, we investigate the problems for evaluating the technological competitiveness of China-owned brand enterprises with 2-tuple linguistic information. We utilize the 2-tuple weighted average (TWA) operator to aggregate the linguistic information corresponding to each alternative and get the overall value of technological competitiveness of China-owned brand enterprises, then rank the alternatives and select the most desirable one (s) by using the overall value. Finally, an illustrative example is given to verify the developed approach and to demonstrate its practicality and effectiveness.

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