

Study on enterprise extension marketing model based on extension engineering methods

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Abstract

This paper studies the marketing strategy of enterprises and proposes an enterprise extension marketing model based on extension engineering methods under market economy. The matter-element model for enterprise marketing is established on extension theory, and the matter-element features, values and discourse domain are studied to produce more marketing strategies. These strategies are subject to extension priority-degree evaluation for convergence analysis. Compatibility analysis is also carried out. Empirical studies prove the model to be feasible and effective.

Keywords: extension marketing, extension engineering, marketing strategy, market, model

1 Introduction

In the era of knowledge economy and with the rapid development of information technology and computer science, it is significant to make out marketing strategy and launch into the market so as to increase competitiveness, gain market share and grow sustainably [1-3]. Therefore, many researchers, both home and abroad, have studied this issue from different perspectives with various methods, achieving remarkable results [4-7].

However, in the process of planning marketing strategy and its implementation, many factors need to be taken into consideration, such as market factor, enterprise factor, human factor, etc. The influence of these factors can be undermined if their coordination and conflict can be addressed. Extenics is a useful tool to turn to as it is an intelligent design subject that copes with conflict and incompatibility.

Currently, some researchers have integrated extenics into the analysis of marketing strategy. But this is far from enough. Based on previous researches, this paper proposes an enterprise extension marketing model based on extension engineering methods, which shall be a reference and guidance for enterprise marketing practice.

2 Extension model of enterprise marketing strategy

2.1 MATTER-ELEMENT MODEL OF ENTERPRISE MARKETING STRATEGY

Extenics is an intelligent design subject proposed by Chinese scholar Professor Cai Wen. It conducts an extension analysis for design tasks and copes with conflicts by a combination of qualitative and quantitative

method. In this way, extension engineering methods are given birth. Matter-element as the basic unit to describe design task, uses a sequence set with three elements $R_{market} = O_{market}, C, V$ to describe the enterprise marketing strategy that has one-dimension. O_{market} refers to the name of the strategy, C refers to characteristics of the strategy and V refers to value of the characteristics.

In real terms, marketing strategy is restricted by many factors. Therefore, there is a necessity to take these conflict and incompatible factors together with marketing evaluation indicators as characteristics of matter-element. Then, the matter-element of marketing strategy with n characteristics is expressed by:

$$R_{market} = O_{market}, C, V = \begin{bmatrix} O_{market} & c_1 & v_1 \\ & c_2 & v_2 \\ & \vdots & \vdots \\ & c_n & v_n \end{bmatrix}. \quad (1)$$

In the expression, $c_i, 1 \leq i \leq n$ refers to the broad sense of characteristics of marketing strategy O_{market} . $v_i, 1 \leq i \leq n$ refers to the value of characteristics c_i .

2.2 EXTENSION ANALYSIS OF ENTERPRISE MARKETING STRATEGY

The planning and extension of marketing strategy are in fact an extension analysis of the matter-element model. Extension transformation enriches such analysis. Based on the constructed matter-element model, discourse domain, characteristics of marketing strategy and values of the characteristics are three approaches to do the extension analysis in order to get more valuable strategies

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and models. The extension model can be achieved in the following ways.

1) Transform the value of the characteristics in matter-element model R to achieve the extension transformation of marketing demand and the value of marketing capability indicators, there is:

$$\begin{aligned} R_{TV} &= R^*, k_V, k_V^* \mid R^* \in R \rightarrow R_{iTV}, \\ k_V &= k \vee R, \\ k_V^* &= k^* \vee R \rightarrow R_{iTV}, \end{aligned} \tag{2}$$

where R_{TV} refers to extension transformation of the value of the characteristics in matter-element model R . k_V and k_V^* refers to correlation function before and after extension transformation respectively. $k_V^* = k^* \vee R \rightarrow R_{iTV} \geq 0$ refers to effective extension transformation of the value of the characteristics in model R .

2) Transform the characteristics in matter-element model R to achieve the extension transformation of factors influencing marketing and marketing capability indicators, there is:

$$\begin{aligned} R_{TC} &= R^*, k_C, k_C^* \mid R^* \in R \rightarrow R_{iTC}, \\ k_C &= k \wedge R, \\ k_C^* &= k^* \wedge R \rightarrow R_{iTC}, \end{aligned} \tag{3}$$

where R_{TC} refers to extension transformation of the characteristic in matter-element model R . k_C and k_C^* refers to correlation function before and after extension transformation respectively. In particular, $k_C^* = k^* \wedge R \rightarrow R_{iTC} \geq 0$ refers to effective extension transformation of the characteristics in model R .

3) Transform the discourse domain in matter-element model R to achieve the extension transformation of factors influencing marketing and marketing force indicators, there is:

$$\begin{aligned} R_{TO} &= R^*, k_O, k_O^* \mid R^* \in R \rightarrow R_{iTO}, \\ k_O &= k \circ R, \\ k_O^* &= k^* \circ R \rightarrow R_{iTO}, \end{aligned} \tag{4}$$

where R_{TO} refers to extension transformation of the discourse domain in matter-element model R . k_O and k_O^* refers to correlation function before and after extension transformation respectively. In particular, $k_O^* = k^* \circ R \rightarrow R_{iTO} \geq 0$ refers to effective

extension transformation of the discourse domain in model R .

2.3 CONVERGENCE ANALYSIS OF ENTERPRISE MARKETING STRATEGY

Based on the extension analysis, many marketing strategies that meet the enterprise's demand are available at hand. Thus, convergence analysis is necessary for the study. Suppose there are m marketing strategies by extension analysis. Here can acquire q convergence indicators after the consultation with design experts. The correlation function k_i^j of marketing strategy i about convergence indicator j can be expressed in the following forms.

If the strategy target is expressed by range U_{0j} , the extension correlation function k_i^j is:

$$k_i^j = \rho(v_i^j, U_{0j}) / |U_{0j}|, \tag{5}$$

where $\rho(v_i^j, U_{0j})$ refers to the extension distance of marketing strategy i about convergence indicator j . The detailed calculation is referred to Equation (10) and (11).

If the strategy target is expressed by range set U_{0j} and U_j , the extension correlation function k_i^j is:

$$k_i^j = \rho(v_i^j, U_{0j}) / (\rho(v_i^j, U_j) - \rho(v_i^j, U_{0j})). \tag{6}$$

Extension correlation function needs to be normalized to get $k_i^{\otimes j}$ so that the indicators are unified:

$$k_i^{\otimes j} = \begin{cases} k_i^j / \max_{v_i^j \in U_{0j}} k_i^j, & k_i^j > 0 \\ 0, & k_i^j = 0. \\ k_i^j / \max_{v_i^j \in U_{0j}} |k_i^j|, & k_i^j < 0 \end{cases} \tag{7}$$

Given different weight w_j of convergence indicators, the extension priority-degree ψ_i of marketing strategy i is:

$$\psi_i = w_1, w_2, \dots, w_q * \begin{bmatrix} k_i^{\otimes 1} \\ k_i^{\otimes 2} \\ \vdots \\ k_i^{\otimes q} \end{bmatrix} = \sum_{j=1}^q w_j * k_i^{\otimes j} \tag{8}$$

Analyse all extension priority-degree ψ_i . When ψ_i meets the requirement of the given threshold, it means that this marketing strategy is feasible and effective.

3 Compatibility analysis of enterprise marketing strategy

Enterprise marketing strategy subject to convergence analysis may not accord with the anticipated marketing target as some indicators can conflict with each other and be incompatible. Thus, compatibility analysis is needed so as to be closer to the anticipated marketing target for the purpose of increasing marketing ability and competitiveness.

The general model of compatibility analysis is expressed as:

$$P = G \otimes L, \tag{9}$$

where G refers to the strategy target and L refers to factors and conditions that restrict the implementation of the strategy.

In extension theory, there are three ways to conduct the compatibility analysis. First, with the marketing target unchanged, transform the restriction conditions to solve the problem; second, when the restriction conditions fail to change, adjust the target to solve the problem; third, adjust both the target and the restriction conditions. Compatibility function is introduced to measure the effectiveness of these three ways.

Suppose the value of the marketing target of matter-element model is V_i , the restricted value is $V_0 = [v_0^{\min}, v_0^{\max}]$. If V_i is the accurate value, then the extension distance between the strategy target value and the restricted value V_0 is:

$$\rho(V_i, V_0) = \left| V_i - \frac{v_0^{\max} + v_0^{\min}}{2} \right| - \frac{v_0^{\max} - v_0^{\min}}{2}. \tag{10}$$

If V_i is fuzzy value with uncertain information and $V_i = [v_i^{\min}, v_i^{\max}]$, the extension distance between the strategy target value and the restricted value V_0 is:

$$\rho(V_i, V_0) = \frac{\rho(v_i^{\min}, V_0) + \rho(v_i^{\max}, V_0)}{2} = \frac{\left| v_i^{\min} - \frac{v_0^{\max} + v_0^{\min}}{2} \right| + \left| v_i^{\max} - \frac{v_0^{\max} + v_0^{\min}}{2} \right| - v_0^{\max} - v_0^{\min}}{2}. \tag{11}$$

If the marketing strategy target and factors and restriction conditions that influence the implementation of the strategy are not compatible and of single characteristics, which means only one condition fails to meet the strategy target, then the compatibility function $K P = G \otimes L$ is expressed as:

$$K P = G \otimes L = -\rho(V_i, V_0). \tag{12}$$

If the marketing strategy target and factors and restriction conditions that influence the implementation

of the strategy are not compatible and of multiple characteristics, which means many conditions fail to meet the strategy target, and when every characteristics fits the compatibility, the compatibility function $K P = G \otimes L$ is expressed as:

$$K P = G \otimes L = \min_{1 \leq i \leq m} -\rho(V_i, V_0) \wedge \left(\bigwedge_{i=1}^m -\rho(V_i, V_0) \geq 0 \right). \tag{13}$$

If the marketing strategy target and factors and restriction conditions that influence the implementation of the strategy are not compatible and of multiple characteristics, which means many conditions fail to meet the strategy target, and when one characteristics fits the compatibility, the compatibility function $K P = G \otimes L$ is expressed as:

$$K P = G \otimes L = \max_{1 \leq i \leq m} -\rho(V_i, V_0) \wedge \left(\bigvee_{i=1}^m -\rho(V_i, V_0) \geq 0 \right). \tag{14}$$

According to the compatibility analysis, when $K P = G \otimes L > 0$, the marketing strategy target and factors and restriction conditions that influence the implementation of the strategy are compatible. When $K P = G \otimes L < 0$, the marketing strategy target and factors and restriction conditions that influence the implementation of the strategy are incompatible. When $K P = G \otimes L = 0$, they are in between.

A marketing strategy that fits the compatibility is labelled as feasible and effective. One that doesn't fit the compatibility is infectious in one way or another and thus needs improvement to better serve the market.

4 Case study and analysis

The marketing strategy of a new product of a home appliance enterprise is subject to case study that further illustrates the extension marketing model based on extension engineering methods. This product is a high-end product. Market survey and marketing ideas of the management team are taken into consideration. Based on Equations (1)-(3), launch area, market target and launch layer are studied. Three extension marketing plans are shown in Table 1.

TABLE 1 Extension marketing plan of new products of a home appliance enterprise

Marketing Plan	Profit Margin	Market Share	Sales Growth	Production Quota
A	13.5	15.0	8.5	68.5
B	16.8	12.0	7.2	65.0
C	15.0	14.0	6.0	66.5

Based on expert views and the marketing ability of the enterprise, the anticipated marketing profit rate is 15-20 with the market share registering 13-18. The sales growth rate stands at 7-10 and the production quota is 60-70. According to the convergence analysis expression, the extension distance (Table 2) and the extension correlation function (Table 3) of different marketing strategy plans are acquired.

TABLE 2 Extension distance of marketing plan

Marketing Plan	Extension Distance			
	Profit Margin	Market Share	Sales Growth	Production Quota
A	1.50	-2.50	-1.50	-1.50
B	-1.80	0.50	-0.20	-5.00
C	0.00	-1.50	1.00	-3.50

TABLE 3 Extension correlation function of marketing plan

Marketing Plan	Extension Correlation Function			
	Profit Margin	Market Share	Sales Growth	Production Quota
A	1.000	-1.000	-1.000	-0.300
B	-1.000	1.000	-0.133	-1.000
C	0.000	0.600	1.000	-0.700

Given the weight of matter-element characteristics $W = 0.20, 0.30, 0.30, 0.20$, the priority-degree sequence is $\psi = -0.460, -0.139, 0.340$. Suppose the threshold of priority-degree is $\psi_0 = 0$, from the sequence it is clear that plan A and B are feasible. This company values on marketing development and promotion of new products. So the market share and sales growth rate are conditions

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for compatibility analysis. Profit rate and production quota are secondary factors.

From the compatibility analysis model, the compatibility function of plan A is:

$$K_{A-P=G\otimes L} = 1.000 | \min 1.000, 1.000 \wedge -\rho V_2, V_0 \geq 0 \wedge -\rho V_3, V_0 \geq 0 > 0.$$

This strategy does fit the anticipated target. The compatibility function of plan B is:

$$K_{B-P=G\otimes L} = -1.000 | \min -1.000, 0.139 \wedge -\rho V_2, V_0 \geq 0 \wedge -\rho V_3, V_0 < 0 < 0.$$

It doesn't fit the anticipated target and the matter-element characteristics needs to be subject to extension transformation so better serve the marketing demand.

5 Conclusions

This paper studies the marketing strategy of enterprises and proposes an enterprise extension marketing model based on extension engineering methods. These strategies are subject to convergence analysis and compatibility analysis. It provides guidance to make out a marketing strategy in a smart and quick way. From empirical studies, it is clear that this extension marketing model can lead the convergence analysis and compatibility analysis so as to cope with conflicts and conduct effective evaluation. It serves to scientific management and planning of enterprises and helps them to increase competitiveness and grow sustainably.

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