Critical Factors to Green Marketing Strategies Implementation of Chinese Enterprises

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Combining with 4P theory, organization theory, environment theory, this paper mainly focuses on the contributory factors of implementing green marketing strategies for enterprises. Through applying DEMATEL method, the research deeply analyzes the mutual influence relationships of the criteria, draws the Influential Network Relation Map, and gives the weight of each dimension based on ANP method. The results show that among the three evaluation dimensions, 4P possesses the largest influence degree, followed by organization dimension and environment dimension, indicating that the general influence degree of 4P dimension is the largest in the overall structure, making it the most important influence dimension.

INTRODUCTION

As population grows, the development of commercial production and assumption of non-renewable resources together bring huge challenges to natural environment (Hart, 1995). Since 2013, haze pollution, mostly consisting of PM10 (inhalable particles) and PM2.5 (particles that can go directly to the alveoli of the lungs), has become increasingly severe. According to the weather bulletin issued by China Meteorological Administration, 2014 witnessed 13 times of widespread and continuing haze in total, during which the day number of hazes was 17.9 on average domestically, and Jing-jin-ji (Beijing, Tianjin, Hebei) and Yangtze River Delta saw more haze days, with 61 days and 66 days respectively. The frequent and random appearance of haze on the one hand threatens the wellbeing of mankind; on the other hand, it brings various negative effects on social and economic development (Ma & Zhang, 2014). Therefore, the effective treatment of haze pollution as well as advancing sustainable development has become a major concern of various social groups. Coddington once suggested that the reasonable development of the globe could be achieved only when productivity is advanced and consumption habits and structures are altered to maximize the utilization of natural resources and minimize the production of wastes (Coddington, 1990). As an emerging consumption pattern, green consumption is beneficial to human health, ecological balance and the balance between the material needs and spiritual needs of mankind, which is highly praised by the governments (Peattie, 2010). Plenty of western societies and international groups, such as the European Union, treat green consumption as a material factor of environmental reform (Buttel, 2003). By the end of 2015, the State Council and Ministry of Environmental Protection of PRC respectively issued observations related to green consumption, which explicitly mentioned that it is

necessary to cultivate green lifestyles, advocate green consumption, extensively launch green living campaigns and resolutely resist and oppose extravagance and irrational consumption in various forms. As public awareness of green consumption grows and perception as well as attitude toward green consumption alters, it will finally exert influence on enterprises (Fitzsimmons, Fitzsimmons, & Bordoloi, 2008). Thus, enterprises in developed countries are positively seeking and adopting green marketing strategies to cope with environmental problems, through which they have realized that if the products and services provided by a certain company could satisfy the environmental concern of consumers, they would have much preference for such products or services (Albino, Balice, & Dangelico, 2009).

Given the serious haze pollution in China, more and more Chinese enterprises should realize that the implementation of green marketing strategies is essential to society and enterprises themselves, as well as sustainable development. Chinese enterprises should play significant roles in the challenge of effectively coping with the problem of environmental sustainability through implementing reasonable green marketing strategies and operations. However, the following problems may be encountered by enterprises in the implementation of green marketing strategies: which of these problems would stand in the way of implementing green marketing strategies? How long before Chinese enterprises would implement green marketing strategies? The objective of the research is to probe into the factors that affect enterprises implementing green marketing strategies, find out the mutual relationships among these factors and determine their weights, and further give suggestions on promoting the implementation of green marketing strategies for Chinese enterprises.

Theoretical contributions of the research are mostly reflected in the following two aspects: first, combining classic 4P theory of marketing and organization and environmental theories, the research comprehensively analyzes the contributory factors of the implementation of green marketing strategies, which fills the gaps of implementation analysis of green marketing strategies, and provides a brand new analysis framework integrating marketing and organization theories for the contributory factors. Second, the research introduces a hybrid multi-criteria decision model based on DEMATEL-ANP into the strategy implementation study of enterprises; according to the model, relationships between contributory factors are revealed through quantitative data, and thus the research is able to find the weights of each criteria then provide a new idea and method of strategy implementation study for enterprises. Practical significance of the research is that on the one hand it makes the whole society attach importance to green consumption and green marketing, therefore implementing green marketing strategies would be the inevitable choice for enterprises in the future context of green consumption for whole society; on the other hand, based on the specific outcomes of the research, it provides a reference framework of implementing green marketing strategies for enterprises, and allows the enterprises aware of the direction and efforts they have to make in future implementation of green marketing strategies.

LITERATURE REVIEW

Green Marketing Strategies

Green marketing initially originates in the ecological marketing in 1970s (Henion & Kinnear, 1976); after 20 years' development, both theoretical and practical researches of green marketing have been deepened continuously. Due to the different cognitive perspectives, there are several definitions of green marketing as follows: from a practically perspective, green marketing refers to the marketing of commodities or services that are environmental friendly (Polonsky, 2014); from an academic perspective, green marketing refers to analyzing how marketing activities work on environment while how can environmental variables participate the determination of marketing in enterprises (Chamorro, Rubio, & Miranda, 2009); Peattie defines green marketing as the marketing activity of existing products and services system that reduces social and environmental impacts as well as reducing the damage of products and services themselves (Peattie, 2010). Implementation of green marketing strategies for enterprises means (1) how to start and manage green actions; (2) how to define its target customers; and (3) how to promote market supplies to utilize green actions to create sustainable competitiveness (D'Souza, Taghian, Lamb, & Peretiatkos, 2006). The research holds the opinion that green marketing means that under the

framework of legitimacy of ever-growing environmental awareness, enterprises take the environmental friendly strategies. On the one hand, it can help promote the identification of products among public; on the other hand, it can help promote the identification of enterprises' responsibility and cultural values among public opinions; therefore, it can help enterprises maintain their continuous competitive advantages, maintain and promote their achievements and finally achieve business success. The legal strategies taken by enterprises that are friendly to environment and that help enterprises maintain continuous competitive advantages and achievements are called green marketing strategies.

At present, studies mainly take target market positioning, demand forecasting and green product promoting as dependent variables to investigate their relationships with green marketing strategies. Details are as follows: (1) target positioning of green consumers: recognize the subdivisions of target market, and provide targeted market products to attract the certain green subdivisions (Belz & Peattie, 2009); (2) demand forecasting on environmental friendly products: from a strategic perspective, it is of great importance to understand the trend of attractability and the long-term survivability of subdivisions of green market (Smith, 2010), which includes the reason why consumers purchase green products, recognizing the characteristics of green products, understanding the pricing of green products as well as the perception, expectation and will of transactions of consumers (Pedro Pereira Luzio & Lemke, 2013); (3) promoting of environmental friendly products, including effective promotion of green products, altering or strengthening the green attitude to increase consumption, various researches have recognized that the perception of consumers toward green products is the basic driving force of green consumption (D'Souza, Taghian, & Lamb, 2006; Tanner & Wölfing Kast, 2003); (4) developing the competitive advantages based on the limited consideration of environment, researches have found that the cooperation between production and marketing is helpful to the development and maintenance of competitive advantages of enterprises (Prakash, 2002). To sum up, there are few researches directly related to the critical factors related to green marketing strategies implementation. In this article, it's the research emphasis to discuss those factors deeply.

Factors of Implementing the Strategies

It is generally recognized that the first personnel who defined enterprise is Chandler, who defined the strategy as "determining the long-term basic targets and objectives, selecting the ways to follow for enterprises in order to achieve these target, and managing the material resources of enterprises to achieve these ways and targets" (Chandler, 1962). The strategy includes various perspectives, including but not limited to product objectives, internal management and pricing. Porter considered that the core of enterprise strategy is to develop competitive advantages which are influenced by two factors: (1) the profitability of enterprises in their industries, i.e. the attractiveness of industry; and (2) the relative competitive positions of enterprises in their industries (Porter, 1980). His analysis settled the foundation of the importance of external environment scanning during the process of strategy making. CK Prahalad and G Hamel proposed the core competence of enterprises, which emphasized that the internal conditions of enterprises play decisive roles in maintaining competitive advantages and gaining excess profits. Reflected in the practice of strategy management, their theory requires enterprises to conduct business operations in their advantageous industries and relevant industries proceeding from their own resources and abilities to avoid the blind multiple operations in the irrelevant industries that may attract enterprises (PRAHALAD & HAMEL, 1990). The theory settled the foundation of the importance of internal scanning during the process of strategic analysis. It is thus clear that both external and internal analysis is vital for enterprises to implement certain strategies. In connection with green marketing strategies, the internal analysis includes classic 4P theory of marketing and organization theory; while external analysis emphasizes on environmental theories. Based on these theories, the research proposes the analysis framework to investigate the contributory factors of implementing green marketing strategies.

4P Theory

In 1960, McCarthy E. Jerome, a famous US marketing scholar, presented Marketing Mix as Product, Price, Place and Promotion, i.e. 4P Mix in his Basic Marketing on the basis of 12 elements of Marketing

Mix proposed by Neil Borden (McCarthy & Perreault, 1960). McCarthy defined Marketing Mix as "the mix of elements which marketing managers can dominate to satisfy the market objectives". Such definition of McCarthy further emphasized the controllable characteristics of Marketing Mix. Throughout a general observation of the development of marketing theories, it can be discovered that the 4P Mix is the pattern whose impacts are most powerful and profound as of today. Philip Kotler further recognized the Marketing Mix methods centering on 4Ps as well as settling the pattern of 4Ps Marketing Mix. Henceforth, 4Ps Mix method has had profound impact on both the practice and theories of marketing management, and been widely spread continuously (Kotler & Levy, 1969). 4Ps Marketing Mix separates all the factors that enterprises confront in operations into two categories: the first category is uncontrollable factor, including external environmental factors such as politics, economics, society, technology and public; the other category includes micro environmental factors involving in the operations of enterprises, such as products, pricing, places and promotions. The missions of business operations of enterprises are influencing and affecting on uncontrollable factors through carious controllable factors to create a favorable external environment for the development of enterprises and to promote the achievement of business objectives of enterprises.

It can be inferred from classic 4P theory of marketing that the essence of marketing activities of enterprises is a process in which internal controllable factors are applied to adapt to the external environment, i.e. through the planning and implementation of products, pricing, distribution and promotion, and the active and dynamic reaction toward external uncontrollable factors to facilitate the achievement of transactions as well as objectives of individuals and organizations. If a certain company is able to produce appropriate products, set appropriate prices, utilize appropriate distribution places and assist by appropriate promoting activities, the company will succeed. Opinions of Ailawadi, K. L., Lehmann, D. R., & Neslin, S. A.; and Mintz, O., & Currim, I. S. agreed with the definition of green marketing strategies given by the research, the problems that enterprises incur are transformed into: the specific difficulties enterprises need to overcome during the planning and implementation of products, pricing, distribution and promotions and simultaneously satisfying the environmental friendly objectives (Ailawadi, Lehmann, & Neslin, 2001; Mintz & Currim, 2013).

In 4P theory, Product emphasizes on the developing function, it requires products possess unique selling points and rank their functional appeals in the first place. As the basis and key point of green marketing strategies, green products are required to combine the green conceptions into the process of product developing and manufacturing, their packages, and especially, are required to be as short, small, light and thin as possible to save materials; besides, materials used in the production of green products are required to be toxic-free and degradable, and the anti-counterfeiting techniques used for green products must be significant enough to distinguish green products from regular products. Therefore, the criterion can be concluded as the difficulty of satisfying green and environmental requirements for product design and production.

Price refers to the different pricing strategies in accordance with different market positioning. 4P theory takes production costs, sales costs and market environment into consideration, based on which it sets acceptable prices for consumers through certain pricing methods including markup pricing, competitive pricing and psychological pricing. The problems that enterprises have to confront when adopting green marketing strategies are whether enterprises are able to make profits through the pricing they set in accordance with green marketing costs. For example, whether the premium caused by green marketing costs is acceptable to enterprises.

Place: Enterprise are not directly interact with consumers, however, they emphasize on the development of distributors and construction of sales network. The relationship between enterprises and consumers is built through distributors. Balderjahn demonstrated that the attitude toward environmental protection and green products of consumers impacts significantly on their green purchase activities (Balderjahn, 1988). Chan and Lau also demonstrated that the environmental protection knowledge and feelings toward ecological environment of consumers have effects on their green purchase activities (Chan & Lau, 2000). Therefore, psychological factors such as the perception, awareness, feelings and attitude toward environmental protection would affect the green purchase activities of consumers. For

enterprises adopting green marketing strategies, the places of their products must take subdivisions of consumers into consideration. The difficulty to implement such strategies for enterprises is whether they can accurately distribute according to green purchase wills of consumers.

Promotion: Enterprises lay stress on stimulating consumers through the alteration of sales activities; enterprises contribute to the growth of sales by utilizing short-term activities (such as discounts, two-for-one and on-site marketing activities) to increase consumption, attracting consumers of other brands or resulting in advance consumption. Existing researches have shown that consumers who are more likely to conduct green purchase activities are generally young, well-educated and well-paid relatively (Lee, 2008); besides, females, especially married females with young children, are more likely to conduct green purchase activities (Laroche, Bergeron, & Barbaro-Forleo, 2001; Lee, 2009). Similar to distribution, the difficulty of implementing promoting strategies for enterprises is whether they are able to promote in accordance with characteristics of consumers.

Organization Theory

From Weber to Hall, the importance of organization theories is self-evident with their development and enrichment (Hall, 1991; Weber, 1946). The objective of organization is to achieve the targets collaboratively through defining the relationship between missions and positions. Various facts have proved that well-organized enterprises can beat poor-organized enterprises. Organizational characteristics are the determining factors for enterprises to adopt green marketing strategies. Confronting with green marketing strategies, certain enterprises are willing to implement them, however, some enterprises remain indifferent, which is closely related to the characteristics and internal conditions of organizations.

Scale of organization: Scale of organization has significant impacts on the implementation of strategies for enterprises (Bluedorn, 1993). Organizations in larger scales are more specialized and departmentalized, and have more levels and regulations than those in smaller scales. Additionally, major corporations possess more financial and technical resources, which empowers them to undertake green marketing strategies.

Support of senior executives: Kotter pointed out that differentiating from management, working directions are settled through leaders' future visions; leaders inculcate such visions to others and encourage them to overcome various obstacles and achieve the visions collaboratively. Therefore, in order to achieve the visions, it requires powerful leadership (Kotter, 1990). Shamir, House and Arthur proposed that charismatic leaders achieve the visions by delivering a net set of values to their subordinates through demonstrating attractive visions, and showing their courage and firm conviction of such visions through unconventional inspiring activities (Shamir, House, & Arthur, 1993). Venkataramani, V., Green, S. G., & Schleicher, D. J. considered that social networks of leaders affect behaviors of employees through affecting LMX thereupon then affecting the implementation of strategies (Venkataramani, Green, & Schleicher, 2010). Egri and Herman proposed that leaders who are more eco-centric, openness to change, and self-transcendent, which means leaders are in the transformational leadership style, positively impact on the environmental strategies of certain companies (Egri & Herman, 2000). In general, the successful implementation of strategies, however the subordinated are affected, requires to investigate the level of support of leaders inside the organizations.

Culture of organization: Organizational culture refers to a set of meaning systems shared by organization members, which can distinguish the organization with others (Schein, 2010). Organizational culture represents the common perceptions of all organization members. Members in certain organizations with different backgrounds or levels are inclined to use similar words to describe their organizational cultures. As a control mechanism of ideology, organizational culture can guide and shape the attitudes and behaviors of employees. Besides, organizational culture will create an atmosphere in which members are able to recognize the common identification and common perception of their organizations (James et al., 2008). However, when the organization is confronting with a dynamic environment and pushing forward reforms, organizational culture could be the biggest impediment (Sørensen, 2002). Therefore, whether the culture of an organization is favorable to environmental

protection and supportive to green marketing strategies is vital to the implementation of green marketing strategies.

Environmental Theory

Environmental characteristics are vital to the decision of whether adopting the innovative technologies for enterprises. Environmental factors are the impacts coming from the external of organizations, such as markets, competitors, supply chain partners, governments and industry associations; frequently, such impacts are in the form of pressure and power, support and promotion. External opportunities and threats refer to the material trends or events in the field of economy, society, population, politics or legislation that will bring huge benefits or huge damages to the enterprises. It is vital for strategies of enterprises to recognize external factors.

Competitors: Substitutes, Rivalry and Threat of New Entrants mentioned in the Five-Force Model proposed by Porter are all competitors (Porter, 1980). Ecological theory is a discipline focusing on the relationship between environment and organisms, in which various theories have described the relationship between survivabilities and adaptabilities, etc. among organisms given certain environmental elements (Hannan & Freeman, 1977). Over the competition of enterprises, the dynamism of competitors directly determines the survivabilities and adaptabilities of enterprises with different resources given certain environmental elements. Therefore, the competitive position of certain enterprises can be clearly shown through analyzing the survivabilities and adaptabilities of enterprises in accordance with biological theory; and thus an overall competitive landscape of a certain industry can be described. As for the implementation of green marketing strategies, the environment that enterprises are faced with, whether take substitutes, competitors or new entrants into consideration, is applicable to the analysis of biological theory. At an age when environmental protection wins support among the people, green marketing is far beyond the green slogan and environmental protection; to some extent, it is an inevitable strategy under the pressure of competitors, therefore, the industrial landscape decides the strategy selection of players. As a result, the competitor criterion refers to the pressure from the external competition, which makes enterprises adopt the green marketing strategies.

Partners: Bargaining Power of Suppliers proposed by Porter is a typical partner analysis. A network of companies working together towards the targets (such as customer service and fulfillment) can be defined as a supply chain (Xu, Zhou, & Phan, 2010). While many green supply chain management research associate with company performance, the conclusion is that green supply chain truly can influence companies' profit or sometimes competitive advantages (Zhu & Sarkis, 2004). According to Rao and Holt's study, there is a positive relationship between green supply chain management practices and companies' competitiveness as well as economic performance (Rao & Holt, 2005). Vachon and Klassen investigated the similar problem and concluded a correlation exists between environmental performance and competitive advantage (Vachon & Klassen, 2008). It can be inferred that with the support of suppliers and supply chain, enterprises are more competitive, and such competitiveness is favorable to environment and the achievement of green marketing. Therefore, when implementing green marketing strategies, the wills and preparations to conduct related activities of suppliers of certain companies needs being considered as well.

Industry legitimacy: Selznick considered that organizations are not closed; they could be affected by environment (Selznick, 1949). When studying organizations, it is important to go beyond the organizations themselves. Every organization needs to adapt to the environment; therefore, we have to recognize organizational phenomena from the perspective of the relationship between organization and environment. Why would organizations spend large amount of time on things that seemed to be irrelevant to their activities such as spending costs on green marketing strategies? The reason is that when environmental protection is accepted by social customs, governmental policies and legal provisions, such conception becomes systems through legitimacy, and the system is able to affect thoughts and actions of human beings, and to form the organizational thinking (Douglas, 1986). Dam and Apeldoorn differentiated green marketing from its simultaneous term, which indicates that "focuses on market pull and legislative push toward improved, environmentally friendly corporate performance" (Van Dam &

Apeldoorn, 1996). Thus, present green marketing strategies are no longer pure marketing strategies; instead, they are the performance of legitimacy. Hence the success implementation of green marketing strategies is influenced by industrial legitimacy. Specific illustrations of each contributory factor is shown in Table 1:

TABLE 1
CRITICAL FACTORS OF GREEN MARKETING STRATEGIES IMPLEMENTING

Dimension/Criterion	Illustration
Marketing	
Product(c1)	Difficulty of product design and production to satisfy the requirements of environmental protection
Price(c2)	Acceptability of enterprises toward premium generated by green marketing costs
Place(c3)	Difficulty of accurate distribution of enterprises in accordance with the green purchase wills of consumers
Promotion(c4)	Difficulty to conduct effective promotion by enterprises in accordance with characteristics of consumers
Organization	
Scale of organization(c5)	Scale of companies. Large companies possess more financial and technical resources, and are more capable of undertaking the costs of implementing green marketing strategies
Support of senior executives(c6)	Degree of support of senior executives of certain enterprises on green marketing strategies
Culture of organization(c7)	Degree of match between organizational culture and green marketing
Environment	
Competitor(c8)	Pressure of external competition which makes enterprises adopt green marketing strategies
Partner(c9)	Will and preparation of cooperation partners (e.g. customers and suppliers of enterprises) to participate in green marketing activities
Legitimacy(c10)	Degree of support of social custom and governmental regulations and provisions on green marketing strategies

METHODOLOGY

Hybrid multi-criteria decision model based on DEMATEL-ANP method could effectively help solve the problem of multi-attribute and multi-criteria evaluation. Factors that affect the implementation of green marketing strategy for enterprises may vary; therefore, the research takes the hybrid multi-criteria decision model as the main research technique. The analysis process of the model is shown as below: After defining evaluation criteria, the first step is to obtain the initial data through DEMATEL survey to analyze the influence matrix T of each dimension and criterion, and draw the relation graph of influence nets; the second step is to respectively derive the unweighted super matrix and weighted super matrix $W^w$and limit super matrix $W^*$to obtain the weight of each evaluation criterion through ANP method based on influence matrix T.

Decision Making Trial and Evaluation Laboratory

Decision Making Trial and Evaluation Laboratory (DEMATEL Method for short) is a method developed by Geneva Battelle Association in 1972~1976 with the intention to solve the complicated and difficult global problems such as energy, technology, mankind and environmental protection (Tzeng, Chiang, & Li, 2007). DEMATEL establishes the systematic structure model through observing the level of mutual influences between criteria pairwise and utilizing matrix and relevant mathematical theories to calculate the structural relationships and impact strength of criteria. It is now widely applied to the management of brand marketing, portfolio selection of suppliers, evaluation of national park websites and evaluations of tourism policies (Horng, Liu, Chou, Yin, & Tsai, 2014; Liu, Tzeng, & Lee, 2012; Tsai, Chou, & Lai, 2010). According to Liou & Chuang, computation of DEMATEL Method is divided into following steps (Liou, Tzeng, & Chang, 2007):

Step 1: Establish initial influence matrix $A = [a_{ij}]_{m\times n}$.

After identifying evaluation criterion system, complete the survey design of DEMATEL, which invites each interviewee (usually the specialists or scholars of certain fields) to compare the criteria pairwise through the Likert Scale 0 (no influence), 1 (small influence), 2 (medium influence), 3 (large influence), 4 (extremely large influence), and obtain the level of mutual influences. After calculating the arithmetic average of all evaluations of all interviewees, the direct influence matrix $A = [a_{ij}]_{m\times n}$ can be obtained, in which a_{ij} represents the influence level of criterion i on criterion j .

$$\boldsymbol{A} = \begin{bmatrix} a_{11} & \cdots & a_{1j} & \cdots & a_{1n} \\ \vdots & & \vdots & & \vdots \\ a_{i1} & \cdots & a_{ij} & \cdots & a_{in} \\ \vdots & & \vdots & & \vdots \\ a_{n1} & \cdots & a_{nj} & \cdots & a_{nn} \end{bmatrix} \quad (1)$$

Step 2: Establish standardized direct influence matrix.

Standardize the direct influence matrix through equation (2) and (3) to obtain the standardized direct influence matrix N, whose value is between 1 and 0.

$$\boldsymbol{N} = \boldsymbol{A}/s \quad (2)$$

$$s = \max\left[\max_{1\le i\le n}\sum_{j=1}^{n} a_{ij}\,,\ \max_{1\le j\le n}\sum_{j=1}^{n} a_{ij}\right] \quad (3)$$

Step 3: Calculate the comprehensive influence matrix T.

Mutual influences between systematic criteria are composed of direct influences and indirect influences, in which the indirect influence matrix is a series of degressive matrix array N^2, N^3, $\cdots$, N^h, and $lim_{h\to\infty}N^h = [0]_{n\times n}$. According to the definition, comprehensive influence matrix is the sum of direct influence matrix and indirect influence matrix, which is computed through equation (4).

$$\boldsymbol{T} = \mathbf{N} + \boldsymbol{N}^2 + \boldsymbol{N}^3 + \cdots + \boldsymbol{N}^h = \mathbf{N}(\boldsymbol{I} - \boldsymbol{N})^{-1} \quad (4)$$

Step 4: Calculate influence degree and reason degree, and draw the Influential Network Relation Map (INRM).

Sum of each line and column and r and c can be obtained through calculating the sum of comprehensive influence matrix T and each line and column respectively, shown in equation (5) and equation (6), in which r_i represents the total sum of other criterion levels directly or indirectly influenced by criterion i, c_i represents the total sum of influence levels of criterion i influenced by other criteria. $(r_i + c_i)$ is the total level of influenced and being influenced among criteria, which is known as influence degree; for a certain criterion, the larger the influence degree is, the larger influence it has on other criteria; therefore, preliminarily, influence degree is deemed to be a relatively important criterion. $(r_i - c_i)$ is the total level of influenced or being influenced among criteria, which is known as reason degree, indicating the the level of causal relationship among criteria. If $(r_i - c_i)$ is positive, it has larger

influence on other criteria and is called "cause element". On the contrary, if $(r_i - c_i)$ is negative, it undertakes larger influences of other criteria and is called "result element". Ultimately, through setting the influence degree $(r_i + c_i)$ and reason degree $(r_i - c_i)$ as respectively abscissa and ordinate, the Influential Network Relation Map of criteria can be drawn.

$$\boldsymbol{r} = \left[\sum_{j=1}^{n} t_{ij}\right]_{n\times 1} = (r_i)_{n\times 1} = (r_1, \cdots r_i, \cdots, r_n) \tag{5}$$

$$\boldsymbol{c} = \left[\sum_{i=1}^{n} t_{ij}\right]'_{1\times n} = \left(c_j\right)'_{1\times n} = \left(c_1, \cdots c_j, \cdots, c_n\right) \tag{6}$$

Analytic Network Process

Analytic Network Process (ANP) is proposed on the basis of Analytic Hierarchy Process (AHP), which is a method for determining the weight of criteria through utilizing the mutual influence relationships between criteria. ANP has effectively improved the shortcomings of being too idealistic of AHP. In AHP method, decision problems are decomposed into hierarchical structures and evaluated through quantitative judgment; AHP is mainly applied to the situation where each dimension and criterion has no mutual relationship i.e. in independent relationship. However, realistic problems are often in relationships of dependency or feedback. As the problems and elements increase, their relationship becomes more complicated; therefore, the too idealistic AHP method is not applicable to realistic problems, which will result in deviation of evaluation. ANP method is the general form of AHP method, which is more applicable to realistic problems. Many scholars combine DEMATEL and ANP, which is known as DANP method, whose basic steps after DEMATEL could be concluded as follows:

Step 5: Standardize the comprehensive influence matrix. Standardized comprehensive influence matrix obtained from DEMATEL method T_C and T_c are written as T_C^{a} and T_c^{a}. Process of standardization is shown in equation (7)-(11).

$$\boldsymbol{T_C^{\mathrm{a}}} = \begin{bmatrix} t_C^{11}/d_1 & \cdots & t_C^{1j}/d_1 & \cdots & t_C^{1n}/d_1 \\ \vdots & & \vdots & & \vdots \\ t_C^{i1}/d_2 & \cdots & t_C^{ij}/d_2 & \cdots & t_C^{in}/d_2 \\ \vdots & & \vdots & & \vdots \\ t_C^{n1}/d_3 & \cdots & t_C^{nj}/d_3 & \cdots & t_C^{nn}/d_3 \end{bmatrix} \tag{7}$$

$$\boldsymbol{d_i} = \sum_{j=1}^{n} t_C^{ij}, \quad i = 1, 2, \cdots, n \tag{8}$$

$$\boldsymbol{T_c^{\mathrm{a}}} = \begin{bmatrix} t_c^{\mathrm{a}11} & \cdots & t_c^{\mathrm{a}1j} & \cdots & t_c^{\mathrm{a}1n} \\ \vdots & & \vdots & & \vdots \\ t_c^{\mathrm{a}i1} & \cdots & t_c^{\mathrm{a}ij} & \cdots & t_c^{\mathrm{a}in} \\ \vdots & & \vdots & & \vdots \\ t_c^{\mathrm{a}n1} & \cdots & t_c^{\mathrm{a}nj} & \cdots & t_c^{\mathrm{a}nn} \end{bmatrix} \tag{9}$$

$$\boldsymbol{T_c^{\mathrm{a}11}} = \begin{bmatrix} t_{c^{11}}^{11}/d_{c1}^{11} & \cdots & t_{c^{1j}}^{11}/d_{c1}^{11} & \cdots & t_{c^{1n}}^{11}/d_{c1}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{c^{i1}}^{11}/d_{ci}^{11} & \cdots & t_{c^{ij}}^{11}/d_{ci}^{11} & \cdots & t_{c^{in}}^{11}/d_{ci}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{c^{n1}}^{11}/d_{cn}^{11} & \cdots & t_{c^{nj}}^{11}/d_{cn}^{11} & \cdots & t_{c^{nn}}^{11}/d_{cn}^{11} \end{bmatrix} \tag{10}$$

$$\boldsymbol{d_{ci}^{11}} = \sum_{j=1}^{n} t_{Cij}^{11}, \quad i = 1, 2, \cdots, n \tag{11}$$

Step 6: Establish unweighted super matrix W, which is the transposed matrix of matrix T_c^{α}; its computation is shown as equation (12). If its sub-matrix W_{ij} is null, the criteria are independent without any mutual influence relationships.

$$\boldsymbol{W} = [T_c^{\alpha}]^T = \begin{bmatrix} W^{11} & \cdots & W^{i1} & \cdots & W^{n1} \\ \vdots & & \vdots & & \vdots \\ W^{1j} & \cdots & W^{ij} & \cdots & W^{nj} \\ \vdots & & \vdots & & \vdots \\ W^{1n} & \cdots & W^{in} & \cdots & W^{nn} \end{bmatrix} \tag{12}$$

Step 7: Establish weighted super matrix W^w, as shown in equation (13).

$$\boldsymbol{W^w} = \begin{bmatrix} \boldsymbol{t_C^{\alpha 11} \times W^{11}} & \boldsymbol{t_C^{\alpha 11} \times W^{12}} & \cdots & \cdots & \boldsymbol{t_C^{\alpha n1} \times W^{1n}} \\ \boldsymbol{t_C^{\alpha 12} \times W^{21}} & \boldsymbol{t_C^{\alpha 22} \times W^{22}} & \vdots & & \vdots \\ \vdots & \cdots & \boldsymbol{t_C^{\alpha ji} \times W^{ij}} & \cdots & \boldsymbol{t_C^{\alpha ni} \times W^{ni}} \\ \vdots & & \vdots & & \vdots \\ \boldsymbol{t_C^{\alpha 1n} \times W^{n1}} & \boldsymbol{t_C^{\alpha 2n} \times W^{11}} & \cdots & \cdots & \boldsymbol{t_C^{\alpha nn} \times W^{nn}} \end{bmatrix} \tag{13}$$

Step 8: Calculate the limit super matrix W^*. Conduct involution calculation $lim_{\alpha\to\infty}(W^w)^{\alpha}$ on weighted super matrix W^w itself until the result converges to a stable limit super matrixW^*, from which the wight of each criterion is obtained.

RESULTS AND DISCUSSION

Data Collection

In the process of DEMATEL analysis, data collection is generally achieved through evaluations of specialists and scholars in accordance with Likert Scale from 0~4 (0 means no influence; 1 means small influence; 2 means medium influence; 3 means large influence; 4 means extremely large influence). The study invited scholars of marketing strategy and middle and senior executives of certain enterprises to participate the DEMATEL survey. In order to assure the confidence of the research result, it is required to test the discordance rate of opinions of specialists and scholars; if the discordance rate is lower than 5%, then the confidence of the survey is higher than 95%, which indicates that the increase of additional samples will not have impact on the overall research result.

Calculation of Influence Degree and Reason Degree and Establishment of INRM

In accordance with the specific steps of DEMATEL method introduced before, first through counting the direct relation matrix of dimensions and criteria given by the 15 specialists and scholars and conducting arithmetic average calculation, the initial influence matrix A can be obtained, as shown in Table 2. The values represent different opinions. The higher the value is, the larger influence of the criterion on the other criterion is; on the contrary, the lower, the smaller. Second, calculate the total sum of each column and line in initial influence matrix A through MATLAB R2011b software and equation (2) and (3), find the biggest value, divide all the elements in the matrix by s, and then obtain the standardized direct influence matrix N. Next, apply equation (4) to obtain the comprehensive influence matrix T_c of each criterion (see Table 4). Comprehensive influence matrix$T_d$of each dimension can be obtained through the same method (see Table 3). Based on comprehensive influence matrix T_c and T_d, calculate the total sum of each line of each dimension and criterion, and the result is the influence level of each dimension and criterion; calculate the total sum of each column, and the result is the level of being

influence of each dimension and criterion; then sum up the two results to obtain the influence degree of each dimension and criterion while subtract the results to obtain the reason degree of each dimension and criterion; detained computation is demonstrated in equation (5) and (6). Table 6 shows the influence degree and reason degree of centrality. Ultimately, set the influence degree and reason degree respectively as the abscissa and ordinate, and successively draw the INRM of each dimension and criterion (see Figure 1); in INRM, if the arrow direction is leaving, it means the influence level of the criterion is lager while the influence is flowing toward another criterion; if the criterion is pointed by an arrow, it means the criterion is influenced by another criterion, i.e. the passive influencer. In the following part the influence network relationship of each dimension and criterion will be discussed respectively.

It can be inferred from Table 5 that among the three evaluation dimensions, 4P dimension possesses the largest influence degree, followed by organization dimension and environment dimension, indicating that 4P dimension is the most important influence dimension with the largest general influence relationship level in the overall structure.

As for reason degree, organization and environment are positive, whose causal relationships are cause factors, i.e. the active influencer. However, 4P theory is negative, indicating that the result factor in causal relationship, i.e. the passive influencer. Among which,

TABLE 2
INITIAL INFLUENTIAL MATRIX A

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
c1	0.000	3.643	2.571	2.357	2.000	2.857	1.643	2.929	2.571	1.929
c2	3.143	0.000	3.000	3.214	1.929	2.429	1.500	3.000	2.929	1.429
c3	1.857	2.857	0.000	2.857	2.071	2.214	1.357	2.571	2.571	1.429
c4	1.929	2.929	2.571	0.000	1.500	2.357	1.500	2.786	2.071	1.500
c5	2.429	2.429	2.643	2.357	0.000	2.500	2.786	2.571	2.500	1.929
c6	2.786	2.429	2.429	2.500	2.429	0.000	3.071	2.571	2.857	2.000
c7	2.357	1.714	1.857	2.000	2.214	2.286	0.000	1.929	2.214	2.214
c8	3.071	3.429	2.500	2.929	1.643	1.929	1.571	0.000	2.500	1.643
c9	2.643	2.571	2.714	2.357	1.786	2.000	1.500	2.214	0.000	2.071
c10	2.429	2.286	2.286	2.214	1.929	3.571	2.429	2.571	2.929	0.000

Discordance rate (%) $=\frac{1}{n(n-1)}\sum_{i=1}^{n}\sum_{j=1}^{n}\frac{\left|a_{ij}^{s}-a_{ij}^{s-1}\right|}{a_{ij}^{s}}\times 100\%$, confidence =1-discordance rate, in which s represents the amount of interviewees, a_{ij}^{s} represents the average influence level of criterion i on criterion j, and n represents the amount of criteria. In this study, $n(n-1)$=10*9.

TABLE 3
TOTAL-INFLUENTIAL DIMENSIONS MATRIX T_d

	Marketing	Organization	Environment
Marketing	0.0294	0.1231	0.1099
Organization	0.1551	0.0280	0.1154
Environment	0.1304	0.1116	0.0233

TABLE 4
TOTAL-INFLUENTIAL CRITERIA MATRIX T_c

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
c1	0.681	0.865	0.777	0.779	0.607	0.759	0.581	0.803	0.787	0.563
c2	0.792	0.732	0.789	0.804	0.602	0.741	0.572	0.803	0.794	0.544
c3	0.673	0.754	0.603	0.716	0.548	0.661	0.511	0.711	0.706	0.489
c4	0.659	0.739	0.682	0.594	0.515	0.650	0.503	0.701	0.672	0.479
c5	0.756	0.806	0.764	0.762	0.520	0.733	0.611	0.775	0.768	0.554
c6	0.793	0.833	0.781	0.791	0.631	0.664	0.639	0.800	0.805	0.575
c7	0.663	0.685	0.646	0.657	0.533	0.640	0.440	0.661	0.667	0.499
c8	0.755	0.818	0.737	0.759	0.565	0.691	0.548	0.657	0.745	0.526
c9	0.702	0.748	0.707	0.702	0.541	0.659	0.518	0.702	0.614	0.514
c10	0.773	0.820	0.768	0.774	0.608	0.787	0.613	0.792	0.801	0.493

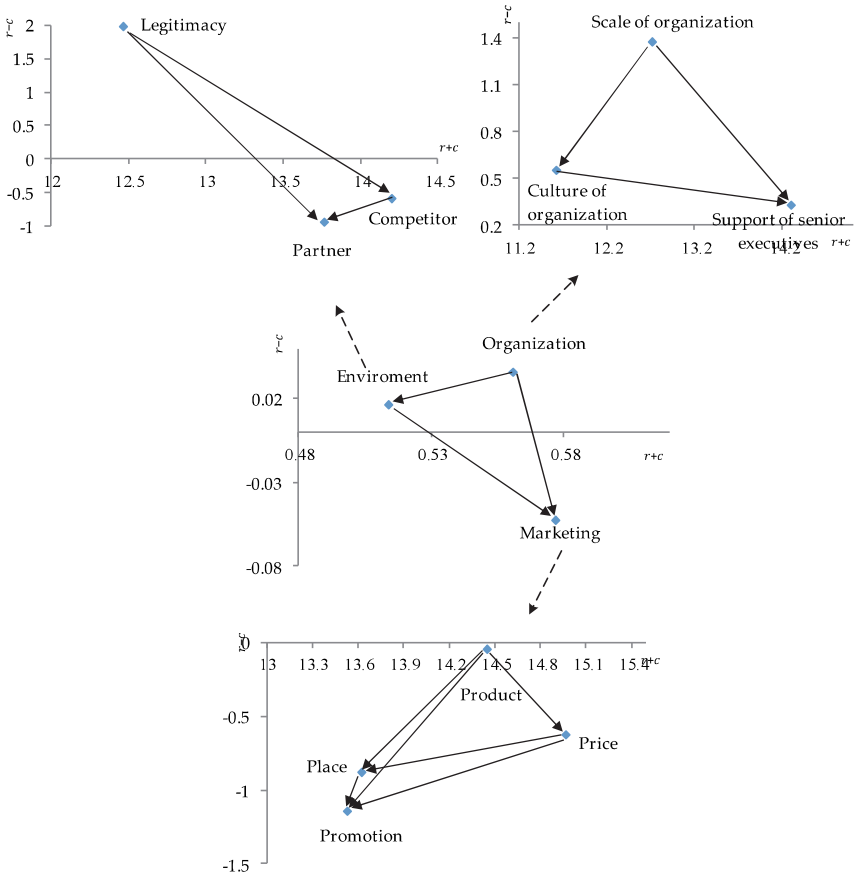
TABLE 5
SUM OF INFLUENCES GIVEN AND RECEIVED ON DIMENSIONS AND CRITERIA

Dimensions/Criteria	R	C	Influencedegree (R+C)	Reason degree (R-C)
Marketing	26.942	29.637	56.579	-2.694
C1	7.204	7.246	14.450	-0.042
C2	7.174	7.799	14.973	-0.626
C3	6.370	7.254	13.624	-0.883
C4	6.194	7.338	13.532	-1.143
Organization	20.453	18.194	38.647	2.259
C5	7.049	5.670	12.719	1.379
C6	7.313	6.987	14.300	0.326
C7	6.091	5.537	11.627	0.554
Environment	20.438	20.002	40.440	0.435
C8	6.800	7.405	14.206	-0.605
C9	6.408	7.359	13.767	-0.951
C10	7.229	5.238	12.467	1.991

The organization dimension possesses the largest reason degree, reflected in the figure that it has two arrows pointing out toward environment and 4P dimension; while 4P dimension possesses the smallest reason degree, indicating that it is the ultimate result and is easily influence by other dimensions. Therefore, when considering the implementation of overall strategies, the organization dimension should be the first concern; implementation of strategies with larger organization dimension makes enterprises adapt to the external environment better and propose sales strategies for products, prices, distributions and

promotions. As the dimension with largest reason degree, organization dimension will generate positive impacts on other dimensions.

FIGURE 1
INFLUENTIAL NETWORK RELATIONS MAP FOR GREEN MARKETING STRATEGIES



Being specific to criteria under each dimension, it can be inferred from Table 5 and Figure 1 that: In 4P theory dimension, the order of influence degree is successively: price, product, place, and promotion. As the influencer with the largest reason degree, product has three out-pointing arrows, which can influence on price, place and promotion. Therefore, it is obvious that product is the determining factor. It is also applicable to overcoming the difficulty of green marketing strategies implementing. Only solving the problem of product design in the first place, can problem of price, place and promotion be further solved.

In organization theory dimension, the order of influence degree is successively: support of senior executives, scale of organization, and culture of organization. Support of senior executives is considered as the most powerful criterion in the dimension. No matter in the aspect of solving internal problems or reacting to external environment, support of senior executives is always the determining factor for planning and implementation of strategies. The order of reason degree is successively: scale of organization, culture of organization, and support of senior executives. As analysis aforementioned, larger companies possess more financial and technical resources, and are more capable of undertaking the costs of adopting green marketing strategies. Only companies with the probability to achieve green and

environmental protection targets, can form the corresponding environmental protection culture, which can further advance their senior executives to powerfully support the implementation of green marketing strategies.

In the environment theory dimension, the order of influence degree is successively: competitors, partners, legitimacy, which indicates that the determining factor is the external competition, with the largest influence on other criteria. The order of reason degree is successively: legitimacy, competitors, and partners. It can be inferred that social customs and governmental regulations and provisions make up the legitimacy for enterprises to implement green marketing strategies, which further shapes the external competitive environment and influence the competitor criterion, and naturally influence the consumption habits of customers and matching wills of suppliers.

Weight Computing of each Dimension and Criterion

After analyzing the mutual influence relationship between each dimension and criterion though DEMATEL method, the study will compute the weight of each dimension and criterion through ANP method. First, standardize the influence matrix T_C and T_c obtained from DEMATEL survey results, whose process is demonstrated in equation (4-7) and (4-11). Through which, the unweighted super matrix W could be obtained (see table 6), running equation (4-12) to establish weighted super matrix W^w, powering the weighted super matrix W^w itself with $\lim_{\alpha\to\infty}(W^w)^\alpha$ until its result convergences to a stable limit super matrix W^*, as shown in Table 7, and from which the weight and order of each dimension and criterion is obtained (see table 8).

It can be inferred from Table 9 that among the three dimensions, the respective order of weight is: 4P (0.363), organization (0.330), and environment (0.307). In 4P dimension, weight of price (0.095) is the highest, followed successively by promotion (0.090), product (0.089), place (0.089); in organization dimension, order of weight is successively: support of senior executives (0.127), scale of organization (0.103), culture of organization (0.100); in environment dimension, the order of weight is successively competitors (0.114), partners (0.113), legitimacy (0.080). Above all the weight of criteria, support of senior executives (0.127), competitors (0.114), partners (0.113), scale of organization (0.103), culture of organization (0.100) ranks the top five.

TABLE 6
THE UNWEIGHTED SUPER MATRIX W

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
c1	0.220	0.254	0.245	0.247	0.245	0.248	0.250	0.246	0.246	0.247
c2	0.279	0.235	0.275	0.276	0.261	0.261	0.258	0.267	0.262	0.261
c3	0.251	0.253	0.220	0.255	0.247	0.244	0.244	0.240	0.247	0.245
c4	0.251	0.258	0.261	0.222	0.247	0.247	0.248	0.247	0.245	0.247
c5	0.312	0.314	0.319	0.309	0.279	0.326	0.331	0.313	0.315	0.303
c6	0.390	0.387	0.384	0.390	0.393	0.343	0.397	0.383	0.383	0.392
c7	0.298	0.299	0.297	0.301	0.328	0.331	0.273	0.304	0.302	0.305
c8	0.373	0.375	0.373	0.378	0.369	0.367	0.362	0.341	0.384	0.380
c9	0.365	0.371	0.370	0.363	0.366	0.369	0.365	0.386	0.335	0.384
c10	0.262	0.254	0.257	0.259	0.264	0.264	0.273	0.273	0.281	0.237

TABLE 7
THE STABLE MATRIX OF DANP (WHEN POWER $\lim_{q\to\infty}(W^w)^q$)

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
c1	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089
c2	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095
c3	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089
c4	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
c5	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103
c6	0.127	0.127	0.127	0.127	0.127	0.127	0.127	0.127	0.127	0.127
c7	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
c8	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114
c9	0.113	0.113	0.113	0.113	0.113	0.113	0.113	0.113	0.113	0.113
c10	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080

TABLE 8
WEIGHT AND ORDER OF DIMENSIONS AND CRITERIA

Dimension	Weight	Order	Criteria	Weight	Order
Marketing	0.363	1	Product(c1)	0.089	3
			Price(c2)	0.095	1
			Place(c3)	0.089	4
			Promotion(c4)	0.090	2
Organization	0.330	2	Scale of organization(c5)	0.103	2
			Support of senior executives(c6)	0.127	1
			Culture of organization(c7)	0.100	3
Environment	0.307	3	Competitor(c8)	0.114	1
			Partner(c9)	0.113	2
			Legitimacy(c10)	0.080	3

CONCLUSION

On the basis of classic 4P theory of marketing, organization theories and environment theories, the research establishes an analysis framework for contributory factors of green marketing strategies implementing, as well as the evaluation criteria of implementation of green marketing strategies. Through a detailed introduction and proper application of DEMATEL method, the research recognizes the influence degree and reason degree of each dimension and criterion, draws the Influential Network Relation Map (INRM) of dimensions and criteria, as well as computing the weight of each dimension and criterion. The results have shown that among the three evaluation dimensions, 4P possesses the largest influence degree, followed by organization dimension and environment dimension, indicating that 4P

dimension is the most important influence dimension with the largest general influence relation level. Above all the weight of criteria, support of senior executives ranks the top while legality ranks the bottom.

Theoretically, the paper fills the gap in implementation analysis of green marketing strategies, and provides a new analysis framework combining with marketing and organization theories for contributory factors of green marketing strategies implementing. Besides, the paper introduces the hybrid multi-criteria decision model based on DEMATEL-ANP into the study of strategy implementations in enterprises. Through quantitative data, the relationship between each contributory factor is shown directly, and the distance from theory to practice is recognized to further provide a new idea and method for researches in the aspect of strategy implementations in enterprises.

Practically, the paper evokes the responsibility of enterprises to society and public, directs the green consumption, injects power to the strengthening of sustainable development, and supports the promotion of sustainable development launched by enterprises and governments. If the organizational scale permits, enterprises should establish the united organizational culture, promote the strategy planning through organizational culture and ultimately promote the implementation of strategies through support of senior executives. Under the protection of organization, enterprises should also value the promotion of competitors and partners relying on external environment legitimacy to supervise and urge the implementation of strategies of themselves. In the last, the details of green marketing strategy implementation is of same significance, which requires enterprises to start with product design and refresh the design philosophy of products, and take price, place and promotion, etc. into consideration comprehensively during the planning process of product design to make sure that the green marketing is not only environmental friendly, but also profitable. From a governmental perspective, on the one hand, governments can start from external environment to ensure the industrial legitimacy of environment protection through laws and regulations and value propaganda, etc. to further push forward the sustainable development of enterprises in certain industries and create a positive competition atmosphere; on the other hand, governments can start from educating consumers, make the conception of green consumption well-accepted by public and merge into social customs, alter the habits of consumers and further promote the implementation of green marketing strategies for enterprises.

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