Expert Systems with Applications 39 (2012) 5600–5615

Contents lists available at SciVerse ScienceDirect

Expert Systems with Applications

journal homepage: www.elsevier.com/locate/eswa

Brand marketing for creating brand value based on a MCDM model combining DEMATEL with ANP and VIKOR methods

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ARTICLE INFO

Keywords:
Brand marketing
Brand value
MCDM (multiple criteria decision making)
DEMATEL (decision making trial and evaluation laboratory)
ANP (analytic network process)
VIKOR

ABSTRACT

When consumers purchase products, they will consider the brand first, because it indirectly leads consumers to associate the products with the quality, functions, and the design. Based on the smiling curve, it showed enhancing the marketing or R&D will create value-added to the products or brands. Thus, this study intended to use brand marketing to create brand value. However, there are many criteria among the strategies, and they are interrelated. Therefore, this study utilized the MCDM model combining DEMATEL with ANP and VIKOR methods to clarify the interrelated relationships of brand marketing and find the problems or gaps; then, evaluated the situation to reduce the gaps in order to achieve the aspired levels and rank the priorities in brand marketing strategies, we also evaluated the customer's satisfaction of brand marketing by three electronic manufacturing companies in Taiwan. As the empirical results, value pricing is the most important factor, followed by consumer's price perception and perceived quality while showed the highest satisfaction of brand marketing was in F2 company. The results of this paper will provide the enterprises with a reference for planning brand marketing.

1. Introduction

In consumer marketing, brands often provide the primary points of differentiation between competitive offerings, and as such they can be critical to the success of companies (Wood, 2000). For consumers, brands can be used to identify the sources or manufacturers while let manufacturers or distributors to know their responsibility. Most importantly, the brands have a special meaning to consumers. Because consumers learned the brands based on the experiences of using the products and from the years of manufacturers marketing plans that they can find which brand is acceptable and which brand are not satisfy their needs. As a result, the brands become a kind of shorthand to simplify products purchase decision tools or methods (Keller, 2001). People may find it rational to make different inferences from the brands they see and from the words they hear (Kuksov, 2007). Therefore, the brands can help consumers connect all the factors of the product. While brands have been widely used to identify products origin and its physical characteristics for many centuries (Farquhar, 1989), currently, the brand-related issues, such as, brand loyalty, brand image and brand equity are widely discussed, but being less concerned about the brand-related marketing to create brand value. Based on the smiling curve (Shih, 1992), it showed enhancing the marketing and R&D will create value-added to the products or brands (see the Fig. 1). Herremans, Ryans, and Aggarwal (2000) also pointed out that customers are retained in several ways but generally by some form of investment in marketing and/or R&D. Marketing support might lead directly to building brand value, which in turn retains customers.

Another possibility is that marketing support might retain customers; customer's retention then reduces return volatility, which in turn builds brand value (Herremans et al., 2000). Keller (2001) noted that the beneficial association to the brands is able to satisfy the consumer's needs and successfully communicate with consumers by the products or marketing strategy. The brand marketing includes many elements, we can generalize the elements from the literature of Keller (2001) who noted the brand-related marketing with product strategy, price strategy, channel strategy and communication strategy, and use them to satisfy customer's needs for creating brand value.

However, there are many factors in brand marketing and they are complicated and interrelated. One of the hybrid MCDM model combining the decision making trial and evaluation laboratory (DEMATEL) with analytic network process (ANP) and VIKOR methods can be effectively used to solve the complex and tangled problem of understanding the complex structure of the causal

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doi:10.1016/j.eswa.2011.11.057

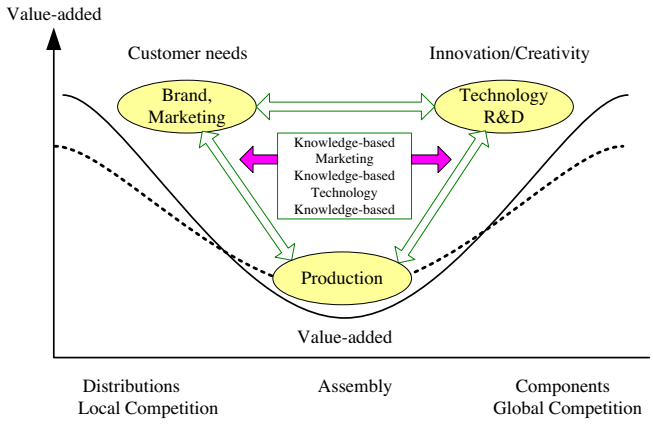

Fig. 1. The smiling curve.

relationships; subsequently, one can probe the interrelated relationships between the dimensions and criteria and then to build a impact relation map (IRM) among criteria for brand marketing evaluation. The weights of each factor of MCDM problem for selecting the best strategy will then be derived by utilizing the ANP combined DMATEL (Li & Tzeng, 2009a, 2009b; Tzeng, Chiang, & Li, 2007). We then identified the most suitable strategy by VIKOR and offered a complete depiction and testing of the decision model for a reference to enterprises (Chen & Tzeng, 2011, Chen, Hsu, & Tzeng, 2011; Chen, Lein, et al., 2011; Huang, Tzeng, & Ho, 2011; Hung, Chou, & Tzeng, 2011; Liou & Tzeng, 2011; Liu, Tzeng, & Lee, 2011, 2012; Ou Yang, Shieh, & Tzeng, 2012; Shen, Lin, & Tzeng, 2011; Yang & Tzeng, 2011).

Currently, the DEMATEL has been applied in marketing to discuss consumers' behavior of marketing strategy (Chiu, Chen, Tzeng, & Shyu, 2006); in the innovation of industries discussing the policy mix on re-configuration (Huang, Shyu, & Tzeng, 2007). And in R&D, Lin and Tzeng (2009) discussed the value of technology innovation. The analytic network process (ANP) was proposed by Saaty (1996) to overcome the problem of dependence and feedback among criteria or alternatives (Liou, Tzeng, & Chang, 2007). Furthermore, the ANP method is used to decide the relative weights of the criteria. It improves the visibility of decision-making processes and generates priorities between the decision alternatives. In order to provide a systematic approach to set priorities among multi-criteria and trade-off among objectives, the ANP method is applied prior to goal programming formulation, for example: selecting management systems for sustainable development (Tsai & Chou, 2009), the choice of logistics service providers (Jharkharia & Shankar, 2007). In addition, the VIKOR method was applied to determine the best feasible solution according to the selected criteria, such as prioritizing land-use restraint strategies (Chang & Hsu, 2009), supplier selection (Sanayei, Mousavi, & Yazdankhah, 2010), portfolio selection (Ho, Tsai, Tzeng, & Fang, 2011).

Therefore, the purpose of this study is intended to provide an empirical case in brand marketing to demonstrate how the MCDM model can be applied to brand marketing to discover important factors that can create brand value. This study proposes a hybrid MCDM model combining the DEMATEL with ANP and VIKOR methods to illustrate the interrelated relationships in brand marketing. After understanding the interrelated relationships, we can find the problems or gaps in brand marketing; then, we evaluate the situation to reduce the gaps in order to achieve the aspired levels in each criterion by considering an impact-relations-map for brand marketing to create brand value. This study also ranks the priorities of dimensions and criteria to find the important factors in brand marketing and also evaluates the customer's satisfaction of brand marketing in 3 chosen electronic manufacturing companies in Taiwan.

The remainder of this paper is organized as follows: we reviewed the literature in Section 2. A hybrid MCDM model combining DEMATEL with ANP and VIKOR for brand marketing is introduced in Section 3. An empirical case of brand marketing is illustrated to demonstrate the proposed methods in Section 4. Conclusions are presented in the last Section.

2. Literature review

The purpose of this Section is to identify the influential factors of brand marketing based on past literatures and discuss studies. To make up for such a gap, this study conducted a literature review of Keller (2001) who noted that the elements and selections of brands will create value for the customer-based brand, and the most important strategy is brand-related marketing activities and marketing planning such as: the perceived quality, perceived value and enhance the consumer experience of product strategy; the consumer's price perception and value pricing of price strategy; the channel design, push and pull strategy and channel support of channel strategy; the advertisement, promotions, event marketing and sponsorship, public relations and publicity materials and personal selling of communication strategy.

2.1. The brand definition

The different approaches to define the brand construct partly stem from differing philosophies (such as product-plus and holistic branding outlined below) and stakeholder perspective, (i.e., a brand may be defined from the consumers' perspective and/or from the brand owner's perspective). In addition, brands are sometimes defined in terms of their purpose, and sometimes described by their characteristics. From this diversity an integrated definition is drawn (Wood, 2000).

The American Marketing Association (1960) proposed the following company-oriented definition of a brand as: a name, term, sign, symbol, or design, or a combination of them, intended to identify the goods or services of one seller or group of sellers and to differentiate them from those of competitors. This definition has been criticized for being too product-oriented, with emphasis on visual features as differentiating mechanisms (Arnold, 1992; Crainer, 1995). Watkins (1986), Aaker (1991), Stanton, Etzel, and Walker (1991), Doyle (1994) and Kotler, Armstrong, Saunders, and Wong (1996) adopted this definition. Dibb, Simkin, Pride, and Ferrell (1997) use the Bennett (1988) variant of the definition which is: a brand is a name, term, design, symbol or any other feature that identifies one seller's good or service as distinct from those of other sellers. The key changed to the original definition are the words "any other feature" as this allows for intangibles, such as image, to be the point of differentiation. The particular value of this definition is that it focuses on a fundamental brand purpose, which is differentiation. It should not be forgotten that brands operate in a market environment where differentiation is crucially important. Even where monopolies exist, companies may choose to position their brand(s) with a view to future competition. The other key feature of this definition is that it takes the corporate perspective rather than emphasizing consumer benefits. Ambler (1992) takes a consumer-oriented approach in defining a brand as: the promise of the bundles of attributes that someone buys and provides satisfaction. The attributes that make up a brand may be real or illusory, rational or emotional, tangible or invisible. Many other brand definitions and descriptions focus on the methods used to achieve differentiation and/or emphasize the benefits the consumer derives from purchasing brands. These include (inter

alia) definitions and descriptions that emphasize brands as an image in the consumers' minds (Boulding, 1956; Martineau, 1959; Keller, 1993) brand personality (Alt & Griggs, 1988; Goodyear, 1993; Aaker, 1996), brands as value systems (Sheth, Newman, & Gross, 1991, 1991), and brands as added value (Levitt, 1962; de Chernatony & McDonald, 1992; Murphy, 1992; Wolfe, 1993; Doyle, 1994).

Styles and Ambler (1995) identified two broad philosophical approaches to define a brand. The first is the product-plus approach which views branding as an addition to the product. The brand is essentially viewed as an identifier. In this context, branding would be one of the final processes in new product development (i.e., it is additional to the product). The second approach is the holistic perspective in which the focus is the brand itself. Using the marketing mix, the brand is tailored to the needs and wants of a specified target group. The elements of the marketing mix are unified by the brand such that the individual elements of the mix (for instance price), are managed in a way which supports the brand message (Wood, 2000).

2.2. Brand-related marketing for creating brand value

With the increasing emphasis on services in all markets, the differences of marketing practices in consumers and business markets are diminishing (Vargo & Lusch, 2004). However, some differences may exist when it comes to branding (Mudambi, 2002). A number of attempts have been made to reconcile the differences in accounting/finance with marketing perspectives. Indeed, as an example of the importance of doing so, Anderson (1982) noted that ignoring the financial implications of marketing decisions (such as increases in working capital or in optimal debt ratios) is a serious form of marketing myopia. Brand marketing is an action that enterprise takes a long time to express the brand image and the concept of products; therefore, successful companies have discovered the brand characteristics and try to maintain the brand image. The successful brand marketing will make the brand gained more loyalty from consumers and increase more profits on investment.

These attributes emanate from all elements of the marketing mix and the attributes of a brand are created by using the marketing mix. In marketing, the link between brands and added value is common thought not consistent. It is recognized that marketing, as a discipline, sometimes uses and adapts concepts derived from other disciplines. The concept of added value most notably can be found in economics, accounting and marketing literature, and there is a distinct integration of ideas among the three disciplines. Wood (1996) explored the various approaches to the concept of added value and examines the fundamental differences in the accounting and marketing approaches. These are very briefly outlined next. In accounting, added value is quantifiable and something that accrues to the organization. The accounting approach is typified by Lucey (1985), who defined added value as: the difference between sales income and bought in goods and services. Value-added is the wealth that a firm creates by its own efforts. In accounting, added value is quantifiable and something that accrues to the organization. The accounting approach is typified by Lucey (1985), who defined added value as: the difference between sales income and bought in goods and services. Value added is the wealth that a firm creates by its own efforts. In marketing, added value is not quantifiable and is translated as a consumer benefit. The marketing approach is indicated by Kinner and Bernhardt (1986) when they suggested that: many companies make their product more convenient to use, thus adding value for the consumer. Wood (1996) suggested that what marketers call added value would better be termed added value agents. Much marketing activity is based around managing added value agents, the outcomes of which are represented by added value itself. Added value agents are many and various, but branding is of major importance, and gets significant coverage in the marketing literature. By managing added value agents, marketers can significantly increase added value that accrues to the organization. Added value agents such as brands provide benefits for the consumers that are sufficient to create purchases. From a marketing perspective, it is recognized that products that have yet to be sold have potential added value (Ecroyd & Lyons, 1979) which marketing activity can help to realize. Although added value can be attributed to products and service, both core and surround, increasingly added value agents, such as brand image, are derived from the less tangible aspects. Added value is implicit to this definition. That is, a brand is a mechanism for achieving competitive advantage for firms, through differentiation (purpose). The attributes that differentiate a brand provide the customer with satisfaction and benefits for which they are willing to pay (mechanism). Competitive advantage for firms may be determined in terms of revenue, profit, added value or market share. Benefits the consumer purchases may be real or illusory, rational or emotional, tangible or intangible. In whatever way the benefits or attributes of brands are described, it is important they are distinguished from the added value (and other advantages) the firm gains, as this has been the source of much confusion (Wood, 2000).

Brand value is suggested as one of the performance measures that can replace the term "competitive advantage". It is a relationship between the various concepts of brand equity (i.e., brand value is a function of brand strength which is, in turn, an unction of brand description), brand description determines brand strength, which in turn determines brand value. The brand strength and brand value provides information that may determine how brand description is managed. Whereas added value, profit and revenue are historically focused measures, brand value looks to the future. Brand value is an index-based measure that seeks to represent the net present value of the future earnings stream of a brand. The job of managers of brands, therefore, is to maximize the long-term value of that earnings stream. This will require expenditure on the marketing mix to support brands, and may lead to short-term sub-optimization (even to profit and loss account losses) to ensure the long-term brand building. Brand value has an additional advantage over other measures, in that it addresses the health of the market, as well as the health of the brand within a market. A key benefit of adopting brand value as a performance measure is that it creates a long-term focus for management. If brand strength is the degree of attachment to a brand, and brand value is based on the future earnings of a brand then the higher the brand strength the higher the brand value. Managers of brands (not necessarily marketers alone) should therefore manage, and seek to maximize, both brand strength and brand value. The natural long-term outcome of this should be increased profitability (Wood, 2000).

2.3. The measurements for brand marketing

Keller (2001) proposed that the elements and selection of brands will create value for the customer-based brand, and the most important strategy is brand-related marketing activities and marketing planning such as:

2.3.1. Product strategy

Product is the core of the brand. To consumers, the brand experience and the company communication will let them receive the product information, and it will also form an influence on their purchase. The prerequisite of successful marketing is whether the product is a substance, service, organization or design, they all meet the customer's needs and satisfaction. The factors of the products strategy is as following:

(1) Perceived quality: perceived quality is considered a "core/primary" facet across customer-based brand (CBBE) equity frameworks (Aaker, 1996; Dyson, Farr, & Hollis, 1996;Farquhar, 1989; Keller, 1993). Perceived quality represents consumers' judgments regarding a brand's overall excellence or superiority (Zeithaml, 1988). Consumers will rely more on physical characteristics of products than on extrinsic cues if they believe they can confidently judge those physical characteristics that indicate product quality (Jacoby, Olson, & Haddock, 1971; Szybillo & Jacoby, 1974; Valenzi & Andrews, 1971; Wheatley, Chiu, & Goldman, 1981) and when they are highly involved in the judgment or decision (Maheswaran, Mackie, & Chaiken, 1992; Sprott & Shimp, 2004). From a consumer-level perspective, brand equity is augmentable by enhancing a brand's image (Keller, 1993), and because perceived quality is an important component of image, anything done to enhance quality perceptions will improve equity as well. A definition that has gained some level of acceptance views perceived quality as judgment of the overall excellence, esteem, or superiority of a brand (with respect to its intended purposes) relative to alternative brand(s). Perceived quality is at a higher level of abstraction than any specific attribute, and differs from objective quality as perceived quality is more akin to an attitudinal assessment of a brand—a global affective assessment of a brand's performance relative to other brands (Aaker, 1996; Keller, 1993; Zeithaml, 1988).

(2) Perceived value: the perceived value is defined as "the consumer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given" (Zeithaml, 1988). Bishop (1984) also pointed out that customer's perceived value can be defined from the perspectives of money, quality, benefit, and social psychology. More specific, perceived value can be summarized as a trade-off between perceived benefits and perceived costs (Lovelock, 2000). Recent research studies have suggested that perceived value may be a better predictor of repurchase intentions than either satisfaction or quality (Cronin, Brady, & Hult, 2000; Oh, 2000; Chen, 2008). Perceived value can be analyzed with a unidimensional measure (Gale, 1994) or a multidimensional scale (Sheth et al., 1991, Sheth, Newman, & Gross, 1991; Petrick & Backman, 2002). The Monetary perspective indicates that value is generated when less is paid (such as by using coupons or promotions) for goods. In other words, it is the concept of consumer surplus in economics; perceived value is the difference between the highest price that consumers are willing to pay for a product or a service and the amount practically paid (Kuo, Wub, & Deng, 2009). According to the quality perspective, value is the difference between the money paid for a certain product and the quality of the product (Bishop, 1984). That is, when less money is paid for a high quality product, positive perceived value will be created. The benefit perspective indicates that perceived value is customers' verall evaluation of the utility of perceived benefits and perceived sacrifices (Zeithaml, 1988). In other words, consumers may cognitively integrate their perceptions of what they get and what they have to give up in order to obtaining goods (Kuo et al., 2009).

(3) Enhance the consumer experience: employing an economic and marketing perspective, Schmitt (1999) declared that experiences are private, personal events that occur in response to some stimulation and involve the entire being as a result of observing or participating in an event. He postulated that in order to stimulate desired consumer experiences, marketers must provide the right setting and environment. Lewis and Chambers (2000) defined consumer experience as "the total outcome to the customer from the combination of environment, goods and services purchased". Finally, most researchers attempting to define the experience overlook the operational patterns that are common to many consumer experiences. Consumers who have actually tried a brand and experienced its intrinsic attributes should rely less on the brand name cue when forming quality judgments compared to when judging quality without trial experience (Sprott & Shimp, 2004).

2.3.2. Price strategy

Shipley and Jobber (2001) proposed that the determination of the objectives of the pricing process is the starting point of pricing strategies. The objectives of the pricing process are a direct result of a company's overall strategy. Price is an important factor of enterprise's income, and it is associated with the strong awareness, and uniqueness of the brand. The factors of the price strategy includes is as following:

(1) Consumer's price perception: studies have advocated that price perception is a complex and broad stimulus which consists of positive and negative cues to consumers (Erickson & Johansson, 1985; Lichtenstein, Bloch, & Black, 1988, 1993). Previous studies have identified a number of constructs, such as value consciousness, price consciousness, sale proneness, and price mavenim, which represent price in its negative role. Lichtenstein, Ridgway, and Netemeyer (1993) defined value consciousness as the concern for price paid relative to quality received, and price consciousness as the degree to which the consumer focuses exclusively on paying low prices. On the other hand, price-quality schema and prestige sensitivity have been recognized as a positive perception of price. Lichtenstein et al. (1993) defined the price-quality schema as the level of the price cue that is related positively to the quality level of the product.

(2) Value pricing: a product's economic value is the price of the customer's best alternative-reference value-plus the value of whatever differentiates the offering from the alternative – differentiation value (Nagle & Holden, 1999). In this definition, reference is thus made to the received value of customers—the value customer actually experience through specific product-customer interactions—and not to customers' desired value—the value customers want from products and services and their providers (Flint & Woodruff, 2001). The concept of economic (or customer) value is being interpreted in two different ways. According to Simpson, Siguaw, and Baker (2001), Ulaga and Chacour (2001), Walter, Ritter, and Gemuenden (2001), and Zeithaml (1988), customer value is the difference between perceived benefits and sacrifices. In microeconomic terms, customer value is seen here as the difference between the consumer's willingness to pay and the actual price paid, which is equal to the "consumer surplus," the excess value retained by the consumer. From a marketing perspective, the goal of pricing strategy is to assign a price that is the monetary equivalent of the value the customer perceives in the product while meeting profit and return on investment goals. Conversely, pricing approaches based on customers' perceptions of value are strategic and long-term in nature since they are focused on capturing unique value from each market segment through the pricing mechanism (Harmon, Raffo, & Faulk, 2005). Customer value is the overall benefit derived from the product, as the customer perceives it, at the price the customer is willing to pay. At the core of perceived value pricing is the requirement that companies must first understand how the customer perceives value. Perceived value can be defined

in terms of the tradeoff between perceived benefits received and the perceived price for acquiring the product or service that delivers those benefits. Software developers should understand what these tradeoffs are and how they should influence software design (Harmon et al., 2005).

2.3.3. Channel strategy

Stone, Hobbs, and Khaleeli (2002) studied an emerging distribution strategy using more than one retail type to serve consumers, which is multi-channel retailing, and they concluded that multi-channel retailing provided unique shopping experiences and values for consumers. The sales and delivery channel of product will impose a big influence on the last selling. The channel strategy includes the design and management, such as: wholesalers, distributors, dealers and retailers. The factors of channel strategy can be divided into:

(1) Direct and indirect channels: Moriarty, Swartz, and Khuen (1988) study multi-channels with a combination of direct and indirect channels, "hybrid channels", and emphasized the element of competition between the manufacturer and the indirect channels in consumers' decisions. While most volume brands rely on indirect channels, except in metro areas where cost of land is very high, premium brands in general have a mixture of direct and indirect sales channels. The aim of an indirect channel may be to replicate a manufacturer's direct channel and fulfill the manufacturer's intentions, thus assuming the manufacturer's role as channel captain. However, substantial differences exist between brands in this respect, apart from the structural choice of direct or indirect channels (Winter & Szulanski, 2001; Parment, 2008).
(2) Push and pull: pure push strategy means that the brand owner only devotes resources to motivate desirable behavior at the next vertical level of the channel (i.e., retailers in this study). On the other hand, sole reliance on a pull strategy means that the brand owner only devotes resources to motivate brand preference with end customers (Frazier, 1999). An interaction between a message sender and receiver is identified as push-style if the message transfer is initiated by the sender. In contrast, a pull-style communication represents interactions initiated by the receiver. An event channel may communicate with a supplier using one style of communication, and communicate with a consumer using a different style of communication (Zhao, 2003). A brand owner can enjoy a favorable position with the pull effects from the ultimate buyers (Corey, Rangan, & Cespedes, 1989). Webster (2000) also noted that the relationship between the brand and the consumer is an important part of the relationship between the manufacturer and the reseller. Consumers' favorable attitude toward the particular brands that a retailer carries can generate positive externalities for the retailer in other product categories by creating demand pull effects (Fein & Anderson, 1997). This is called "consumers' pull force." Consumer's pull force comes from the brand owner having devoting resources to motivate brands preference with end customers (Frazier, 1999).
(3) Channel support: retail structure and geography are here defined as the number of channels and outlets and their extension in terms of geography and size, including the number of sales outlets and how they are scattered across different types of areas Parment (2008). If a retailer in a channel relationship believes that a given brand owner creates higher value than alternatives, the retailer is likely to be more satisfied with the relationship with the brand owner (Simpson et al., 2001). Market-level response is the strategic imperative for any marketing strategy. This research is concerned in particular with market response to multiple channel retailing. Recent market research suggested that customer shopping patterns have evolved to take advantage of the new multiple channel environments. Results indicate that 35 percent of the consumers surveyed shopped using some combination of catalogs, bricks-and-mortar stores, and the internet; 66 percent said that they had visited one channel before purchasing from another (Saunders, 2002). These customers "are combining various channels and approaches, searching online to buy offline, searching offline to buy online-and everything in between" (Wind & Mahajan, 2002). We defined customer multi-channel employment as the number of different channels a customer visits in making a purchase. With the advent of multi-channel shopping, customers have expectations regarding the service outputs available to them from all of a retailer's channels.

2.3.4. Communication strategy

Keller (2001) considered the most flexible marketing strategy is the "marketing communication", it also the last element of brand building. Enterprises can use the communication tools to inform the brand message for consumers by directly or indirectly to persuade and remind them. Brand marketing communication is represented a "Voice" which make dialogues and a well relationship between the company and consumers. The function of marketing communication will make the brand better, favorable and unique in consumer's mind such as:

(1) Advertisement: advertising, it has been conjectured in prior literature, shapes consumer preferences in multiple ways. The first, most obvious effect is that advertising informs the consumer of product attributes and hence raises awareness and knowledge of the true quality of the brand. This has been called the informative effect of advertising (Bucklin, 1965; Lavidge & Steiner, 1961). Second, advertising may directly influence a consumer's brand evaluations through such cues as celebrity endorsements and music, even without providing any explicit information. This has been referred to as the persuasive or prestige effect of ads (Aaker & Stayman, 1990; Batra & Ray, 1986). Third, advertising can influence how consumers experience and evaluate the quality of the product from subsequent consumption. This effect has been evocatively referred to as the transformative effect of advertising (Deighton, 1984; Mehta, Chen, & Narasimhan, 2008). Most print advertisements contain a brand, pictorial, and text element. The brand element covers the visual brand identity cues in print advertisements, such as the brand name, trademark, and logo of the source (Keller, 2003). The existence of both category-level and brand-level advertising in commodity markets raises the possibility of advertising interdependence. More specifically, there is a concern that generic advertising may mitigate or amplify the advertising efforts of individual brands (Pieters & Wedel, 2004).
(2) Sale promotions: sales promotions, in general, are meant to stimulate stronger target market response than would otherwise occur without the promotions. They can originate with the manufacturer and be directed at the retailer or consumer, or be targeted at the consumer by the retailer. Manufacturer to retailer promotions, or trade promotions, are often in the form of cash, advertising, or trade allowances. Manufacturer to consumer promotions might consist of coupons, mail-in refunds, or free samples. Retailers to consumer promotions often take the form of discounts, free gifts, and contests (Lilien, Kotler, & Moorthy, 1992; Nair and Tarase-

wich, 2002). Sales promotions are marketing events and tools designed to stimulate quicker and greater purchases for a limited period of time (Kotler, 1988). Much research on consumer responses to sales promotion examines immediate effects on consumer purchases (Gupta, 1988; Inman, McAlister, & Hoyer, 1990; Nijs, Dekimpe, Steenkamp, & Hanssens, 2001; Valette-Florence, Guizani, & Merunka, 2011). In the simplest terms, sales promotion is all about "adding value" and "prompting action" in order to achieve predefined marketing objectives. The added value can be "real" or "perceived" but must constitute something additional to the basic brand proposition (Simonetti, 2005).

(3) Event marketing and sponsorship: corporate sponsorship frequently generates a favorable image for the sponsor, both at the corporate and brand levels (Gwinner & Eaton, 1999). In much the same way that a product may share the image of an endorsing celebrity, meanings held by events are transferable to a brand through sponsorship (Cornwell & Coote, 2005; Gwinner, 1997; Chien, Cornwell, & Pappu, 2011). Co-branding theory suggested that pairing an event with a destination will engender some transfer of image between the event and destination brands (Xing & Chalip, 2006). If secondary associations with events can lead to the transfer of attitudes to the brand, by extension, attitudes associated with sponsors are also expected to transfer to evaluations the event. When one considers the case of multiple sponsors, the brands and event are associated via the placement of representations of the entities (Ruth & Simonin, 2003). Event marketing links a company's brand to an activity for the purpose of creating experiences for attendees and promoting a product or service. The synergies between sponsorships and event marketing encourage their joint application. Whereas sponsorship alone has a limited ability to relay specific product information, event marketing at sponsored events increases the quantity and types of information firms can convey to consumers (Grohs, Wagner, & Vsetecka, 2004; Lacey, Close, & Finney, 2010).

(4) Public relations and publicity materials: public relations are a profession wherein roles of expertise and responsibility exist. Early investigation into the kinds of work performed by public relations professionals identified four specific roles: the expert prescriber, the communication facilitator, the problem-solver, and the communication technician (Algren & Eichhorn, 2007; Broom, Casey, & Ritchey, 1997; Broom & Dozier, 1986; Broom & Smith, 1979). Propaganda was developed and used to bring about cooperation between the industrialized society and the fighting armed forces. Carefully designed propaganda messages were communicated through news stories, films, photograph records, speeches, books, sermons, posters, rumours, billboard advertisements, and handbills to the general public. From a communication perspective, several key features make propaganda the tool of choice in certain contexts, and public diplomacy in other contexts. Propaganda deliberately manipulates the communication through a variety of techniques so that some aspect is hidden from the audience and the audience feels compelled to accept the message. With coercion as the goal, information control and deception are keys to effective propaganda. Propaganda Institute identified many of the techniques such as "name-calling, labeling, bandwagon, etc." used to manipulate and control information (Zaharna, 2004).

(5) Personnel selling: several aspects have been addressed within the behavior framework, including the view introduced by Evans (1963) that the content of selling is a dyadic relationship leading to the adaptation of knowledge about the communication process and its specific features in buyer–seller relationships. Salespeople play a key role in the formation of long-term buyer–seller relationship. As the primary link between the buying and selling firm, they have considerable influence on the buyer's interest in continuing the relationship (Biong & Selnes, 1996). Wotruba (1991) suggested the nature of personal selling, like marketing Kotler (1998), has involved through the four eras-productions sales, marketing, and partnering. In each of these eras, the role of sales differs, and thus salespeople in these role engage in different activities and need different sets of knowledge, skills and abilities to be effective. The sale role is to stimulate, rather than satisfy, demand for products. To persuade customers that they need a supplier's products, salespeople in this role focus on achieving selling techniques to persuade customers to buy products (Weitz & Bradford, 1999).

Based on the standpoints of Keller (2001); four factors (dimensions) impact on brand marketing: (1) product strategy, (2) price strategy, (3) channel strategy, and (4) communication strategy. In addition, reviewing literature shows that product strategy is affected by three criteria: perceived quality, perceived value, and enhance the consumer experience; price strategy is affected by two criteria: consumer's price perception, value pricing; channel strategy is affected by three criteria: channel design, push and pull strategy and channel support and communication strategy is affected by five criteria: advertisement, promotions, event marketing and sponsorship, public relations and publicity materials and personal selling which are interpreted in Table 1.

3. Building a hybrid MCDM model combining DEMATEL with ANP for brand marketing

As any criterion may inter-influenced, this study adopted DEMATEL technique to know the influenced structure between the criterion and try to find the problems which we can improve. After knowing the influenced structure between each criterion, we weighted them by combined the ANP method to find the most important criterion that will help to create brand value. In order to understand the gap of each criterion and to rank the first important strategy to carry out, the VIKOR technique will be leveraged for calculating compromise ranking and gap of the alternatives. In short, the framework of evaluation contains three main phases: (1) constructing the impact- relations-map (IRM) among criteria by the DEMATEL technique, (2) calculating the weights of each criterion by combined the ANP based on the IRM, and (3) ranking or improving the priorities of alternatives of brand marketing through the VIKOR.

3.1. The DEMATEL for constructing IRM

DEMATEL has been successfully applied in many situations, such as marketing strategies, e-learning evaluation, control systems and safety problems (Chiu et al., 2006), information security (Ou Yang, Shieh, Leu, & Tzeng, 2009), financial stock investment (Lee, Tzeng, Guan, Chien, & Huang, 2009, 2009), and water resources and environment (Chen, Lien, & Tzeng, 2010). The methodology can confirm interdependence among variables/criteria and restrict the relations that reflect characteristics within an essential systemic and developmental trend. The method can be summarized as follows (Li & Tzeng, 2009a, 2009b; Liou et al., 2007):

Step 1: *Calculate the initial average matrix by scores*. Respondents are asked to indicate the direct effects they believe each element i exerts on each element j of others, as indicated

Table 1
Explanation of criteria.

Dimensions & Evaluation criteria	Descriptions
Product strategy (D_1)	
Perceived quality (c_1)	The advantage for the quality perception of products and services
Perceived value (c_2)	The combination of the quality perception and cost perception to estimate the value of the products
Enhance the consumer experience (c_3)	To find a way that how to encourage consumers to try the products and repurchase
Price strategy (D_2)	
Consumer's price perception (c_4)	Take the value-based pricing strategies to attempt making the price more reasonable and offer a better product to satisfy consumer's expectation
Value pricing (c_5)	To expose the quality and cost of the products, and try to satisfy customer's needs by mix the product quality and price
Channels strategy (D_3)	
Direct and indirect channel (c_6)	Direct channel including letters, phone calls, e-mail and personal interview to sell products for customers. Indirect channel including agents, brokers, wholesalers, distributors, retailers
Push and pull (c_7)	Pull strategy means that consumers will use their purchasing power to influence the retailers to "pull" the products through the channels. Directly stimulates the channels to purchase or sell products to consumers, which is called push strategy
Channels support (c_8)	Many different services are provided by the channel members, and these services can enhance the consumers to purchase or receive the values of brand. Channel support can be divided into: the retail segment, company itself, and other tools
Communication strategy (D_4)	
Advertisement (c_9)	Advertisers provided the ideas, goods or services in terms of any non-staff to present and sell products
Sales promotions (c_{10})	Eencouraging customers to try the products, services or use the products in short-term incentive while it has many ways in sales promotions
Event marketing and sponsorship (c_{11})	It refers to sports, arts, entertainments or social activities related to public events or activities which are public sponsored
Public relations and propaganda material (c_{12})	Public relations and propaganda materials are related with any programs, and are designed to promote and protect the company's image or its individual products
Personnel sale (c_{13})	Personnel sale involves the manufacture sale, and needs to face one or more potential buyers in an interaction

by a_{ij}, using an integer scale ranging from 0, 1, 2, 3, and 4 (going from "No influence (0)," to "Very high influence (4)"). From any group of direct matrices of respondents, it is possible to derive an average matrix $\boldsymbol{A} = [a_{ij}]_{n\times n}$ by experts, each element being the mean of the same elements in the various direct matrices of the respondents.

Step 2: *Calculate the initial influence matrix*. The initial influence matrix $\boldsymbol{D} = [d_{ij}]_{n\times n}$ is obtained by normalizing the average matrix $\boldsymbol{A}$ (shown by degree, i.e., shown by membership and $0 \leqslant d_{ij} < 1$, also called the "fuzzy cognitive matrix"), in which all principal diagonal elements equal zero. Based on $\boldsymbol{D}$, the initial effect that an element exerts and receives from another is shown. The map portrays a contextual relationship among the elements of a system, in which a numeral represents the strength of influence (affected degree).

Step 3: *Derive the full direct/indirect influence matrix.* A continuous decrease of the indirect effects of problems along the powers of e.g., $\boldsymbol{D}^2, \boldsymbol{D}^3, \ldots, \boldsymbol{D}^m$ and $\lim_{\ell\to\infty}\boldsymbol{D}^\ell = [0]_{n\times n}$, where $\boldsymbol{D} = [d_{ij}]_{n\times n}, 0 \leqslant d_{ij} < 1$ and $0 \leqslant \sum_i d_{ij} \leqslant 1$ or $0 \leqslant \sum_j d_{ij} \leqslant 1$ and at least one column or one row of summation equals one, but not all. Let the (i,j) element of matrix $\boldsymbol{A}$ be denoted by a_{ij}, the matrix $\boldsymbol{D}$ can be gained as follows.

$$\boldsymbol{D} = s \times \boldsymbol{A}, \tag{1}$$

where

$$s = \mathrm{Min}\left[\frac{1}{\max_{1\leqslant i\leqslant n}\sum_{j=1}^{n}|a_{ij}|}, \frac{1}{\max_{1\leqslant i\leqslant n}\sum_{i=1}^{n}|a_{ij}|}\right] \tag{2}$$

and

$$\lim_{\ell\to\infty}\boldsymbol{D}^\ell = [0]_{n\times n}, \quad 0 \leqslant d_{ij} \leqslant 1. \tag{3}$$

Step 4: *Attaining the total-influence matrix* $\boldsymbol{T}$. The total-influence matrix $\boldsymbol{T}$ can be obtained by using Eq. (4) where $\boldsymbol{I}$ is denoted as the identity matrix.

$$\boldsymbol{T} = \boldsymbol{D} + \boldsymbol{D}^2 + \cdots + \boldsymbol{D}^\ell = \boldsymbol{D}(\boldsymbol{I} - \boldsymbol{D})^{-1} \quad \text{when } \ell \to \infty. \tag{4}$$

If we define the sum of rows and the sum of columns separately denoted as vector $\boldsymbol{r}$ and $\boldsymbol{c}$ within the total-influence matrix $\boldsymbol{T}$ through Eqs. (5), (6) then

$$\boldsymbol{T} = [t_{ij}], \quad i,j = 1,2,\ldots,n, \tag{5}$$

$$\boldsymbol{r} = [r_i]_{n\times 1} = \left[\sum_{j=1}^{n} t_{ij}\right]_{n\times 1}, \quad \boldsymbol{c} = [c_j]_{n\times 1} = \left[\sum_{i=1}^{n} t_{ij}\right]'_{1\times n}, \tag{6}$$

where superscript $'$ denotes transposition.

Suppose r_i denotes the row sum of the ith row matrix $\boldsymbol{T}$, then r_i shows the sum of direct and indirect effects of factor i on the other factors/criteria. If c_i denotes the column sum of the jth column of matrix $\boldsymbol{T}$, then c_j shows the sum of direct and indirect effects that factor j has received from the other factors. Furthermore, when $j = i$ (i.e. the sum of the row and column aggregates) $(r_i + c_i)$ provides an index of the strength of influences given and received, that is, $(r_i + c_i)$ shows the degree that the factor i plays in the problem. If $(r_i - c_i)$ is positive, then factor i is affecting other factors, and if $(r_i - c_i)$ is negative, then factor i is being influenced by other factors (Tsai & Chou, 2009; Tzeng et al., 2007; Wu & Lee, 2007).

3.2. Combining ANP method for calculating weights of criteria based on the IRM

We call the total-influenced matrix $\boldsymbol{T}_c = [t_{ij}]_{n\times n}$ obtained by criteria and $\boldsymbol{T}_D = [t_{ij}^D]_{m\times m}$ obtained by dimensions (clusters) from $\boldsymbol{T}_c$. Then, we normalize supermatrix $\boldsymbol{T}_c$ for the ANP weights of dimensions (clusters) by using influence matrix $\boldsymbol{T}_D$.

Step5: *Establish the unweighted Supermatrix.* The total-influence matrix will be obtained form DEMATEL. Each column will sum for normalization.

$$\boldsymbol{T}_c = \begin{array}{c} \\ D_1\ c_{11} \\ \quad\ c_{12} \\ \quad\ \vdots \\ \quad\ c_{1m_1} \\ D_i\ c_{i1} \\ \quad\ c_{i2} \\ \quad\ \vdots \\ \quad\ c_{im_i} \\ D_3\ c_{n1} \\ \quad\ c_{n2} \\ \quad\ \vdots \\ \quad\ c_{nm_n} \end{array} \begin{array}{c} \begin{array}{cccccc} D_1 & & D_j & & D_n \\ c_{11}..c_{1m_1} & \cdots & c_{j1}..c_{jm_j} & \cdots & c_{n1}..c_{nm_n} \end{array} \\ \begin{bmatrix} \boldsymbol{T}_c^{11} & \cdots & \boldsymbol{T}_c^{1j} & \cdots & \boldsymbol{T}_c^{1n} \\ \vdots & & \vdots & & \vdots \\ \boldsymbol{T}_c^{i1} & \cdots & \boldsymbol{T}_c^{ij} & \cdots & \boldsymbol{T}_c^{in} \\ \vdots & & \vdots & & \vdots \\ \boldsymbol{T}_c^{n1} & \cdots & \boldsymbol{T}_c^{nj} & \cdots & \boldsymbol{T}_c^{nn} \end{bmatrix} \end{array}. \tag{7}$$

After normalizing the total-influence matrix $\boldsymbol{T}_c$ by dimensions (clusters), we will obtain a new matrix $\boldsymbol{T}_c^{\alpha}$ which is shown as Eq. (8).

$$\boldsymbol{T}_c^{\alpha} = \begin{array}{c} \\ D_1 \\ \vdots \\ D_i \\ \vdots \\ D_n \end{array} \begin{array}{c} \begin{array}{cccccc} D_1 & & D_j & & D_n \\ c_{11}\cdots c_{1m_1} & & c_{j1}\cdots c_{jm_j} & \cdots & c_{n1}\cdots c_{nm_n} \end{array} \\ \begin{bmatrix} \boldsymbol{T}_c^{\alpha 11} & \cdots & \boldsymbol{T}_c^{\alpha 1j} & \cdots & \boldsymbol{T}_c^{\alpha 1n} \\ \vdots & & \vdots & & \vdots \\ \boldsymbol{T}_c^{\alpha i1} & \cdots & \boldsymbol{T}_c^{\alpha ij} & \cdots & \boldsymbol{T}_c^{\alpha in} \\ \vdots & & \vdots & & \vdots \\ \boldsymbol{T}_c^{\alpha n1} & \cdots & \boldsymbol{T}_c^{\alpha nj} & \cdots & \boldsymbol{T}_c^{\alpha nn} \end{bmatrix} \end{array}. \tag{8}$$

In addition, an explanation for the normalization $\boldsymbol{T}_c^{\alpha 11}$ is shown as Eqs. (9), (10), and other $\boldsymbol{T}_c^{\alpha nn}$ are as above.

$$d_{ci}^{11} = \sum_{j=1}^{m_1} t_{ij}^{11}, \quad i = 1,2,\ldots,m_1, \tag{9}$$

$$\begin{aligned} \boldsymbol{T}_c^{\alpha 11} &= \begin{bmatrix} t_{c11}^{11}/d_{c1}^{11} & \cdots & t_{c1j}^{11}/d_{c1}^{11} & \cdots & t_{c1m_1}^{11}/d_{c1}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{ci1}^{11}/d_{ci}^{11} & \cdots & t_{cij}^{11}/d_{ci}^{11} & \cdots & t_{cim_1}^{11}/d_{ci}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{cm_11}^{11}/d_{cm_1}^{11} & \cdots & t_{cm_1j}^{11}/d_{cm_1}^{11} & \cdots & t_{cm_1m_1}^{11}/d_{cm_1}^{11} \end{bmatrix} \\ &= \begin{bmatrix} t_{c11}^{\alpha 11} & \cdots & t_{c1j}^{\alpha 11} & \cdots & t_{c1m_1}^{\alpha 11} \\ \vdots & & \vdots & & \vdots \\ t_{ci1}^{\alpha 11} & \cdots & t_{cij}^{\alpha 11} & \cdots & t_{cim_1}^{\alpha 11} \\ \vdots & & \vdots & & \vdots \\ t_{cm_11}^{\alpha 11} & \cdots & t_{cm_1j}^{\alpha 11} & \cdots & t_{cm_1m_1}^{\alpha 11} \end{bmatrix}. \end{aligned} \tag{10}$$

Let total-influence matrix match and fill into the interdependence clusters. It called unweighted supermatrix is shown as Eq. (11) which based on transpose the normalized influence matrix $\boldsymbol{T}_c^{\alpha}$ by dimensions (clusters), i.e., $\boldsymbol{W} = (\boldsymbol{T}_c^{\alpha})'$.

$$W = (\boldsymbol{T}_c^{\alpha})' = \begin{array}{c} \\ D_1 \\ \vdots \\ D_j \\ \vdots \\ D_n \end{array} \begin{array}{c} \begin{array}{cccccc} D_1 & & D_i & & D_n \\ c_{11}\cdots c_{1m_1} & & c_{i1}\cdots c_{im_i} & \cdots & c_{n1}\cdots c_{nm_n} \end{array} \\ \begin{bmatrix} \boldsymbol{W}^{11} & \cdots & \boldsymbol{W}^{i1} & \cdots & \boldsymbol{W}^{n1} \\ \vdots & & \vdots & & \vdots \\ \boldsymbol{W}^{1j} & \cdots & \boldsymbol{W}^{ij} & \cdots & \boldsymbol{W}^{nj} \\ \vdots & & \vdots & & \vdots \\ \boldsymbol{W}^{1n} & \cdots & \boldsymbol{W}^{in} & \cdots & \boldsymbol{W}^{nn} \end{bmatrix} \end{array}. \tag{11}$$

If the matrix $\boldsymbol{W}^{11}$ is blank or 0 which shown as Eq. (12) means the matrix between the clusters or criteria is independent and with no interdependent, and the other $\boldsymbol{W}^{nn}$ are as above.

$$W^{11} = \begin{array}{c} \\ c_{11} \\ \vdots \\ c_{1j} \\ \vdots \\ c_{1m_1} \end{array} \begin{array}{c} \begin{array}{cccccc} c_{11} & & c_{1i} & & c_{1m_1} \end{array} \\ \begin{bmatrix} t_{c11}^{\alpha 11} & \cdots & t_{ci1}^{\alpha 11} & \cdots & t_{cm_11}^{\alpha 11} \\ \vdots & & \vdots & & \vdots \\ t_{c1j}^{\alpha 11} & \cdots & t_{cij}^{\alpha 11} & \cdots & t_{cm_1j}^{\alpha 11} \\ \vdots & & \vdots & & \vdots \\ t_{c1m_1}^{\alpha 11} & \cdots & t_{cim_1}^{\alpha 11} & \cdots & t_{cm_1m_1}^{\alpha 11} \end{bmatrix} \end{array}. \tag{12}$$

Step 6: *For obtaining the weighted Supermatrix, each column will sum for normalization as Eq. (13).*

$$\boldsymbol{T}_D = \begin{bmatrix} t_D^{11} & \cdots & t_D^{1j} & \cdots & t_D^{1n} \\ \vdots & & \vdots & & \vdots \\ t_D^{i1} & \cdots & t_D^{ij} & \cdots & t_D^{in} \\ \vdots & & \vdots & & \vdots \\ t_D^{n1} & \cdots & t_D^{nj} & \cdots & t_D^{nn} \end{bmatrix}. \tag{13}$$

We normalized the total-influence matrix $\boldsymbol{T}_D$, and obtained a new matrix $\boldsymbol{T}_D^{\alpha}$ is shown as Eq. (14) (where $t_D^{\alpha ij} = t_D^{ij}/d_i$).

$$\begin{aligned} \boldsymbol{T}_D^{\alpha} &= \begin{bmatrix} t_D^{11}/d_1 & \cdots & t_D^{1j}/d_1 & \cdots & t_D^{1n}/d_1 \\ \vdots & & \vdots & & \vdots \\ t_D^{i1}/d_i & \cdots & t_D^{ij}/d_i & \cdots & t_D^{in}/d_i \\ \vdots & & \vdots & & \vdots \\ t_D^{n1}/d_n & \cdots & t_D^{nj}/d_n & \cdots & t_D^{nn}/d_n \end{bmatrix} \\ &= \begin{bmatrix} t_D^{\alpha 11} & \cdots & t_D^{\alpha 1j} & \cdots & t_D^{\alpha 1n} \\ \vdots & & \vdots & & \vdots \\ t_D^{\alpha i1} & \cdots & t_D^{\alpha ij} & \cdots & t_D^{\alpha in} \\ \vdots & & \vdots & & \vdots \\ t_D^{\alpha n1} & \cdots & t_D^{\alpha nj} & \cdots & t_D^{\alpha nn} \end{bmatrix}. \end{aligned} \tag{14}$$

Let the normalized total-influence matrix $\boldsymbol{T}_D^{\alpha}$ fill into the unweighted supermatrix to obtain the weighted supermatrix.

$$\boldsymbol{W}^{\alpha} = \boldsymbol{T}_D^{\alpha}\boldsymbol{W} = \begin{bmatrix} t_D^{\alpha 11} \times \boldsymbol{W}^{11} & \cdots & t_D^{\alpha i1} \times \boldsymbol{W}^{1j} & \cdots & t_D^{\alpha n1} \times \boldsymbol{W}^{1n} \\ \vdots & & \vdots & & \vdots \\ t_D^{\alpha 1j} \times \boldsymbol{W}^{i1} & \cdots & t_D^{\alpha ij} \times \boldsymbol{W}^{ij} & \cdots & t_D^{\alpha nj} \times \boldsymbol{W}^{in} \\ \vdots & & \vdots & & \vdots \\ t_D^{\alpha 1n} \times \boldsymbol{W}^{n1} & \cdots & t_D^{\alpha in} \times \boldsymbol{W}^{nj} & \cdots & t_D^{\alpha nn} \times \boldsymbol{W}^{nn} \end{bmatrix}. \tag{15}$$

Step 7: *Limit the weighted supermatrix.* Limit the weighted supermatrix by raising it to a sufficiently large power k, until the supermatrix has converged and become a long-term stable supermatrix to get the global priority vectors, called ANP weights, such as $lim_{h\to\infty}(\boldsymbol{W}^{\alpha})^h$.

3.3. The VIKOR for ranking and improving the alternatives

(Opricovic, 1988) proposed the compromise ranking method (VIKOR) as one applicable technique to implement within MCDM. Suppose the feasible alternatives are represented by $A_1, A_2, \ldots, A_k, \ldots, A_m$. The performance score of alternative A_k and the jth criterion is denoted by f_{kj}; w_j is the weight (relative importance) of the jth criterion, where $j = 1,2,\ldots,n$, and n is the number of criteria. Development of the VIKOR method began with the following form of L_p-metric (Ho et al., 2011):

$$L_k^p = \left\{ \sum_{j=1}^{n} \left[w_j \left(\left| f_j^* - f_{kj} \right| \right) \Big/ \left(\left| f_j^* - f_j^- \right| \right) \right]^p \right\}^{1/p}, \tag{16}$$

where $1 \leqslant p \leqslant \infty$; $k = 1,2,\ldots,m$; weight w_j is derived from the ANP. To formulate the ranking and gap measure $L_k^{p=1}$ (as S_k) and $L_k^{p=\infty}$ (as Q_k) are used by VIKOR (Opricovic, 1988; Opricovic & Tzeng, 2002, 2004, 2007; Tzeng, Lin, & Opricovic, 2005; Tzeng, Teng, Chen, & Opricovic, 2002).

$$S_k = L_k^{p=1} = \sum_{j=1}^{n} \left[w_j \left(\left| f_j^* - f_{kj} \right| \right) / \left(\left| f_j^* - f_j^- \right| \right) \right], \quad (17)$$

$$Q_k = L_k^{p=\infty} = max_j \left\{ \left(\left| f_j^* - f_{kj} \right| \right) / \left(\left| f_j^* - f_j^- \right| \right) | j = 1, 2, \ldots, n \right\}. \quad (18)$$

The compromise solution $\min_k L_k^p$ showed the synthesized gap to be the minimum and will be selected for its value to be the closest to the aspired level. Besides, the group utility is emphasized when p is small (such as $p = 1$); on the contrary, if p tends to become infinite, the individual maximal regrets/gaps obtain more importance in prior improvement (Freimer & Yu, 1976; Yu, 1973) in each dimension/criterion. Consequently, $\min_k S_k$ stresses the maximum group utility; however, $\min_k Q_k$ accents on the selecting the minimum from the maximum individual regrets/gaps. The compromise ranking algorithm VIKOR has four steps according to the above mentioned ideas.

Step 1: *Obtain an aspired or tolerable level.* We calculated the best f_j^* values (aspired level) and the worst f_j^- values (tolerable level) of all criterion functions, $j = 1, 2, \ldots, n$. Suppose the *jth* function denotes benefits: $f_j^* = \max_k f_{kj}$ and $f_j^- = \min_k f_{kj}$ or these values can be set by decision makers (i.e., f_j^* is the aspired level and f_j^- is the worst value). Further, an original rating matrix can be converted into a normalized weight-rating matrix by using the equation:

$$r_{kj} = \left(\left| f_j^* - f_{kj} \right| \right) / \left(\left| f_j^* - f_j^- \right| \right). \quad (19)$$

Step 2: *Calculate mean of group utility and maximal regret.* The values can be computed respectively by $S_k = \sum_{j=1}^{n} w_j r_{kj}$ (the synthesized gap for all criteria) and $Q_k = \max_j \{ r_{kj} | j = 1, 2, \ldots, n \}$ (the maximal gap in k criterion for prior improvement).

Step 3: *Calculate the index value*. The value can be counted by $R_k = v(S_k - S^*)/(S^- - S^*) + (1 - v)(Q_k - Q^*)/(Q^- - Q^*)$, where $k = 1, 2, \ldots, m$. $S^* = \min_i S_i$ or setting $S^* = 0$ and $S^- = \max_i S_i$ or setting $S^- = 1$; $Q^* = \min_i Q_i$ or setting $Q^* = 0$ and $Q^- = \max_i Q_i$ or setting $Q^- = 1$; and $\boldsymbol{v}$ is presented as the weight of the strategy of the maximum group utility. Therefore, we also can re-write $R_k = \boldsymbol{v} S_k + (1 - \boldsymbol{v}) Q_k$, when $S^* = 0$, $S^- = 1$, $Q^* = 0$ and $Q^- = 1$.

Step 4: *Rank or improve the alternatives for a compromise solution*. Order them decreasingly by the value of S_k, Q_k and R_k. Propose as a compromise solution the alternative ($A^{(1)}$) which is arranged by the measure $\min\{R_k | k = 1, 2, \ldots, m\}$ when the two conditions are satisfied: **C1**. *Acceptable advantage*: $R(A^{(2)}) - R(A^{(1)}) \geqslant 1/(m - 1)$, where $A^{(2)}$ is the second position in the alternatives ranked by R. **C2**. *Acceptable stability in decision making*: Alternative $A^{(1)}$ must also be the best ranked by S_k or/and Q_k. When one of the conditions is not satisfied, a set of compromise solutions is selected. The compromise solutions are composed of: (1) Alternatives $A^{(1)}$ and $A^{(2)}$ if only condition **C2** is not satisfied, or (2) Alternatives $A^{(1)}, A^{(2)}, \ldots, A^{(M)}$ if condition **C1** is not satisfied. $A^{(M)}$ is calculated by the relation $R(A^{(M)}) - R(A^{(1)}) < 1/(m - 1)$ for maximum M (the positions of these alternatives are close).

The compromise-ranking method (VIKOR) is applied to determine the compromise solution and the solution is adoptable for decision-makers in that it offers a maximum group utility of the majority (shown by min S), and a maximal regret of minimum individuals of the opponent (shown by min Q). This model utilizes the DEMATEL and ANP processes in Sections 3.1 and 3.2 to get the weights of criteria with dependence and feedback and employs the VIKOR method to acquire the compromise solution.

4. The empirical case of electronic manufacturing industry

In this Section, an empirical study is displayed to illustrate the application of the proposed model for evaluating and finding the key success factors of brand marketing which will help to create brand value.

4.1. Background and problem descriptions

In the recent years, the lower value-added of assembly, and the resources allocation biased towards assembly in Taiwan's industries, it's become a problem to concerned about Taiwan's industries development in the future, Taiwan's industries must to be upgraded by toward to brand marketing and R&D in order to integrate the Taiwan's superior resources to amplify the strength and the kinetic energy that Taiwan's industries have accumulated. According to the information of the website of Branding Taiwan in 2010, it noted that after a successful transition from Original Equipment Manufactures (OEM) to Original Design Manufacture (ODM), Taiwan is currently making great progress in evolving itself and entering into the era of Own Branding & Manufacturing (OBM), or Original Brand Manufacturing. In order to facilitate Taiwanese enterprises in shifting to international branding, advance the growth and development of brands, as well as create a more conducive environment for brands to grow, the Ministry of Economic Affairs of Taiwan carried out the Executive Yuan's "Branding Taiwan Plan" in 2006. In addition, the Image Enhancement Plan (IEP) was incorporated into this plan, speeding up the globalization of Taiwan businesses and boosting their determination for market competitiveness. Thus, the image and brands of Taiwan enterprises can be greatly enhanced, creating an even more favorable environment for international branding efforts. Moreover, in this study we take the electronic manufacturing industry for example to demonstrate how will the enterprise to create brand values by brand marketing and base on the MCDM model combining DEMATEL with ANP and VIKOR to find the best strategy and improve ways.

4.2. Data collection

A questionnaire was used to gather information from experts with professional knowledge and managerial experience, especially those with knowledge of marketing. These experts were managers and scholars of marketing. Furthermore, the background of expert is described as follows: managers of marketing are good at marketing analysis; scholars of marketing are those who specialize in the management of marketing and the teaching of marketing courses in a university. On the other hand, we also investigated 35 customers who have using the samples' products over 3 years to know their satisfaction of brand marketing in the 3 chosen companies which with good reputation in electronic manufacturing in Taiwan in this study. A total of 50 subjects were divided into seven managers and eight scholars and 35 customers. This investigation was carried out in November 2009, and it took 40–80 min for everyone to fill out the questionnaire and to be interviewed. The inconsistent rate of these questionnaires is 3.8%, under 5%, which means additional questionnaires for this study will not influence the findings; and the credibility is 96.20%.

4.3. Measuring relationships among dimensions and criteria by DEMATEL

The aim is not only determine the most important factors of brand marketing but also measure the relationships among dimensions and criteria. The marketing experts were thus asked to determine the importance of the relationships among the dimensions

Table 2
The initial influence matrix A for criteria.

Criteria	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}
c_1	0.000	2.667	2.111	2.333	2.222	1.667	2.222	2.000	2.111	2.556	2.222	1.889	2.222
c_2	2.778	0.000	2.667	2.111	2.111	1.778	1.667	1.778	2.444	2.111	2.111	2.111	1.889
c_3	2.333	2.333	0.000	1.889	1.889	2.333	2.222	2.000	2.222	2.333	2.333	2.444	2.111
c_4	2.444	2.111	2.111	0.000	2.556	2.000	2.222	2.222	2.000	2.000	2.111	2.333	2.222
c_5	2.333	2.111	2.000	2.000	0.000	1.889	2.222	2.222	2.333	2.556	2.222	2.222	2.222
c_6	1.778	1.667	2.000	2.000	1.667	0.000	2.222	2.111	2.444	2.333	1.778	2.000	1.889
c_7	2.000	2.000	2.000	1.778	1.889	1.889	0.000	1.778	1.889	1.889	2.000	2.000	2.222
c_8	2.556	2.556	2.778	1.889	2.111	2.111	1.778	0.000	2.222	2.444	2.000	2.111	1.778
c_9	2.556	2.444	2.111	2.333	2.111	2.444	2.444	2.111	0.000	2.444	2.556	2.444	2.222
c_{10}	2.667	2.222	2.333	2.222	1.889	2.333	1.778	2.000	1.778	0.000	2.222	2.111	1.889
c_{11}	2.222	2.222	2.222	2.000	2.222	2.111	2.222	2.111	2.111	1.889	0.000	1.778	1.444
c_{12}	2.444	2.333	2.222	2.111	2.111	2.111	2.111	2.333	2.000	2.333	1.889	0.000	1.778
c_{13}	2.667	2.333	2.444	2.222	2.778	2.222	2.444	2.000	2.333	2.667	2.333	2.333	0.000

Note:Inconsistent rate (%) = $\frac{1}{n(n-1)}\sum_{i=1}^{n}\sum_{j=1}^{n}\left[(\bar{d}_{ij}^{15}-\bar{d}_{ij}^{14})/\bar{d}_{ij}^{15}\right]\times 100\% = 3.8\% < 5\%$
Credibility = 1–3.8% (inconsistent rate) = 96.20%

Table 3
The normalized direct-influence matrix D for criteria.

Criteria	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}
c_1	0.000	0.093	0.073	0.081	0.077	0.058	0.077	0.069	0.073	0.089	0.077	0.066	0.077
c_2	0.097	0.000	0.093	0.073	0.073	0.062	0.058	0.062	0.085	0.073	0.073	0.073	0.066
c_3	0.081	0.081	0.000	0.066	0.066	0.081	0.077	0.069	0.077	0.081	0.081	0.085	0.073
c_4	0.085	0.073	0.073	0.000	0.089	0.069	0.077	0.077	0.069	0.069	0.073	0.081	0.077
c_5	0.081	0.073	0.069	0.069	0.000	0.066	0.077	0.077	0.081	0.089	0.077	0.077	0.077
c_6	0.062	0.058	0.069	0.069	0.058	0.000	0.077	0.073	0.085	0.081	0.062	0.069	0.066
c_7	0.069	0.069	0.069	0.062	0.066	0.066	0.000	0.062	0.066	0.066	0.069	0.069	0.077
c_8	0.089	0.089	0.097	0.066	0.073	0.073	0.062	0.000	0.077	0.085	0.069	0.073	0.062
c_9	0.089	0.085	0.073	0.081	0.073	0.085	0.085	0.073	0.000	0.085	0.089	0.085	0.077
c_{10}	0.093	0.077	0.081	0.077	0.066	0.081	0.062	0.069	0.062	0.000	0.077	0.073	0.066
c_{11}	0.077	0.077	0.077	0.069	0.077	0.073	0.077	0.073	0.073	0.066	0.000	0.062	0.050
c_{12}	0.085	0.081	0.077	0.073	0.073	0.073	0.073	0.081	0.069	0.081	0.066	0.000	0.062
c_{13}	0.093	0.081	0.085	0.077	0.097	0.077	0.085	0.069	0.081	0.093	0.081	0.081	0.000

Table 4
The total-influence matrix T_c for criteria.

Criteria	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}
c_1	0.710	0.754	0.736	0.695	0.706	0.673	0.705	0.678	0.710	0.762	0.712	0.701	0.668
c_2	0.782	0.655	0.738	0.675	0.688	0.663	0.675	0.659	0.706	0.735	0.695	0.694	0.645
c_3	0.788	0.748	0.672	0.685	0.699	0.697	0.709	0.682	0.717	0.760	0.719	0.721	0.668
c_4	0.790	0.740	0.739	0.622	0.718	0.686	0.708	0.688	0.709	0.748	0.711	0.717	0.671
c_5	0.787	0.740	0.736	0.688	0.636	0.683	0.708	0.688	0.719	0.765	0.715	0.713	0.671
c_6	0.708	0.668	0.677	0.633	0.635	0.567	0.653	0.631	0.666	0.699	0.645	0.651	0.608
c_7	0.701	0.665	0.664	0.614	0.630	0.616	0.569	0.608	0.637	0.672	0.639	0.638	0.607
c_8	0.794	0.754	0.759	0.684	0.704	0.689	0.694	0.616	0.716	0.762	0.708	0.710	0.657
c_9	0.839	0.793	0.782	0.737	0.745	0.739	0.755	0.724	0.685	0.805	0.766	0.761	0.709
c_{10}	0.773	0.721	0.723	0.674	0.677	0.675	0.673	0.661	0.681	0.661	0.693	0.689	0.640
c_{11}	0.737	0.699	0.698	0.646	0.666	0.648	0.666	0.644	0.670	0.700	0.601	0.658	0.608
c_{12}	0.775	0.733	0.728	0.678	0.691	0.676	0.691	0.678	0.696	0.744	0.691	0.628	0.644
c_{13}	0.858	0.804	0.806	0.747	0.778	0.745	0.769	0.733	0.774	0.827	0.773	0.772	0.650

Table 5
The total-influence matrix T_D for dimensions.

Dimensions	Product strategy	Price strategy	Channel strategy	Communication strategy
Product strategy	0.732	0.691	0.683	0.708
Price strategy	0.755	0.666	0.693	0.714
Channel strategy	0.710	0.650	0.627	0.668
Communication strategy	0.765	0.704	0.699	0.701

and criteria. The averaged initial direct-relation 13 × 13 matrix ***A*** (Table 2), obtained by pair-wise comparisons in terms of influences and directions between criteria. As matrix ***A*** shows, the normalized direct-relation ***D*** (Table 3) is calculated from Eqs. (1)–(3). Then,

Table 6
The sum of influences given and received on dimensions and criteria.

Dimensions/criteria	r_i	c_i	$r_i + c_i$	$r_i - c_i$
Product strategy	2.814	2.962	5.776	−0.148
Perceived quality	9.210	10.042	19.252	−0.832
Perceived value	9.010	9.474	18.484	−0.464
Enhance the consumer experience	9.265	9.458	18.723	−0.193
Price strategy	2.828	2.711	5.539	0.117
Consumer's price perception	9.247	8.778	18.025	0.469
Value pricing	9.249	8.973	18.222	0.276
Channel strategy	2.655	2.702	5.357	−0.047
Direct and indirect channels	8.441	8.757	17.198	−0.316
Push and pull	8.260	8.975	17.235	−0.715
Channel support	9.247	8.690	17.937	0.557
Communication strategy	2.869	2.791	5.660	0.078
Advertisement	9.840	9.086	18.926	0.754
Sales promotions	8.941	9.640	18.581	−0.699
Event marketing and sponsorship	8.641	9.068	17.709	−0.427
Public relations and propaganda material	9.053	9.053	18.105	0.000
Personnel sale	10.035	8.446	18.481	1.589

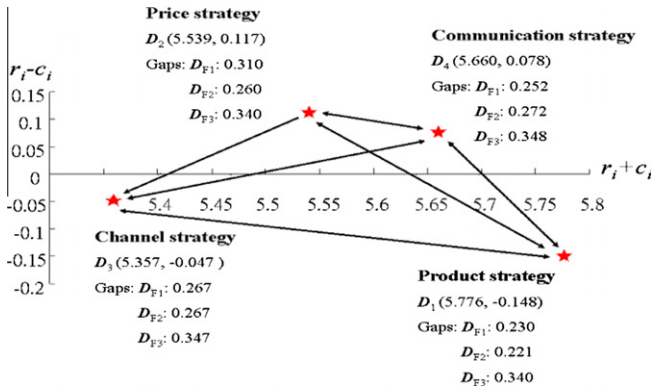

Fig. 2. The impact-relations-map of relations within dimensions of brand marketing.

using Eq. (4), total influence $\boldsymbol{T}_c$ (Table 4) and $\boldsymbol{T}_D$ (Table 5) is derived and by using Eq. (6) the IRM was constructed by the $\boldsymbol{r}$ and $\boldsymbol{c}$ in the total direct-influence matrix $\boldsymbol{T}_c$ and $\boldsymbol{T}_D$ (Table 6) as showed in Figs. 2 and 3.

4.4. Weighting of each criterion by combining the DEMATEL with ANP methods (DANP Technique)

The DANP technique combines the DEMATEL technique with the ANP method. The DEMATEL technique was developed by the Battelle Geneva Institute: (1) to analyze complex real dealing mainly with interactive map-model techniques (Gabus & Fontela, 1972); and (2) to evaluate qualitative and factor-linked aspects of societal problems. After determining the relationship structure between the factors of brand marketing, the ANP method is applied to obtain criteria influence-weights. The traditional ANP method is used to derive the weighted supermatrix by transforming each column to sum exactly to unity. Each element in a column is divided by the number of clusters so each column will exactly sum to unity. Using this normalization method implies each cluster has the same influence-weights (Ou Yang, Leu, & Tzeng, 2008). However, we know the degrees of influence of the factors on each other are different from Table 6. Therefore, using the traditional normalized method is irrational. In this research, we combined the DEMATEL technique to solve this problem, which is used to obtain the normalized matrix $\boldsymbol{T}_c$. We first normalized the total-influence matrix $\boldsymbol{T}$. By calculating the limiting power of the weighted supermatrix, $\lim_{h\to\infty}(\boldsymbol{W}^{\alpha})^h$ is applied until a steady-state condition is reached (Tables 7–12). Each row represents the weight of each criterion. As seen in the Table 11, results showed that experts were most concerned with value pricing (0.123) and consumer's price perception (0.120) and least concerned with personal selling (0.047). From the standpoint of dimensions, experts considered the first important strategy among the four strategies is product strategy, and the criterion of perceived quality as important, second is communication strategy, and the criterion of promotions as important; third is price strategy, and the criterion of value pricing as important; fourth is channel strategy, and the criterion of push and pull as important. This finding revealed that the experts believed value pricing could not be overlooked by planners when planning brand marketing. Besides, the synthesized scores which received from DANP method were then calculated to derive the total satisfaction and performance by SAW and VIKOR methods. We calculated the highest total satisfaction of the three companies by SAW method. The results showed the highest total satisfaction was in F_2 company, followed by F_1 company and F_3 company. Moreover, we calculated the gaps between the criteria by VIKOR method in order to know the three companies' performance of brand marketing and to know the compromise ranking. The results demonstrated that the total gaps were highest in F_3 company, followed by F_1 company and F_2 company (Table 12).

4.5. Discussions and implications

In Table 6, we know the degrees of influence of criteria are different with each other. The cluster-weighted supermatrix that was obtained by using traditional average method (equal cluster-weighted) in ANP is irrational. Therefore, the normalized matrix $\boldsymbol{T}_c$, which is obtained influential cluster-weighted by DEMATEL method results, is combined to the procedure of the ANP method in this study. By combining DEMATEL and ANP methods, we found value pricing which weighted 0.123 is the most important factor for creating brand value. A price is playing an important role for products, which will influence the perception of the products to consumers and also directly influence the profit to enterprises. When consumers purchase an item they sometimes take the price for consideration, some consumers will prefer the low price not because the brand, quality and other factors; others are prefer the high price or brand, because they think the high price means the high quality. But enterprises can't always use the low price or high price strategy to satisfy customers, they should provide the values of products which the consumers will be willing to buy, and the value perceptions of products is different to each customer, therefore,

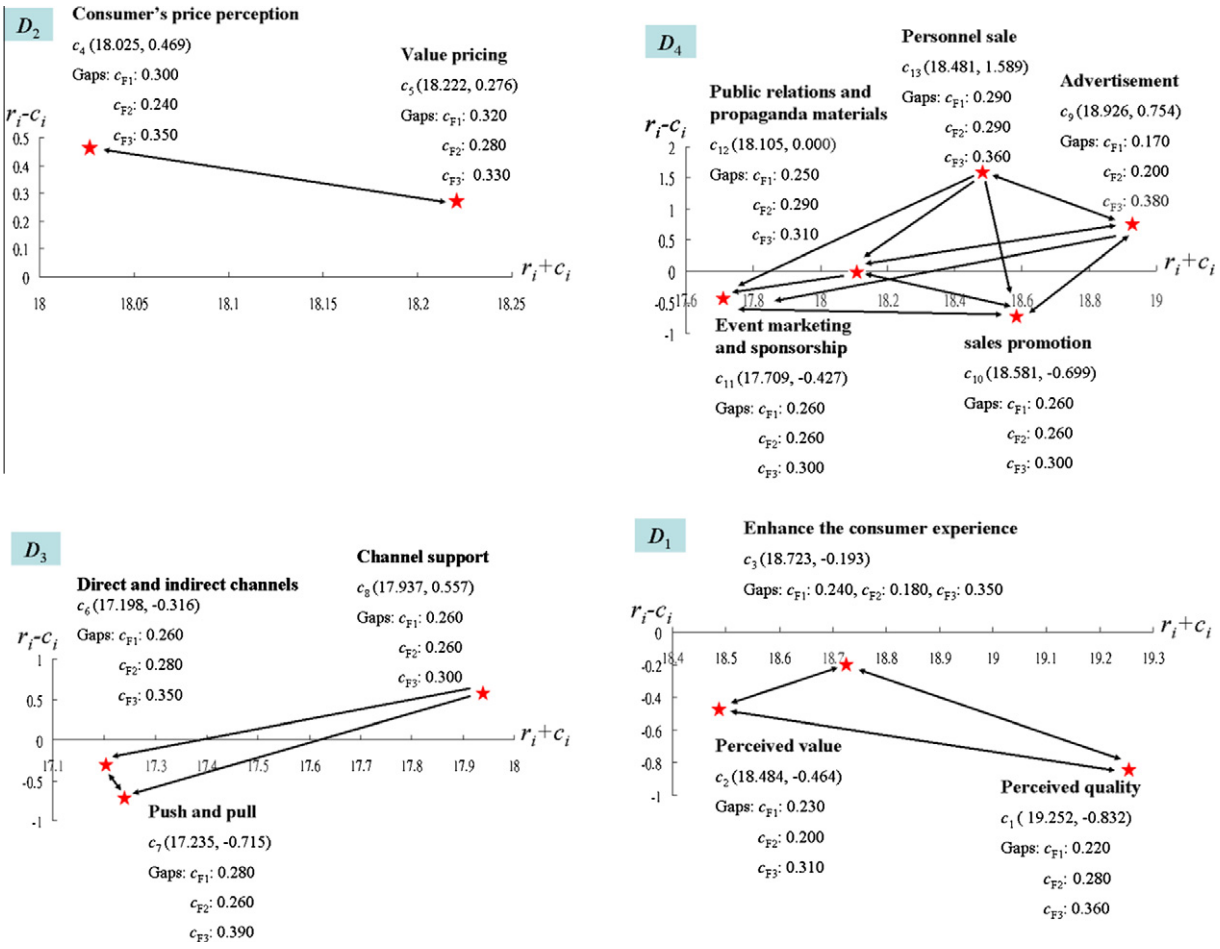

Fig. 3. The impact-relations-map of relations within criteria of brand marketing.

Table 7
The new matrix T_c^{α} obtained by normalizing matrix T_c.

Criteria	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}
c_1	0.322	0.343	0.335	0.496	0.504	0.327	0.343	0.330	0.200	0.214	0.201	0.197	0.188
c_2	0.360	0.301	0.339	0.495	0.505	0.332	0.338	0.330	0.202	0.211	0.200	0.201	0.186
c_3	0.357	0.339	0.304	0.495	0.505	0.333	0.340	0.327	0.200	0.212	0.201	0.201	0.186
c_4	0.348	0.326	0.326	0.464	0.536	0.330	0.340	0.330	0.199	0.210	0.200	0.202	0.189
c_5	0.348	0.327	0.325	0.519	0.481	0.329	0.340	0.331	0.201	0.213	0.200	0.199	0.187
c_6	0.345	0.325	0.330	0.499	0.501	0.306	0.353	0.341	0.204	0.214	0.197	0.199	0.186
c_7	0.345	0.328	0.327	0.494	0.506	0.344	0.317	0.339	0.200	0.210	0.200	0.200	0.190
c_8	0.344	0.327	0.329	0.493	0.507	0.345	0.347	0.308	0.202	0.214	0.199	0.200	0.185
c_9	0.347	0.329	0.324	0.497	0.503	0.333	0.341	0.326	0.184	0.216	0.206	0.204	0.190
c_{10}	0.349	0.325	0.326	0.499	0.501	0.336	0.335	0.329	0.203	0.196	0.206	0.205	0.190
c_{11}	0.345	0.328	0.327	0.493	0.507	0.331	0.340	0.329	0.207	0.216	0.186	0.203	0.188
c_{12}	0.346	0.328	0.326	0.495	0.505	0.331	0.337	0.332	0.204	0.219	0.203	0.185	0.189
c_{13}	0.347	0.326	0.327	0.490	0.510	0.332	0.342	0.326	0.204	0.218	0.204	0.203	0.171

enterprise must be aware the price express an products information to customers. Moreover, in this consumer-oriented era, the customer's perceived value is the key factor when decided a price to the products; thus, enterprises should not always based on the consideration of costs instead the customer's perceived value to decided the price. In addition, we can improve the problems of brand marketing based on the impact-relations-map (Fig. 2), which utilized the DEMATEL method to understand the interaction between dimensions and criteria. In the impact-relations-map, $(r_i + c_i)$ provides an index of the strength of influences given and received, that is, $(r_i + c_i)$ shows the degree that each dimension and criteria play in the problem. If $(r_i - c_i)$ is positive, then each dimension and criterion is affecting other factors, and if $(r_i - c_i)$ is negative, then each dimension and criterion is being influenced by other factors. By $(r_i + c_i)$ and $(r_i - c_i)$ in Fig. 2, we can determine the price strategy should first to be improved, second is communication strategy, because both are influence other strategies most, that is, if enterprises plan the price strategy and communication strategy well, it will make other two strategies be better, they also can begin on the criteria of consumer's price perception to improve

Table 8
The unweighted supermatrix W.

Criteria	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}
c_1	0.322	0.360	0.357	0.348	0.348	0.345	0.345	0.344	0.347	0.349	0.345	0.346	0.347
c_2	0.343	0.301	0.339	0.326	0.327	0.325	0.328	0.327	0.329	0.325	0.328	0.328	0.326
c_3	0.335	0.339	0.304	0.326	0.325	0.330	0.327	0.329	0.324	0.326	0.327	0.326	0.327
c_4	0.496	0.495	0.495	0.464	0.519	0.499	0.494	0.493	0.497	0.499	0.493	0.495	0.490
c_5	0.504	0.505	0.505	0.536	0.481	0.501	0.506	0.507	0.503	0.501	0.507	0.505	0.510
c_6	0.327	0.332	0.333	0.330	0.329	0.306	0.344	0.345	0.333	0.336	0.331	0.331	0.332
c_7	0.343	0.338	0.340	0.340	0.340	0.353	0.317	0.347	0.341	0.335	0.340	0.337	0.342
c_8	0.330	0.330	0.327	0.330	0.331	0.341	0.339	0.308	0.326	0.329	0.329	0.332	0.326
c_9	0.200	0.202	0.200	0.199	0.201	0.204	0.200	0.202	0.184	0.203	0.207	0.204	0.204
c_{10}	0.214	0.211	0.212	0.210	0.213	0.214	0.210	0.214	0.216	0.196	0.216	0.219	0.218
c_{11}	0.201	0.200	0.201	0.200	0.200	0.197	0.200	0.199	0.206	0.206	0.186	0.203	0.204
c_{12}	0.197	0.201	0.201	0.202	0.199	0.199	0.200	0.200	0.204	0.205	0.203	0.185	0.203
c_{13}	0.188	0.186	0.186	0.189	0.187	0.186	0.190	0.185	0.190	0.190	0.188	0.189	0.171

Note: $W = (T_c^{\alpha})'$.

Table 9
The new matrix T_D^{α} obtained by matrix T_D.

Dimensions	$\boldsymbol{D}_1$	$\boldsymbol{D}_2$	$\boldsymbol{D}_3$	$\boldsymbol{D}_4$
$\boldsymbol{D}_1$	0.260	0.245	0.243	0.252
$\boldsymbol{D}_2$	0.267	0.235	0.245	0.253
$\boldsymbol{D}_3$	0.267	0.245	0.236	0.252
$\boldsymbol{D}_4$	0.267	0.245	0.244	0.244

the price strategy and criteria of personal selling, advertisement to improve communication strategy (see Fig. 3). As seen in Fig. 2, it also determine the product strategy is being influenced most, that is, the product strategy in the four strategies represents an important problem which should pay more attentions, and enterprises can improve it by criterion of enhancing the consumer experience. In addition, the results showed that the highest total satisfaction was in F_2 company, followed by F_1 company and F_3 company. It also showed that product strategy almost obtained the highest satisfaction in the three companies. On the other hand, we found that the lowest satisfaction of the three companies almost in the sales promotion and personnel sale that means both are need to be improved. Furthermore, the compromise ranking by VIKOR method showed which dimension and criterion is close to the aspiring level, and we can see their gaps clearly. In Table 12, it showed the total gaps were lowest in F_2 company, which is close to the aspiring level, and the dimension of product strategy and the criterion of

Table 10
Weighting the unweighted supermatrix based on total-influence normalized matrix W^{α}.

Criteria	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}
c_1	0.084	0.093	0.093	0.093	0.093	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.093
c_2	0.089	0.078	0.088	0.087	0.087	0.087	0.088	0.087	0.087	0.087	0.087	0.087	0.087
c_3	0.087	0.088	0.079	0.087	0.087	0.088	0.088	0.088	0.086	0.087	0.087	0.087	0.087
c_4	0.122	0.122	0.122	0.109	0.122	0.122	0.121	0.121	0.121	0.122	0.121	0.122	0.120
c_5	0.124	0.124	0.124	0.126	0.113	0.123	0.124	0.124	0.122	0.123	0.124	0.124	0.124
c_6	0.079	0.081	0.081	0.081	0.081	0.072	0.081	0.081	0.081	0.082	0.081	0.081	0.081
c_7	0.083	0.082	0.082	0.083	0.084	0.083	0.075	0.082	0.083	0.082	0.083	0.082	0.083
c_8	0.080	0.080	0.079	0.081	0.081	0.081	0.080	0.073	0.080	0.080	0.080	0.081	0.080
c_9	0.050	0.051	0.050	0.050	0.051	0.051	0.050	0.051	0.045	0.050	0.051	0.050	0.050
c_{10}	0.054	0.053	0.053	0.053	0.054	0.054	0.053	0.054	0.053	0.048	0.053	0.053	0.053
c_{11}	0.050	0.050	0.051	0.051	0.050	0.050	0.050	0.050	0.050	0.050	0.045	0.050	0.050
c_{12}	0.050	0.050	0.051	0.051	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.045	0.050
c_{13}	0.048	0.048	0.047	0.048	0.047	0.047	0.048	0.047	0.050	0.047	0.046	0.046	0.042

Note: $\boldsymbol{W}^{\alpha} = \boldsymbol{T}_D^{\alpha}\boldsymbol{W}$.

Table 11
The stable matrix of ANP when power $\lim_{h\to\infty}(\boldsymbol{W}^{\alpha})^{h}$.

Criteria	c_1	c_2	c_3	c_4	c_5	c_6	c_7	c_8	c_9	c_{10}	c_{11}	c_{12}	c_{13}
c_1	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092
c_2	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086
c_3	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087
c_4	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
c_5	0.123	0.123	0.122	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123
c_6	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
c_7	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082
c_8	0.080	0.080	0.080	0.080	0.080	0.080	0.008	0.080	0.080	0.080	0.080	0.080	0.080
c_9	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
c_{10}	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053
c_{11}	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
c_{12}	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
c_{13}	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047

Table 12
The weights of criteria for evaluating satisfaction and total performance of brand marketing.

Dimensions/Criteria	Weighting by ANP		Evaluating satisfaction by SAW			Evaluating performance by VIKOR		
	Local weight	Global weights	F_1	F_2	F_3	F_1	F_2	F_3
Product strategy	0.265		3.810	3.890	3.342	0.230	0.221	0.340
Perceived quality	0.346	0.092(3)	3.783	3.652	3.217	0.220	0.280	0.360
Perceived value	0.327	0.086	3.826	3.957	3.478	0.230	0.200	0.310
Enhance the consumer experience	0.326	0.087	3.783	4.087	3.348	0.240	0.180	0.350
Price strategy	0.243		3.499	3.694	3.390	0.310	0.260	0.340
Consumer's price perception	0.495	0.120(2)	3.565	3.826	3.348	0.300	0.240	0.350
Value pricing	0.505	0.123(1)	3.435	3.565	3.391	0.320	0.280	0.330
Channel strategy	0.242		3.680	3.753	3.272	0.267	0.267	0.347
Direct and indirect channels	0.331	0.080	3.696	3.696	3.304	0.260	0.280	0.350
Push and pull	0.340	0.082	3.565	3.739	3.000	0.280	0.260	0.390
Channel support	0.329	0.080	3.783	3.826	3.522	0.260	0.260	0.300
Communication strategy	0.250		3.683	3.650	3.283	0.252	0.272	0.348
Advertisement	0.201	0.050	4.174	4.000	3.217	0.170	0.200	0.380
Sales promotions	0.213	0.053	3.391	3.565	3.217	0.300	0.290	0.340
Event marketing and sponsorship	0.200	0.050	3.696	3.609	3.304	0.250	0.290	0.350
Public relations and propaganda material	0.200	0.050	3.696	3.565	3.435	0.250	0.290	0.310
Personnel sale	0.187	0.047	3.478	3.522	3.261	0.290	0.290	0.360
Total satisfaction & performance	–	–	3.670(2)	3.750(1)	3.320(3)	0.260(2)	0.250(1)	0.340(3)

Example for SAW:
Calculating total performance by global weights: $0.092 * 3.783 + 0.086 * 3.826 + 0.087 * 3.783 + 0.120 * 3.565 + 0.123 * 3.435 + 0.080 * 3.\ 696 + 0.082 * 3.565 + 0.080 * 3.783 + 0.050 * 4.174 + 0.053 * 3.391 + 0.050 * 3.696 + 0.050 * 3.\ 696 + 0.047 * 3.478 = 3.670$.
Calculating total performance by local weights: $0.265 * 3.793 + 0.243 * 3.499 + 0.242 * 3.680 + 0.250 * 3.683 = 3.670$.

enhancing the consumer experience are the most close to the aspiring level. On the other hand, other dimension and criterion which is far form the aspiring level need to find a improve way to reduce the gaps.

The hybrid MCDM model combining DEMATEL, ANP and VIKOR methods demonstrated a useful decision making model, which help to clarify the complicated problems and rank the priority in this study. The MCDM model also helps to find the most important strategy and how to improve the problems of the brand marketing that indicated that enterprise is suggested to create brand value by our findings.

5. Conclusions and remarks

To consumers, the brands are used to identify the value of products and company image. In order to enhance brand values of products, we proposed the brand marketing to reach the goal. We applied the MCDM model combining DEMATEL with ANP and VIKOR methods to identify the interrelated relationships and find the most important factor of brand marketing. As the empirical results, value pricing is the most important factor, followed by consumer's price perception and perceived quality. The results also showed that the highest total satisfaction of brand marketing was in F2 company. On the other hand, marketing planners who want to create brand values not only take the value pricing for primary consideration but also improve the price strategy and communication strategy to reduce problems and gaps for reaching aspired levels. Moreover, after a successful transition from OEM to ODM and now entering into the era of OBM in Taiwan. For the future research, there are many brands of different industries or companies can be investigated. Also, there are many interrelated factors among the problems should be clarified and solved. The proposed MCDM model in this study is a good method to solve the interrelated problems. Creating brand value is not only important in Taiwan but also in anywhere in the world. Enterprise must by creating brand values and satisfying customer's need to maintain their competitive advantage. Therefore, this study proposed the brand marketing to create brand value while there are still many ways or strategies to create brand values should be concerned in the future.

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