



A new hybrid MCDM model combining DANP with VIKOR to improve e-store business

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ARTICLE INFO

Article history:

Received 14 November 2011

Received in revised form 30 June 2012

Accepted 30 June 2012

Available online 11 July 2012

Keywords:

e-Store business

Internet stores

Customers' needs

Marketing strategies

Multiple Criteria Decision-Making (MCDM)

DEMATEL

Analytic Network Process (ANP)

DEMATEL-based ANP (DANP)

VIKOR

ABSTRACT

Many consumers today buy products and services from e-stores. Because e-store managers are responsible for allocating different resources, it is essential that they understand consumers' shopping behaviour to provide the best possible value for visitors to their websites. Therefore, the purpose of this article is to focus on assessing and improving strategies to reduce the gaps in customer satisfaction caused by interdependence and feedback problems among dimensions and criteria to achieve the aspiration level. We propose a new hybrid Multiple Attribute Decision Making (MADM) model, combining the Decision Making Trial and Evaluation Laboratory (DEMATEL), DEMATEL-based Analytic Network Process (DANP), and Višekriterijumsko Kompromisno Rangiranje (VIKOR) methods to solve these problems. Then, three real cases are used to illustrate how the proposed new hybrid Multiple Criteria Decision-Making (MCDM) model improves e-store business. These results can provide e-store managers with a knowledge-based understanding of how to create marketing strategies that reduce the performance gaps of dimensions and criteria to satisfy consumers' needs and encourage customers to purchase more.

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1. Introduction

It has become increasingly common for consumers to buy products and services from e-stores because these types of stores provide them with a convenient and fast shopping environment and high-quality products and services, saving them time and money. E-stores have become an important retailing channel, and many such stores have been established and are experiencing a continuous increase in sales. Therefore, this article focuses on the assessment, improvement, and setting of strategies to better meet customer needs. These needs are met by reducing performance gaps introduced by interdependence and feedback problems among dimensions and criteria, allowing the aspiration level to be achieved and promoting customer satisfaction to bring people real happiness. It is essential for e-store managers to know how to manage business and marketing strategies because the success of the store depends on excellent management and accurate marketing strategies.

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Electronic commerce (EC) is defined as the process of buying, selling, or exchanging products, services, advertisements, and information via electronic communication technologies (the Internet and www, PDAs (Personal Digital Assistants), smartphones, and tablet computers). Those technologies facilitate the manufacturing of products and the provision of services to satisfy the wants and needs of consumers [4,51,66]. EC includes e-stores, and because shopping is a complex behaviour composed of rational choices, amusement, and social communication [87,90], understanding consumers' wants and needs is critical for the stores' successful management and development [27,90]. This understanding particularly applies to e-stores, in which consumers' shopping behaviour may be different from that in traditional brick-and-mortar stores [71,91]. Therefore, e-store management issues are a hot topic because such stores seek to extend their consideration sets and improve consumers' welfare, and the quality and quantity of individually customised interfaces can facilitate a better, more efficient purchase decision-making process [62,88].

Previous EC researchers have focused on the consumers' motivations [30,71], the shopping behaviour [39,81], the intelligent agents [43,86], the satisfaction-loyalty relationship [5,15,63], and the risk [10]. This research has focused on how to manage e-stores and create marketing strategies. Previous relation methods have focused on influence [38], assessment [13], ranking [37,92],

selection [18,36,47,49,60,72], and improvement [14,21,46,48,50,51,59,83,85]. Thus, this study seeks a new hybrid Multiple Attribute Decision Making (MADM) model combining the Decision Making Trial and Evaluation Laboratory (DEMATEL) technique to build an influential relationship among dimensions and criteria, DEMATEL-based ANP (DANP) to find the influential weights, and VIšekriterijumsko KOmpromisno Rangiranje (VIKOR) methods to assess performance, not only in ranking and selection but also in improving and creating e-store marketing strategies to reduce gaps in each dimension and criterion to promote the e-store environment and satisfy customers' needs. These processes can not only help e-store managers to understand customers' wants and needs, they can also assist them in improving their products and service to reduce performance gaps in customer satisfaction by building an effective e-store marketing strategy.

An empirical study of three e-stores – Yahoo, PChome, and Books aims to demonstrate the proposed new hybrid Multiple Criteria Decision-Making (MCDM) model for ranking and improvement. Because this study focuses on the effects of certain influential relationships among dimension and criteria in an e-store business and the creation of marketing strategies for the e-store manager, this study surveyed three e-stores to determine the best strategies for improving an e-store. From the survey results, we found that prioritising the customers' needs and giving them perfect post-purchase service can affect customers' purchase decisions, information searches, and evaluation of alternatives. Therefore, initial marketing strategies can include advertisements and light products to meet the customers' needs. Then, the e-store can create high-quality post-sales service programmes, offer fast delivery of products, provide complete packaging, communicate after the purchase, offer guarantees, and implement liberal returns policies to improve post-purchase service.

The remainder of this paper is organised as follows: Section 2 reviews the consumer decision-making process and evaluation framework, including e-store business criteria and performance. Section 3 provides a brief introduction of the DEMATEL technique, the DANP influential weights and the VIKOR method used to establish a new hybrid MCDM model to resolve problems of interdependence and feedback. An empirical study of Yahoo, PChome, and Books is presented in Section 4 to demonstrate the proposed model and, finally, conclusions and remarks are presented in Section 5.

2. Review of consumers' decision-making process and evaluation framework

An e-store markets and sells products or services offered by a company [54]. E-stores are becoming critically important to online retailers, and they have become important parts of retailer strategy [30]. Therefore, knowing the needs of customers and how to meet those needs is important. E-stores are a highly visible, well-received, and popular type of e-commerce [20,26] that sells products and services online [8,67]. E-stores are part of the e-commerce and retail channel, which includes online retailers, online stores, online shops, e-shops, and any virtual shopping websites that sell products or services from businesses to customers, such as Amazon [35,75,89]. Amazon.com was established in 1994 during an era of rapid growth for the Internet, which quickly became a key channel for the sale of products and services [2,40,77,78]. Consequently, e-store management is a key issue for the development of e-commerce.

The number of e-stores has grown quickly because they are convenient, eliminate sales pressure, and save time. The online retail sales of European e-stores increased 18% from 2009 to 2010 [9]. Forrester research forecasts that European online sales will have a compound annual growth rate of 12%, from €96.7 bn (£82.0 bn) in

2011 to €171.9 bn (£145.8 bn) in 2016 [22,32]. The UK Office for National Statistics reports that e-store sales increased by 13.1% in March 2011 [56]. Forrester research forecasts UK online sales will have compound annual growth rate of 11%, from £30.1 bn in 2011 to £51.0 bn in 2016, and the UK's proportion of online shoppers will increase from 75% of the population in 2011 to 85% in 2016. The proportion of online shoppers in Sweden will increase from 72% of the population in 2011 to 86% in 2016 [22,32]. In the US, Forrester research forecasts that online retail sales are expected to grow from US\$176.2 bn in 2010 to US\$278.9 bn in 2015, which is an increase of more than 10% [53]. Forrester research forecasts note that US online shoppers will have a compound annual growth rate of 15%, from 167 million people in 2012 to 192 million people in 2016, and it is predicted that each consumer's spending will grow by 44%, from US\$1207 in 2012 to US\$1738 in 2016. Therefore, the total sale value for e-stores will increase by 45%, from US\$226 bn in 2012 to US\$327 bn in 2016 [52,69]. All available reports indicate that sales by e-stores are growing rapidly in all areas.

Customer satisfaction has been considered most important issues for marketers and customer researchers [42,55,73]. Companies need to develop strategies that help company develop sustainable business practices [41]. E-store should to meet customers' needs [65] and increase customer satisfaction by creating customer value in consumer marketing [19,64]. Loyal customers that indulge in repeat purchases are the bedrock of any business [1]. Customer satisfaction is important mostly because of its indirect influence on the profitability of companies [3]; satisfied customers tend to make not only more purchases but also repeat purchases [7,74,76], and customer satisfaction has become a key element of many companies' business strategies [24]. Therefore, understanding the criteria that influence customer satisfaction is important not only to describe the actual situation but also to plan improvements, and actions [79].

Marketing activities should be designed to increase customer satisfaction [33]. Therefore, in this paper, we combined consumer behaviour and customer satisfaction to create dimensions and criteria that show the influence level, weighting, and performance among dimensions and criteria.

This study primarily examines consumers' criteria for the business-to-consumer electronic commerce (B2C e-commerce) of e-stores, focusing on consumer satisfaction. E-store buyer behaviour refers to consumer behaviour, and the steps in the consumers' decision-making process can be found in most textbooks and journals, some of which describe these steps as need recognition, information search, evaluation, purchase, and after-purchase evaluation [23,28,29,34,61,68,89]. Others propose that the steps are need recognition, information search, evaluation, purchase, and post-purchase behaviour [44,82]. In fact, according to e-store customers' behaviour, including blog writing, Facebook reviews, and tendency to repurchase, the main components of this process can be considered to be need recognition, information search, evaluation, purchase, and post-purchase behaviour. Based on these criteria, Bizrate.com and Alexa.com conducted surveys asking respondents to rate retailers on 14 e-store attributes, namely, product availability, ease of finding, overall look and design, clarity, number of reviews, brand, relative price, selection, variety of shipping options, shipping charges, charge statement, order tracking, on-time delivery, and expectations met [31]. A detailed description of these components is provided in Table 1. In summary, the intact criteria, which include five influential dimensions and fourteen criteria, need to be considered (see Table 1).

Having surveyed several Taiwan EC websites, Chang and Chen [12] found that, according to users, Yahoo.com, Yahoo auction, PChome.com, and Books.com were the four top online shopping sites [12]. Another study [80] found that the most popular website

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