THE DETERMINANTS OF E-COMMERCE WEBSITE SELECTION USING DELPHI - FUZZY EVALUATION METHOD: A CASE STUDY OF VIETNAM

CÁC TIÊU CHÍ QUYẾT ĐỊNH SỰ LỰA CHỌN TRANG THƯƠNG MẠI ĐIỆN TỬ SỬ DỤNG PHƯƠNG PHÁP ĐÁNH GIÁ FUZZY-DELPHI: NGHIÊN CỨU TRƯỜNG HỢP TẠI VIỆT NAM

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Abstract

Vietnam is one of the developing countries that is approving and bringing e-commerce into an important element. It leads to the changing the behavior of users in Vietnam in which people can use electronic device features to do shopping activities. Along with the occurrence and development of E-commerce, customers can have benefits from diversity of choices but it causes a fiercer competition among these e-retailers at the same time. Understanding the criteria that influence the choice of e-commerce websites is vital. Hence, the study aims to examine the criteria affecting the selection of websites of customers by applying a modified Delphi method and fuzzy theory. The results illustrate that among 11 factors, product or service quality is prioritized as selecting a website, followed by feedback from previous customers.

Keywords: *E-commerce, competition, modified Delphi method and fuzzy theory.*

Tóm tắt

Thương mại điện tử tại Việt Nam đang phát triển mạnh mẽ. Thương mại điện tử dẫn tới sự thay đổi thói quen của người tiêu dùng ở Việt Nam khi mà các hoạt động mua sắm thông qua việc sử dụng các thiết bị điện tử. Với sự ra đời và phát triển của các trang thương mại điện tử, người tiêu dùng ngày càng được hưởng nhiều lợi ích hơn từ việc có nhiều sự lựa chọn hơn. Đồng thời, chính sự gia tăng nhanh chóng này cũng tạo ra sự cạnh tranh gay gắt giữa các kênh thương mại điện tử. Nhận biết được các tiêu chí quyết định đến sự lựa chọn các trang website là rất quan trọng. Chính vì vậy, nghiên cứu thực hiện nhằm mục đích đánh giá các tiêu chí ảnh hưởng đến việc lựa chọn trang website của khách hàng bằng cách áp dụng phương pháp Delphi và lý thuyết Fuzzy. Kết quả cho thấy rằng chất lượng sản phẩm/ dịch vụ được ưu tiên hơn khi chọn một trang website, tiếp theo là phản hồi từ các khách hàng trước đó.

Từ khóa: *Thương mại điện tử, cạnh tranh, phương pháp Delphi và lý thuyết Fuzzy.*

1. Introduction

E-commerce has emerged as an indispensable part of modern lifestyle in which buying and selling of products and services are supported by internet. Establishing competitive differentiation to attract and satisfy customers is paramount importance to e-commerce websites. Understanding customer desires can be considered as a key component of effectiveness and success. Many empirical studies have conducted to evaluate factors affecting the decision of selecting e-commerce websites. Samira, et al, [1] used Analytic Hierarchy Process method to identify 6 factors effecting the decision of selecting e-commerce websites in Bangladesh including ease of usage, past experience, privacy and security, customer service, product variety and brand image. Meanwhile, the success factors for e-commerce in Thailand were contributed by industry KSFs, well-designed websites, Internet connection, IT capability, large product selection, online security, brand name recognition, competitive prices and promotion, customer support and relationship, and order fulfillment under matrix method [2]. In Nigeria, Folorunso, et al, [3] used a correlation matrix approach to prove that the cost of implementation, accessibility, data security and citizen's income are the most important factors. Factors affecting the selecting e-commerce websites vary from country to country, from region to region as a result of differences in cultures, needs, and customers

behaviour. The determinants of e-commerce website selection in Vietnam are definitely different from those in a certain country.

Vietnam's e-commerce sector is witnessed strong growth in the region with revenue of approximately 3 billion US\$ and more than 50 million users in 2019 by Statista, though it is just as an emerging market behind Singapore, Indonesia, and Thailand. Owning a range of comparative advantages such as young population, increasing middle class, high internet and smart phone users is considered the key factor driving Vietnam becoming one of the most promising e-commerce market attracting both domestic and foreign investors. The top five most successful e-commerce platforms in Vietnam including Vietnamese e-commerce platforms namely The gioi Di Dong, Sendo, Tiki and the two international co-operations Lazada Viet Nam and Shopee Viet Nam by iPrice Group have made improvements to attract more e-commerce customers. However, the number of researches about determinants of e-commerce website selection in Vietnam is exceedingly limited. Therefore, to fill the gap, the study aims to examine the criteria affecting the selection of websites of customers by applying modified Delphi method and fuzzy theory. The study here aims to identify factors affecting e-commerce website selection with the scope of Vietnam, thereby provides both academic and practice implications to improve the services of the E-commerce websites.

2. Methodology

E-commerce website selection is a multiple criteria decision making problem. In many cases, the preferential model of decision making is uncertain, and it is difficult for decision makers to provide exact numerical values for comparative ratios [4]. This study hence proposes using fuzzy theory to resolve the uncertainly and imprecision of performance evaluations, in which the comparison judgments of a decision maker are presented as fuzzy triangular numbers. To more accurately reflect the original opinions of decision makers, a Fuzzy - Delphi methodology, which is able to handle both the quantitative and qualitative elements of a problem, is used.

Fuzzy - Delphi is a methodology combining the Fuzzy method and Delphi method for optimal decision making strategies. The Fuzzy Delphi method can resolve uncertainly regarding decision space and combine the advantages of statistical methods [5]. It has four advantages: to decrease the times of questionnaire surveys, to avoid distorting individual expert opinions, to clearly express the sematic structure of predicted items, and to consider the fuzzy nature during the interview process [6].

This study hence proposes using fuzzy theory to measure experts' perceptions utilizing linguistic expressions as 'strongly unimportant', 'unimportant', 'neutral', 'important' and 'strongly important' to achieve the judgment of decision makers... This is shown with the support of membership ability, which is evaluated in the unit interval of real [0, 10]. Fuzzy sets extend classical sets as the index functions of classical sets are special cases of the membership ability of fuzzy sets if the latter only have the values 0 or 10. A classic value set is typically called crisp sets in the fuzzy theory [7]. A triangular fuzzy number is composed of three parameters, i.e., a1, a2, and a3, and the membership function can be indicated as shown in equation (1):

$$\mu A = \begin{cases} 0, & x \leq \alpha_1 \\ (x - \alpha_1)/((\alpha_2 - \alpha_3).\alpha_1 \leq x \leq \alpha_2 \\ (\alpha_3 - x)/(\alpha_3 - \alpha_2), a_2 \leq x \leq \alpha_3 \\ 0, & x \geq \alpha_3 \end{cases} \quad (1)$$

Triangular fuzzy numbers between the membership function "n" are defined as shown here:

$$\left[\bar{A} = \alpha_1^{(i)}, \alpha_2^{(i)}, \alpha_3^{(i)}, i = 1,2,3 \ldots \ldots + n\right] \quad (2)$$

Fuzzy number is defined as follows:

$$\left[\bar{A} = A_{ave} = \right.$$

$$\left. \frac{\bar{A}+\bar{A}+\cdots+\bar{A}}{n} = \frac{\left(\sum_1^n \alpha_1^{(i)} \sum_1^n \alpha_2^{(i)} \sum_1^n \alpha_3^{(i)}\right)}{n} = (\alpha_1,\alpha_2,\alpha_3)\right] \quad (3)$$

The last step in the fuzzy method is de-fuzzification. The aiming of de-fuzzification is to convert the results of the whole fuzzy set obtained in the previous step into the crisp numbers. The most common method of de-fuzzification is the centre of gravity. This method solves the centre of the area of the binding membership function.

$$Y^* = \frac{(\bar{A}_3 - \bar{A}_1) + (\bar{A}_2 - \bar{A}_1)}{3} + \bar{A}_1 \quad (4)$$
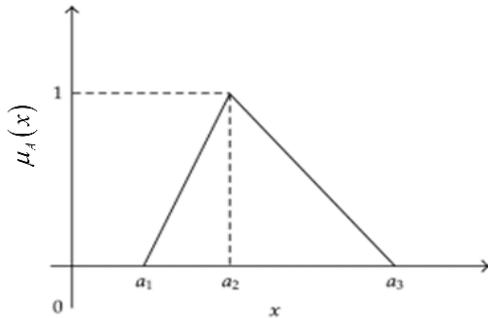
Source: Zadeh (1965) [8]

Figure 1. The triangular fuzzy number

Table 1. Linguistic variables for the evaluation of each factor

Linguistic scale	Fuzzy score
Strongly unimportant	(1, 1, 2)
Unimportant	(2, 3, 4)
Neutral	(4, 5, 6)
Important	(6, 7, 8)
Strongly important	(8, 9,10)

3. Empirical study

The research process can be found in Figure 2. A hybrid Fuzzy - Delphi based methodology divides the whole benchmarking process into two stages. The first stage includes identification, synthesis of the key factors that may affect the e-commerce website selection by customers via modified Delphi method. The second stage is to set up the fuzzy matrix and compute the weights of each KPF using the Fuzzy Delphi method to prioritize the key factors.

3.1. Identifying factors affecting the selection of e-commerce websites

In the first stage, determinants deriving from previous research related to selecting e-commerce websites was circulated among fifteen respondents who usually shop online were interviewed during a brainstorming session to identify the KPFs. In all, within a period of 28 days (from 19 December 2019 to 15 January 2020), 11 factors were identified in this session as shown in Table 2. To determine the crucial factors among all of the factors obtained from the participants' opinion more objectively, a 5-point scale questionnaire survey was simultaneously administered. Cronbach's Alpha was applied to test the reliability of the questionnaire before the selection of appraisal KPFs. The value of 0.753 that was obtained is greater than 0.35 and is therefore viewed as reliable. If any Cronbach's Alpha is less than 0.35, the corresponding datum is not reliable and will be deleted. Those more than 0.35 are viewed as reliable [9].
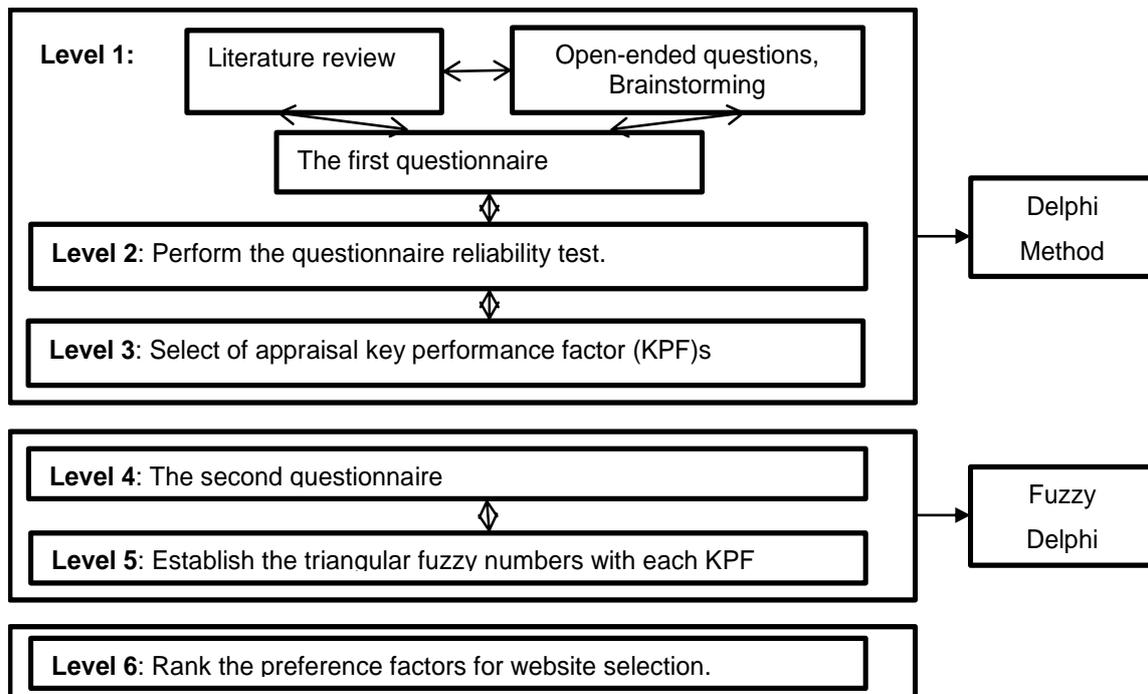

Figure 2. Generalized framework through Fuzzy-Delphi based approach

3.2. Weighting factors affecting the selection of e-commerce websites

The second survey was conducted with a larger number of participants. There were 102 participants having experience in buying products in e-commerce websites, in which 2 questionnaires missing answer were eliminated, so 100 questionnaires were successfully returned and validated as shown in table 2. The evaluation was checked the reliability by Cronbach's Alpha which was 0.913.

To clarify the priority of the criteria, the fuzzy method was applied using linguistic variables as shown in Table 1. The final fuzzy scores were based on equation (3) and the defuzzification was based on equation (4). The results are illustrated in Table 3.

Table 2. General information about responses

Gender	Female	72 %
	Male	28 %
Age	Less than 18	5 %
	18-25	91 %
	More than 25	4 %
Occupation	Student	79 %
	Employee	16 %
	Others	5 %
Frequency of buying online	Always	6 %
	Often	23 %
	Sometimes	58 %
	Seldom	13 %
Main kind of product purchased	Clothes, shoes	53.5 %
	Accessories	10.3 %
	Cosmetic	10.3 %
	Book	8.4 %
	Others	17.5 %

Table 3. Importance weights of criteria

Key performance factors	Fuzzy score			Defuzzification	Rank
Competitive price	5.78	6.72	7.72	6.74	3
The quality of product and service	6.17	7.10	8.10	7.12	1
Shipping cost	5.17	6.12	7.12	6.14	10
Shipping time	5.50	6.46	7.46	6.47	4
Feedback from previous customers	6.09	7.06	8.06	7.07	2
Warranty	4.97	5.90	6.90	5.92	11
Customer responsiveness	5.43	6.42	7.43	6.43	5
Value-added services (discount, package,..)	5.18	6.14	7.14	6.15	8
Description of product/service	5.43	6.40	7.40	6.41	6
Refund policy	5.36	6.32	7.32	6.33	7
Ease of checkout (payment method)	5.16	6.13	7.13	6.14	9

The ranking of the determinants of the selection of e-commerce websites shows that the quality of product and service is ranked as the most important factor when choosing an e-commerce website. Customers are much interested in websites offering clear original, brand name, verified e-retailers and high quality products and services. Next, the feedback from previous customer factor is ranked second. Customers have no have the option of testing or checking the product before its delivery, so feedbacks from previous customers play an important role in the decision to buy products of users. They will be more reassuring when purchasing products on an e-commerce website with positive comments and high rating. "Competitive price" and "shipping time" are also among the deciding factors when choosing a website, ranked 3 and 4 respectively. Noticing the high requirement among e-commerce for speedy and timely delivery some Vietnamese e-commerce platforms such as Tiki offered Tikinow or Shopee introduced delivery policy in four hours. The lowest priority is given to ease of checkout (payment method), shipping cost and warranty. Vietnam has low banking penetration, so customers could choose the simplest payment which is cash on delivery payment method besides credit card payment or mobile method. The

"warranty" factor is at the bottom of the rankings. This is well explained by the market's largest segment is Fashion followed by electronic and media, toy, hobby, furniture and appliances.

4. Conclusion

The development of e-commerce is providing a great opportunity for e-retailers. Recognizing customer needs is crucial to increase the competitiveness and success. The study is to analyze the determinants of e-commerce websites selection. The results using the hybrid modified Delphi - fuzzy method proposed criteria in selecting certain e-commerce websites in which the quality of product and service, feedback from previous customer, competitive price and shipping time are important factors. This study, thus, have the potential to enrich the understanding on how customers select and evaluate e-commerce websites. The identification of priority factors will be crucial to e-commerce websites satisfy customer's requirement as limited resource availability. This leads to useful implications for managers of e-retailers and e-commerce websites to identify the elements to focus and improve. Moreover, the study would a timely contribution to the literature on e-commerce field. Despite of academic and practical implications, the findings should be specified for each group customers having different characteristics such as ages, income and type of products. It is recommended that future studies should replicate and develop to examine potential differences of criteria to have better insights of each customer segmentation as well of each group of e-commerce websites for different products and services such as consumer goods, hotels, motels, tourism and air tickets.

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