The Effect of Confidence and Security on Vietnamese Online Shopping Intention by GM(1, N) Analysis

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Abstract: The purpose of this research is to investigate the effect of consumer confidence and transaction security on online shopping intention in Vietnam. Consumer confidence, transaction security, and online shopping intention were employed to design a questionnaire measured with five-point Likert scale. The respondent data from online survey by convenience sampling were analyzed by GM(1, N) model to explore the effect of confidence and security on online shopping intention. The results show that trust of goods quality, online prestige, and service quality rank as the first to third most significant factors while trust of security system, transact system, payment system and information as fifth to eighth place. That means consumers always believe online commodities even they do not touch the goods. In contrast, no matter how many efforts have been made to improve security, transact, payment and information, consumers' trust on these functions still have less influence on purchase intention. It is suggested that online shopping vendors should try to upgrade product/service quality to preserve reputation rather than focus on the promotion of information to increase customers' confidence.

Key words: GM(1, N); consumer confidence; transaction security; online shopping; trust

JEL codes: M31

1. Introduction

The rapid development of internet technology not only incubates the information media for communication, but also online shopping environment. The speedy growth of online shopping has made many businessmen turn to online businesses to meet the need of consumers interested in shopping online in the past two decades. The benefit

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of online shopping felt by consumers is that online shopping breaks the limitation of time and location, provides convenient purchasing experience, and makes easy and quick multiple comparison of products and services. Driggs (2019) indicated that consumers are gradually feel ease with online shopping, and retailers of various product providers are increasing their online sales, working to improve buyer experience by straightforward navigation and classification, superior values and delivery choices. According to Information Resources Incorporated (IRI), e-commerce sales increased enormously 35.4% in 2018. Besides, Gen X and Millennial consumers are more accustomed to online shopping than older age groups. Moreover, 54% of millennials and Gen Xers are less likely to make impulse purchase when shopping online. It is expected that e-commerce sales will continue to rise in 2019 because retailers will progressively more investing in better ways to attract shoppers to purchase online.

There are two major factors affect consumers' trust in online shopping, namely safety/security of online transactions and consumer confidence toward online sellers. That is to say, consumers are deeply reliant on commodity image and persuasiveness of sellers. In order to catch the attention of consumers to agree to the transactions, sellers have to work for trust from consumers. However, how to increase transaction safety and security of online shopping and consumer confidence in products and services is more difficult than those of traditional shopping, because online shopping consumers can not directly touch and feel the products or services in the purchase process (Pavlou, 2003; Verhagen, Meents, & Tan, 2006).

Hence, how to promote consumer trust in online shopping is a critical issue that deserves our attention. The purpose of this research is to explore the influence of consumer confidence and transaction security on online shopping intention of Vietnamese.

2. Literature Review

There are eight factors that influence online shopping: e-service quality, time, price, easiness, security, trust, convenience, and website quality. After factor reduction, there are 3 most foremost factors: trust factor, price factor and time factor (Edwar et al., 2018).

Trust is a significant factor for sellers to construct a satisfactory and continuing relationship with customers, and it is distinguished by vulnerability, uncertainty, and dependency (Bradach & Eccles, 1989).

Trust is also an interactive process in which buyers and sellers will concurrently evaluate the costs and benefits of accomplishing a transaction with each other (Doney & Cannon, 1997).

General speaking, trust will exit only when sellers make guarantee to buyers that they have the competence to provide appropriate product or service that match the requirement of customers with satisfactory quality and quantity. Furthermore, consumer confidence toward sellers will be ascertained only when sellers unreservedly dedicate to create a decent relation with consumers (Jarvenpaa, Tractinsky & Vitale, 2000).

Confidence with the services is one of the most significant factors to influence consumers' behavior of online shopping (Maenpaa et al., 2008; Suki & Suki, 2013). Kim (2012) suggested that company reputation, structural assurance, trusting stance, and initial trust beliefs will influence consumers' attitude to online shopping. Kim and Jihyun (2009) explained that many customers believe that those who trust conventional brick and mortar retailers will have almost the same confidence towards online shopping for products with the retailer.

This is because that the online shopping consumers can not check the products before the products delivered to them as the face-to-face transactions of conventional brick-and-mortar retailing. That means the consumers

have to take the risk of trusting what product is in the shipping box. On the other hand, many consumers think that online transactions are still not secure enough to protect personal and payment information from disclosure. This situation will hinder consumers from shopping online and cause experienced internet users and online shoppers to be the most potential future online shoppers. These restrictions affect shoppers to be suspicious about purchasing products online. Generally speaking, consumer confidence in online shopping will be influenced by privacy issue, security, and trust on products (Castañeda & Montoro, 2007; Lim et al., 2011; Ramanathan, 2011; Rasiah & Tan, 2011; Suki, 2006; Suki & Suki, 2007). Consumer satisfaction in e-commerce transacting will affect consumer confidence in shaping attitudes and behavior to repurchase online (Sidharta & Suzanto, 2015).

In the Americas, over half of consumers believe shopping websites have security mechanisms to protect their information with the range from 57% in Mexico to 81% in the U.S. This could be because of a longer history of online shopping and promotion of security measures in the U.S. EMEA demonstrates more variation between Eurozone and Non-Eurozone in confidence e of online shopping. Eurozone countries have little differences ranging from 64% in Spain to 69% in Italy. This is most possible due to synchronization of consumer protection and privacy laws of EU. Regarding to the Non-Eurozone countries, there were more variation with 55% of UAE to 79% in the U.K., of which the former is similar to Mexico and the latter to the U.S. (Inscoe, 2017).

3. Materials and Method

This study is based on a previous research (Nguyen Thi, 2019) by using its partial variables and data as well as a modification of research by Chiu, Lai, and Nguyen Thi (2019). The three variables of consumer confidence, transaction security, and online shopping intention with questions (factors) of four, four and one respectively were utilized to design a questionnaire. All the nine questions were quantified with 5-point Likert scale by denoting 1 as strongly disagreement, 2 for disagreement, 3 for neutral, 4 for agreement and 5 for strongly agreement. The convenience sampling with online survey was employed to collect data. As a result, 220 respondents were obtained of which 206 were valid. The collected data were analyzed by GM (1, N) method to discover the weighting of each factor of consumer confidence and transaction security on online shopping intention. The comprehensive computation procedure of GM (1, N) is illustrated as follows.

GM (1, N) is one of the Grey modeling (GM). For sequences $x_i^{(0)}(k)$, where i =1,2,3,…N, k = 1,2,3,…n, if $x_1^{(0)}(k)$ is the behavior of a system (called major sequence), and $x_2^{(0)}(k), x_3^{(0)}(k), x_4^{(0)}(k),...x_N^{(0)}(k)$ are the significant factors influencing the system's behavior (called influential sequences), then GM(1,N) could be utilized to probe the system as follows (Wen et al., 2009; Fitriana & Hariyanto, 2012; Lai et al., 2015; Chiu et al., 2016).

(1) Building original sequences

$$
\begin{aligned}
x_1^{(0)} &= \left\{ x_1^{(0)}(1), x_1^{(0)}(2), x_1^{(0)}(3),..., x_1^{(0)}(k) \right\} \\
x_2^{(0)} &= \left\{ x_2^{(0)}(1), x_2^{(0)}(2), x_2^{(0)}(3),..., x_2^{(0)}(k) \right\} \\
x_3^{(0)} &= \left\{ x_3^{(0)}(1), x_3^{(0)}(2), x_3^{(0)}(3),..., x_3^{(0)}(k) \right\} \\
&.. \\
x_N^{(0)} &= \left\{ x_N^{(0)}(1), x_N^{(0)}(2), x_N^{(0)}(3),..., x_N^{(0)}(k) \right\}
\end{aligned}
\tag{1}
$$

where k = 1,2,3,…n.

(2) Creating accumulated generating operation (AGO) sequences

$$
\begin{aligned}
x_1^{(1)} &= \left\{ x_1^{(1)}(1), x_1^{(1)}(2), x_1^{(1)}(3), \ldots, x_1^{(1)}(k) \right\} \\
x_2^{(1)} &= \left\{ x_2^{(1)}(1), x_2^{(1)}(2), x_2^{(1)}(3), \ldots, x_2^{(1)}(k) \right\} \\
x_3^{(1)} &= \left\{ x_3^{(1)}(1), x_3^{(1)}(2), x_3^{(1)}(3), \ldots, x_3^{(1)}(k) \right\} \\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\
x_N^{(1)} &= \left\{ x_N^{(1)}(1), x_N^{(1)}(2), x_N^{(1)}(3), \ldots, x_N^{(1)}(k) \right\}
\end{aligned}
\tag{2}
$$

where

$$
x_i^{(1)} = \left(\sum_{k=1}^{1} x_i^{(0)}(k), \sum_{k=1}^{2} x_i^{(0)}(k), \sum_{k=1}^{3} x_i^{(0)}(k), \ldots, \sum_{k=1}^{n} x_i^{(0)}(k) \right)
$$

$i = 1,2,3,\ldots N.$

$k = 1,2,3,\ldots n.$

(3) Integrating the AGO sequences with the original sequence.

$$
x_1^{(0)}(k) + a z_1^{(1)}(k) = \sum_{i=2}^{N} b_i x_i^{(1)}(k)
\tag{3}
$$

Where $z_1^{(1)}(k) = 0.5 x_1^{(1)}(k) + 0.5 x_1^{(1)}(k-1)$, $k \geq 2$

(4) Substituting all AGO values into Eq. (3).

$$
\begin{aligned}
a_1 z_1^{(1)}(2) &= b_2 x_2^{(1)}(2) + \cdots + b_N x_N^{(1)}(2) \\
a_1 z_1^{(1)}(3) &= b_2 x_2^{(1)}(3) + \cdots + b_N x_N^{(1)}(3) \\
a_1 z_1^{(1)}(4) &= b_2 x_2^{(1)}(4) + \cdots + b_N x_N^{(1)}(4) \\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\
a_1 z_1^{(1)}(n) &= b_2 x_2^{(1)}(n) + \cdots + b_N x_N^{(1)}(n)
\end{aligned}
\tag{4}
$$

(5) Structuring GM(1, N) matrix equation according to Eq. (4).

$$
\begin{bmatrix} x_1^{(0)}(2) \\ x_1^{(0)}(3) \\ \cdot \\ \cdot \\ \cdot \\ x_1^{(0)}(n) \end{bmatrix}
=
\begin{bmatrix}
-z_1^{(1)}(2) & x_2^{(1)}(2) & \ldots & x_N^{(1)}(2) \\
-z_1^{(1)}(3) & x_2^{(1)}(3) & \ldots & x_N^{(1)}(3) \\
\cdot & & & \\
\cdot & & \ldots & \\
\cdot & & & \\
-z_1^{(1)}(n) & x_2^{(1)}(n) & \ldots & x_N^{(1)}(n)
\end{bmatrix}
\begin{bmatrix} a \\ b_2 \\ \cdot \\ \cdot \\ \cdot \\ b_N \end{bmatrix}
\tag{5}
$$

(6) Resolving $\hat{a} = (B^T B)^{-1} B^T Y$ by means of least square method to obtain the following results.

$$
\hat{a} = \begin{bmatrix} a \\ b_2 \\ \cdot \\ \cdot \\ \cdot \\ b_N \end{bmatrix}
\quad
B = \begin{bmatrix}
-z_1^{(1)}(2) & x_2^{(1)}(2) & \ldots & x_N^{(1)}(2) \\
-z_1^{(1)}(3) & x_2^{(1)}(3) & \ldots & x_N^{(1)}(3) \\
\cdot & & & \\
\cdot & & \ldots & \\
\cdot & & & \\
-z_1^{(1)}(n) & x_2^{(1)}(n) & \ldots & x_N^{(1)}(n)
\end{bmatrix}
\quad
Y_N = \begin{bmatrix} x_1^{(0)}(2) \\ x_1^{(0)}(3) \\ \cdot \\ \cdot \\ \cdot \\ x_1^{(0)}(n) \end{bmatrix}
$$

Eventually, the correlation between the influential sequences and the major sequence can be determined by the outcome values of b_N.

4. Analysis Results

According to the purpose of this research and the operation procedureof GM(1,N), the original sequences contain influential sequence (x_1 for online shopping intention) and target sequences ($x_2 \sim x_5$ for consumer confidence and $x_3 \sim x_9$ for transaction security) as follows.

x_1: intention of online shopping

x_2: trust of goods quality

x_3: trust of service quality

x_4: trust of information

x_5: trust of prestige

x_6: trust of payment system

x_7: trust of privacy protection

x_8: trust of security system

x_9: trust of transaction system

According to the aforementioned Eq. (1) to Eq. (5), the comprehensive calculation procedure is displayed as follows.

(1) Building original sequences according to Eq. (1)

$x_1^{(0)} = (4, 3, 5, \ldots, 3)$

$x_2^{(0)} = (4, 3, 3, \ldots, 1)$

$x_3^{(0)} = (4, 3, 3, \ldots, 2)$

$x_4^{(0)} = (4, 3, 3, \ldots, 1)$

$x_5^{(0)} = (4, 3, 4, \ldots, 1)$

$x_6^{(0)} = (4, 3, 3, \ldots, 2)$

$x_7^{(0)} = (4, 3, 3, \ldots, 2)$

$x_8^{(0)} = (4, 3, 4, \ldots, 2)$

$x_9^{(0)} = (4, 3, 4, \ldots, 2)$

(2) Structuring the AGO sequences according to Eq. (2)

$x_1^{(1)} = (4, 7, 12, \ldots, 739)$

$z_1^{(1)} = (-, 5.5, 9.5, \ldots, 737.5)$

$x_2^{(1)} = (4, 7, 10, \ldots, 714)$

$x_3^{(1)} = (4, 7, 10, \ldots, 696)$

$x_4^{(1)} = (4, 7, 10, \ldots, 713)$

$x_5^{(1)} = (4, 7, 11, \ldots, 689)$

$x_6^{(1)} = (4, 7, 10, \ldots, 684)$

$x_7^{(1)} = (4, 7, 10, \ldots, 677)$

$x_8^{(1)} = (4, 7, 11, \ldots, 712)$

$x_9^{(1)} = (4, 7, 11, \ldots, 682)$

(3) Integrating AGO sequence with other sequences and solve GM (1, N) matrix as Eq. (3)-(5).

$$\begin{bmatrix} 3 \\ 5 \\ \vdots \\ 3 \end{bmatrix} = \begin{bmatrix} -5.5 & 7... & 7 \\ -9.5 & 10... & 11 \\ & & \vdots \\ -737.5 & 714... & 682 \end{bmatrix} \begin{bmatrix} a \\ b_2 \\ \vdots \\ b_9 \end{bmatrix}$$

Consequently, the outcome values of b_N are $b_2 = 0.4975$, $b_3 = 0.2225$, $b_4 = 0.0409$, $b_5 = 0.3843$, $b_6 = 0.0603$, $b_7 = 0.2219$, $b_8 = 0.1654$, $b_9 = 0.1363$ and their rankings are graded and shown as Table 1. The verification of the result by toolbox developed by Wen et al. (2005) and Wen (2016) is presented in Figure 1.

Table 1　Ranking of factors by GM (1, N)

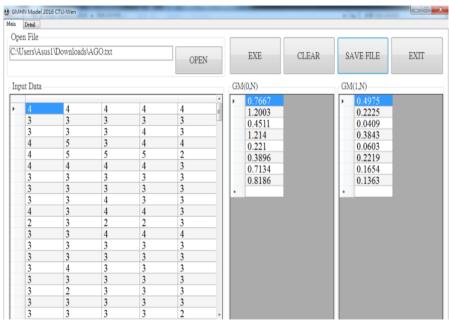| Factors	Weighting	Ranking
trust of goods quality	0.4975	1
trust of service quality	0.2225	3
trust of information	0.0409	8
trust of prestige	0.3843	2
trust of payment system	0.0603	7
trust of privacy protection	0.2219	4
trust of security system	0.1654	5
trust of transaction system	0.1363	6

Figure 1　The Verification of the Result by Toolbox

5. Conclusion

As the results of GM (1, N) analysis suggested, trust of goods quality, trust of online prestige, and trust of service quality rank as the first to third most significant factors in terms of their highly-flavored weighting towards online shopping intention while trust of security system, trust of transaction system, trust of payment system and trust of information as fifth to eighth place. It is obvious that factors of consumer confidence except information receive more attention than transaction security except privacy protection when shop online. That means consumers would be deeply concerned more about the quality of online commodities than physical shopping because they can't feel and touch the goods they want to buy. As for the second and third concerns, consumers can only rely on the historical prestige and perceived service quality of the online shops or platforms under the condition of without knowing the actual status of the desired online shopping goods. On the contrary, no matter how many efforts have been made by online sellers to improve security system, transact system, payment system and the information, consumers' trust on these function still have less influence on consumers' purchase intention, especially for information accuracy. This implies that consumers might suspect online sellers of glorifying product or service information so that they would rather trust their impression and previous experiences of the shopping website to decide to purchase on this website or not. Hence, it is suggested that online shopping vendors should try their best to upgrade product/service quality to preserve reputation rather than focus on the promotion of information to increase customers' confidence.

Acknowledgements

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