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# Risk and opportunity for online purchase intention – A moderated mediation model investigation

Shu-Hsien Liao [a,*,1], Da-Chian Hu [b], Yu-Chun Chung [c], An-Pu Huang [a]

[a] Department of Management Sciences, Tamkang University, No. 151, Yingjuan Rd., Danshuei Dist, New Taipei City, Taiwan, ROC
[b] Department of Food and Beverage Management, Jinwen University of Science and Technology, Xindian Dist., New Taipei City 23154, Taiwan, ROC
[c] Center for Sustainability Science, Academia Sinica, 128 Academia Road, Section 2, Nankang 11529, Taiwan, ROC

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ABSTRACT

What is the risk and opportunity for online purchase intention? This study focused on online purchase intention to explore the relationships on the proposed theoretical model for an electronic commerce environment in Taiwan. This study found electronic word-of-mouth plays a fully mediated role between perceived risk and online purchase intention. Online involvement plays a moderated mediating role in the proposed theoretical model. Perceived risk of online purchase intention through electronic word-of-mouth is stronger at low degrees of online involvement than at higher degrees of online involvement for Taiwan's online consumers. This study concludes online operators might consider encouraging online consumers to participate in online information with a high degree of involvement. Thus, although perceived risk is a risk for online consumers and is harmful to online purchase intention, online operators should turn risks into opportunities for electronic commerce by effectively using the power of online involvement and e-WOM.

## 1. Introduction

The Internet has become an indispensable platform for global communication and business, so for consumers, online purchasing is a viable purchase option. Internet World Stats (2018) reported Internet users exceeded 4 billion in 2017, an increase of 577% compared to the total number of Internet users in 2000. The Asian region makes up 49.2% of all Internet users. In 2017, an estimated 1.66 billion people worldwide purchased goods online; the total number of Internet users has triggered $ 230 million in Internet sales, and forecasts show it will grow to $ 448 million by 2021 (Statista, 2018), meaning online purchasing is growing not only at present, but also in the future electronic commerce global market (Zhang et al., 2019). Although the number of people purchasing online is growing, a significant proportion of Internet users still consider online purchasing a source of risk and uncertainty. For online consumers, perceived risk is considered a basic problem in the decision-making process of online purchasing. Perceived risk is defined as the degree to which people express uncertainty about services or goods (Wang and Lee, 2020). In an online purchasing environment, people expect greater risk and less trust than existing physical purchasing environments because there is huge difficulty in evaluating products due to there being no visual or tangible signs related to product quality, no face-to-face interactions with salespeople and purchases are affected by security and privacy issues (Rosillo-Díaz et al., 2019). Therefore, it is assumed people may feel a certain

* Corresponding author.
*E-mail address:* michael@mail.tku.edu.tw (S.-H. Liao).
[1] ORCID ID: 0000-0002-3667-2867.

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degree of risk when purchasing products through the Internet. For example, consumers are concerned the Internet pays little attention to security when using credit cards, mobile payments and disclosing personal information, or when purchasing products from sellers without physical inspection (Zhan and Zhou, 2018). Thus, in recent years, some research on intentions and behaviors of online purchasing has been conducted. Most research attempted to identify factors influencing online purchasing intentions and behaviors. However, a few study considers the possible risk and opportunity of online purchasing intentions for both consumers and operators in which can turn risks into opportunities by effectively using proper alternatives (Li and Fang, 2019; Zhu, 2019).

Online purchasing studies showed the factors affecting consumers' online purchase intention are multifaceted and complex (Hsiao and Chen, 2018; Zhu et al., 2019). Chang et al. (2005) summarized forty-five recent studies on online purchasing intentions, and found consumers' trust and preference for online purchasing are the most important factors affecting their online shopping intentions. Some studies pointed to a strong correlation between online purchase intentions and engaging in online purchasing behaviors (Vijayasarathy, 2004). In the past, behavioral science theories summarized intention into an attitude structure, which included one of the key elements of opinion, emotion, and willingness, and believed intention can be used to anticipate actual behavior. Based on this factor, marketers have long considered purchasing intentions anticipated purchasing behaviors (Cheung et al., 2005). The more positive experience consumers have with a particular online brand or service and product, the more likely they are to purchase and repeat purchases online. At the same time, for products with positive online reviews, online purchase intention is positively related to consumer satisfaction (Kim et al., 2009). In terms of online reviews, a kind of electronic word-of mouth, consumers' motivations for electronic word-of-mouth searches allow rapid and comprehensive understanding of external information about a product, reduce the time it takes to collect information, and reduce their risk of purchase (Goldsmith and Horowitz, 2006). Solomon (2006) figured the definition of search behavior is when consumers face online purchase decisions, they need to search for relevant information to help them make decisions, and this search process is termed online information search behavior. Since consumers can't make purchase decisions entirely based on the appearance of the product, electronic word-of-mouth searches occur.

Tan and Lee (2019) also found when consumers want to buy a product online, they usually ask consumers who have also purchased the product online as a reference for buying or not. When the purchased product is an experience product, since this type of product is less able to understand its quality before purchase or experience, consumers often ask about the purchase before buying this type of product. Experienced consumers help make purchasing decisions for others. When consumers search for word-of-mouth information online, the purpose is actually to find an experienced agent who has used the product or service, to help themselves make a purchasing decision from the buying experience of the experienced agent, and its motivation and involvement for seeking information are more positive (Chang et al., 2019). In terms of involvement, the involvement of the purchase decision refers to the degree to which consumers believe the purchase decision is relevant to them. The involvement of purchase decision-making has a great relationship with contextual involvement and product involvement, meaning product factors and contextual factors will influence consumers' purchasing decisions (Ramadan et al., 2019). The degree of online involvement affects online purchasing intention and behavior. Online involvement occurs when a product category is associated with the value system or self-concept that someone deeply believes (Broeck et al., 2018). When consumers realize a product is highly relevant to themselves, they will be in a high-involvement state, and a high-involvement state will drive consumers to actively search for product-related online information, and seriously consider and compare the differences between brands, products and prices to make the most suitable decision (Ballon et al., 2018). However, low-involvement leads to passivity in the search for online information, and the use of peripheral paths to process information, such as being susceptible to the influence of the advertisement and changing their purchase intentions and attitudes (Nadia et al., 2019).

Accordingly, what is the risk and opportunity for online purchase intention? This study focused on online purchase intention to explore the cause-and-effect relationships on the proposed theoretical model. This study used perceived risk as an independent variable; online purchase intention as a dependent variable; electronic word-of-mouth as a mediation variable; and online involvement as moderated mediation variables for investigating consumers' online purchase intentions in terms of seeking cause-and-effect relationships for exploring risk and opportunity of online purchase intention from the perspectives of online consumers and operators. In addition, the moderated mediating role of online involvement is examined in the proposed theoretical model for an electronic commerce environment in Taiwan. Proposed theoretical model and hypotheses are investigated and research findings are illustrated as managerial implications. Finally, a conclusion section is given to present the research results and possible future studies.

## 2. Theoretical background and hypotheses development

### *2.1. Perceived risk and online purchase intention*

Perceived risk was first proposed by Bauer (1960). He believed there will always be unpleasant consequences of consumer purchases. Therefore, consumer behavior can be regarded as a risk burden, which may result in unforeseen negative consequences. Cox (1967) added consumer goals in his research and further developed the concept of perceived risk, pointing out consumers will act according to the purchase target. If they realize their purchase target has the possibility of being impossible to complete, perceived risk is then produced. In some cases, consumers may not have a clear purchase target and may not be aware of the existence of risk, but their behavior may still be potentially affected by perceived risk (Dowling and Richard, 1994; Sweeney et al., 1999). In regard to online purchasing, Forsythe and Shi (2003) defined perceived risk as the expected loss of a consumer's subjective experience in a particular online purchasing. Chiu et al. (2012) found consumers' online shopping experience will positively affect the perception quality of online users and effectively reduce consumer perceived risks. Kamalul Ariffin et al. (2018) pointed out consumers with lower perceived risk toward online purchasing platforms have higher purchase intention. In addition, Rosillo-Díaz et al. (2019) research results also suggested in the context of online purchasing, consumer perceived risk has a negative and significant effect on online purchase

intention. Zhang and Yang (2019) proposed perceived risk is consumers making subjective judgments about the possibility of threats or negative events generated by the Internet. The above research shows perceived risk has a negative impact on online purchase intention, thus hypothesis H1 is proposed as follows:

***H1:*** *There is a positive relationship between perceived risk and online purchase intention.*

### 2.2. Perceived risk and electronic word-of-mouth

Hennig et al. (2004) contended customers actively share their experiences, opinions, and related knowledge on specific topics for non-commercial purposes in electronic communication media such as message boards or chat rooms on websites. The product information and topic discussions provided by other consumers, as well as the spread of emotional cognition caused by the interaction with the enterprise, is the so-called electronic word-of-mouth. On the other hand, Gelb and Sundaram (2002) termed this online word-of-mouth or network word-of-mouth. Siqueira et al. (2010) believed when consumers have a certain degree of involvement and professionalism, when faced with e-WOM, they will judge its authenticity based on their own knowledge. In addition, when they agreed with the content of the message, they more easily and rapidly accept this online information. San-Martín et al. (2020) found the quality of electronic word-of-mouth has a significant positive impact on consumer brand trust. However, the higher the consumer brand trust, the higher the intention to purchase online. In addition, the quality of e-WOM and brand trust will be affected and consumer perceived risks have a negative impact (Hua et al., 2017). Lim (2015) contended consumers may have unpredictable consumption results and worry about leakage of personal privacy and personal information security during the purchasing process, creating perceived risks and low intention to purchase products or services through online platforms. This study used e-WOM as a moderating variable to explore the degree of consumers' perceived risk to online purchasing services. It was found e-WOM and perceived risk had a positive and significant relationship. Chatterjee (2001) pointed out consumers' information acceptance of e-WOM determines the power of e-WOM. The stronger the consumer's feeling and confidence level before receiving electronic word-of-mouth information, the stronger the degree of perceived risk, which will dominate the interpretation and use of electronic word-of-mouth information by consumers. Therefore, the more consumers can accept the information transmitted by e-WOM, the deeper the impact (Hussain et al., 2017). The above research shows perceived risk has a certain degree of impact on consumers' e-WOM, thus hypothesis H2 is proposed as follows:

***H2:*** *There is a positive relationship between perceived risk and electronic word-of-mouth.*

### 2.3. Electronic word-of-mouth and online purchase intention

Internet information source has a certain impact on online purchase intention. Consumers build a psychological model of perceived value, incorporating consumers' perceived profit, perceived value, and product price into a model in terms of generating a purchase intention as well as making a decision on final purchasing behavior (Ashton et al., 2010). On the other hand, if the pursuit of maximizing perceived value is the principle of positive decision making, then the pursuit of minimizing perceived risk is a principle of reverse decision making of a purchase intention (Agag and El-Masry, 2017). Ketelaar et al. (2015) pointed out higher electronic word-of-mouth quality is more likely to attract consumer interest and is more persuasive than lower electronic word-of-mouth quality. Electronic word-of-mouth with higher word-of-mouth quality is more persuasive to consumers and easier to influence their purchase intentions. In other words, compared with low electronic word-of-mouth quality, high-quality electronic word-of-mouth information is more likely to arouse consumer interest and increase their online purchase intention (Erkan and Evans, 2018). Roy et al. (2019) found positive e-WOM can build a good image for the enterprise, reduce the expenditure of advertising marketing, and then increase the profit of the enterprise. When consumers query e-WOM information through the Internet, the positive or negative messages they receive may directly or indirectly affect their online purchase intentions. The above research shows electronic word-of-mouth has a positive impact on online purchase intention, thus hypothesis H3 is proposed as follows:

***H3:*** *There is a positive relationship between electronic word-of-mouth and online purchase intention.*

### 2.4. Perceived risk, electronic word-of-mouth and online purchase intention

Sun (2014) noted as the internet matured with the vigorous development of e-commerce, most consumers gradually enjoyed more and more conveniences. As long as they have handheld digital wireless devices, they can connect to e-commerce purchasing anytime, anywhere. His empirical tests showed in the context of online auctions, perceived risk negatively impacts trust, seller factors and situational characteristics, and electronic word-of-mouth positively impacts online purchase intention. On the other hand, the factors affecting e-WOM are extremely complex, and can be explored from the communication process, that is, the message itself, the source of the message, and the receiver of the message (Tan and Lee, 2019). San-Martín et al. (2020) examined the influence of economic, social, physical, and technological attributes associated with tourism in the role played by personal characteristics such as anxiety, perceived risk and experience for booking trips online in terms of online purchase intention and electronic word-of-mouth (e-WOM). The results revealed the values attributed to tourism anxiety, risk, and experience positively affected online purchase intention and e-WOM. Ventre and Kolbe (2020) used perceived usefulness, e-WOM, trust, and perceived risk to influence online purchase intention to examine the correlation between variables and found perceived usefulness and e-WOM significantly impact online purchase intention. The above research shows e-WOM might have an effect between perceived risk and online purchase intention, thus hypothesis H4 is proposed as follows:

***H4:*** *Electronic word-of-mouth has a mediating effect between perceived risk and online purchase intention.*

### 2.5. Moderated mediating role of online involvement on perceived risk, electronic word-of-mouth and online purchase intention

Peng et al. (2019) found most consumers extensively collect information and seek out the opinions of friends and family before purchasing online. They also found perceived value is positively related to purchase intention, whereas time pressure negatively moderates the effect of emotional/social value on purchase intention. Chu and Chen (2019) pointed out when online consumers are faced with the need to buy products with high perceived risk, they are more active in collecting information and are more receptive to the opinions of others than those with highly tangible products. On the other hand, consumers will differ in perceived risk degrees, and their involvement and behavior for collecting online information will also vary (Zhang and Yang, 2019). The degree of online involvement is due to the personal interpretation of, and preference of consumers in relation to, the source of Internet information. In addition, the degree of online involvement depends on the individual decision-making model of the consumer. The level of personal online involvement of consumers will also affect the degree of satisfaction or intention to purchase online (Bonn et al., 2016). Therefore, we can deduce as consumers' perceived risk varies their degree of involvement in the Internet, their degree of concern for the quality of electronic word-of-mouth also differs. When perceived risk is low, because consumers can make purchase decisions more easily, their attention to electronic word-of-mouth is also relatively low. On the contrary, when the degree of perceived risk is high, to reduce the purchase risk of consumers, the degree of online involvement will also increase with the increased uncertainty, and more attention will be paid to online word of mouth. Therefore, this study argues electronic word-of-mouth has different considerations under certain degrees of perceived risk with different degrees of online involvement and then influences purchase intention. Based on the above literature, this study proposes perceived risk of online purchase intention through electronic word-of-mouth is stronger at low degrees of online involvement than at higher degrees of online involvement, thus hypothesis H5 is proposed as follows:

***H5:*** *The indirect effect of perceived risk on online purchase intention through electronic word-of-mouth is stronger at low degrees of online involvement than at high degrees of online involvement.*

## 3. Research method

### 3.1. Theoretical model

In this study, Taiwan's online consumers are taken as the research subject to investigate the relationships among the variables, including PR, e-WOM, OPI and OI and then examine whether there is any mediating effect while taking e-WOM mediating variables and in addition to investigate the moderated mediating role of online involvement. According to the proposed hypotheses, this study presents the theoretical model in Fig. 1.

### 3.2. Subjects and data collection procedure

The data collection procedure of this study was distributed using online questionnaires, and the questionnaires were surveyed via social platforms (Facebook, Instagram, Dcard, PTT). After completing the online questionnaire, the IP address and response time of the respondent was automatically recorded. When a duplicate IP and short time were encountered, the data were deleted to avoid duplicate responses and untrue information to ensure the accuracy and completeness of the questionnaire responses. A total of 509 online questionnaires were collected during the survey period. The questionnaire results could not be submitted without complete answers. Therefore, all of the online questionnaires received were completed. The number of questionnaires distributed online was 609, of which 508 were valid, with the effective rate being 83.41%.

### 3.3. Measures and common method variance (CMV)

In terms of perceived risk, this study modified Bauer (1960), Dowling and Richard (1994), Sweeney et al. (1999) measurement according to the characteristics of online shopping. Perceived risk is defined as when online shopping consumers are performing their

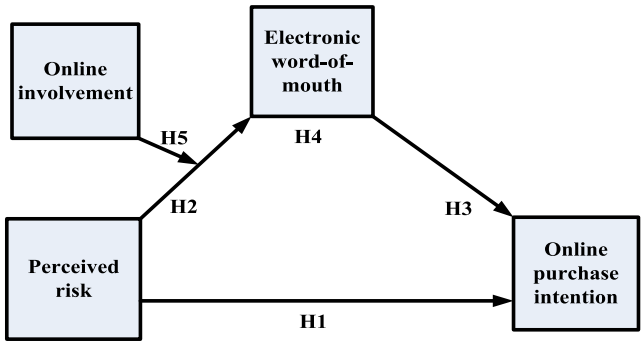


**Fig. 1.** Theoretical model.

online shopping, whether their products, services, personal data confidentiality, finance, shipping, and system quality performance are as expected. It is divided into two measurement factors of cognitive risk and functional risk for subsequent research and discussion, and the design questionnaire is modified in a way suitable for online shopping consumers. In terms of online trust, the operational definition of electronic word-of-mouth in this research is based on the views of Chung and Darke (2006) and Okazaki et al. (2008). Electronic word-of-mouth is defined as the online purchasing consumer receiving information about products or services. When it comes to electronic word-of-mouth information about related information, electronic word-of-mouth is considered to have considerable influence, and its influence comes from the interaction between individuals or relationships. In terms of online involvement, this study is based on the scale of involvement developed by Ramadan et al. (2019). There is a close relationship between the degree of involvement and the behavior of customers and consumers. Consumer purchasing behavior may be affected by the degree of involvement. If customers or consumers are based on what they think meets their needs, values, or interests, they will be willing to spend more time to understand and participate frequently, and the higher the degree of involvement, the more likely it is to trigger their psychological commitment. The degree of online involvement in this study focuses on emphasizing the nature of involvement, and divides it into two measurement factors: situational involvement and response involvement. In terms of online purchase intention, this study mainly refers to Zeithaml (1988), defining it as the degree to which online shopping consumers understand the service when shopping online. Good cognition or perception of risk will further affect its ideas of possible purchase, desire to buy, and consider buying, and will divide the purchase intention into three factors of quality, price, and image.

The term common method variance (CMV) refers to a certain amount of variances in measurement that can be attributed to the method used. The results of a psychometric test can be divided into two parts: random error variance and systematic variance, the latter being composed of trait variance and method variance. Trait variance is a measurement to reflect the variance of measured construct, and so with greater trait variance there is higher validity of the measured construct. Random error variance and method variance are both measurement errors, whereas method variance is systematic error as well as trait variance (Wall, 2014). To prevent these measurement errors from occurring in our research, this study thus takes some precautions in the design and delivery of questionnaire as follows:

(1) Hidden information of respondent:

To prevent respondent's carelessness or personal biases towards answering the questionnaire, this study adopts an anonymous survey method.

(2) Randomized items:

This study broke up all the items within perceived risk, e-WOM and online purchase intention and re-arranged them randomly.

(3) False question:

To test the validity of this questionnaire, a false question was put in the construct of online purchase intention.

(4) Reverse question:

To prevent respondent's carelessness in answering the questionnaire, this study uses some reverse questions to confirm the respondent is concentrating.

(5) Wording:

To prevent respondents from misunderstanding terms that hinder answering the questionnaire, the wording of each item was modified for the sake of simplicity and readability as much as possible by consultation with academics and online operator practitioners.

## 4. Results

### *4.1. Estimation method*

A maximum likelihood (ML) method was used in this study as an estimation of the model, and the distribution of variables greatly affects the ML of structural equation modeling (SEM). On the one hand, if the absolute value of the coefficient of skewness is greater than 3, the variable would be considered to have extreme skewness. On the other hand, if the absolute value of the coefficient of kurtosis is greater than 10, this is abnormal; and if the absolute value of coefficient of kurtosis is greater than 20, then the variable would be considered to have extreme kurtosis (Kline, 1998). Since the skewness and kurtosis of each variable ranges from −1.23 to −0.31 and from 0.48 to 2.90, respectively, we can conclude all these observed variables have multivariate normality.

### 4.2. Measurement model

**Confirmatory factor analysis (CFA).** The confirmatory factor analysis (CFA) primarily explores the fit between a variable's factor and its measurement item in this questionnaire. The initial model for this study was modified because of incomplete model fit by considering the modification indices (MI). In addition, the theoretical background of MI was based on a calculation from the residual and the standardized residual analysis of the structural equation modeling is similar to that of other statistical techniques. When the coefficient of the standardized residual (SR) is larger than +3, it indicates the estimated variance or covariance is not enough; and when the value of SR is smaller than −3, it indicates the estimated variance or covariance has over-emphasized the covariance of these two observed variables (Chiou, 2003). Further, a lower value of item standard estimate indicates a lower explanation of variables. Table 1

The initial model for this study was modified because the model indices did not fit well. The revised standards were mainly evaluated based on standard parameter estimates. The electronic word-of-mouth variable had three deleted items, the online involvement variable had no deleted item, the perceived risk variable had two deleted items and the online purchase intention variable had one deleted item. The final model of the revised indicators is summarized in Table 2. Table 2 shows the test of goodness-of-fit for the CFA model as follows: GFI (0.95), CFI (0.99), NNFI (0.98), SRMR (0.04), RMSEA (0.053), chi-square (294.31), df (109), $\chi 2/df$ (2.7). All indices matched the benchmarks and the model fit is good (Effelsberg et al., 2014).

**Reliability.** An alpha coefficient represented by Cronbach (1951) was calculated to explore the internal consistency and stability of the measures used. According to Nunnally (1978), a Cronbach's α value greater than 0.7 indicates high reliability, a value between 0.7 and 0.35 means acceptable reliability, and a value smaller than 0.35 indicates low reliability that should be rejected. This study adopts SPSS 12.0 to measure the reliability of the formal questionnaire. Each Cronbach's α value of variables is greater than 0.7 (i.e., high reliability). Therefore, the reliability of the questionnaire in this study is quite acceptable (see Table 3).

Many studies also use construct reliability (CR) to test their research reliability. Construct reliability is mainly used to balance latent construct indicators. If the construction reliability is greater than 0.6, it means the individual indicators are consistent and there are standards for achieving reliability. The formula for calculating construct reliability is:

$$CR = \left[ \frac{(\sum \lambda)^2}{(\sum \lambda)^2 + \sum(\theta)} \right]$$

Following calculation, the construction reliability of this study is shown in Table 3. The CR values of all facets are greater than 0.6, indicating the intrinsic quality of this study is good.

**Convergent validity**. The analytical results of convergent validity in this study indicate the t-values of all the measurement items from each dimension of variables are from 9.56 to 23.04 (Fornell and Larcker, 1981). As shown in Table 4, the *t* value of each variable is greater than 1.96, indicating the convergence validity of the items under each variable is good.

**Discriminant validity.** This study tested discriminant validity on the method by Anderson and Gerbing (1988). If the chi-square ($\chi 2$) value of the difference between the restricted model and the non-restricted model is greater than 3.84, then the discriminant validity of these two dimensions is good. Since all $\Delta\chi 2$ values are greater than 3.84, the discriminant validity of this study is good (Table 5).

**Common method variance testing.** As for the examination of common method variance, currently the most frequently used method to deal with the problem of CMV is Harman's one-factor test, which is used to analyze all items of various variables. This study adopts this method to test the severity of CMV. While using Harman's one-factor test, we assumed if a single factor extracted after the factor analysis or the main variation is more than 50% while a comprehensive factor is used to explain independent variables and dependent variables, then a serious problem with CMV is present (Mattila and Enz, 2002). According to the test results of the present study, a total of four factors were extracted. Among them, the variance explained by the first factor is 36.60%, which is <50%, indicating the present study does not have a serious problem of common method variance.

### 4.3. Correlation analysis

Using the structural equation model (SEM), correlation analysis is mainly calculated by the linear substitution method based on the value of the linear correlation between variables. Therefore, this study first uses Pearson correlation analysis to examine the correlation between the variables in this study. The correlation coefficient is shown in Table 6.

Since correlation analysis can only show a strong correlation between the facets of various variables, it can only provide a test for studying the relationship between the facets. However, more rigorous and reliable research and development requires further

**Table 1**
The mean, standard deviation, skewness and kurtosis of research variables.

| Variable relationship | Variable name | Mean | Standard deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|
| Independent variable | Perceived risk | 4.03 | 0.66 | −1.05 | 2.90 |
| Dependent variable | Online purchase intention | 3.75 | 0.84 | -0.70 | 0.93 |
| Mediation variable | Electronic word-of-mouth | 3.91 | 0.82 | −1.23 | 2.47 |
| Moderated mediation variable | Online involvement | 3.64 | 0.69 | -0.66 | 1.36 |

**Table 2**
Test of goodness-of-fit for the CFA model.

| Indices | Goodness-of-fit interval | Initial model | Final model (delete 7 items) |
|---|---|---|---|
| GFI | >0.9 | 0.89 | 0.95 |
| CFI | >0.95 | 0.97 | 0.99 |
| NNFI | >0.95 | 0.97 | 0.98 |
| SRMR | <0.05 | 0.048 | 0.04 |
| RMSEA | <0.08 | 0.069 | 0.053 |
| chi-square | | 939.88 | 294.31 |
| df | | 242 | 109 |
| $\chi^2$/df | < 0.3 | 3.88 | 2.7 |

**Table 3**
Reliability.

| Variable type | Variable | Items | Item No. | Cronbach's $\alpha$ | CR |
|---|---|---|---|---|---|
| Independent variable | Perceived risk | 11,13,14,15 | 4 | 0.833 | 0.845 |
| Dependent variable | Online purchase intention | 17,18,19 | 3 | 0.918 | 0.924 |
| Mediator | e-WOM | 1,2,3 | 3 | 0.922 | 0.925 |
| Moderated mediator | Online involvement | 7,8,9,10 | 4 | 0.716 | 0.701 |

**Table 4**
Convergent validity.

| Variable type | Variable | Item | Standardized coefficients | Standard error | *t* value |
|---|---|---|---|---|---|
| Independent variable | Perceived risk | EOPR1 | 0.58 | 0.04 | 14.77 |
| | | EOPR2 | 0.84 | 0.03 | 24.04 |
| | | EOPR3 | 0.82 | 0.03 | 23.21 |
| | | EOPR4 | 0.78 | 0.03 | 21.69 |
| Dependent variable | Online purchase intention | OP11 | 0.93 | 0.03 | 29.64 |
| | | OP12 | 0.80 | 0.03 | 23.60 |
| | | OP13 | 0.95 | 0.03 | 30.94 |
| Mediator | e-WOM | eWOM1 | 0.92 | 0.03 | 29.00 |
| | | eWOM2 | 0.90 | 0.03 | 27.99 |
| | | eWOM3 | 0.87 | 0.03 | 26.35 |
| Moderated mediator | Online involvement | OI11 | 0.47 | 0.04 | 11.03 |
| | | OI12 | 0.82 | 0.03 | 21.54 |
| | | OI13 | 0.62 | 0.04 | 15.32 |
| | | OI14 | 0.50 | 0.04 | 12.03 |

**Table 5**
Discriminant validity.

| Variable | Model | **$\chi$2** | **df** | **$\Delta\chi$2** |
|---|---|---|---|---|
| | Non-restricted model | 294.31 | 109 | – |
| Perceived risk | Perceived risk – e-WOM | 1378.56 | 110 | 1084.25 |
| | Perceived risk – Online involvement | 633.41 | 110 | 339.1 |
| | Perceived risk –Online purchase intention | 1484.17 | 110 | 1189.86 |
| e-WOM | e-WOM –Online involvement | 473.77 | 110 | 179.46 |
| | e-WOM –Online purchase intention | 1312.04 | 110 | 1017.73 |
| Online involvement | Online involvement–Online purchase intention | 643.6 | 110 | 349.29 |
| Online purchase intention | Online purchase intention– e-WOM | 447.85 | 110 | 153.54 |

Note 1: $\Delta\chi2$ = Restricted model$\chi2$—Non-restricted model $\chi2$.
Note 2: $\Delta\chi2 > 3.84$ is significant.

**Table 6**
Correlation analysis.

| Variable | e-WOM | Online involvement | Perceived risk | Online purchase intention |
|---|---|---|---|---|
| e-WOM | 1.0 | | | |
| Online involvement | 0.543** | 1.0 | | |
| Perceived risk | 0.326** | 0.354** | 1.0 | |
| Online purchase intention | 0.542** | 0.365** | 0.175** | 1.0 |

** At a significance level of 0.01 (two-tailed), the correlation is significant.

verification of the relationships between the direct effects, indirect effects, and mediating effects of the facets. Therefore, the relevant verification procedures will depend on the structural equation model.

### 4.4. Theoretical model

The fitness indexes for GFI, CFI, NNFI, SRMR, and RMSEA of the final theoretical model of this study are 0.95, 0.98, 0.97, 0.13, 0.068, the norm chi-square is 226.54, and the chi-square degree of freedom is 3.78, indicating the research model reaches acceptable fitness. In the relationship between perceived risk and e-WOM, the t-values reached significant levels, and their parameter estimates were 0.36. However, the relationship between internet perceived risk and online purchase intention did not reach a significant level, its parameter estimate is 0.02, so the mediating effect of e-WOM in this study is a full mediation. The path coefficients of each variable in this study are shown in Fig. 2.

### 4.5. Hypotheses testing

We used maximum likelihood estimation to estimate the theoretical model of γ and β, and to test whether the hypotheses were significantly supported. According to LISREL 11.0, the total and indirect effects are shown in Table 7. The sample size should be between 100 and 150 when using the maximum likelihood estimation method to estimate a structural model (Ding et al., 1995). The sample size in this study was 508, meeting the sample-size requirements. The test results are shown in Table 7. The research results from the structural model are as follows:

(1) The relationships between perceived risk and online purchase intention:

Table 6 shows the *t* value of the relationship between perceived risk and online purchase intention is<0.48 ($\gamma 21 = -0.02$, p greater than 0.05), indicating there is no significant impact between perceived risk and online purchase intention. This study thus assumes H1 is not supported.

(2) The relationships between perceived risk and electronic word-of-mouth:

Table 6 shows the *t* value of the relationship between perceived risk and electronic word-of-mouth reaches a significant level of 8.35 ($\gamma 11 = 0.36$, $p < 0.001$), indicating perceived risk and electronic word-of-mouth has a significant impact, so this study assumes H2 is supported.

(3) The relationships between electronic word-of-mouth and online purchase intention:

Table 6 shows the relationship between electronic word-of-mouth and online purchase intention has a significant *t* value of 9.44 ($\beta 21 = 0.60$, $p < 0.001$), indicating there is a significant impact between electronic word-of-mouth and online purchase intention, so this study assumes H3 is supported.

(4) The relationships between perceived risk, electronic word-of-mouth and online purchase intention

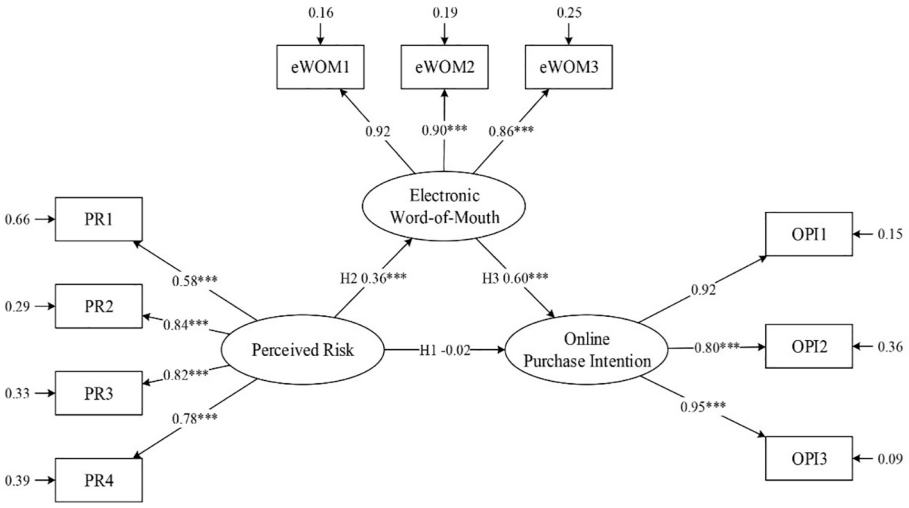


**Fig. 2.** Path analysis diagram.

**Table 7**
Path analysis.

| Hypothesis | Path | Hypothetical relationship | Normalized indicators estimates | *t* value | Results |
|---|---|---|---|---|---|
| H1 | Perceived risk → Online purchase intention | Positive | −0.02 | 0.48* | Not support |
| H2 | Perceived risk → e-WOM | Positive | 0.37 | 8.35*** | Support |
| H3 | e-WOM → Online purchase intention | Positive | 0.31 | 9.44*** | Support |

*Notes:*|*t*|≧1.96, Significance level > 0.05 note *
|*t*|≧2.58, Significance level > 0.01 note **
|*t*|≧3.29, Significance level > 0.001 note***

In this study, a Sobel test was used to detect whether the mediation effect was significant. In Table 7, it can be found the relationship between perceived risk and online purchase intention is a z-value of 0.48 ($p > 0.05$), which did not reach a significant level, and the indirect effect of electronic word-of-mouth on perceived risk and online purchase intention is 0.11, the z value is 6.89 ($p < 0.001$), which is a significant level. Therefore, electronic word-of-mouth has a full mediation effect on the impact between perceived risk and on online purchase intention, so this study assumes H4 is supported.

In addition, in terms of the moderated mediation test, we test whether the degree of online involvement (moderating variable) will impact the mediating effect of electronic word-of-mouth (mediating variable) on perceived risk and online purchase intention (Table 8). This study uses PROCESS 3.0 to verify the moderated mediating effect (Hayes, 2013). The parameter settings are X: Internet perceived risk; Y: Internet purchase intention; M: electronic word-of-mouth; W: Internet involvement.

Hayes (2013) further tested whether there is a conditional indirect effect, that is, it will vary depending on the level of the moderator variable (such as the average plus 1 standard deviation, and the average minus 1 standard deviation). The results are shown in Table 7. As shown in Table 9, when the degree of online involvement is high, electronic word-of-mouth has a mediating effect and the indirect effect is 0.0192, ($p < 0.01$). However; when the degree of online involvement is low, electronic word-of-mouth has a mediating effect and the indirect effect is 0.1318, ($p < 0.01$).

Further comparing the indirect effects, the difference between a high degree of online involvement and a low degree of online involvement also reached a significant level (Index = −0.0901, [−0.1306, −0.0495]) (Fig. 3 and Table 10), indicating the degree of online involvement weakens the indirect effects of electronic word-of-mouth between perceived risks and online purchase intention. When the degree of online involvement is high, the indirect effect of electronic word-of-mouth on the perceived risk of the online purchase intention is weak; on the contrary, when the degree of online involvement is low, the indirect effect between the electronic word-of-mouth and online purchase intentions is strong. Thus, H5 is supported.

## 5. Implications

### 5.1. Theoretical implications

In terms of perceived risk, studies revealed consumers have a certain degree of perceived risk and negative image of the online commerce environment (Ariffin et al., 2018). To avoid risks, consumers tend to be fairly thoughtful decision makers in online purchasing. Research has shown consumers perceive risks associated with purchasing online and as a result online purchasing has not yet reached the numbers that were projected. For e-commerce to live up to its full potential, online operators should gain an understanding of which perceived risks online purchasing consumers are most concerned with. It is already known perceived risk influences a consumer's decision-making (Cozzarin and Dimitrov, 2016). It has been suggested consumers use online involvement as a means of verifying the decision process in terms of dealing with perceived risk and trust expectation (Hong, 2015). This study found there is a negative relationship between perceived risk and online purchase intention. This result not only supports the figure evidence of a high perceived risk and low trust electronic commerce environment in Taiwan, but also indicates Taiwan online operators have more work to do in terms of earning trust and loyalty from consumers.

On the other hand, this study found a positive relationship between perceived risk and electronic word-of-mouth; and a positive relationship between electronic word-of-mouth and online purchase intention. For online operators, the good news is online consumers who are concerned with perceived risks may not completely reject the intention of online purchasing because of the effect of e-WOM. This study showed e-WOM plays an active role in fully mediating perceived risk and online purchase intention. This finding is consistent with Hussain et al. (2018) consumers' online information adoption behavior. In addition, this finding also suggests e-WOM offers possible cognitive paths to help online operators reduce consumers' perceived risk and then arrive at a high purchase intention.

Word-of-mouth is divided into positive and negative information delivery (Singh, 1990). Negative word-of-mouth information is actually a kind of complaining behavior characterized by consumers giving details about unsatisfactory products or service quality. Positive word-of-mouth information can not only reduce the company's advertising costs, but also increase its revenue and sales

**Table 8**
Path analysis of mediator.

| Hypothesis | Path | Indirect effect | z value | Result |
|---|---|---|---|---|
| H4 | Perceived risk → e-WOM → Online purchase intention | 0.11 | 6.89 | Support |

**Table 9**
The high and low degrees of moderating effect on electronic word-of-mouth.

| Moderating effect on high and low degrees | Indirect effect | SE | 95% CI | |
|---|---|---|---|---|
| Degree of online involvement is low | 0.1318 | 0.0313 | 0.0698 | 0.1944 |
| Online involvement | 0.0642 | 0.0273 | 0.0084 | 0.1167 |
| Degree of online involvement is high | 0.0192 | 0.0292 | −0.0409 | 0.0744 |

*Note:* Since all variables have been standardized before analysis, the mean can be turned to a 0 value. Therefore, the estimation of the simple effect of the degree of online involvement is to set the value with a high degree of online involvement to +1 (mean plus 1 standard deviation). To estimate the simple effect of low online involvement, set the value of low online involvement to +1 (mean minus 1 standard deviation). Deviations are fixed under a 95% confidence interval. The first value is expressed as a lower limit, and the second value is expressed as an upper limit.

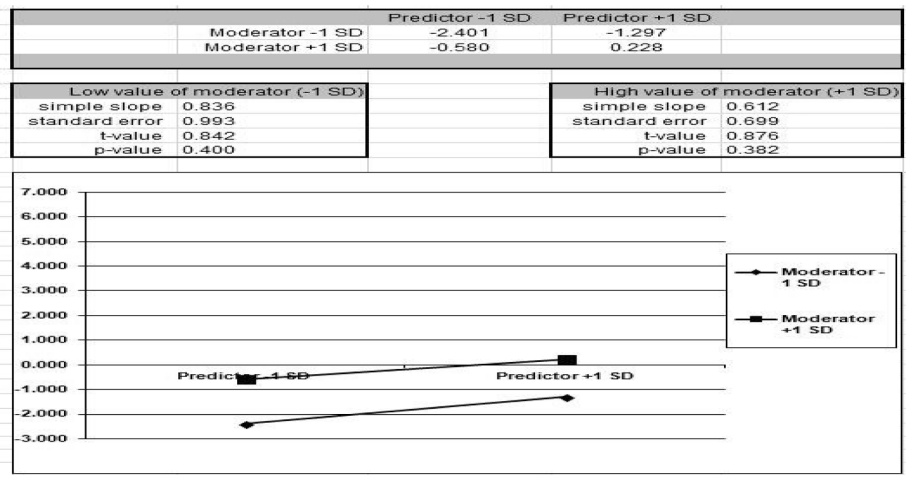


**Fig. 3.** The moderated effect of the online involvement on the relationship between perceived risk and electronic word-of-mouth.

**Table 10**
The index of moderated mediation online involvement.

| | Index | SE | 95% CI | |
|---|---|---|---|---|
| Online involvement | −0.0901 | 0.0207 | −0.1306 | −0.0495 |

volume; while negative word-of-mouth information can damage the image of the company and cause inestimable losses. Studies have also found online consumers usually give more weight to negative e-WOM than positive e-WOM (Verkijika and De Wet, 2019). Siqueira et al. (2019) also pointed out 54% of online consumers who have received positive word-of-mouth messages are willing to buy new products, but only 18% of consumers who have received negative word-of-mouth information intend to purchase. Compared with positive electronic word-of-mouth information, consumers will rely more on negative information, because when a consumer is exposed to negative information, he/she is likely to have doubts and uncertainties about the online product or service, and this then affect his or her online purchase intention (Yusuf et al., 2018). In addition, this study first found that when the degree of online involvement is high, the indirect effect of electronic word-of-mouth on the perceived risk of the online purchase intention is weak; on the contrary, when the degree of online involvement is low, the indirect effect between the electronic word-of-mouth and online purchase intentions is strong. This finding might be an originality and contribution on proposed theoretical model.

### *5.2. Practical implications*

According to the statistics of the Consumer Security Division of the Taiwan Executive Yuan, the number of online complaint cases involving consumer online transactions received by the municipalities, counties (cities) in each municipality in 2019 was 3711 (an increase of 867 cases from 2844 in 2014), of which 2698 were online disputes (an increase of 797 compared with 1901 cases in 2018), accounting for 72.7% of online transaction appeal cases. In addition, the proportion of statistics-oriented cases from sales channels, product categories, and dispute types to the annual appeal cases is as follows: Top three sales channels (trading platforms): online auction 2698 cases (72.7%), online shopping malls 650 cases (17.5%) and online shopping store 269 cases (7.3%). Top three product categories: apparel, leather goods, and footwear 800 cases (21.5%), communications and peripheral goods 349 cases (9.4%) and appliances and peripheral goods 251 cases (6.8%). Top three dispute types: defective items 1186 cases (32%), refund issues 640 cases (17.2%) and returns rejected 483 cases (13%) (Taiwan Consumer Protection Office, 2020). As mentioned in the statistics, the number

of complaints concerning online transaction disputes has continued to rise. In 2019, the number of Taiwan consumer disputes reported online accounted for 72.7% of the total number of online transaction complaints. In this regard, the electronic commerce environment in Taiwan is viewed as having high perceived risk and low trust.

On the other hand, as a first step towards obtaining positive e-WOM from online consumers, online operators must understand the risk perceptions of consumers and how consumers avoid risks in online purchasing. This can be done through consumers' online involvement in terms of recognizing a positive or negative e-WOM in addition to collecting necessary online information and making a decision when online purchasing. The degree of online involvement affects online purchasing intention/behavior. When consumers realize a product is highly relevant to themselves, they will be in a high-involvement state, and a high-involvement state will drive consumers to actively search for product-related information, and cautiously consider and compare the differences in online information to make the most suitable decision (Ballon et al., 2018). Therefore, this study inferred online involvement and e-WOM both play positive roles and effects on the relationships between perceived risk and online purchase intention.

## 6. Conclusion and future research

Several future research directions are worth pursuing. First, this study focuses on perceived risk associated with e-WOM and online purchase intention. It would be interesting to examine other types of risk and their effects on attitudes and intentions in the context of online shopping. Second, refined research designs are needed to explore the inter-correlations between knowledge, information search, and perceived risk. Findings based on the objective measures of knowledge and information search would strengthen the results reported in this research. For example, knowledge and information search online could be other measures to supplement the online involvement construct. Third, this study emphasizes psychology factors as determinants of attitudes and intentions in online purchasing issues. Future research should explore the effects of other determinants, such as trust, perceived value, experience value, satisfaction, loyalty, and re-purchase intention/behavior etc. Finally, this study found e-WOM plays a fully mediated role between perceived risk and online purchase intention. Perceived risk of online purchase intention through electronic word-of-mouth is stronger at low degrees of online involvement than at higher degrees of online involvement for Taiwan's online consumers. Online involvement plays a moderated mediating role in the proposed theoretical model. This study concludes online operators might consider encouraging online consumers to participate in online information with a high degree of involvement in terms of generating positive e-WOM to lower consumers' perceived risk and increase online purchase intention. Thus, although perceived risk is a risk for online consumers and is harmful to online purchase intention, online operators should turn risks into opportunities for electronic commerce by effectively using the power of online involvement and electronic word-of-mouth.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix:. Questionnaire

*A. Perceived risk*

EOR1: Online shopping is more risky than in-store purchases
EOR2: The products displayed on the Internet will differ from the actual products
EOR3: I worry about the incomplete services provided by online shopping
EOR4: I worry about personal data being abused or resold online

*B. Electronic word-of-mouth*

eWOM1: I will share the experience of using the product with others online
eWOM2: Online communities get product information faster
eWOM3: The high visibility of products on the Internet will affect my familiarity with the products

*C. Online purchase intention*

OPI1: I have an intention to shop online
OPI2: I would like to recommend friends and family to shop online
OPI3: I currently shop online

*D. Online trust*

OT1: If I don't refer to other consumers' online reviews before buying, I'm upset
OT2: Before online shopping, I will search the web for any disputes
OT3: For me, online shopping has more pitfalls

*E. Online involvement*

OI11: I will take the initiative to go online to ask about the product I want to buy
OI12: I will actively refer to business intelligence and product/service reports
OI13: I often discuss products/service online with friends or colleagues
OI14: Online shopping appeals to me

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