A STUDY ON THE PROMOTION EFFECTIVENESS OF RECOMMENDER SYSTEM

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DECLARATION

I hereby declare that:

(1) This Research Project is the end result of my own work and that due acknowledgement has been given in the references to all sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

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CHAPTER ONE: RESEARCH OVERVIEW

1.0 Introduction

This research aims to examine the relationship between perceived trust and promotion effectiveness of recommendation system. Specifically, this research explores the relationship between three types of trusts namely, competence trust, benevolence trust and integrity trust and perceived Recommendation Agent (RA) trust. This chapter provides an overall picture of this research. Henceforth, this chapter contains research background, problem statement, research objective, research questions, hypotheses of study and significance of study.

1.1 Research Background

In these years, the internet has become indispensable and gaining a foothold in the adoption of e-commerce. In Taiwan, more than 85% of people had Internet access and the potential market size of e-commerce already reached US$ 42.69 billion in 2017 with 20% growth rate in nearly 5 years (Chen & Lan, 2018). Along with the sharp increased volume of online information, customers are not only have growing difficulty to identify every information available on the website, but also lead to a situation called "information explosion''. Information explosion occurs when the overloading of information causes the hardship to deal with online data. Hence, there are more platforms emerged and started to launch certain systems such as search engine, interactive decision system, personalization and recommendation system in their websites to manage and to help customer to filter substantial information.

Broadly speaking, recommendation system is a type of web-based tool that tailored the decision suggestion for customers by analysing their individual preferences (Li & Karahanna, 2015). The main objective of recommendation system is to enhance overall ease of use of website and improve users' motivation for their final decision (Komiak & Benbasat, 2006; Li & Karahanna, 2015). Currently, lots of popular websites such as Netflix,

Amazon, Taobao and Shopee already adopted this system. Take Netflix for example, Netflix designed the algorithm and analysed user profile such as watching record, watching time, video's categories or the data from those customers who have similar taste to offer the recommendations that might meet customer preference (Gomez-Uribe & Hunt, 2016). Besides, the world largest online retailer, i.e., Amazon, also collected users' data through artificial intelligence and adopted collaborative recommendation system to provide suggestions in the light of matching use to similar customer. Furthermore, Nguyen et al. (2019) also pointed out that 35% of Amazon revenue came from its recommendation agent and there is a 29% of sales increase since it adopted recommendation system.

Despite the product recommendation is provided, the final decision is still depending on the RA's promotion effectiveness. In other words, if the promotion effectiveness of RA is not good enough, customers would not take up the suggestions as a feasible reference. RA would therefore fail to stimulate consumers' motivation. As such, the perceived trust between user and RA become increasingly important and could not be neglected in the field of product promotion.

Based on the research proposed by Benbasat and Wang (2005), they claimed that the perceived trust of RA is composed of three major beliefs including competence belief, benevolence belief and integrity belief. Competence belief refers to the ability of RA such as the relevance of suggestion, quality of recommendation, dealing time and so on (Komiak & Benbasat, 2008). Benevolence belief focuses on whether RA cares about users' interests while integrity belief emphasizes whether RA colluded with other merchant and reinforced certain product's promotion (Komiak & Benbasat, 2008). Therefore, this research is dedicated to examining whether perceived trust could positively influence product promotion effectiveness, and to confirm the effect of competence belief, benevolence belief and integrity belief on the perception of trust in RA.

The result of this research can serve as a guide both e-commerce merchants and researcher in the field of production promotion particularly RA system. For e-commerce merchants, this research proposed effective strategy for them to improve the recommendation system that they already adopted. As for future researchers, this study not only provides the

fundamental point of view about the relationship between perceived RA trust and product promotion effectiveness, but also offer a preliminary empirical result of the effect of three types of belief toward perceived trust in RA.

1.2 Problem Statement

Currently, the fast development of Internet that backed by growing number of new technologies have resolved the difficulties and improve the convenience in our daily life. This development creates the interest of many researchers and they began to investigate the relationship between human and technology. Most of these researches primarily looked into the usage intention of specific technology. For example, Technology Acceptance Model (TAM), which is proposed by Davis in 1989, is widely applied in recent Information Technology (IT) researches to find out the factors that affect the adoption of new technology.

Similarly, in the field of recommendation system, there are still lots of studies that aimed to explore the usage intention of RA through adopting TAM and other models. However, even though lots of studies confirm the factors that might affect users' intention of RA, but there are still few researches emphasize on the product promotion effectiveness which is part of topic after customer have used RA as their decision aid tool. Product promotion effectiveness was proposed by Hoster et al. (2011) and it is defined as the positive promotional method that use to attract existing or potential customers as well as to reinforce their motivation to purchase the good. Previous research have confirmed that product promotion effectiveness has a positively relationship with customer satisfaction and product search effectiveness, which would eventually enhance customer's unplanned purchase (Hostler, Yoon, Guo, Guimaraes, & Forgionne, 2011). Other researches also agreed that promotional effectiveness is a critical factor that would affect final purchasing decision of customer (Büttner, Florack, & Göritz, 2015; Gedenk, 2019; Huynh, 2016).

In terms of perceived trust in RA, there are lots of studies have examined the perceived trust in RA, for instances, Komiak and Benbasat (2008) and Qui and Benbasat (2009).

Komiak and Benbasat (2008) proposed a two-process view of trust and distrust building and explained three types of attribution process (competence, benevolence and integrity) in detail. Meanwhile, Qui and Benbasat (2009) added the construct of trust into TAM model and found that trusting belief is not only directly affecting the usage intention of RA, but also could influence the usage intention indirectly via perceived usefulness. However, there is limited research focused on the relationship between trust and promotion effectiveness. Hence, this research is set to close the gap between perceived trust and product promotion effectiveness through designing perceived trust as second-order construct. Furthermore, this research is also committed to understand the effect of three types of beliefs toward perceived RA trust and examine the importance of each belief in RA's promotion effectiveness.

1.3 Research Objective

Against the research background and the deficiency of Recommendation Agent (RA) in the field of product promotion, the following are the main objectives of this study:

I. To exploring the impact of perceived trust in RA on product recommendation effectiveness.
II. To examine the relationship between three types of trust (competence trust, benevolence trust and integrity trust) on perceived RA trust.

1.4 Research Question

The detailed research questions are developed in order to address the main research objectives as follow:

I. Does perceived trust in RA has any impact on product promotion effectiveness?
II. Is there any relationship between types if trust (competence trust, benevolence trust and integrity trust) and perceived RA trust?

1.5 Hypotheses of Study

The corresponding hypotheses are developed based on the detailed research questions set forth.

1.5.1 The relationship between three types of belief and perceived RA trust

H_1: There is a positive relationship between competence belief and perceived RA trust.

H_2: There is a positive relationship between benevolence belief and perceived RA trust.

H_3: There is a positive relationship between integrity belief and perceived RA trust.

1.5.2 The relationship between perceived RA trust and product promotion effectiveness

H_4: There is a positive relationship between perceived RA trust and product promotion effectiveness.

1.6 Significance of Study

The growing popularity of e-commerce in the digital age along with the emergence of recommendation system for recommending suitable product to customer based on their personal preferences has become increasingly common on every platform. Therefore, promotion effectiveness of recommendation system could effectively affect customer final decision and it becomes increasing important for almost very platform. The findings of this study would then contribute to lots of aspects including both market merchants and future researchers. For market merchant, the result of this research offers some insights by providing them a reference for future development. For example, the result shows that the relationship between perceived trust and product promotion effectiveness are positively significance and competence belief was the most important factor which would affect perceived RA trust, hence, market merchant could enhance their promotion effectiveness through reinforcing RA's competence such as reducing the dealing time or extending the data base to generate more accurate suggestion. In addition to market merchant, this research also closes the gap of promotion effectiveness in RA related studies and can be seem as the fundamental basis for future researcher who wants to further examine the effect of perceived trust toward promotion effectiveness.

1.7 Conclusion

This chapter clearly explains the context of this research including research background, problem statement, research objective, research question, research hypotheses and significance of study. In next chapter, the definitions and relationship between each construct will be discussed in detail based on former researchers' results.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

According to Webster and Watson (2002), literature review always adopts to depict the research with comprehensive structure of relevant studies and provides fairish suggestions on auditing the review. This chapter provides an overview of the literature review in relation to current study. Hence, this chapter shows the evidences provided from previous articles and proposes theoretical framework of this research. Firstly, it presents the past literature on each important variable of current study, namely perceived RA trust, competence trust, benevolence trust, integrity trust and product promotion effectiveness. Secondly, it describes the linkages among the variables of studied through a research framework. Thirdly, respective hypotheses are developed therein.

This research categories perceived recommendation agent's trust into three categories namely, competence trust, benevolence trust and integrity trust, and uses technology trust theory to examine the relationship between perceived recommendation agent's trust and product promotional effectiveness.

2.1 Relevant Literatures of Research Construct

2.1.1 Perceived Recommendation agent (RA) trust

Trust is indicated as the positively expectation and confident to certain item and the level of trust would be determined by another's cues provided by the item (Lewicki, McAllister, & Bies, 1998). In common, trust is always examined in interpersonal relationship (Sztompka, 1999) and defined as the dependence of trustors from trustee while trustee should burden some risks from trustor (Mayer, Davis, & Schoorman, 1995; McKnight, Choudhury, & Kacmar, 2002). Moreover, trust can also be known as a belief, intention or attitude. To be specific, there are three general categories of beliefs including competence trust, benevolence trust and integrity trust (Mayer et al., 1995).

The trust between people and technology has been widely discussed in many studies. Lots of studies claimed that there is no significant difference among the interaction between human and technology, comparing with trust in interpersonal relationship (Cassell & Bickmore, 2000; Reeves & Nass, 1996; Sztompka, 1999). For example, Reeves and Nass (1996) and Jian, Bisantz, and Drury (2000) pointed out that computer are always served as a social actor for human beings and would be applied by social rules. Hence, Benbasat and Wang (2005) defined that the trust in RA is an elongation of interpersonal trust which has been widely examined in recent literatures. Moreover, current literatures also pointed out that customer will attribute the types of belief of RA in trust building process (Komiak & Benbasat, 2008) and trust of RA can be realized in terms of agent's competence, benevolence and integrity (McKnight et al., 2002; Xiao & Benbasat, 2002) that have been widely accepted in several studies already (Komiak & Benbasat, 2006, 2008; McKnight et al., 2002).

2.1.1.1 Competence Trust

Competence trust is type of cognitive trust and is defined as the rational expectation of customer that recommendation agent is able to generate good product suggestion (S. X. Komiak & Benbasat, 2004). Besides, Komiak and Benbasat (2008) pointed out that competence trust is the procedure that user transform the competence of RA into trustworthiness-related characteristics and closed to the concept of Capability process (Doney & Cannon, 1997) and Attribution process (Chopra & Wallace, 2003) which also processes via assessing item's ability and describing its latent ability.

2.1.1.2 Benevolence Trust

Benevolence trust is an emotional-based trust and indicate as the affective feeling of customer that it is secure and comfortable when making the decision with RA's help. Komiak and Benbasat (2008) also suggested that benevolence trust is the procedure that user transform the benevolence of RA into trustworthiness-related characteristics and the concept close to intentionality process (Doney & Cannon, 1997), affect-based trust (Slonim,

Chiasson, Gates, & McAllister, 2001), which thought that the trusting process of people is based on target's internal motivations.

2.1.1.3 Integrity Trust

Integrity trust always be treated as a type of cognitive trust and refers to the rational expectation of customer that RA will offer objective suggestion(S. X. Komiak & Benbasat, 2004). Komiak and Benbasat (2008) claimed that integrity trust is the procedure that user transform the integrity of RA into trustworthiness-related characteristics and closed to the concept of intentionally process (Doney & Cannon, 1997) and affect-based trust (Slonim et al., 2001) which thought that the trusting process of people is based on target's internal motivations.

2.1.2 Product Promotion Effectiveness

Product promotion refers to the positive promotional method that use to attract existing or potential customers to reinforce their motivation to purchase the good which would lead to the increasing of financial performance (Hultink, Griffin, Hart, & Robben, 1997). Product promotion effectives is defined as the ability of RA to attract the users' attention and create interests for them (Hostler et al., 2011). Besides, if customer trust the recommendation generated by RA, they would become more reliable to adopt it and thought RA is helpful and useful. Lots of prior researches also examine the relationship between trust and product promotion and found that trust not only would improve the effectiveness of promotion , but also further influence the final purchasing motivation and intention (Hu, Lin, & Zhang, 2002; Luk & Yip, 2008).

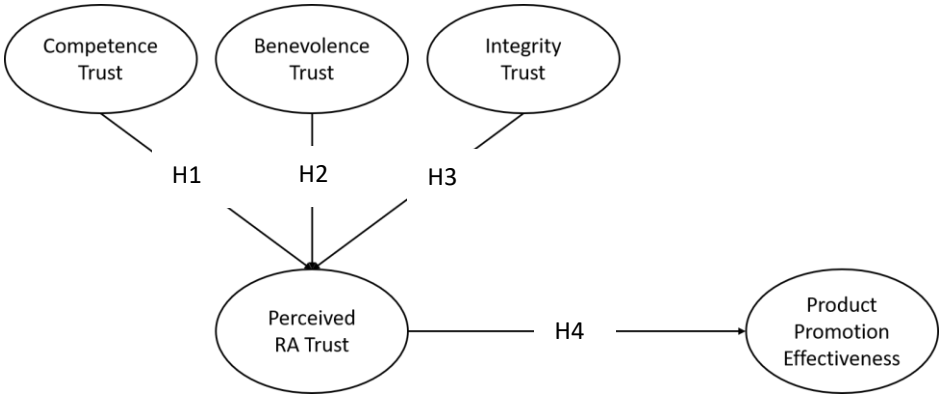
2.1.3 Trust in Recommendation Agent

Currently, growing number of websites starts to launch their own web-based decision support technologies to offer a better using experience for their users. Recommendation system, which could help users to narrow down their consideration set and provide tailored suggestions based on their personal preferences, acts as the role of agent between users and platform. However, the agency relationship between users and technology is always affected by the perception of trust, that is, users always avoid to completely apply technologies if they do not have enough trust toward them. Hence, trust becomes more and more important in the adoption of technologies and growing number of studies also starts to investigate the trust in technologies.

For the adoption of recommendation agent, RA always play a supporting role in user's decision-making process. Hence, several recent literatures began to investigate the trusting beliefs in RA which would influence user's intention to adopt it and numerous studies have founded multiple dimensions of trusting belief in recommendation system, including the perception of competence, integrity and benevolence. Benbasat and Wang (2005) and Komiak and Benbasat (2006) have widely discussed the discriminant validity and nomological validity of trusting beliefs in RA. Therefore, when the competence, benevolence and integrity of RA have been approved by users, users would tend to believe the suggestions provide by RA more.

2.2 Proposed Research Framework

Figure 2.1: Proposed Research Framework



Source: Developed for this study

According to the previous literatures mentioned above, the research framework is proposed. This research creates the higher order construct- perceived RA trust to examine its relationship with three types of beliefs (competence belief, benevolence belief and integrity belief). Besides, the effect of perceived RA trust on product promotion effectiveness is testified as well through using analysed data to verify the proposed hypotheses below:

H_1: There is a positive relationship between competence belief and perceived RA trust.

H_2: There is a positive relationship between benevolence belief and perceived RA trust.

H_3: There is a positive relationship between integrity belief and perceived RA trust.

H_4: There is a positive relationship between perceived RA trust and product promotion effectiveness.

2.3 Conclusion

This chapter sorts out the definition of each research construct from previous literatures and organized the related references about each relationship that use to support the

hypotheses of this research. The research framework is proposed at the end of the chapter together with respective hypotheses developed. In next chapter, the research methodology would be introduced in detail including research design, data collection method, sampling design, research instrument, construct measurement, data processing method and analysis method.

CHAPTER THREE: RESEARCH METHODLOGY

3.0 Introduction

Chapter Three describes the research methodology used in current research which entails the research process. The design of research, data collection method, sampling design, research instrument, construct measurement, data processing method and analysis method are spelt out in this chapter in detail. Owing to the nature of the construct of Perceived RA Trust, this research uses Hierarchical Component Model (HCM) in the context of Partial Least Square Structural Equation Modelling (PLS-SEM). The research methodology adopted to examine Perceived RA Trust on product promotion effectiveness and testing the relationship between three types of beliefs (competence belief, benevolence belief and integrity belief) are explained in this chapter.

3.1 Research Design

Research design refers to the overall plan of a research that adopts to interpret the methods and procedures when collecting and analysing the information required (Zikmund, Babin, Carr, & Griffin, 2013). Research design is also defined as a conceptual framework and the blueprint of research that composed of the collection and analysis of data (Kothari, 2004). Current research utilises quantitative method and it is a causal research. The proceeding sections provide the description of quantitative method and the nature of causal research.

3.1.1 Quantitative Method

Quantitative method, which is mainly used to examine the construct that can be measured in quantity or amount (Kothari, 2004). Current research utilises quantitative method by examining the selected constructs in form of quantifying them. The main objective of quantitative method is to propose the research hypotheses and then use the analysed statistic to verify the correctness of them. Bell, Bryman and Harley (2018) also claimed that the credibility is always high when researchers use quantitative method to observe social science issue (Bell, Bryman, & Harley, 2018).

3.1.2 Causal Research and Exploratory Research

Casual research is often adopted to realize the cause and effect relationship between each construct (Kothari, 2004). Zikmund et al. (2013) explained that causal research focuses on the examination of how one variable influence another. Current research is considered as a causal research because its main objective is set to study the cause and effect of product promotion effectiveness. Moreover, due to there are none previous research on this field, hence this research is an exploratory research. In other words, this research examines how perceived trust affects product promotion effectiveness and its' relationship between three types of beliefs, namely competence belief, benevolence belief and, integrity belief.

3.2 Data Collection Method

Data collection method is vital in research because researchers would use the collected data to analyse and to test the hypotheses formulated. If the data is inaccurate, the validity and the research result would be severely affected by rendering an invalid research result. In general, primary data and secondary data are the two most common types of data that facilitate the research process. For current research, primary data is collected from the pool of targeted respondents while secondary data is gathered from the extensive past literatures.

3.2.1 Primary Data

Primary data refers to the data which is collected for the first time (Bell et al., 2018). Zikumund et al. (2013) also suggested that primary data could be collected through various methods including observation method, interview method, self-administrative questionnaires or schedules. In this research, only self-administrative questionnaire is adopted to gather the primary data from respondents. The main advantage of self-administrative questionnaire is that it could collect data from a large population in a relatively quick manner. This research also applied the snowball method to delivering questionnaire. Snowballing method refers to researchers share the questionnaire to other representative via mediators and the representative would be clarified the questions through the explaining from mediators (Bell et al., 2018).

3.3 Sampling Design

Sampling design refers to the plan to select the sample from certain population (Kothari, 2004). Sampling is defined as the selection procedure that researcher uses to choose appropriate respondents for the sample (Zikmund et al., 2013). Generally, sampling contains four steps including determining target population, deciding sampling size, choosing sampling element and selecting sampling technique. After these steps, researcher could correctly have recognized the qualified respondents to join into the questionnaire survey.

3.3.1 Target Population

Target population is defined as the group of respondents that researchers want to study (Sekaran & Bougie, 2016). This research is dedicated to investigating the relationship between perceived RA trust and product promotion effectiveness. Hence, the target population in this study is focused on those who had ever used online shopping in Taiwan with the assistance of recommendation agent.

The most popular online shopping websites in Taiwan are Books.com, Shopee and PChome. Each of these website accounts for a large market share respectively in current e-commerce market. According to the report from Taiwan Network Information Center (TWNIC) in 2018, nearly 65% of population in Taiwan have used online shopping and 95% of them have bought on the website, hence, supposed that merely 50% of users they had ever adopted recommendation agent, there are at least 7.5 million of people that had ever considered the suggestions from RA as reference before. Overall, the population in this research is too large to be measured, hence, it is appropriate to adopt the non-probability sampling in this research.

3.3.2 Sampling Size

Sampling size could be decided by many methods including rule of thumb, RMSEA and G-Power. According to Preacher and Coffman (2006), after calculating the RMSEA at http://www.quantpsy.org/rmsea/rmsea.htm, the sample size in this research includes 307 respondents that randomly choose from target population.

3.3.3 Sampling Elements

Due to the nature of current research that covers a huge population and it is not feasible to measure, the criteria that set forth is any online shopping user who had ever use RA. The sampling technique adopted to reach to the pool of targeted respondents is explained in the subsequent section.

3.3.4 Sampling Technique

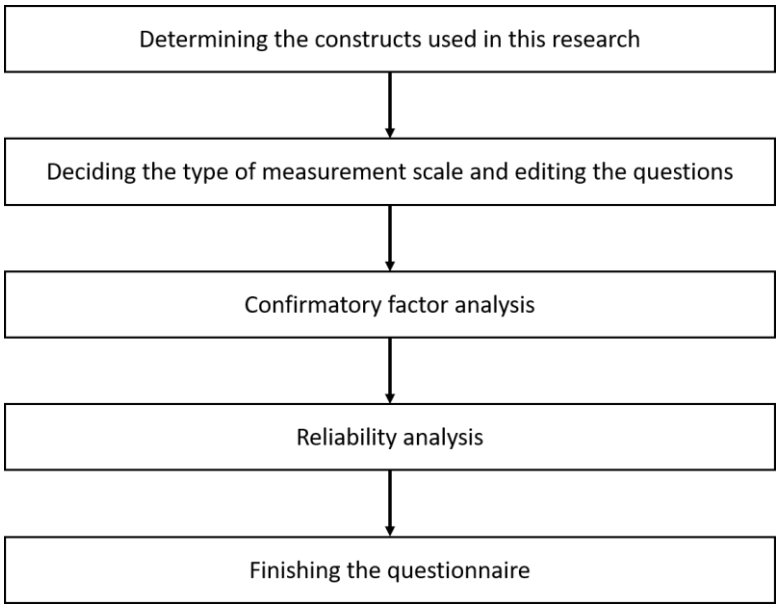
Generally, there are two categories of sampling technique: probability sampling and non-probability sampling. Probability sampling indicates the concept of random selection, which means that every element in the population have certain probability that can be selected into research, whereas non-probability sampling indicates the concept of non-sampling, which means that the samples are picked subjectively and it is not necessarily that every element has chance to be chosen as sample in research. In this research, non-probability sampling is adopted because it is a more effective and efficient way to deciding sample.

The target respondents in this research includes 307 users that had ever used recommendation system when they were shopping on Taiwan's website. Moreover, the questionnaire is selected through snowballing technique, i.e., a non-probability sampling, which is always applied when the respondents are difficult to located, through sharing the questionnaire to specific representative who had previous shopping experience with recommendation system, and the original representative will then sent it to other representative who have past using experience with recommendation system as well.

3.4 Research Instrument

Self- administrated questionnaire, which is commonly used to collect the data from large sample. Likewise, in current research, self-administered questionnaire is used as an instrument in this research to reach to the pool of respondents. Comparing to the traditional paper survey, this research created the questionnaire and distributed it through Google Form, which not only can effectively reduce amount of missing value, but also can reach time and cost-efficient simultaneously. The procedure of editing measurement scale shows in the graph below.

Figure 3.1: Procedure of Research Instrument



Source: Developed for the research

3.4.1 Origin of Constructs

The questionnaire that adopted for current research is composed of different previous scales from past relevant studies, mainly from Benbasat and Wang (2005) and Hostler et al. (2011). The measurement scale is arranged in the table below and the complete questionnaire would be shows in APPENDIX I.

Table 3.1: Origin of Constructs of Questionnaire

Section A		
Measurement scale	**Items**	**Adopt from**
Demographic profile	7	Self-developed
Section B		
Measurement scale	**Items**	**Adopt from**
Competence belief	5	Benbasat and Wang (2005)
Benevolence belief	3	Benbasat and Wang (2005)
Integrity belief	3	Benbasat and Wang (2005)
Product promotion effectiveness	6	Hostler et al. (2011)
Total	**24**	

Source: Developed for the research

3.4.2 Questionnaire Design

It is necessary for researchers to consider the factors that would affect the reliability and validity of data when they design the questionnaire. In general, measurement scales could be divided into four types in terms of mathematical properties, including nominal scale, ordinal scale, interval scale and ratio scale. In this research, nominal scale, ordinal scale and Likert scale are adopted to measure each construct.

The questionnaire in this research is made up by two sections. Section A captures the demographic profile of respondents and Section B collects data to measure each of construct.

In section A, in order to better understand the nature of each respondents, the biographical information is collected through nominal scale and ordinal scales, including habit of using online shopping, gender, age, educational level, occupation, income and the frequency of using online shopping.

Meanwhile, in section B, the Five-point Likert scale was adopted to collect the data of each construct including competence belief, benevolence belief integrity belief and product promotion effectiveness. In Likert scale, respondents indicate their statement of each question via five degrees, ranging from 'strongly disagree' represented by "1" to 'strongly agree' represented by "5".

3.5 Construct Measurement

Questionnaire is considered as an exploration instrument which is combined of various question that use to collect the objective data form respondents. As mention in Question Design, there are commonly four types of measurement scales, including nominal scale, ordinal scale, interval scale and ratio scale, in this research, only nominal scale, ordinal scale and Likert scale are applied and would be discussed in detail below.

3.5.1 Demographic Profile

In demography profile, nominal and ordinal scale are both adopted. Nominal scale, a non-numeric approach, which is always used to deal with the categorized data, is the least powerful level of measurement (Zikmund, Babin, Carr, & Griffin, 2003). In nominal scale, researcher would use a number to represent specific group and each number do not have any order or distance relationship (Bell et al., 2018; Zikmund et al., 2013).

On the other hand, Ordinal scale is always used to deal with the data that have order relationship (Zikmund et al., 2003). To be specific, ordinal scale can indicate the good/bad or high/low relationship between each respondent, however, the distance between each respondent cannot be effectively identified, which means that nominal scale cannot use to further processing more precising comparisons (Bell et al., 2018; Zikmund et al., 2013).

Overall, in this research, nominal scale is used to test the items including the habit of using online shopping, gender and occupation while ordinal scale is adopted to evaluate the items involving age, educational level, income, using frequency of online shopping.

3.5.2 Latent Variable Measurement

Likert scale is the most widely applied scale to evaluate each construct in the study (Bell et al., 2018). In this research, five-point Likert scale is adopted in Section B to measure each variable including competence belief, benevolence belief, integrity belief and product promotion effectiveness. Respondents have to answer according to the five degrees, from 'strongly disagree' represented by "1" to 'strongly agree' represented by "5" (Bell et al., 2018; Zikmund et al., 2003, 2013).

3.6 Data Processing

Generally, data processing refers to the procedure to collect and check the questionnaire to make sure that each of them are filled correctly and completely by respondents. The missing value, outlier and invalid questionnaire are inspected in this process through the statistic package of SPSS and reported in Chapter 4. There is no missing value in responses collected in this research because all the questionnaires are distributed by Google Form which does not allow incomplete response. However, after manually processing the data cleaning, there are 9 invalid questionnaires are deleted from the total of 307. Lastly, 298 valid questionnaires would be used to analyse in this research, which yield 97% response rate.

3.7 Data Analysis Method

With the fast development of computer technology, structural equation model (SEM), which is a multivariate analysis has been widely adopted in many social science researches in past 30 years. Covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM) are two types of SEM. For covariance-based SEM, it uses common factor model to indicate latent variables while partial least squares structural equation modelling, which is adopted as the primary data analysis method in this research, uses composites to represent latent variables. Smart PLS, which is based on Java Eclipse platform, is the one and only program that customized for PLS path model.

According Ringle, Sarstedt, and Straub (2012), the amount of paper that using PLS-SEM in top journal increases sharply in these years, in other words, it means that PLS-SEM is getting more attention and becomes more and more common over time (Ringle et al., 2012). According to Ringle, Sarstedt and Straub (2012), they investigated the paper which was published in MISQ in these years and sorted out the reasons and the using frequency of PLS-SEM in the table below (Ringle et al., 2012). As you can see in the table, the most common reason, which accounts for 36.92%, is because of the small sample size. The reason among second to sixth are non-normal data, formative measures, focusing on prediction, model complexity and exploratory research, which accounts for 33.85%, 30.77%, 15.38%, 13.85% and 10.77% respectively. In this research, there are three reasons for using PLS-SEM. First of all, perceived trust, which is designed as the HOC, is mainly used to predict its effect on product promotion effectiveness, that is, this research is concentrated on prediction. Secondly, due to there are none previous research investigated RA trust issue through creating perceived trust as HOC, hence, this study is belonging to the exploratory research in this field. Thirdly, because of the existence of perceived trust, the second-order construct, therefore, the level of model complexity is high in this research. To be sum up the points mentioned above, this research decided to adopted PLS-SEM as the foremost data analysis method.

In order to understand the construct which has high level abstraction, PLS-SEM is always used in the hierarchical component models (HCM) or higher-order models (Lohmöller,

1989). As using PLS-SEM in HCM, researchers cannot only simplify the model, but also can reduce collinearity issue and solve the problem of discriminant validity (Hair Jr, Hult, Ringle, & Sarstedt, 2016). Commonly, there are four types of HCM including reflective-reflective types, reflective-formative type, formative reflective type and formative-formative type and each kind of HCM include two elements: Higher-order component (HOC) and Lower order component (LOC). In this research, three types of beliefs are lower order components (LOC) while perceived RA trust is set as the higher order construct (HOC). Besides, this research adopted the reflective-formative type of HCM, which indicates that three types of beliefs are all measured by reflective indicators and mainly focused on the formative relationship between three types of beliefs and perceived RA trust. In order to measure the HOC, repeated indicators approach, which integrates the indicators of each LOC to represent HOC (Hair Jr et al., 2016), is applied in this measurement model.

Table 3.2: Reasons for Using PLS-SEM

	Number of studies in MISQ	Proportion reporting (%)	Number of studies in JM, JMR and JAMS	Proportion reporting (%)
Total	46	70.77	20	33.33
Specific reasons:				
Small sample size	24	36.92	15	25.00
Non-normal data	22	33.85	19	31.67
Formative measures	20	30.77	19	31.67
Focus on prediction	10	15.38	14	23.33
Model complexity	9	13.85	6	10.00
Exploratory research	7	10.77	1	1.67
Theory development	6	9.23	0	0.00
Use of categorical variable	4	6.15	6	10.00
Convergence ensured	2	3.08	2	3.33
Theory testing	1	1.54	5	8.33
Interaction terms	1	1.54	5	8.33

(Source: Developed for the research)

3.7.1 Descriptive Analysis

Descriptive analysis is always used to calculate the basic components of the study and then provides a clear understanding of the respondent. Descriptive analysis can be seen as the foundation of quantitative analysis which interprets the information via some brief charts such as histogram, percentage and frequency distribution (Zikmund et al., 2013). As you can see in Chapter four, the result of descriptive analysis will show the sample mean, variance, standard deviation and the 95% confidence interval simultaneously to provide an integral view for researchers to have a preliminary understanding of the data collected.

3.7.2 Item Analysis

The objective of item analysis is to ensure that the research scale is valid and researcher could use the result of item analysis as the reference to add or delete the indicators of scale to improve overall reliability and validity. Item analysis mainly contains seven measurements of ineligible indicators including missing value, means, variance, skewness, independent t test, correlation and Cronbach's α if item deleted and each of criteria are arranged in the table below.

Table 3.3: Invalid Indicators checking criteria

Indicators of item analysis	**Criteria of indicators**
Percentage of missing value	More than 10%
Mean	More than 4.5 or Less than 1.5
Variance	More than 1
Skewness	More than 1 or Less than -1
Independent T test	Not significant
Correlation after modified	Less than 0.3
Cronbach's α if item deleted	αincrease

Source: Developed by the research

3.7.3 Confirmatory Factor Analysis

Confirmatory factor analysis is always used to ensure the fit of known factor structure and generate the result through observing the community and unique of data. Community refers to the square of pattern loading and unique refers to the indicators' variance minus its community. Before processing confirmatory factor analysis, researcher should make sure that the coefficient of Kaiser-Meyer-Olkin (KMO) is better than 0.7 and the result of Bartlett's test is significant, which indicates that the data is suitable for factor analysis.

The Scree Plot is always adopted to display the number of factors and will shows the eigenvalue in a downward curve. Researcher could understand number of components through observing the points which causes the line becoming flat (Cattell, 1966). Similarly, it also can be understood via the statistic in the table named "Total Variance explained" to checking the number of components that eigenvalues are more than 1, simultaneously, the cumulative percentage of total variance explained could be found in this table as well. If the cumulative percentage of total variance explained is high, this means that there is a high representative that the component could be used to explain the whole framework of study (Kaiser, 1960).

For Pattern Matrix, this research adopts the Varimax rotation method and hides the loading which is less than 0.4. Factor loading refers to the correlation between observed variable and latent variable. Previous research also suggested that the factor loading should be better than 0.5, and ideally, 0.7 or higher (Hair, Ringle, & Sarstedt, 2011).

3.7.4 Coefficient of Determination

R square is the square of specific endogenous construct's correlation between actual value and predictive value and always used to identify the level of predictive and explaining power of the structure model (F. Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014; Henseler et al., 2014). In other words, the coefficient expresses the combined effect from exogenous latent variable to endogenous latent variable. The value of R square is between 0 to 1, 1 represents the highest level of accuracy while 0 represent the lowest accuracy of predictive power (F. Hair Jr et al., 2014; Henseler et al., 2014).

Table 3.4: Standard of R Square

R square	**Level of explaining power**
More than 0.75	High
0.5 to 0.75	Moderate
0.25 to 0.5	Low

Source: F. Hair Jr et al. (2014)

3.7.5 Reliability

Cronbach's α is the typical criterion that use to evaluate internal consistency reliability and always applied to examine whether the function of each question is consistent with the construct (Bell et al., 2018). However, Cronbach's α assumes that all the indicators have the same outer loading, but PLS-SEM prioritize the indicators based on their personal reliability (Hair Jr et al., 2016). Hence, composite reliability is applied in this research. The value of composite reliability is between 0 to 1 and higher value represent higher level of reliability, but there may have anti-effect when the value is above 0.95 (Hair Jr et al., 2016).

Table 3.5: Standard of Composite Reliability

Composite reliability	Meaning
More than 0.95	Anti-effect
0.7 to 0.95	Good
0.6 to 0.7	Acceptable exploratory research
Less than 0.6	Unacceptable

Source: Hair Jr et al. (2016)

3.7.6 Average Variance Extracted

Average variance extracted (AVE) is the criterion which uses to examine the community of a construct. Generally, AVE value should more than 0.5 which reveals that the construct can explain more than 50% of indicators' variance, that is, these constructs have convergent validity. In contrast, if AVE value is less than 0.5, it represents that more variance stays in the error of items than in the variance explained by construct.

3.7.7 Outer Loading

Outer loading always adopts to examine the indicator reliability and evaluate the convergent validity of reflective constructs. Higher the value of outer loading, the more much common in the associated indicators. The value of indicator reliability should bigger than 0.708 which also indicated that the latent variable can explain more than 50% of its variance (Hair Jr et al., 2016).

3.7.8 Cross Loading

The objective of cross loading is to evaluate the discriminant validity of data through observe the outer loading on associated construct (Chin, 1998). Typically, the value of cross loading should more than the loadings on other constructs, which indicates that it has discriminant validity (Chin, 1998).

3.7.9 Fornell-Lacker Analysis

Fornell-Lacker criterion is always used to examine the discriminant validity through comparing the square root of AVE with other construct's correlation coefficients. If the discriminant validity is founded, the square root of AVE should greater than the highest correlation of any other construct (Fornell & Larcker, 1981).

3.7.10 HTMT

Because PLS-SEM would always overestimate the value of loading and AVE and become easily to pass the discriminant validity, hence, Hetero-monotrait ratio is launched as a stricter method to estimate the true correlation between two constructs. If the value of HTMT close to 1, it represents lack of discriminant validity (Henseler, Ringle, & Sarstedt, 2015).

3.7.11 Collinearity Analysis

Variance inflated factor (VIF) and tolerance are always used as the criteria to evaluate collinearity issue. According to (Hair Jr et al., 2016), they suggested that formative indicators should not have high correlation, hence, the value of VIF should less than 5, ideally. 3.3. If outer VIF is more than 5, it means that there may exist collinearity between each indicator and researcher should consider whether to eliminate it.

3.7.12 Bootstrapping

Bootstrapping, a nonparametric procedure, is a resampling method that using the sample repeatedly and re-establishing new sample randomly that can represent population (Hair Jr et al., 2016). Hair et al. (2011) suggested that the bootstrap samples should run 5000 times which means that 5000 PLS path models are estimated (Hair et al., 2011). The p value refers to the possibility when true null hypotheses is wrongly rejected, generally, the p value must be set under 5% significance level, that is, p value should be lower than 0.05. For conservative research, the strict criteria, p value less than 0.01, should be adopted. For exploratory research, 10% significance level is acceptable (Hair Jr et al., 2016).

3.8 Conclusion

This chapter showcases the research methodology adopted in this research including the design of research, data collection method, sampling design, research instrument, construct measurement, data processing method and analysis method. In next chapter, the analysis of the collected data mentioned in this chapter is reported.

CHAPTER FOUR: RESEARCH RESULT AND FINDING

4.0 Introduction

This chapter present the result of the data analyse via the methods mentioned in previous chapter. The data analysis is presented in descriptive analysis, item analysis, confirmatory factor analysis, reliability, average variance extracted, outer loading, cross loading, Fornell-Lacker analysis, HTMT, collinearity analysis, coefficient of determination, and bootstrapping. The results are presented in clear manners and detailed interpretation of each analysed statistic are appended.

4.1 Valid Questionnaire

Table 4.1: Valid Questionnaire

	Number of questionnaires	**Percentage**
Questionnaire distributed	307	100%
Invalid questionnaire	9	3%
Total valid questionnaire	298	97%

Source: Developed for the research

There are in total, 307 questionnaires were distributed to respondents and all of the delivered questionnaire were filled and received by the researcher. The response rate reaches 100% for this research. However, after a manual checking, there are 9 questionnaires were invalid, which accounts for 3%. Hence, the entire number of valid questionnaires are 298, achieving 97% of response rate.

4.2 Descriptive Analysis

Table 7 shows the descriptive analysis of present research which covers the habit of using online shopping and the respondents' profiles.

Table 4.2: Descriptive Analysis

	Frequency	**Percent**	**Valid percent**	**Cumulative percent**
Habit of using online shopping				
Yes	265	88.9	88.9	88.9
No	33	11.1	11.1	100.0
Total	298	100.0	100.0	
Gender				
Male	157	52.7	52.7	52.7
Female	141	47.3	47.3	100.0
Total	298	100.0	100.0	
Age				
16-20	9	3.0	3.0	3.0
21-25	153	51.3	51.3	54.4
26-30	38	12.8	12.8	67.1
31-35	19	6.4	6.4	73.5
36-40	15	5.0	5.0	78.5
41-45	16	5.4	5.4	83.9
Above 46	48	16.1	16.1	100.0
Total	298	100.0	100.0	
Education				
High school	9	3.0	3.0	3.0
College	175	58.7	58.7	61.7
Graduated	113	37.9	37.9	99.7
PHD	1	.3	.3	100.0
Total	298	100.0	100.0	

	Frequency	Percent	Valid percent	Cumulative percent
Occupation				
Student	98	32.9	32.9	32.9
Military/ Education	28	9.4	9.4	42.3
Service	45	15.1	15.1	57.4
Finance	14	4.7	4.7	62.1
IT	14	4.7	4.7	66.8
Advertisement	13	4.4	4.4	71.1
Art	5	1.7	1.7	72.8
Free	8	2.7	2.7	75.5
Medical	6	2.0	2.0	77.5
Manufacture	35	11.7	11.7	89.3
Retirement	4	1.3	1.3	90.6
Others	28	9.4	9.4	100.0
Total	298	100.0	100.0	
Income (In Taiwan Dollar)				
Below 20000	98	32.9	32.9	32.9
20000-40000	105	35.2	35.2	68.1
40000-60000	56	18.8	18.8	86.9
Above 60000	39	13.1	13.1	100.0
Total	298	100.0	100.0	
Frequency				
Never	49	16.4	16.4	16.4
1-2 Days	167	56.0	56.0	72.5
3-4 Days	35	11.7	11.7	84.2
5-6 Days	26	8.7	8.7	93.0
Everyday	21	7.0	7.0	100.0
Total	298	100.0	100.0	

Source: Develop for the research

The table above shows the data of demographic profile of respondents. There are 265 respondents (88.9%) claimed that they have habits of using online shopping, whereas 33 respondents (11.1%) have opposite answers.

In terms of gender, there about 50% share in male and female. There are 157 of respondents (52.7%) are male and 141 of them (47.3%) are female. As for the proportion of each age group, most of the respondent are between 21 to 25 years old, which accounts for 54.4%. The remaining, from high to low in order, are the age above 46, 26 to 30, 31 to 35, 41 to 45, 36 to 40 and 16 to 20, which accounts for 16.1%, 12.8%, 6.4%, 5.4%, 5.0% and 3% respectively.

For education level, 58.7% of respondents have college degree as well as 37.9 % of respondents have graduated degree, besides, 3% of respondents are graduated from high school while only 1 respondent possesses PHD. In the part of occupation, most of the respondent are students, which account for 32.9%, and followed by service industry, manufacturing industry, military and education, which occupied 15.1%, 11.7%, 9.4% and 9.4% respectively. The remaining are finance industry, IT industry, advertisement industry, free, medical and retirement, which only accounts for 4.7%, 4.7%, 4.4%, 2.7%, 2.0% and 1.3%. Lastly, there are 28 respondents (9.4%) in other industries such as architecture and exercise industry.

In terms of income level, most of respondents are between NTD 20,000 to 40,000, which accounts for 35.2 %. Followed by the group 'Below NTD20,000','40,000 to 60,000' and 'Above NTD60,000', which occupies 32.9%, 18.8%, 13.1% respectively. Lastly, for using frequency, the majority of respondents would use 1 to 2 days a week, which accounts for 56%. 16.4% of respondents claimed that they would use less than 1 time a week. The respondents who use 3 to 4 days, 5 to 6 days, and every day a week merely accounts for 11.7%, 8.7% and 7%.

4.3 Item Analysis

Table 4.3: Item Analysis

Items	Missing	Means	Variance	Skewness	Independent t test	correlation	Cronbach's α if item	Ineligible indicators	Item deleted
CT1	0%	3.2215	0.793	-0.248	0.00	0.610		0	
CT2	0%	3.5772	0.703	-0.764	0.00	0.700		0	
CT3	0%	3.7685	0.616	-1.122	0.00	0.577		1	
CT4	0%	3.3859	0.878	-0.494	0.00	0.553		0	
CT5	0%	3.4899	0.924	-0.566	0.00	0.612		0	
BT1	0%	2.9832	1.114	-0.52	0.00	0.201	V	3	X
BT2	0%	4.1040	0.491	-0.797	0.00	0.405		0	
BT3	0%	3.9430	0.512	-0.749	0.00	0.458		0	
IT1	0%	3.1510	0.883	-0.134	0.00	0.719		0	
IT2	0%	3.0067	0.848	0.117	0.00	0.768		0	
IT3	0%	3.0772	0.880	-0.204	0.00	0.779		0	
PE1	0%	3.6074	0.576	-0.740	0.00	0.705		0	
PE2	0%	3.8859	0.418	-1.017	0.00	0.625		1	
PE3	0%	3.7081	0.625	-0.583	0.00	0.674		0	
PE4	0%	3.4564	0.680	-0.186	0.00	0.733		0	
PE5	0%	3.3523	0.721	-0.212	0.00	0.771		0	
PE6	0%	3.2081	1.034	-0.233	0.00	0.625		1	

Source: Developed for the research

Item analysis is aimed to ensure the validity of measurement scale and can be seen as a reference for researchers to judge whether to delete or add the indicators to induce the overall reliability. According to Table 4.3, first of all, in the part of missing value, because the questionnaires are collected by Google Form, thus there are no missing value here. For the means of indicators, all of the value is between 1.5 to 4.5, which means that the item

discrimination is acceptable. In terms of variance, BT1 (σ= 1.114) and PE6 (σ=1.034) exceed the criteria that the variance should less than 1, which means that the consistency of data may be too high to find out the difference between each respondent.

For the value of skewness, it is mainly used to observe the tendency of answer. The absolute value of skewness should less than 1 which represents that the answers are symmetry. However, CT3 ($|$ skewness $|$ = 1.122) and PE2 ($|$ skewness $|$ = 1.017) do not meet with the standard ($|$ skewness $|$ < 1), hence, this indicates that the answers from respondents are not symmetry and have a rightward tendency. In terms of independent t-test, it is primarily adopted to observe the quality of indicators through comparing the difference between the mean score in top 25% group and bottom 25% group. If the result does not achieve significant level, the quality of indicators might be low. However, the result shows that all of the answer reaches significant level, which means that the quality of each indicator is acceptable.

Moreover, researcher always test the quality of indicators via observing the correlation between the total score and the score after modified. The value should higher than 0.3, which indicates that the measurement scale might have good quality. However, the correlation value of BT1 is 0.201, which is less than 0.3, this means that the quality of BT1 is doubtful. Lastly, Cronbach's α is the criteria of consistency, hence, if the value of Cronbach's α increase after deleted certain scale, this might means that the scale is not consistent with others and might aimed to measure different construct's dimensionality. The result shows that the value of Cronbach's α increases after deleted BT1, thus, this means that BT1 might be inconsistent with others.

After consolidating the total invalid indicators, BT1 has 3 invalid indicators and followed by CT3, PE2 and PE6, which have 1 invalid indicator respectively. At last, researchers decide to delete BT1, which has the most ineligible indicators.

4.4 Confirmatory Factor Analysis

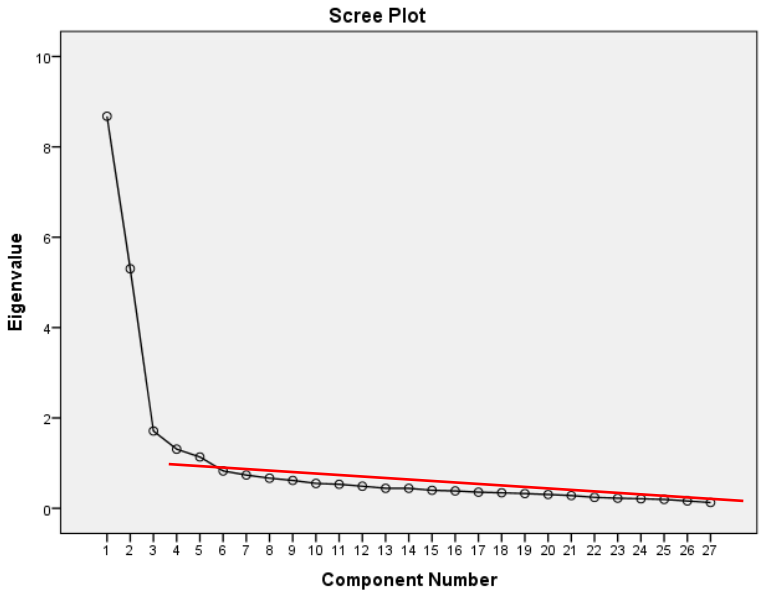
Table 4.4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.97**
Bartlett's Test of Sphericity	Approx. Chi-Square	5084.446
	df	351
	Sig.	0.000

Source: Developed for the research

The main objective of confirmatory factor analysis is to ensure the fit of known factor structure and generate the result through observing the community and unique of data. First of all, researchers should decide whether the data is suitable for factor analysis through observing the value of KMO and the significance of Bartlett's test. As shown on the Table 4.4, the KMO value is more than 0.7 and the result of Bartlett's test is significant, which means that the structure is appropriate to perform factor analysis.

Figure 4.1: Scree Plot



In terms of scree plot, it is applied to demonstrate the number of latent variables via inspect the number of points which cause the line become flat. As shown on Figure 4.1, the line become flat at the fifth points which indicate that there may have four latent variables in this scale.

Table 4.5: Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	6.545	43.631	43.631
2	1.595	10.635	54.266
3	1.194	7.959	62.225
4	1.128	7.523	69.748
5	.678	4.522	74.269
6	.599	3.993	78.262
7	.517	3.447	81.709
8	.483	3.217	84.926
9	.425	2.834	87.760
10	.411	2.739	90.499
11	.335	2.231	92.730
12	.315	2.103	94.833
13	.308	2.053	96.886
14	.255	1.701	98.587
15	.212	1.413	100.000

Source: Developed for the research

The table above shows the percentage of total variance explained, researches could understand the number of latent variables through inspecting the number of components which Eigenvalues are more than 1, besides, the cumulative percentage of total variance explained also could be found in this table as well. The result shows that there are four

components that the Eigenvalues are more than 1 which is the same as the result in scree plot, in addition, four of them collaboratively explain 69.74% of total variance.

Table 4.6: Rotated Component Matrix

	Component			
	1	2	3	4
PE4	.778			
PE3	.773			
PE2	.760			
PE5	.752			
PE1	.641			
CT2		.793		
CT4		.739		
CT5		.664		
CT1		.654		
CT3		.577		
IT2			.879	
IT3			.822	
IT1			.778	
BT3				.840
BT2				.810

Source: Developed for the research

Lastly, after rotation through Varimax method and hide the loading which are lower than 0.4, the rotated component matrix shows that there are exactly four factors in the scale including competence trust, benevolence trust, integrity trust and promotion effectiveness and the result is consistent with Figure 4.1 and Table 4.5.

4.5 Coefficient of Determination

Table 4.7: Coefficient of Determination

	R Square	R Square Adjusted
PT	1.000	1.000
PE	0.443	0.441

Source: Developed for the research

R square is the criteria to identify the predictive and explaining power of the structure model through examining the combined effect from exogenous latent variable to endogenous latent variable. Generally, the value of R square will among 0 to 1. When R square equal to 1, the construct could totally explain the variance, thus, the predict power is strong; when R square equal to 0, the construct cannot predict any variance, thus the accuracy of predict power is low.

According Table 12, the result shows that the R square of perceived trust (PT) is 1, which means that the variance of perceived trust (PT) can be totally predicted by three types of beliefs (competence belief, benevolence belief and integrity belief). The reason is that perceived trust was designed as a second-order construct in this research, which is measured by the three types of beliefs, hence, it can be completely explained by them. For product promotion effectiveness (PE), the value of R square is 0.443, which is between 0.25 to 0.5, indicates a low level of explaining power and this means that perceived trust (PT) explains only 43% of variances in product promotion effectiveness (PE).

4.6 Reliability Analysis

Table 4.8: Reliability Analysis

Variables	Cronbach'sα	Composite Reliability
Benevolence trust	0.726	0.879
Competence trust	0.819	0.874
Integrity trust	0.873	0.922
Product promotion effectiveness	0.863	0.891
Perceived Trust	0.872	0.907

Source: Developed for the research

Typically, Cronbach's α is used as the criteria to evaluate the internal consistency reliability. However, it is not appropriate to use Cronbach's α in PLS-SEM due to the difference of its assumption and the underestimation of internal consistency reliability. Therefore, composite reliability was adopted here.

According to the standard mentioned in Chapter three, if the value of composite reliability is between 0.6 to 0.7, it is acceptable in exploratory research; if the value of composite reliability is between 0.7 to 0.95, it represent that there is a good internal consistency reliability; if the value of composite reliability is above 0.95, there may has an anti-effect. As shown on Table 4.8, the composite reliability of benevolence trust, competence trust, integrity trust, product promotion effectiveness and perceived trust are 0.879, 0.874, 0.922, 0.891 and 0.907 respectively, which are between 0.7 to 0.95, this means that there is a great internal consistency reliability in this research.

4.7 Convergent Validity

4.7.1 Average Variance Extracted

Table 4.9: Average Variance Extracted

Variables	**AVE**
Benevolence trust (BT)	0.785
Competence trust (CT)	0.582
Integrity trust (IT)	0.797
Product promotion effectiveness (PE)	0.661
Perceived RA trust (PT)	0.453

Source: Developed for the research

Average variance extracted (AVE) is always treated as the criteria to judge whether the construct possess convergent validity. Normally, the value of AVE should more than 0.5, this indicates that the construct can explain more than half of indicators' variance. However, if the value of AVE is lower than 0.5, this may represent that most of the variance stay in the error of items instead of the variance explained by the constructs.

The table above shows the result of average variance extracted (AVE), the value of benevolence trust, competence trust, integrity trust and product promotion effectiveness are 0.785, 0.582, 0.979 and 0.661, which supress the threshold of 0.5, this points out that the convergent validity exist in these constructs. However, perceived RA trust (AVE = 0.453 < 0.5) do not meet with the criteria, which means that perceived RA trust don't possess convergent validity.

4.7.2 Outer Loading

Table 4.10: Outer Loading

	Loading
BT2	0.882
BT3	0.889
CT1	0.770
CT2	0.831
CT3	0.740
CT4	0.704
CT5	0.764
IT1	0.879
IT2	0.891
IT3	0.907
PE1	0.821
PE2	0.764
PE3	0.795
PE4	0.846
PE5	0.837

Source: Developed for the research

The primary objective of outer loading analysis is to ensure the indicator's reliability and examine the convergent validity of each construct. The value of indicator reliability should exceed 0.708, which represents that the latent variable can explain more than half of its variance. According to the table above, the outer loading of BT2 and BT3 are 0.882 and 0.889, which exceed the threshold of 0.708, this means that both of them possess high communality in explaining the variance of benevolence trust, in other words, both of them own convergent validity. In terms of competence trust, the outer loadings are 0.770, 0.831, 0.740, 0.704 and 0.764, only CT4 does not reach the threshold of 0.708. However, Hair Jr et al. (2016) considered that 0.7 is closed enough to 0.708 to be acceptable. Hence, the convergent validity of each construct exists.

4.7.3 Cross Loading

Table 4.11: Cross Loading

	BT	CT	IT	PE
BT2	0.882	0.353	0.287	0.441
BT2	0.882	0.353	0.287	0.441
BT3	0.889	0.367	0.310	0.380
BT3	0.889	0.367	0.310	0.380
CT1	0.289	0.770	0.446	0.521
CT1	0.289	0.770	0.446	0.521
CT2	0.323	0.831	0.433	0.447
CT2	0.323	0.831	0.433	0.447
CT3	0.367	0.740	0.398	0.542
CT3	0.367	0.740	0.398	0.542
CT4	0.177	0.704	0.418	0.349
CT4	0.177	0.704	0.418	0.349
CT5	0.383	0.764	0.433	0.464
CT5	0.383	0.764	0.433	0.464
IT1	0.328	0.536	0.879	0.456
IT1	0.328	0.536	0.879	0.456
IT2	0.268	0.418	0.891	0.409
IT2	0.268	0.418	0.891	0.409
IT3	0.303	0.531	0.907	0.451
IT3	0.303	0.531	0.907	0.451
PE1	0.447	0.569	0.450	0.821
PE2	0.447	0.344	0.295	0.764
PE3	0.346	0.494	0.309	0.795
PE4	0.347	0.485	0.483	0.846
PE5	0.310	0.553	0.429	0.837

Source: Developed for the research

Cross loading is the criteria that used to examine the discriminant validity of the data via the observation of the value of outer loading on related construct. Normally, the value of cross loading on target construct would bigger than the value on another construct. As shown on the table above, the higher values in each column have been highlight. In the first column (BT), BT1 and BT2 obviously have higher loading than other indicators; in the second column (CT), CT1, CT2, CT3, CT4 and CT5 have higher loading than other indicators; in the third column (IT), IT1, IT2 and IT3 have higher loading than other indicators; in the last column (PE), PE1, PE2, PE3, PE4 and PE5 have higher loading than other indicators. In general, all of the constructs has higher cross loading in its indicators, which means that the data possess discriminant validity.

4.8 Discriminant Validity

4.8.1 Fornell-Lacker Criteria Analysis

Table 4.12: Fornell-Lacker Analysis

	BT	**CT**	**IT**	**PT**	**PE**
BT	0.886				
CT	0.407	0.763			
IT	0.337	0.558	0.893		
PT	0.597	0.905	0.817	0.673	
PE	0.463	0.611	0.492	0.665	0.813

Source: Developed for the research

Besides from cross loading analysis, Fornell-Lacker criterion is always used to examine the discriminant validity through comparing the square root of AVE with other construct's correlation coefficients as well. Generally, the square root of AVE should greater than the highest correlation of any other construct, this would prove that the existence of discriminant validity. According to the table above, the square root of AVE of benevolence trust (BT) is 0.886, which is larger than the value in CT (0.407), IT (0.337), PT (0.597) and

PE (0.463); the square root of AVE of competence trust is 0.763, which is only bigger than the value in IT (0.558) and PE (0.661), this indicated that CT do not possess discriminant validity with perceived RA trust (PT); the square root of AVE of integrity trust is 0.893, which is larger than the value in PT (0.817) and PE (0.492); the square root of AVE of perceived trust is 0.673, which is bigger than the value in PE (0.665). To be summed up, all of the square root of AVE is greater than other construct's correlation, which indicate that the discriminant validity has been established.

4.8.2 HTMT Analysis

Table 4.13: HTMT Analysis

	BT	**CT**	**IT**	**PE**
BT				
CT	0.524			
IT	0.422	0.657		
PE	0.587	0.710	0.553	

Source: Developed for the research

Due to the overestimate of loading and AVE in PLS-SEM, the discriminant validity become more easily to pass. Therefore, Hetero-monotrait ratio (HTMT) is launch and used to observe the true correlation between two constructs. Normally, if the value of HTMT close or more than 0.9, it represents that there is lacking discriminant validity. According to the table above, all of the constructs are in line with the criteria, the value should smaller than 0.9, this signifies the existence of discriminant validity.

4.9 Collinearity Analysis

Table 4.14: Collinearity Analysis

Items	VIF
BT2	1.480
BT3	1.480
CT1	1.749
CT2	2.070
CT3	1.530
CT4	1.475
CT5	1.620
IT1	2.071
IT2	2.503
IT3	2.591
PE1	1.965
PE2	1.870
PE3	1.935
PE4	2.422
PE5	2.283

Source: Developed for the research

The indicators that used to evaluate collinearity issue is VIF. The value of VIF should less than 5, or a more cautious standard of 3.3, which could prove that the collinearity issue does not occur. According to Table 19, all of VIF are less than 5, even the stricter criteria of 3.3. hence, the collinearity issue do not exist among each construct.

4.10 Bootstrapping

Figure 4.2: Result of Bootstrapping

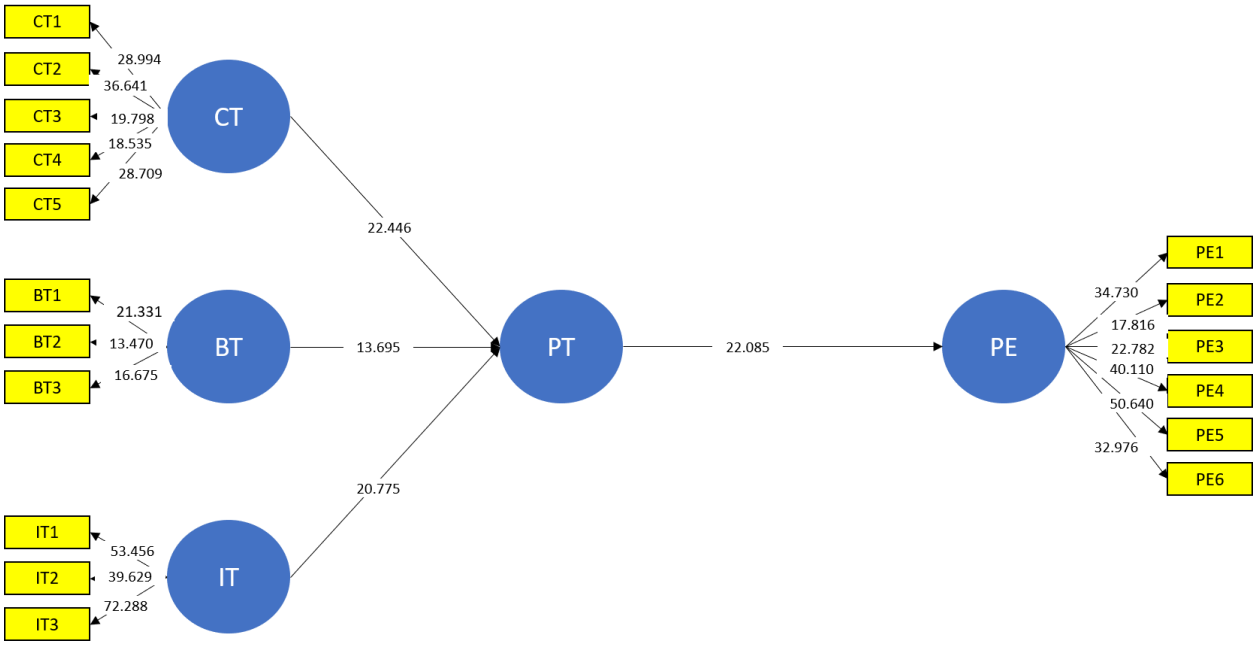


Table 4.15: Result of Bootstrapping

Hypotheses	Relationship	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Result
H_1	**CT -> PT**	0.583	0.583	0.026	22.372	0.000	Supported
H_2	**BT -> PT**	0.219	0.219	0.021	10.241	0.000	Supported
H_3	**IT -> PT**	0.417	0.417	0.020	20.761	0.000	Supported
H_4	**PT -> PE**	0.665	0.667	0.037	17.866	0.000	Supported

Source: Developed for the research

Bootstrapping is a resampling method that uses to examine the relationship between each construct after running the data for 5000 times, in other words, bootstrapping is the method that could examine the research hypotheses through the data analyzed. The value of p-value should less than 0.01, which means that the hypotheses is supported by research data. As shown on the table above, for the relationship between benevolence trust and perceived RA trust, p-value are 0.000, which mean that there is a positive and significant relationship between benevolence trust and perceived RA trust. For the relationship between competence trust and perceived RA trust, the p-value is 0.000, which means that there is a positive and significant relationship between competence trust and perceived RA trust. For the relationship between integrity trust and perceived RA trust, the p value is 0.000, which means that there is a positive and significant relationship between integrity trust and perceived RA trust. For the relationship between perceived RA trust and product promotion effectiveness, the p value is 0.000, which means that there is a positive and significant relationship between perceived RA trust and product promotion effectiveness. To be summed up, all of p value are significant at 1% level, which means that all of research hypotheses are supported.

4.11 Conclusion

This chapter provides the statistical results of the data analysis together with the interpretation of analysed results, including descriptive analysis, item analysis, confirmatory factor analysis, coefficient of determination, reliability, average variance extracted, outer loading, cross loading, Fornell-Lacker analysis, HTMT, collinearity analysis and bootstrapping and the result would be further discussed in next chapter to figure out the implication of this research.

CHAPTER FIVE: CONCLUSION AN DISCUSSION

5.0 Introduction

Chapter Five presents the Conclusion and Discussion of the thesis based on Findings obtained in Chapter Four. The main objective of discussion and finding aims to provide a consolidated view of the statistical analysis and discuss the major finding among the relationships. After that, researchers will propose the implications on different aspects and put forward the limitations and suggestions for further research in the future.

5.1 Summary of Statistical Analysis

5.1.1 Descriptive Analysis

For gender, male respondents consist of 52.7% while female respondent consist of 47.3%. Most of respondents falls in the age group of 21 to 23, which accounts for 51.3%. In terms of education level, the majority of respondents have college degree, which occupies 97%, while 3% of respondents only have high school degree. For occupation, 32.9% of respondents are student, followed by service industry and manufacturing industry, which accounts for 15.1% and 11.7%. In terms of income level, 35.2% of respondents are in the income level of 20,000 to 40,000, 32.9% of respondents falls in the income level that below 20,000, 18.8% of respondents locates at the income level of 40,000 to 60,000, only 13.1 % of respondents have the income above 60,000. Moreover, 88.9% of respondents indicate that they have habit of using online shopping while 11.1% of respondents indicate that they do not have habit of using online shopping. Lastly, for using frequency, 56% of respondents would use 1 to 2 days per week, 11.7% of respondents would use 3 to 4 days per week, 8.7% of respondents would use 5 to 6 days per week, 7% of respondents would use it every day, however, there are still 16.4% of respondents state that they never might not use it once a week.

5.1.2 Item Analysis

According to the result from Table 4.3, there are three invalid indicators of BT1 including invalid variance, invalid correlation and invalid Cronbach's α if item deleted. Followed by PE2, PE6, CT3, which has only one invalid indicator. Lastly, researchers decide to delete BT1 which has the most ineligible indicators to improve the validity of measurement scale.

5.1.3 Confirmatory Factor Analysis

Based on the result in Table 4.4, the value of KMO is 0.97, which is more than 0.7, and the result of Bartlett's Test reaches significant level as well, this indicates that the data is appropriate for performing factor analysis. After that, the results showed in Scree Plot, Total Variance Explained and Rotated Component Matrix present that there are four latent variables in this research, which are benevolence trust, integrity trust, competence trust and product promotion effectiveness.

5.1.4 Coefficient of Determination

R square is used as the indicator to judge the predicting and explaining power of certain construct. As shown in Table 4.7, the R square of perceived RA trust is 1, which means that the variance of perceived RA trust is completely explained by three types of beliefs (competence belief, benevolence belief and integrity belief). In terms of product promotion effectiveness, the value of R square is 0.443, which means that the variance of product promotion effectiveness is only predicted 44.3% by perceived RA trust.

5.1.5 Reliability Analysis

In PLS-SEM, the composite reliability is more suitable than Cronbach's α to observe the reliability due to the different assumption. According to Table 4.8, all of the composite reliability are between 0.7 to 0.95, which means that all of the construct have high level of internal consistency.

5.1.6 Convergent Validity

Average variance extracted (AVE) and outer loading are both treated as the indicator to evaluate whether the convergent validity exist or not. According to the result from Average variance extracted (AVE) on Table 4.9, excepting for perceived RA trust, the remaining constructs all exceed the threshold of 0.5. For the result of outer loading, besides from the measurement scale of perceived RA trust, the remaining all pass the threshold of 0.708. To be summed up, apart from perceived RA trust, benevolence trust, competence trust, integrity trust and product promotion effectiveness all possess convergent validity.

5.1.7 Discriminant Validity

Cross loading, Fonell-Lacker analysis and HTMT analysis are used as the reference to figure out whether the discriminant validity exist or not. First of all, as shown in Table 4.12, the result of cross loading shows that the indicators which belong to their own construct are all larger than other indicators. Secondly, for Fornell-Lacker analysis, the result shows that only CT does not possess discriminant validity, all of the remaining are all bigger than the highest correlation of any construct. Thirdly, for HTMT analysis, the result shows that all of constructs are in line with the criteria of discriminant validity.

5.1.8 Collinearity Analysis

VIF is the criteria that adopted to find out whether the collinearity issue exist or not. According to Table 4.14, all of the VIF value are below 3.3, which is the stricter standard. Hence, there is no collinearity issue in each measurement scale.

5.1.9 Bootstrapping Analysis

Bootstrapping is used to examine the relationship between each construct. As shown in Table 4.15, all of the p values of each relationship are 0.000, which is under the 99% significance level. Hence, all of the research hypotheses are supported in this research.

5.2 Discussion of Hypotheses Results Findings

Table 5.1: Result of Research

Hypotheses	**Value scored**	**Decision**
H_1: There is a positive and significant relationship between competence belief and perceived RA trust.	p (0.000) <0.01	Supported
H_2: There is a positive and significant relationship between benevolence belief and perceived RA trust.	p (0.000) <0.01	Supported
H_3: There is a positive and significant relationship between integrity belief and perceived RA trust.	p (0.000) <0.01	Supported
H_4: There is a positive and significant relationship between perceived RA trust and product promotion effectiveness.	p (0.000) <0.01	Supported

Source: Developed for the research

5.2.1 Relationship between three types of belief and perceived RA trust

H_1: There is a positive relationship between competence belief and perceived RA trust.
H_2: There is a positive relationship between benevolence belief and perceived RA trust.
H_3: There is a positive relationship between integrity belief and perceived RA trust.

The result shows that p value of H_1, H_2 and H_3 are 0.000, which are lower than 0.01, hence H_1, H_2 and H_3 are supported.

The finding was consistent with the researches which focused on trusting belief in recommendation agent. According to Xiao and Benbasat (2002) and McKnight et al. (2002), the results pointed out that perceived trust in recommendation agent is composed of competence belief, benevolence belief and integrity belief. Komiak and Benbasat (2008) also claimed that user would transform the competence, benevolence and integrity of recommendation agent into some features that related to trust. Moreover, this finding also coincides with other trusting literatures. Gefen, Karahanna, and Straub (2003) arranged the trusting beliefs from previous literatures and conceptualized the trust in online shopping

field as three types of beliefs including ability (competence), benevolence and integrity. Mayer et al. (1995) also examine the trust in the context of organization and proposed that trust could be took shape via the competence, benevolence and integrity of employee. Hence, the study concludes that there is a positive and significant relationship between three types of belief (competence trust, benevolence trust and integrity trust) and perceived RA trust.

5.2.2 Relationship between perceived RA trust and product promotion effectiveness

H_4: There is a positive relationship between perceived RA trust and product promotion effectiveness.

The result shows that p value of H_4 is 0.000, which is lower than 0.01, hence H_4 is supported.

The finding is same as other researches on trust and promotion effectiveness. Previous researches have examined lots of benefits that lead by trust including purchasing intention (Qiu & Benbasat, 2009), customer satisfaction (Wu, 2013) and perceived usefulness (Qiu & Benbasat, 2009). Moreover, some past marketing literatures also have the same result with this research. According to De Pechpeyrou and Odou (2012), they investigated the consumer scepticism and promotion effectiveness, the result claimed that if customer distrust the price offer (promotion event) , then the promotion effectiveness would be negatively affected; in contrast, if customer believe that, then the promotion effectiveness would be improved. Amos, Holmes, and Strutton (2008) also studies the relationship between celebrity endorser effects and advertising effectiveness, the result showed that if customer trust celebrity more, then the advertising effectiveness would be higher, in other words, trust would lead to better promotion effectiveness. To be summed up, the result of this research not only double confirm the relationship between trust and product promotion effectiveness, but also extends this relationship into the field of recommendation system.

5.3 Managerial Implication

Currently, recommendation agent has already applied in several e-commerce platforms and brought lots of benefits for both merchants and customers. For customer, recommendation agent could enhance their effectiveness to buy the products they needed; for merchants, recommendation agent not only helps them to upgrade the shopping experience for customer, but also generates more profits for them. Therefore, the research that aims to investigate the antecedent of promotion effectiveness of RA becomes more and more important. The result of this research brings significant managerial implications on the promotion effectiveness of recommendation system and e-commerce platforms could also adopt this research as the reference to improve their functions of recommendation system in the future.

Firstly, the relationship between three types of belief (competence belief, benevolence belief and integrity belief) and perceived RA trust are supported. This indicates that e-commerce platform could improve the perception of trust through enhancing RA's competence, benevolence and integrity. According to the result of on Table 18, both of competence belief and integrity belief have high correlation coefficients with perceived trust, which means that these two types of beliefs have good influence on perceived trust. In other words, if Taiwan's e-commerce platforms want to improve the trust perceived by customers, they could focused on these two types of beliefs.

To be specific, according to Table 16, for competence belief, CT2 "This RA has the expertise to understand my needs and preferences about certain product" has highest loading among the scales, this represents that the most important factors that could affect competence belief is RA's expertise. For integrity belief, IT3 "I consider this RA to possess integrity" has the highest loading, which means that the perception of integrity is a vital factor for improving integrity belief. Therefore, the result suggests that the e-commerce platforms in Taiwan could further enhance their perception of trust through increasing the expertise of RA to provide more accurate suggestions and continuously keeping sense of integrity to offer objective recommendations.

Furthermore, the relationship between perceived RA trust and product promotion effectiveness is supported as well, this means that trust could significantly affect product promotion effectiveness, that is, increasing the trust perceived by users could positively improve the promotion effectiveness of RA. Overall, in order to effectively increase the promotion effectiveness of RA, Taiwan's e-commerce platforms could not only improve the professional knowledge of RA, but also could make an further improvement on the perception of integrity.

5.4 Limitation

During the processing of this research, researcher has identified several limitations. First of all, the data was collected with a cross-sectional foundation, that is, the data was collected at a point of time. Hence, the research cannot observe the effect of perceived RA trust on promotion effectiveness with a longer timeline. However, the perception of trust would be change overtime, thus, this research only could have a description of the effect at certain time point.

Secondly, besides from e-commerce platform, recommendation systems have been widely adopted in other website such as social media and online video platform. However, different website might have different factors which would affect trust perception and promotion effectiveness. Hence, it is hard to generalize the whole types of websites.

5.5 Recommendations for Future Research

Because of the limitation mentioned above, researchers figure out some recommendations that could overcome the limitations of this study.

First of all, researchers suggested to have longer timeline to observe the effect of trust on promotion effectiveness. A longer timeline not only allows the researchers to observe the changes at more than one point of time, but also makes them reduce the impact of time-point changes on the results. Therefore, it is suitable to use longitudinal study for future research.

Secondly, researchers suggested that the scope of research could be extended to other types of website instead of merely focusing on e-commerce platform. This can bring a more accurate result and complete picture on the relationship between trust and promotion effectiveness.

Lastly, it is appropriate for researchers to have one-to-one communication with respondents to decrease the misunderstanding of measurement scale when answering the questionnaire. With the one-to-one communication, respondents could propose their doubts and researchers could explain and justify for them immediately.

5.6 Suggestion for Further Study

According to the limitations and recommendations mentioned above, researchers arrange some areas that haven't been investigated and expect further research could fill up the gap in the future.

Firstly, according to the result from R square, perceived RA trust only explained 44.3% of the variance of product promotion effectiveness, which means that there are still 55.7% of variance is explained by other factors. Hence, it is suggests that other researchers can try to figure out remaining unknown factors in future research.

Secondly, future researcher also can examine whether the demographic profile including habit if using online shopping, gender, age, education, occupation, income and using frequency would affect the relationship between perceived trust and product promotion effectiveness. For example, according to Filieri, Alguezaui, and McLeay (2015), they investigated the reasons why people would trust TripAdvisor and found that using experience would affect the perceived website trust. Hence, it is worthful for future researchers to examine the effect of using frequency on the relationship between perceived RA trust and product promotion effectiveness.

Lastly, for the purpose of obtaining more understanding of the relationship between perceive RA trust and product promotion effectiveness, it is better for future researchers to include interview. With the interview, researchers could have a deeper insight on how users truly thinking about and have an accurate realization on this topic.

5.7 Conclusion

This research is mainly focused on the relationship between perceived RA trust and product promotion effectiveness in Taiwan's e-commerce platform. First, this chapter conclude the result of analysis and discussed the major findings of each relationship. After that, researchers propose the managerial implications, limitations and recommendations of the research and hope future researchers could overcome the limitations and extend the scope of area to obtain a better research contribution.

APPENDIX I

SURVEY

PROMOTION EFFECTIVENESS OF RECOMMENDATION SYSTEM

I am Wang Chuan Yu, a student pursuing Master of Business Administration in Tung Hai University and UTAR. I am conducting a research project on the topic promotion effectiveness of recommendation system and highly-appreciate your co-operation in order to complete the survey.

The questionnaire is anonymous and confidential. This survey contains only two sections, which should take no more than 30 minutes to complete. All the information collected will be kept confidential. We will be more than willing to answer any questions or clarify any issues that need further explanation.

Thank you for your precious time and participation in this survey.

Yours Faithfully,

Wang Chuan Yu

Section A: Demographic Profile

Please tick according to the answer in the boxes that best represents you.

1. Do you the habit of using online shopping?

   □ Yes □ No

2. Gender

   □ Male □ Female

3. Age

   □ Below 15 □ 16-20 □ 21-25 □26-30 □31-35 □36-40 □41-45 □ Above 46

4. Education level

   □ High school □ College □ Graduated □ PHD

5. Occupation

   □ Student □ Military/Education □ Service □ Financial Institution □ Information Technology □ Advertisement/Design □ Art □ Free □ Medical □ Manufacture □ Agriculture □ Retirement □ Others _____

6. Income

   □ Below 20,000 □ 20,000-40,000 □ 40,000-60,000 □ Above 60,000

7. How often do you use online shopping in a week?

   □ Never □ 1-2 days □ 3-4 days □ 5-6 days □ Everyday

Section B: Construct Measurement

Please tick in the box best represent you based on Strongly Disagree (SD), Disagree (D), Neutral (N), Agree(A) and Strongly Agree (SA) on the following statement.

	Questions	**SD**	**D**	**N**	**A**	**SA**
CT1	This RA is like a real expert in assessing certain product.	□	□	□	□	□
CT2	This RA has the expertise to understand my needs and preferences about certain product.	□	□	□	□	□
CT3	This RA has the ability to understand my needs and preferences about certain product.	□	□	□	□	□
CT4	This RA has good knowledge about certain product.	□	□	□	□	□
CT5	This RA considers my needs and all-important attributes of certain product.	□	□	□	□	□
BT1	This RA put my interest first.	□	□	□	□	□
BT2	This RA keeps my interests in mind.	□	□	□	□	□
BT3	This RA wants to understand my needs and preferences.	□	□	□	□	□
IT1	This RA provides unbiased product recommendations.	□	□	□	□	□
IT2	This RA is honest.	□	□	□	□	□
IT3	I consider this RA to possess integrity.	□	□	□	□	□
PE1	The suggestion provided by RA is helpful.	□	□	□	□	□
PE2	The suggestion provided by RA were relevant to the product I want to search for.	□	□	□	□	□

PE3	I am interest in the product suggested by RA.	□	□	□	□	□
PE4	The product suggested by RA is what I like,	□	□	□	□	□
PE5	I like the product suggested by RA.	□	□	□	□	□
PE6	RA can help me to decide which product I want to buy.	□	□	□	□	□

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