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**FACTORS AFFECTING RE-USAGE INTENTIONS  
OF VIRTUAL COMMUNITIES  
SUPPORTING COSMETIC PRODUCTS**

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**ABSTRACT**

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Aim/Purpose	This study uses a cosmetic virtual community (VC) as the research context and the UTAUT model as the theoretical structure aim to explore factors affecting the re-usage intentions of VC members.
Background	The Internet use rate of VC was up to 50%, thereby implying that VC gained the attention of Internet users. Therefore, operating a VC will be an effective way to communicate with customers. However, to maintain an existing member is more efficient than creating a new one. As such, understanding determinants of VC members' re-use intentions becomes important for firms.
Methodology	Through an online survey, 276 valid responses were gathered. The collected data were examined by performing confirmatory factor analysis, structural equation modelling procedures, as well as the moderator analysis.
Contribution	This study shows the importance in the context of online cosmetics-related VC, which was rarely explored before. We provide issues for future research, despite the accumulated academic literature related to UTAUT and VC.
Findings	Results show that only performance expectancy and social influence significantly affecting re-usage intentions and only gender has moderating effects on the path from performance expectancy to VC re-use intention and from trust to VC re-use intention.
Recommendations for Practitioners	This study found that users emphasized performance expectancy most of all. A cosmetic product-related VC should introduce products abundantly, offer useful information, and help people accomplish tasks quickly and productively.

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**Recommendation for Researchers** Future researchers may use our findings to conduct further positivist research in the area of social influence using different subjects and research contexts.

**Keywords** virtual community, cosmetic products, UTAUT model, structural equation modelling approach, effort expectancy, performance expectancy, social influence, trust, re-usage intentions

## INTRODUCTION

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The business world has assumed that virtual communities (VC) can be leveraged to provide access to consumers and consumer data (Spaulding, 2010). According to the summary report of the Taiwan Network Information Center (TWNIC) in July 2016, the Internet use rate in Taiwan was up to 84.8%, whereas the VC use rate was up to 64.4%, thereby implying that VC gained the attention of Internet users. By contrast, the growth rate of VC from 2015 to 2016 increased 30%, thus indicating a promising business opportunity. Participation in a VC is related to the delivery of a variety of services to users within all sectors, to computer-supported collaborative tasks within information services, and to both informal and formal activities for professional updating, learning, and development (Levy, 1997). Pai and Tsai (2011) found that VC participation significantly enhances consumer loyalty intentions. Accordingly, applying VC in communication with online customers can be a significant approach for strategy planning.

A cosmetic-related VC is often provided on a cosmetic-related website, such as a customer forum. For example, UrCosme (<https://www.urcosme.com>), the first cosmetic-related portal site in Taiwan, allows cosmetic users to share their experiences in cosmetic product use. Currently, 103,700 articles of usage experience and 74,465 cosmetic product data are accumulated in its database, and 442,257 members have registered. UrCosme provides rich information about cosmetics and beauty care, which members can browse through before shopping. When buying cosmetic products, most consumers search for related information on the Internet, such as blogs and cosmetic-related websites, before making a decision (Insightxplorer, 2013). Compared with TV and magazines, cosmetic websites affect consumer purchase intentions the most, and after searching for cosmetic information online, more than 40% people would like to purchase afterward (Insightxplorer, 2013). Therefore, we consider that understanding the determinants of re-usage intention related to this kind of VC is important for encouraging customers who continuously wander in a cosmetic-related VC. Industries that want to apply VC as a marketing tool to perform marketing activities can then have a specific guideline for strategic planning.

Many theoretical models, such as the technology acceptance model (TAM), theory of reasoned action (TRA), and theory of planned behavior (TPB), have been applied to examine human behavioral intentions. Davis (1989) indicated that these models could successfully predict the acceptance of an innovation at about 40%. Superior to these models is the Unified Theory of Acceptance and Use of Technology model (UTAUT), a technology innovation acceptance model that can account for an impressive 70% of the variance in behavioral intention and 50% of actual usage (Venkatesh, Thong, & Xu, 2012). Thus, the authors of this study were motivated to use UTAUT as the theoretical framework to conduct an empirical study using cosmetic-related VC (an IT-based and self-supported business application) as the research context. The specific purposes of this study were: (1) to understand whether or not UTAUT can provide a solid theoretical basis for examining VC re-usage in cosmetics web business; (2) to investigate the factors affecting VC members' VC re-use intentions; and (3) to determine the potential moderating effects of demographic variables. Answers to these questions can assist industries to solve business promotion problems and to design a more effective online marketing strategy.

The remainder of this paper presents first the relevant studies on VC, the UTAUT model, and an overview of cosmetic products sales in the Literature Review section. In the Methodology section, we present the research method including our research model, development of the hypotheses, questionnaire design, and data-collecting process. We discuss in detail the analysis results in the Analysis

and Result section. Finally, we provide study implications and future research avenues in the Discussion and Conclusion section.

## LITERATURE REVIEW

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### *VIRTUAL COMMUNITY (VC)*

A VC is defined as a group of people who communicate through electronic group discussions (Donath, 1999). Rothaermela and Sugiyama (2001) conducted an excellent review of the definitions of a VC from previous research. A VC is similar to a community except that it is formed through an electronic communication medium and is not bound by space and time (Tonnies, 1967). A VC is also similar to an organization as it enables social interactions among its members using various Internet tools and exhibits certain community standards and rules (Lawrence, 1995). Hagel and Armstrong (1997) emphasized the relationship building aspect of a VC, because a VC provides an opportunity to people with similar interests to gather together unrestrained by time and space. A VC has also been considered as more than a place of gathering people together. According to Hagel (1999), a VC began as spontaneous social events in a virtual environment where people gathered around common areas of interest and engaged in shared discussions, which persisted and accumulated over time and led to a complex network of personal relationships and an increasing identification with the group as a community. Namely, these spontaneous social events provide the foundation for an attractive business model. Furthermore, a VC can be a significant source of social influence on purchase intentions (Bickart & Schindler, 2001). Kannan, Chang, and Whinston (2000) summed up the function of VCs as e-communities made up of individuals who aggregate into a critical mass driven by common needs that could be social as well as commercial.

Many researchers have recommended the use of VC to influence customer decision making in online shopping from the marketing perspective. For example, Sun and Yang (2009) studied how a VC could influence people's online shopping behaviors and found that consumer trust in sellers as revealed in a VC affects consumers' purchase intentions. De Valck, Van Bruggen, and Wierenga (2009) studied VC in terms of its possible influence on customer decision making from the marketing perspective. Jiang, Ma, Fang, and Li (2013) pointed out that considering the use of a VC as a marketing tool is a logical choice for any business model. Likewise, Kim, Kim, and Huang (2014) studied QQ, the largest VC in China, based on social capital theory to assess how social identification and knowledge creation influence social shopping behaviors. They claimed that a VC could provide opportunities for businesses that want to seek benefits.

Individuals' interaction with a VC enables companies to gather information about consumers' tastes, preferences, trends, concerns, and other personal and collective data to help companies redefine and adapt their virtual social network profiles and improve their supply of products/services. To assist industries that want to operate VCs, this study aims to identify the useful factors affecting VC members' re-use intentions by using the example of cosmetics online business from the marketing perspective.

### *UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY MODEL (UTAUT)*

In past decades, researchers conducted studies on a specific type of acceptance – information technology adoption. They developed sophisticated models that combine innovation and the advantages of other models. For example, TAM offers a basic framework to explain the influence of external factors on behavioral intention (Davis, 1989). Bandura (1977) proposed social cognitive theory (SCT), which states that people learn by observing others and that environment, behavior, and cognition are the important factors influencing individuals on whether or not to perform a specific action. According to innovation diffusion theory (IDT), diffusion is the process by which an innovation is communicated through certain channels over time among participants in a social system (Rogers, 1962).

Venkatesh, Morris, Davis, and Davis (2003) combined eight widely accepted theory frameworks including TAM, SCT, IDT, TRA, TPB and other revised models into their comprehensive research model to better understand individual adoption and use intention of a specific technology. They integrated the advantages of each model and proposed an entirely new model called UTAUT. The previous models were able to successfully predict the acceptance of an innovation for about 40% (Davis, 1989). However, UTAUT can account for an impressive 70% of the variance in behavioral intention and about 50% in actual usage (Venkatesh et al., 2012).

UTAUT posits that performance expectancy, effort expectancy, social influence, and facilitating conditions are determinants of behavioral intentions or use behavior, and that gender, age, experience, and voluntariness of use have moderating effects on the acceptance of internet technology (see Figure 1). It provides not only useful insights, appropriate explanations, and implications to understand customers' behavioral intention but also a convenient tool for managers to assess the likelihood of success for introducing new technology.

UTAUT also helps firms to understand the drivers of acceptance to proactively design interventions (including training, marketing, etc.) targeted at populations of users that may be less inclined to adopt and use new systems (Dyer, 2008). UTAUT has been applied in a variety of behavioral studies, such as e-mail (Gefen & Straub, 1997), Web-based shopping (Van Slyke, Comunale, & Belanger 2002), Internet banking (Lichtenstein & Williamson), rural tourism (San Martín & Herrero, 2012), mobile learning (Thomas, Singh, & Gaffar, 2013), online booking system (Escobar-Rodríguez & Carvajal-Trujillo, 2014), and so on. All of these studies showed that UTAUT was suitable for their works.

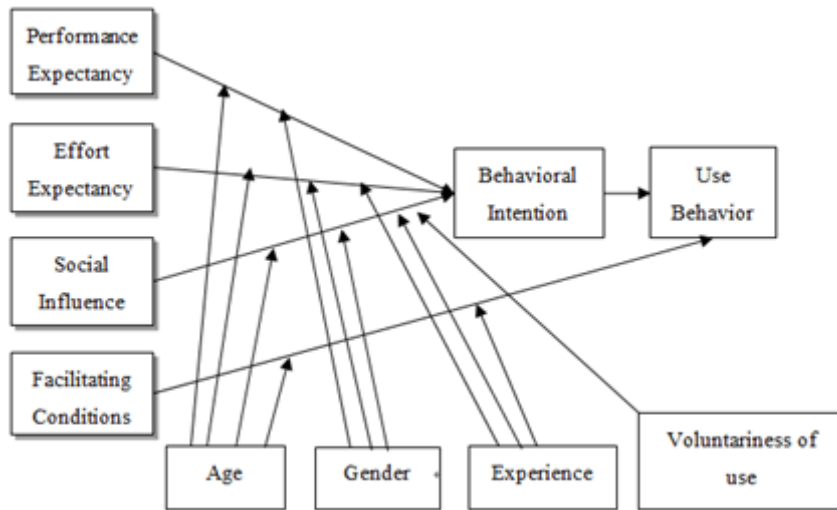


Figure 1. UTAUT model

**OVERVIEW OF COSMETIC PRODUCT SALES**

According to the regulation of the cosmetic directive announced by Executive Yuan in 2002, cosmetic products are substances or mixtures of substances intended to be placed in contact with the external parts of the human body (epidermis, hair system, nails, and so forth) or with the teeth and mucus membranes of the oral cavity with a view to exclusively or mainly clean them, perfume them, change their appearance, protect them, keep them in good condition, or correct body odor (Buzek & Ask, 2009). In summary, cosmetic products can be considered as make-up and skin care products.

Since the 2008 financial crisis, most countries and regions in the world, including Taiwan, have been influenced by globalization. However, the sales of cosmetics did not seem to be much affected. Instead, the overall sale of cosmetics was up to \$288 billion, with \$4.4 billion generated in Taiwan. According to the Industrial Development Bureau Ministry of Economic Affairs Taiwan, the production

value of cosmetics increased to nearly 8.9 billion until 2011 (cosmetic.org.tw, 2014). The data monitor showed that the global make-up market earned the total revenue of \$380 billion in 2012, representing a compound annual growth rate of 4.1% between 2008 and 2012. This growth rate infers that market consumption volumes increased to 0.46 billion units in 2012. According to the Industry and Technology Intelligence Service, Taiwan generated a revenue of \$570 million and a growth rate of 7.22% in 2013. Despite the economic regression, cosmetic sales continue to remain in a relatively advantageous situation. Specifically, the young generation should be considered because they account for 24.9% of the entire cosmetic consumption (Wu & Chen, 2012).

Previous researchers conducted studies on cosmetics business. Kumar, Massie, and Dumonceaux (2006) examined the comparative innovative business strategies of major players and found that each cosmetic company was unique. Each firm offered something different to the industry, such as selling method, marketing strategy, product line, and distribution channel. Sundari and Murugan (2011) suggested that the following key factors could increase cosmetics:

- Increased customer spending power
- Increased demand because of people's awareness
- Key demographic factors
- Entry of herbal and organic products
- Lifestyle and climactic changes
- Massive advertising and promotional strategies

One of the research purposes of our study is to assist the cosmetics industry in solving online promotion problems and to design a marketing strategy through the Internet. Among these key factors, key demographic factors and massive advertising and promotional strategies are related to the marketing field. Sundari and Murugan did not show a clear image of how the promotional strategy would be planned using the Internet and what key demographic factors would influence business growth in the context of the Internet.

Summarizing the literature review, this paper finds that the implementation of a VC is a significant way to encourage members to purchase cosmetic products. However, limited studies have paid attention to cosmetic-related VCs so far. Therefore, this paper attempts to fill this research gap by systematically addressing the study purposes. The UTAUT model is adapted to explore the factors affecting the re-usage intentions of VCs provided by e-retailers of cosmetic products.

## METHODOLOGY

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### *RESEARCH MODEL*

This study focuses on the individual's viewpoint. Drawing on the UTAUT model, this paper aims to predict users' VC re-usage intention in the context of online cosmetic product purchase. One purpose of this research is to determine if the original constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) of UTAUT affect VC re-usage intention. As the construct of facilitating conditions affects user behavior directly but not behavioral intention in the original UTAUT model, it is excluded from our research model. Trust is recognized as a critical factor in virtual environment (Sun & Yang, 2009), and the influence of trust on VC re-usage intention is worthy to understand. Therefore, this study adds trust as an extra construct in the research model.

Two original moderators of UTAUT – experience and voluntariness – are also eliminated because VC usage is voluntary based. All the respondents of this study are members who have a rich experience of using a VC (a detailed description of these experiences is presented in the sampling procedure section). Therefore, the respondents can hardly be divided into different groups. Previous studies (e.g., Touray, Salminen, & Mursu, 2013; Marumbwa, 2014) claimed that the demographic variables

are usually the significant moderators of technology usage. Therefore, educational level is included with gender and age as moderators to measure their moderating effects on the relationships between antecedents and behavioral intentions. Accordingly, our operational research model is presented in Figure 2.

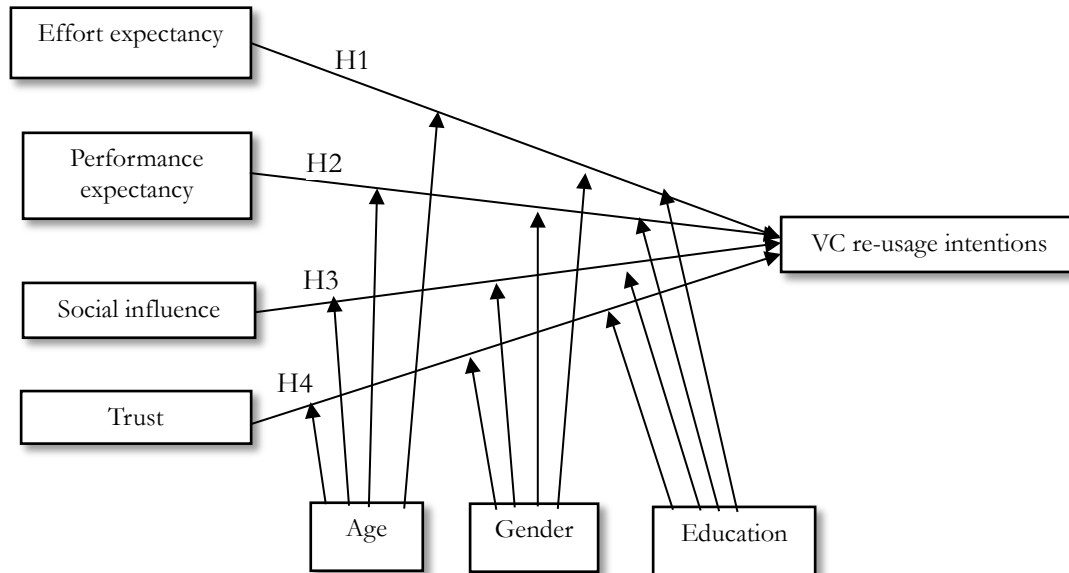


Figure 2. Our research model (revised UTAUT)

## HYPOTHESES

### Behavioral intentions

Hale, Householder, and Greene (2002) posited that the strongest or most proximal predictor of volitional behavior is one's behavioral intention. A central factor in the UTAUT is one's intention to perform a volitional behavior, which has been hypothesized and verified to mediate the effects of performance expectancy, effort expectancy, and social influence on behavior by many studies (e.g., AbuShanab & Pearson, 2007; Wang & Wang, 2010; Martins, Oliveira, & Popovič, 2014). In using VC promotion for the cosmetics industry, understanding users' re-usage intentions rather than their usage intention is more important. In encouraging users' subsequent purchase, understanding users' intention to continuously wander into a cosmetic-related VC is more beneficial than examining one-time usage. Thus, the authors define VC re-usage intention as follows: when an experienced VC member wants to buy cosmetic products, he/she continuously uses VC to search for information and obtain advice for the purchase.

### Performance expectancy

Performance expectancy is defined as the degree to which an individual believes that using a particular system will improve him/her to attain gains in job performance (Venkatesh et al., 2003). In other words, individuals believe that using a particular system can help them to accomplish their tasks more quickly, effectively, productively, and easily than before. In this study, VC members consider that using a VC is useful to search for cosmetics information easily, quickly, effectively, and productively and to gain assistance to purchase cheap, certified, and suitable products.

### **Effort expectancy**

Effort expectancy is the degree of ease associated with the use of a particular system (Venkatesh et al., 2003). Effort expectancy explains how comfortable people feel and how easily a particular system can be adopted and used in their job. This idea is derived from TAM and is similar to perceived ease of use. In this case, it means the degree to which VC members believe that using a VC is simple for them. VC members understand how using it is easy and how to interact with others. They also consider that a VC is easy to learn and understand.

### **Social influence**

Social influence originally came from TRA, and it is also included in TPB and TAM2. Social influence is defined as the extent to which an individual perceives that important others believe he/she should use a new information system (Venkatesh et al., 2003). This variable is important at the early stages of experience with technology, with its effect diminishing over time. In this paper, social influence is defined as the extent to which members' VC usage intention is influenced by their important others who believe/suggest that they should use a VC to obtain relevant information before purchasing cosmetic products.

### **Relationship between predictors and VC re-usage intention**

The UTAUT model hypothesizes that performance expectancy, effort expectancy, and social influence directly affect behavioral intention. Previous researchers claimed that these three constructs are significant in affecting individuals' behavioral intention to use new technology in different fields (e.g., Moore & Benbasat, 1991; Venkatesh & Davis, 2000; AbuShanab & Pearson, 2007; Wang & Wang, 2010; Martins et al., 2014). Following the previous propositions, this study proposes the following hypotheses:

**H1:** Performance expectancy affects users' cosmetic-related VC re-use intention.

**H2:** Effort expectancy affects users' cosmetic-related VC re-use intention.

**H3:** Social influence affects users' cosmetic-related VC re-use intention.

### **Trust and its influence on VC re-usage intention**

Sztompka (1999) noted that trust is one type of social construction that originates from interpersonal relationships. Recognized as a critical success factor in online shopping, trust affects customers' intention to purchase online (Sun & Yang, 2009). Previous research focused on the correlation between trust and individual online intention. For example, Shadkam and O'Hara (2011) indicated that trust leads to desirable outcomes, such as increased intention to purchase and highly positive buying decisions, from online stores. Gefen, Karahanna, and Straub (2003) proved that trust has a positive correlation between members and websites/VCs. In this study, we focus on cosmetics-related VC. Moreover, we consider that VC members search for a long time for relevant cosmetics information in a VC when they believe it is trustworthy in providing excellent information and professional knowledge that meets their needs and will not disclose personal information. Accordingly, this study proposes the following hypothesis:

**H4:** Trust in a cosmetic related VC affects the users' VC re-use intention.

### **Moderating effects**

According to the findings of previous studies (e.g., Venkatesh & Morris, 2000; Lynott & McCandless, 2000; Venkatesh et al., 2003; Wang & Wang, 2010; Miller, 2012), age and gender have been theorized to play moderating roles in the effects of performance expectancy, effort expectancy, and social influence on behavioral intention. Previously, researchers claimed that demographic variables are usually the significant moderators of technology usage. For example, Touray et al. (2013) found that the effect of education on behavioral intention toward the Internet has a significant difference in two

different countries. Marumbwa (2014) explored the moderating effects of demographic variables on frequency of use, use of applications, and acceptance of system services, and found that education has positive moderating effects. Therefore, we propose the following hypotheses:

- H5a:** Age plays a moderating role in the effect of performance expectancy on users' cosmetic-related VC re-use intention.
- H5b:** Gender plays a moderating role in the effect of performance expectancy on users' cosmetic-related VC re-use intention.
- H5c:** Education plays a moderating role in the effect of performance expectancy on users' cosmetic-related VC re-use intention.
- H6a:** Age plays a moderating role in the effect of effort expectancy on users' cosmetic-related VC re-use intention.
- H6b:** Gender plays a moderating role in the effect of effort expectancy on users' cosmetic-related VC re-use intention.
- H6c:** Education plays a moderating role in the effect of effort expectancy on users' cosmetic-related VC re-use intention.
- H7a:** Age plays a moderating role in the effect of social influence on users' cosmetic-related VC re-use intention.
- H7b:** Gender plays a moderating role in the effect of social influence on users' cosmetic-related VC re-use intention.
- H7c:** Education plays a moderating role in the effect of social influence on users' cosmetic-related VC re-use intention.

The construct of trust has been demonstrated to be affected by demographic factors, such as age, education (e.g., Gönül, Carter, & Wind, 2000; Christensen & Lægheid, 2005), and gender (Vineburgh, 2010). Accordingly, we propose the following hypotheses:

- H8a:** Age plays a moderating role in the effect of trust on users' cosmetic-related VC re-use intention.
- H8b:** Gender plays a moderating role in the effect of trust on users' cosmetic-related VC re-use intention.
- H8c:** Education plays a moderating role in the effect of trust on users' cosmetic-related VC re-use intention.

### ***QUESTIONNAIRE DEVELOPMENT***

The questionnaire used in this study was developed according to existing literature on UTAUT and trust (e.g., Venkatesh et al., 2003; Lu, Zhao, & Wang, 2010; Wu, Chen, & Chung, 2010) with VC re-use scenarios in mind. The items were created on the basis of previous scholars' instruments to reflect consumers' general dispositions toward behavioral intentions. We translated the original instrument from English to Chinese, so that we could target Taiwanese respondents. To attain effective translation, we first asked an English teacher (a Taiwanese who is proficient in Chinese and English) to edit the translated Chinese version. Then, we asked another English teacher (also a Taiwanese) to translate this edited instrument from Chinese to English to check whether or not the semantics of this English version is consistent with that of the original instrument. Our questionnaire was completed after conducting the translation processes repeatedly. All items were assessed with a five-point scale ranging from "strongly disagree" (1) to "strongly agree" (5). Table 1 presents the references for each construct and the previous instruments for the questionnaire items.



**Table 1. Questionnaire items and references**

Constructs	Items	References
Performance expectancy	PE1_1: Using VC helps me to search for cosmetic products. PE2_2: Using VC enables me to search and buy cosmetic products quickly. PE3_3: Using VC improves the result of searching for cosmetic products. PE 4_1: Using VC increases the options for purchasing cosmetic products.	Venkatesh et al., 2003
Effort expectancy	EE1_1: I clearly understand the way to interact in VC. EE2_1: It is easy for me to use a VC to search for cosmetic products for purchasing. EE3_1: The operation of VC is easy to understand. EE4_1: It is simple for me to learn how to operate a VC.	Venkatesh et al., 2003
Social influence	SI1_1: I use VC because my friends use it too. SI2_1: People who are important to me think of I should use VC. SI3_3: People who are influential to me use VC, and so I use it too. SI4_4: In general, friends in my social network support me in using VC.	Venkatesh et al., 2003
Trust	TR1_1: I believe that VC can provide excellent information and professional knowledge to members. TR2_1: I believe that VC can provide information and professional knowledge that meets members' needs. TR3_1: I believe that VC will not disclose my personal information. TR4_1: I think that VC is trustworthy.	Lu et al., 2010; Wu et al., 2010
VC re-use intention	BI1_1: I would like to spend more time in VC. BI2_1: I intend to use VC to search for cosmetic product information next time. BI3_1: I predict that I will use VC to search for cosmetic product information once more. BI4_1: I plan to use VC once more to search for cosmetic information.	Venkatesh et al., 2003; Wu et al., 2010

### ***SAMPLING PROCEDURE***

The original questionnaire was pretested before the formal sampling procedure. The purpose of this step was to examine content readability and validity. The pretest was conducted on 10 people (one professor, three PhD students who were both scholars and experts in the IT and retail industries, and six VC users). Based on their comments, the questionnaire was modified slightly and content readability and validity were confirmed. A pilot analysis was then conducted using SPSS 12.0 to examine reliability and initial construct validity. This pilot test used Cronbach's alpha and factor analysis with data from a student sample of 50 (those who all had experience in VC use) through convenient sampling procedures. The results showed that all Cronbach's alpha values were above the recommended 0.7 threshold (0.871 for performance expectancy; 0.917 for effort expectancy; 0.800 for social influence; 0.719 for trust; 0.899 for VC re-use intention; while total Cronbach's alpha = 0.816) by Hair, Black, Babin, Anderson, and Tatham (2006). Therefore, reliability was initially confirmed.

The collected data were then examined by performing exploratory factor analysis (EFA) to examine if the items produced the expected number of factors and if the individual items were loaded on their appropriate factor as expected (Lee, 2009). The first EFA showed that five factors were generat-

ed as expected, but the loading of one item, BI1\_1, was not greater than 0.5 (0.469). We eliminated this item and performed the second EFA. In the second EFA, Kaiser–Meyer–Olkin (KMO) and Bartlett’s tests were utilized first to determine if the data were suitable for conducting the factor analysis. The results of the KMO and Bartlett’s tests shown in Table 2 indicate that the data were appropriate for factor analysis. In the final EFA, varimax rotation was applied using the remaining 19 items that converged in five iterations. Five factors were extracted with all factor loadings higher than 0.50, and the items were loaded on their appropriate factor as expected (see Table 3). Therefore, the initial construct validity was also confirmed.

**Table 2. KMO and Bartlett’s Test**

Kaiser–Meyer–Olkin Measure of Sampling Adequacy		<b>.823</b>
Bartlett’s Test of Sphericity	Approx. Chi-Square	3311.432
	df.	171
	Sig.	<b>.000</b>

**Table 3. Rotated component matrix**

	Component				
	1	2	3	4	5
PE3_1	<b>.862</b>	.147	.227	.039	.075
PE1_1	<b>.853</b>	.119	.219	.009	.055
PE2_1	<b>.823</b>	.149	.205	–.018	.111
PE4_1	<b>.779</b>	.130	.216	–.053	.103
EE3_1	.153	<b>.906</b>	.040	.059	.016
EE2_1	.108	<b>.897</b>	.091	.036	.030
EE4_1	.214	<b>.846</b>	.002	.057	.124
EE1_1	.054	<b>.744</b>	.145	.077	.055
BI3_1	.320	.111	<b>.898</b>	–.121	.080
BI2_1	.308	.119	<b>.889</b>	–.102	.119
BI4_1	.329	.095	<b>.875</b>	–.092	.088
SI2_1	–.091	.014	–.022	<b>.843</b>	.076
SI3_1	–.022	–.095	–.013	<b>.825</b>	.064
SI4_1	–.001	.127	–.062	<b>.726</b>	.011
SI1_1	.078	.156	–.159	<b>.626</b>	–.059
TR2_1	.098	.098	–.110	.185	<b>.782</b>
TR4_1	.097	–.029	.278	–.137	<b>.743</b>
TR1_1	.068	.209	.019	.222	<b>.710</b>
TR3_1	.052	–.084	.104	–.128	<b>.678</b>

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization. <sup>a</sup> Rotation converged in five iterations

After assessing the scale reliability and validity, the formal sampling process began with an online survey. Data were collected from the PTT Bulletin Board System based in Taiwan and the sharing forum on UrCosme (<https://www.urcosme.com>) within a limited period from January to May 2014.

To exclude alternative explanations and to increase internal validity, we targeted VC members who had experience in using VC. Finally, data were gathered from 285 respondents. After eliminating invalid responses (e.g., missing data or identical answers in the entire question response), 276 valid data points remained, achieving an effective response rate of 96.8%.

A review of the sample indicates that 162 (58.7%) of the respondents were female and 114 (41.3%) were male. Majority of the respondents were in the 21–30 age range (77.9%) and had a high level of education (college and graduate school) (95.7%). All of the respondents were experienced VC users. A very high percentage (88.1%) of the respondents had experience in using VC for more than six months and only 11.9% had experience of using VC for less than six months.

## ANALYSIS AND RESULTS

This study followed the two-step procedure suggested by Anderson and Gerbing (1988). The measurement model was used by conducting confirmatory factor analysis (CFA) to measure convergent and discriminant validity. The structural equation model was then estimated for hypothesis testing.

### *ANALYSIS OF THE MEASUREMENT MODEL*

In this step, CFA was conducted iteratively by using AMOS 22.0 with the maximum likelihood method. In the first CFA, two items (TR3\_1 and TR4\_1) are eliminated because their factor loadings ( $\lambda$ ) do not exceed 0.5. The final version of the questionnaire includes 17 items.

Through the final version of this questionnaire, the second CFA yields a chi-square value of 89.01 with 71 degrees of freedom ( $P = 0.073 > 0.05$ ), thus indicating good fitness. In addition, the ratio of chi-square to degree of freedom obtains a value of 1.254, which is less than the suggested value of 5 (Hair et al., 2006). The other indices also provide evidence of good model fit (CFI = 0.991, GFI = 0.956, AGFI = 0.935, RMSEA = 0.030). Thus, all of the latent variables appear to have been adequately measured by respective indicators.

In the reliability test, the Cronbach's alpha scores are greater than 0.7 (0.766–0.963), which indicates that each construct exhibits strong reliability. In addition, all the indicator factor loadings ( $\lambda$ ) are significant and exceed 0.5 (0.52–0.98). The composite reliability (CR) scores also exceed 0.7 (0.851–0.976). The average variance extracted (AVE) by each construct exceeds the threshold of 0.5 (0.589–0.932) (Table 4). Therefore, convergent validity is confirmed.

**Table 4. Construct reliability and convergent validity**

Construct	Item	Factor loading ( $\lambda$ )	Composite reliability (CR)	AVE	Cronbach's alpha
Performance expectancy	PE1_1	0.84	0.928	0.764	0.896
	PE2_1	0.83			
	PE3_1	0.89			
	PE4_1	0.76			
Effort expectancy	EE1_1	0.62	0.925	0.755	0.887
	EE2_1	0.90			
	EE3_1	0.94			
	EE4_1	0.81			
Social influence	SI1_1	0.52	0.851	0.589	0.766
	SI2_1	0.82			
	SI3_1	0.75			
	SI4_1	0.61			
Trust	TR1_1	0.92	0.881	0.789	0.786
	TR2_1	0.71			
VC re-usage intention	BI2_1	0.96	0.976	0.932	0.963
	BI3_1	0.98			
	BI4_1	0.90			

Discriminant validity was evaluated using the criteria recommended by Fornell and Larcker (1981). Table 5 lists the correlations among the constructs, with the square root of the AVE on the diagonal. All diagonal values exceed the inter-construct correlations. The results suggest an adequate discriminant validity of the measurements.

**Table 5. Discriminant validity**

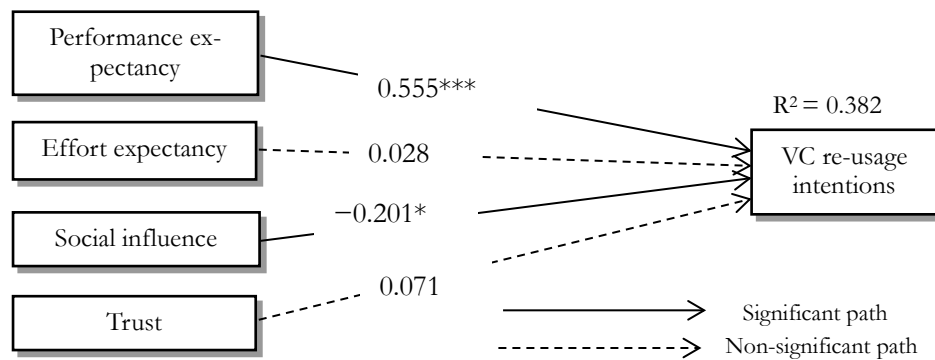
	<b>PE</b>	<b>EE</b>	<b>SI</b>	<b>TR</b>	<b>BI</b>
<b>PE</b>	<b>0.874</b>				
<b>EE</b>	0.322	<b>0.869</b>			
<b>SI</b>	-0.026	0.127	<b>0.768</b>		
<b>TR</b>	0.174	0.216	0.202	<b>0.888</b>	
<b>BI</b>	0.565	0.225	-0.184	0.121	<b>0.965</b>

Note: Figures in italics are the square roots of the AVE.

**ANALYSIS OF THE STRUCTURAL MODEL**

In this step, AMOS 22.0 was used for hypotheses testing, and structural equation modeling was performed to test the research model. The proposed model yields a chi-square value of 137.89 with 109 degrees of freedom ( $P = 0.032 < 0.05$ ), thus indicating a lack of fit. Alternatively, the ratio of chi-square to degree of freedom is used. It obtains a value of 1.265, which is less than the suggested value of 5 (Hair et al., 2006). The other indices provide evidence of good model fit (CFI = 0.991, GFI = 0.945, AGFI = 0.923, RMSEA = 0.031).

As shown in Figure 3, the hypothesized path effects of performance expectancy ( $\beta = 0.555, t = 8.989, p = 0.000$ ) and social influence ( $\beta = -0.201, t = -3.252, p = 0.001$ ) are significant on VC re-use intention. Therefore, H1 and H3 are supported, and the effects of effort expectancy ( $\beta = 0.028, t = 0.488, p = 0.626$ ) and trust ( $\beta = 0.071, t = 1.221, p = 0.222$ ) on VC re-use intention are not supported.



Notes: \*  $t > 1.960, p < 0.05$ ; \*\*  $t > 2.576, p < 0.01$ ; \*\*\*  $t > 3.291, p < 0.001$

**Figure 3. Result of the structural model analysis**

**ANALYSIS OF MODERATING EFFECTS**

To test the hypotheses of the moderating effects of the selected demographic variables, the multi-group analysis suggested by Jöreskog and Sörbom (1993) was conducted. In the test result of the moderating effects of gender, the chi-square difference ( $\Delta\chi^2 = 12.914, p < 0.05$ ) indicates a significant difference between the male and female groups. This finding shows significant moderating effects on the relationships between performance expectancy and VC re-usage intention ( $\Delta r_1 = -0.261$  at  $t = 2.995, p < 0.01$ ) and between trust and VC re-use intention ( $\Delta r_4 = 0.287$  at  $t = 1.967, p < 0.05$ ) (see Figure 4).

With regard to the moderating effects of age, the chi-square difference ( $\Delta\chi^2 = 2.725$ ,  $p > 0.05$ ) shows a non-significant difference between the young and old groups.

Concerning the moderating effects of education level, the sample used shows a high level of education ( $n = 264$ , 95.65%). The high percentage of samples with a high educational level were prevalent in the VC literature (e.g., Huang & Yen, 2009; Wu, 2010) resulting in the failure of adopting multi-group analysis for AMOS. Therefore, the moderating effect of education level was not tested in our study.

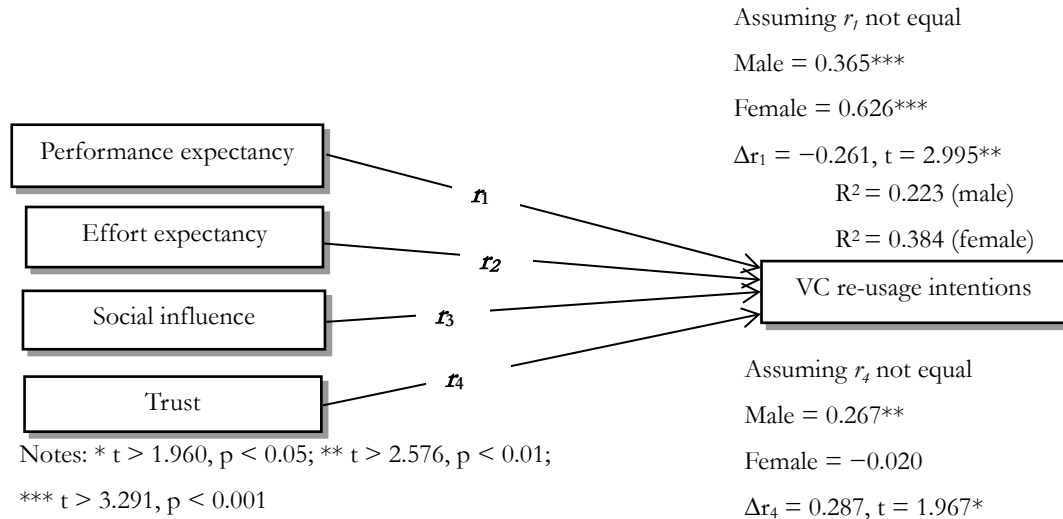


Figure 4. Analysis of moderating effects

## DISCUSSION

The main purpose of this study is to examine the suitability of the UTAUT model in the VC context for the cosmetics industry and to measure the influencing effects of the proposed predictors on VC re-usage intentions. The results of the structural model analysis show that H1 and H3 are supported, thus, indicating that performance expectancy positively affects VC re-usage intention and social influence negatively affects VC re-use intention in online cosmetics business. However, the expected path effects of effort expectancy and trust on VC re-usage intention are not significant in our study.

In our study, all the respondents are VC members and voluntary users who have great experience in VC usage. Through usage experience, they become familiar with VC operation and learn about the reputation of a specific VC. Accordingly, effort expectancy and trust are not the main considerations in VC re-usage intention. In other words, the influencing effects of effort expectancy and trust on VC re-usage intentions might become weak as members are familiar with a VC.

Second, the influencing effects of performance expectancy on VC re-usage intention are positive and most significant in our structural model analysis. That is, VC members consider that using a VC is useful for searching information on cosmetic products easily, quickly, effectively, and productively, and for gaining more product options. Thus, members enhance their willingness to use VC continuously before making a decision to purchase cosmetic products. Performance expectancy is the most influential factor in this study for attracting users to navigate a VC repeatedly. This finding is consistent with the results in some previous studies (e.g., Madigan et al., 2016; Tarhini, El-Masri, Ali, and Serrano, 2016).

In addition, previous researchers found that social influence positively affects behavioral intention to use new technology (e.g., Moore & Benbasat, 1991; Venkatesh & Davis, 2000; AbuShanab & Pearson, 2007; Wang & Wang, 2010; Martins et al., 2014). However, the influencing effects of social influence on VC re-usage intention are negative in our study. The possible explanation for this result

may be the familiarity with a VC, which is similar to our clarification of the non-significant influencing effects of effort expectancy and trust. Venkatesh et al. (2003) suggested that social influence is important at the early stages of technology experience, with the effect diminishing over time. Our results are different from those of previous research (e.g., Moore & Benbasat, 1991; Venkatesh & Davis, 2000; AbuShanab & Pearson, 2007; Wang & Wang, 2010; Martins et al., 2014), because our sampling targets are experienced users. Researchers have indicated that people emphasize on various benefits when using a VC to search for cosmetic products (e.g., Athiyaman, 2002; Dholakia, Bagozzi, & Pearo, 2004). When members are familiar with a VC or when information is transparent, they will not rely on the social benefits of participation and group referent but on other benefits, such as saving in time and effort. For example, regular and experienced VC members are more likely to continuously use a VC than new users even when negative social influences (important others do not use it or do not want the individual to use it) are present, because the former knows that they can gain useful information easily, quickly, effectively, and productively using a VC.

Finally, the tests of hypothesized moderating effects show that only H5b and H8b are supported.

First, the moderator of gender in H5b moderates the influencing effects of performance expectancy on VC re-usage intention. The findings indicate that females' VC re-usage intention is more affected by performance expectancy than that of male. According to Venkatesh and Morris (2000), compared with that of women, men's technology usage decision is strongly influenced by the perceived usefulness of a new software system. However, in technology re-usage, our finding is reversed. In comparing a new usage behavior, individuals' re-usage behavior does not focus on the technology itself but on the products searched/discussed in a VC. In general, females processed information in a more exhaustive and interpretive way, relying on a broad variety of information. Females processed information resorting more to sources in the external world rather than to their own judgments (Meyers-Levy, 1988; Kim, Lehto & Morrison, 2007). Thus, women using a cosmetic-related VC may care highly about whether or not a VC can provide them with useful information on effectiveness, selectivity, and price. If a VC can meet their expectation greatly, they will enhance their willingness to use the VC repeatedly. By contrast, men are taught to be assertive (Hofstede, 1980; Gefen & Straub, 1997). Gefen and Straub (1997) confirmed that women perceive a higher value for "perceived usefulness" than men. As the results, men re-use a VC mostly can be considered for confirming their viewpoints but not to gain useful information. Therefore, the expectation of VC performance for men is weaker than that for women.

Second, as hypothesized, gender in H8b moderates the effect of trust on VC re-use intention. Wang and Yamagishi (2005) revealed in their study that male participants' high trust toward unknown partners had a strong relationship with expectation of reciprocity from their partners, whereas female participants had low trust toward unknown partners. Sanchez-Franco, Ramos, and Velicia (2009) pointed out that the influence of trust on loyalty is significantly stronger for males than for females. Their arguments seem supported in our study, which indicates that the moderating effect on the path effect of trust on VC re-use intention is significantly stronger in men than in women. Broos (2005) presented that males are found to have less anxiety of using information and communication technology. Hargittai and Shafer (2006) found that men's self-assessed skill is significantly higher than that of women. Compared with men, women don't consider themselves as ready for promotions, they predict they will do worse on tests, and they generally underestimate their abilities (Kay & Shipman, 2014). Accordingly, we consider that, essentially, men are more confidential about their own skills/knowledge than women. Once men believe that a VC provides professional skills/knowledge, they are likely to produce stronger trust than women, further affecting their re-usage intention. In this study, the remaining two items for trust construct are related to professional skills and knowledge; therefore, the result seems self-explanatory that men tend to easily re-use VC because of their trust.

Finally, the moderator of age is non-significant in our study. The reason for this finding may be due to the sample comprising mostly of young ( $n = 253, 91.67\%$ ) individuals. The similarity of respondents caused the measurement of such moderating effects meaningless.

### ***CONTRIBUTIONS***

For academics, this paper provides issues for future research, despite the accumulated academic literature related to UTAUT and VC. For example, social influence used to be considered as a key factor to positively stimulate behavioral intentions. However, it shows a negative influence in our study. Some researchers pointed out that social network and social influence have become more complex and inconsistent, and thus social influence should not be simplified into a model (e.g., Lee, Lee, & Lee, 2006; Hamre, 2008). Future researchers may use our findings to conduct further positivist research in the area of social influence using different subjects and research contexts.

In practice, the purpose of firms building a VC is for communicating with customers. Maintaining an existing customer relationship is more efficient than creating a new one (Mendoza, Marius, Pérez, & Grimán, 2006). Thus, understanding the factors affecting users' VC re-usage intentions toward VC in the future is more important than exploring the factors for attracting new users. One valuable contribution of this study is to show such importance in the context of online cosmetics-related VC which was rarely explored before. Using cosmetics-related VC as an example, this study found that users emphasized on performance expectancy most of all. A cosmetic product-related VC should introduce products abundantly (for selectivity), offer useful information (e.g., price comparison, effective introduction, etc.), and help people accomplish tasks quickly and productively (e.g., fast linking to product websites), while allowing free browsing for information (Guo & Barnes, 2007; San Martín & Herrero, 2012).

Although effort expectancy and trust are not significant determinants for VC re-usage intention in our study, they remain important factors. The authors attribute such result to using experienced VC users and the dependent variable of re-usage intention. Al-Gahtani, Hubona, and Wang, (2007) found that with the increased years of experience, ease of use becomes less important in predicting behavioral intentions. And as we have discussed in previous section, the influencing effects of effort expectancy and trust on VC re-usage intentions might become weak as members are familiar with a VC. However, Kim, Shin and Lee (2009) found that the perception of initial trust is vital in promoting personal intention to use mobile banking services. Gefen et al. (2003) also found that potential customers (inexperienced customers) were influenced by their trust in the e-vendor. Therefore, even though effort expectancy and trust failed to be supported as two important predictors of VC re-usage intention in our study, for the early development stage of a VC, we suggest for developers to maintain the features of easy use (for effort expectancy), security (for trust), and professionalism (for trust), which could prevent members' disappointment in a VC and final failure.

According to our findings on the moderators, VC managers should design the arrangement of the displays, including products and information, for different genders. Our high-percentage of young and highly educated individuals in the sample is consistent with previous VC related research (e.g., Sangwan, 2005; Huang & Yen, 2009; Wu, 2010; Chen et al., 2014), which declared that most VC members were young and highly educated. Accordingly, VC should be designed to meet the demands of young and highly educated users.

### ***LIMITATION***

First, although the VC has been widely used in the world, this research targets only the VC members in Taiwan. In the VC literature, study samples collected in Taiwan usually have the features of a high percentage of young and highly educated individuals compared with those in other countries. Therefore, the evaluated and identified factors on re-usage intentions of VC members are also restricted to Taiwan. We suggest that future researchers conduct surveys to compare the results with those in other countries.

Second, the modified UTAUT model used in our study tests only the effects of four independent variables and three moderating variables. This paper believes that other factors can be investigated as well. Therefore, we suggest that a comprehensive empirical study be designed to evaluate the effects of other factors as well.

Third, this research focused on VC re-usage intention regarding cosmetic products. The most significant issue for industries is consumers' purchase intention after using a VC. Future researchers, retailers, and even manufacturers can extend this research to explore the relationship between VC usage and VC members' continuance purchase intention. Moreover, future researchers can also extend the research sample to other industries.

## CONCLUSION

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The current study shows that for cosmetics-related VC re-use, the effects of performance expectancy, effort expectancy, social influence, and trust are only partially consistent with those in previous studies. First, the effect of performance expectancy on VC re-use intention is confirmed to be positive and significant. Second, the effects of effort expectancy and trust on VC re-use intention are not significant. Third, the effect of social influence on VC re-use intention is negative, which is contradictory to the findings in previous studies. Finally, only gender has moderating effects on the path from performance expectancy to VC re-use intention and from trust to VC re-use intention. Overall, our study confirms the important roles of performance expectancy and social influence as well as the important moderating role of gender in influencing VC re-uses with a revised UTAUT model, which is tailored to the context of online cosmetic product promotion.

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