

Original Research Article

**The Effect of Electronic Word-of-Mouth upon Purchasing
Cell Phone on the Internet**

Abstract This research has divided the consumer shopping behaviors into pre- and post-purchase models in order to conduct a further discussion. Product attributes, gathering Electronic Word-of-Mouth (eWOM) and pre-purchase customer satisfaction are included in the pre-purchase model, and the post-purchase model covers product attributes, spreading eWOM and post-purchase customer satisfaction. A structural equation model is built to analyze the differences. The results reveal that: (1) Product attributes have significantly and positively influenced both eWOM (gathering positive and negative eWOMs before purchasing, and spreading positive and negative eWOMs after purchasing) and post-purchase customer satisfaction; (2) The positive eWOMs gathered before purchasing have positive significant effects on pre-purchase customer satisfaction; (3) The post-purchase customer satisfaction exerts positive significant effects upon spreading positive eWOMs and has negative significant effects on spreading negative eWOMs; (4) In the pre-purchase framework, gathering information on eWOMs has a full mediation effect, and it shows the customer satisfaction has a partial mediation effect in the post-purchase framework.

Keywords: Electronic Word-of-Mouth (eWOM), Product Attribute, Customer Satisfaction, Cell Phone

1. Introduction

The technology today allows the telecommunication industry growing rapidly, which makes using cell phones become increasingly common. According to Taiwan National Communication Commission, the total Taiwan cell phone subscriptions by the second quarter

of 2010 were 27.17 millions (1.17 subscriptions per person), and the total subscriptions were 28.29 millions by the second quarter of 2011 (1.22 cell phones in-use per person), which showed an increase of 160,000 subscriptions compared to the previous quarter and a growth of 1.12 millions within one year [20]. Based on these numbers, Taiwan's telecom market certainly has immense potential. In addition, Taiwan FIND [21] revealed the number of Internet users in Taiwan had swelled from 9.76 millions (penetration rate: 43%) in December of 2006 to 10.88 millions (penetration rate: 47%) in June of 2011, which implies that Internet definitely plays an important role in Taiwan people's daily life.

Internet has changed the way how consumers obtain information before making a purchase. In the past, consumers got the latest information mainly by exchanging knowledge with their kin and friends and knowing from traditional media. However, most of consumers today gather and exchange information through online media tools, such as e-mails, newsgroups, online forums, industry portal discussion areas, bulletin boards systems, Multi-User Dungeons (MUD, multiplayer online role-playing game), chat rooms, blogs and discussion forum etc. The online communication can be instant, multipleuserdialogue, convenient, anonymous, and free from geographic and time constraints [25].

Using cell phones and Internet has become widely popular these days, and such phenomenon pushes cell phone manufacturers to come up with new models and functions constantly in the hope of attracting consumers and meeting their needs. Through expectancy theory, Mittal et al. [47] studied how the performances of product and service attributes influence the satisfaction. The result has proved that there is an asymmetric correlation between attribute performances and the satisfaction. Based on this finding, this study further explored the correlation between product attributes and customer satisfaction, which is one of the motives of this research. With the rapid Internet development, consumers get used to gathering information on Internet. Synovate Report [55] found that nearly 60% of the consumers in Taiwan obtained information about consumer electronics on Internet;

51 moreover, the empirical study by Doh & Hwang [16] suggested that consumers would google
 52 the product information and feedbacks of other users online before shopping. On these
 53 grounds, Internet and eWOMs indeed have become important reference resources for
 54 consumers before making purchase decisions. Hanson [28] proposed that the influence of
 55 eWOM goes faster and spreads more widely compared to the traditional Word-of-Mouth (off
 56 line) approach. A research by Synovate Report [55] also indicated that top three of the most
 57 looked-up products of Taiwan consumers were cell phones (53%), digital cameras (48%) and
 58 laptops (47%). Based on this result, this study aims at the leading product, cell phones, to
 59 explore consumer buying behaviors and to explore how eWOMs influence consumers'
 60 behaviors, which is another motive of this study. Besides, TARP's research [57] on Coca
 61 Cola discovered that a satisfied customer would spread positive WOMs to 4 to 5 people, but a
 62 dissatisfied customer would spread negative WOMs to over 9 people. On the basis of this
 63 interesting finding, customer satisfaction definitely affects the effectiveness of WOM, and the
 64 impacts of negative WOMs might be greater than the positive ones. Accordingly, this
 65 research would probe into the connections between customer satisfaction and eWOMs, which
 66 serves as the third motive.

67 To summarize, the purposes of this study are as follows: (1) To discuss how the degree
 68 of consumer valuing product attributes influences consumers's behaviors of gathering
 69 eWOMs; (2) To explore how eWOM gathering influences pre-purchase customer
 70 satisfaction; (3) To examine how the degree of consumer valuing product attributes exerts
 71 influences on pre-purchase customer satisfaction; (4) To study whether gathering eWOM
 72 gives any mediation effects in the pre-purchase framework; (5) To see how the degree of
 73 consumer valuing product attributes affects eWOM spreading; (6) To research how
 74 post-purchase customer satisfaction affects eWOM spreading; (7) To discuss how the degree
 75 of consumer valuing product attributes influences the post-purchase customer satisfaction; (8)
 76 To explore whether the post-purchase customer satisfaction gives any mediation effects in the

77 post-purchase framework; (9) It is hoped that the empirical results would be helpful for cell
78 phone manufactures in developing business policies and marketing strategies.

79 **2. Literature Review**

80 **2.1 Word-of-Mouth (WOM)**

81 **2.1.1 Definition**

82 “Word of Mouth” (WOM) is the oldest way of creating information flow, which
83 represents an informal communication channel, and the information is exchanged from
84 person to person by oral communication. As time passed by, the natures of “Word of Mouth”
85 have changed substantially. In the contemporary society, many companies have utilized
86 WOM to facilitate product sale. Kotler [39] deemed that WOM is a sole marketing approach
87 at extremely low-cost which makes the information disseminate from consumers to
88 consumers.

89 The earliest definition of WOM was proposed by Arndt [2], who characterized WOM as
90 the oral person-to-person communication between a sender and a receiver to deliver
91 non-commercial messages, regarding a brand, product or service. The oral communication
92 could be delivered face-to-face or via phone communication. Westbrook [63] defined WOM
93 communication as informal information directed at other consumers about the characteristic
94 of particular goods and services. Bone [6] proposed that WOM is one kind of
95 person-to-person communication, but none of the involving parties are acting as any sources
96 of marketing. Hawkins et al. [27] argued that WOM is the process allows consumers sharing
97 information and opinions that direct buyers towards and away from specific products, brands,
98 and services. Litvin et al. [43] suggested that WOM is opinion exchanging activities among
99 consumers about goods or services.

100 To summarize, Word-of-Mouth is a two-way, person-to-person informal communication,
101 which does not involve any commercial motives and is an oral communication to transmit his,
102 her own or others’ experiences about goods, brands and services. But such communication

103 may cover both positive and negative feedbacks.

104 **2.1.2 Type**

105 Word of mouth can be categorized into positive WOM and negative WOM by delivered
106 words. By the occurrence of making a purchase, it can be categorized into pre-purchase
107 WOM and post-purchase WOM [60].

108 **1. Positive WOM and Negative WOM**

109 WOM can be categorized into positive WOM and negative WOM by the delivered
110 words. Both would give different degree of impact to the purchased goods [2]. The positive
111 WOM is when consumers are satisfied with services received or the goods, they would tell
112 others about their pleasant experiences and reasons [19]. Richins [52] suggested that the
113 negative WOM is the dissatisfaction from consuming experience, and consumers tell others
114 about his or her imperfect experience or complaints of particular goods or services. Singh and
115 Pandya [53] deemed positive WOM has something to do with the satisfaction level of the
116 consuming experience, and negative WOM is viewed as a type of customer complaint. To
117 conclude, regardless of positive or negative WOM, consumers may tell others about their
118 satisfied or dissatisfied perception of their personal experiences, which would further
119 influence other consumers' purchase or perception of the product or service.

120 **2. Pre- and Post-Purchase WOM**

121 By the occurrence of making a purchase, it can be categorized into pre-purchase and
122 post-purchase WOM. Delivering before- and after-purchasing WOM represents the informal
123 information directed at other consumers about the ownership, usage, or characteristic of
124 particular goods and services and their sellers [63]. Before-purchasing WOM means the
125 people who are stimulated by companies' advertisements, marketing activities or tools, but do
126 not make any purchases discuss about ratings of the goods or services with other consumers
127 in private, and a purchase decision then would be made. Through this process, consumers can
128 seek for unanimous opinions and also can eliminate their feelings of uncertainty. Therefore,

information from their own social network would become more important than the information from any other sources in the process that consumers evaluate new products or services, or as their perceived risk of purchase decision making rises. At this moment, consumers would deeply rely on others' opinions, and the ultimate objective is to seek others' suggestions in order to reduce their perceived risk [2, 7].

2.1.3 Timing and Motivation of Seeking WOM

According to Zheng [69], in the consumer decision process (Fig. 1), when a consumer is making a purchase decision, the second step is to gather information; that is as consumers realize something needs to be changed, they would start to search information about the product or service in order to learn more details. Consumers often initiate an internal search in the first place and then chew over the information of the plan-to-buy product from their own past experiences. If the internal information fails to help the consumers make their decision, they would pursue an external search from other sources, such as advertisements, periodicals, the Internet etc, in order to gather more information.

When coming across a new product or a new service, consumers are not able to know its performance or quality before purchase. Therefore, consumers would tend to seek others' reviews in order to judge whether to buy the product or not. The perceived risk is also a key factor giving influence to the behavior of gathering WOM. When facing a highly uncertain service, consumers are inclined to search relevant information proactively in order to increase the determinability and to reduce their perceived risk. Regarding the timing of applying WOM, Kotler [38] proposed that consumers would proactively look for relevant WOM under five circumstances, which are when information overloaded; when high perceived risk happening; when evaluating a new product or a new service; when selecting professional service providers; when facing increased product complexity, but lacking objective and clear evaluation criteria.

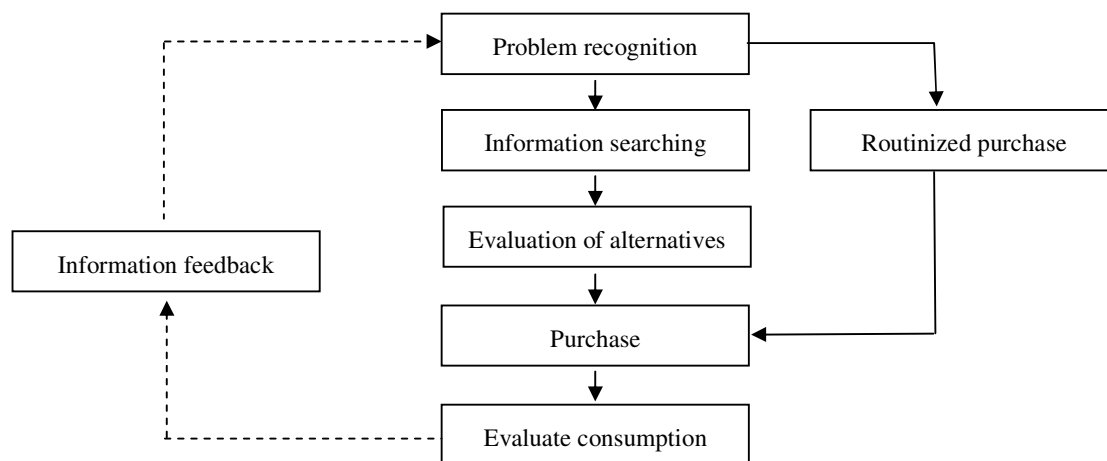


Figure 1 Consumer Decision Process

Source: Zheng [69]

2.2 Electronic Word-of-Mouth (eWOM)

2.2.1 Definition and Types

Via Internet, people could convey the feedbacks and opinions of using a product or service to other consumers online and form the so-called “electronic word-of-mouth”, also know as “online word-of-mouth” [24, 30]. Westbrook [63] defined it as “by using Internet-based technologies, informal communications directed at other consumers about the ownership, usage, or characteristics of particular goods and services and/or their sellers.”

Many types of electronic platforms would influence interpersonal relationship. The process in each type has its own particular characteristics. Some are simultaneous, such as instant messaging, and some are asynchronous, such as emails and blogs. Some communication is done by one to one, but some is one to many. Some communication would be many-to-many, which is carried out in the on-line chat rooms [33]. The eWOM channels that Litvin et al. [43] has proposed are as shown in the Figure 2.

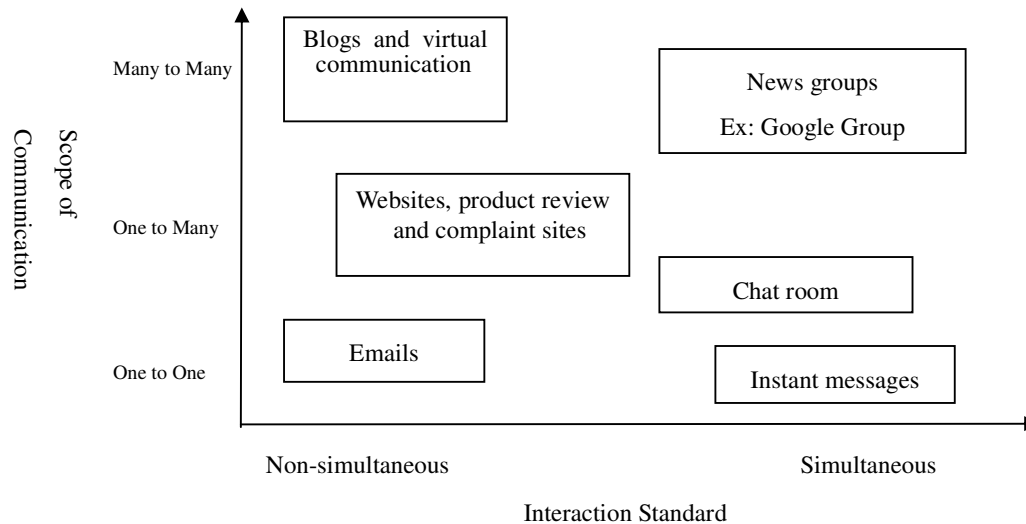


Figure 2 Typology of eWOM Channels

Source: Litvin et al. [43]

2.2.2 Characteristic

The Internet allows a brand new form and large capacity for media communication. Such media platforms' features are low-cost communication, replicable messages, personalized media etc. In other words, Internet gives a digital form of Word of Mouth. Goldsmith and Horowitz [25] concluded that the features of electronic Word of Mouth are having variety of avenues or means, anonymity and confidentiality, freedom from geographic and time constraints, and permanence of online conversations.

2.2.3 Differences between WOM and eWOM

With the rapid growth of Internet, WOM is no more confined to the physical face-to-face oral communication. The emergence of eWOM has turned information exchanging activities from traditional offline means, such as oral transmission, sound, body language, into digitalized and multi-media communication. Besides, the unique nature of eWOM permits the communication not to be constrained by location and time. Tanimoto and Fujii [56] also pointed out that, via Internet, the spreading of WOM will be vented at a faster speed, to a wider extent, and the subjects will be more liberal; furthermore, the effects of

dissemination would far surpass the traditional offline WOM means. This research has listed the differences between eWOM and traditional WOM as exhibited in Table 1.

Table 1 Differences between WOM and eWOM

	eWOM	WOM
Media	Internet, including World Wide Web, email, Bulletin Boards System, news groups, Instant Messenger	Face to face, phone
Form	Digitalized, multimedia (texts, pictures, streaming media etc.)	Oral, sound, body language, gestures
Objects	Extensive (acquaintances and strangers)	Acquaintances only
Characteristics	Simultaneous and non-simultaneous Commercial and non-commercial	Simultaneous Non-commercial
Reliability	Relatively low	Relatively high
Spreading speed	Fast	Slow
Interaction	One to one, one to many, many to many	One to one
Message interaction	Cue-triggered	Self-determined
Time and spatial limit	No limit	Limited
Trust and attitude of crowd	Tend to be skeptical	Trustworthy
Effectiveness and cost	Highly effective	High cost

Source: Fei [18]; Chen [9]; Wang [60]; Wang [61]

2.3 Product Attribute

2.3.1 Definition and Characteristic

“Product attribute” is the product characteristics that consumers have perceived. Based on different needs and motives, each individual would hold different attitudes toward the characteristics of a same product and evaluate the characteristics differently [36]. Product attribute consists of various explicit and implicit characteristics and natures of a product, which can be perceived by consumers. Each product actually is formed by a set of attributes,

such as appearance, functions, prices, brand and so on [65]. For a product, product attribute is having a long-term value. Chiou [12] indicated that product attribute usually is based on customer satisfaction, is a source for sustainable competitive advantage (SCA), is marketing leading research and development, and is qualified for owning developer rights.

2.3.2 Type

Scholars hold different opinions on the classification of product attributes; therefore, the ways to classify them are varied.

1. Classified by needs

Park et al. [49] classified the consumer needs as functional needs, experiential needs, symbolic needs etc. Furthermore, if product attributes are designed primarily to satisfy consumer needs, based on different types of needs for attributive satisfaction, the product attributes can be classified as utilitarian attributes [54], hedonic attributes [32] and symbolic attributes [49]. If the product attributes is to satisfy various levels of consumer needs, Lo [45] has classified the product attributes as basic function attribute (also known as primary attribute and hard attribute), convenience function attribute (also known as secondary attribute), and psychological satisfaction attribute (also known as soft attribute or symbol attribute).

2. Classified by products

Lefkoff-Hagius and Mason [42] pointed out that when evaluating the going-to-buy product, consumers tend to classify the product attributes as product characteristics, product benefit and social image.

3. Classified by product performance

Chiou [12] suggested that the product attribute is a combination of a product's explicit and implicit characteristics and natures. The included product attributes are essential attribute, formal attribute, perceived attribute and augmented attribute.

4. Classified by product benefit

Aaker [1] classified product benefits as functional benefit, emotional benefit and self-expressive benefit.

5. Classified by Benefit Chain

Young and Feigin [67] have proposed the “Grey Benefit Chain” and classified the product benefits as functional benefit, practical benefit and emotional pay-off.

2.4 Customer Satisfaction

Cardozo [8] pioneered the researching of customer satisfaction. Cardozo [8] suggested customer satisfaction is a function of expectation for products and the obtained product performance. If the performance is beyond consumers’ expectation, the consumers would thus feel well satisfied and vice versa. Hunt [35] proposed that customer satisfaction is an integration of the fulfillment of various needs, the delight, the interaction between expectation and performance, an evaluation of purchasing and consuming experiences, a consumption benefit evaluation, a comparison between actualities and expectations as well as the obtained insufficient and surplus attributes in a purchase. Hempel [29] defined that customer satisfaction is the achieved level of the products and service benefits that customers had expected, which means the consistency of expectation and the real effect. Oliver [48] argued that customer satisfaction is the expectancy disconfirmation of expectation and actual perception. Churchill and Surprenant [13] viewed the customer satisfaction as a post-purchase output. If the actual product performance is equal to or greater than the pre-purchase expectation, the consumer would feel satisfied and vice versa. Tse and Wilton [58] suggested that customer satisfaction is a response to the discrepancy between a consumer’s prior expectations and his or her perception of the actual performance regarding the purchase. Westbrook and Oliver [64] defined the customer satisfaction is a result arising from comparing their criteria with the product’s or service’s performance quality or their perception. Ganesh et al. [23] deemed that the customer satisfaction is a function of the

discrepancy between a consumer's expectations and his or her perception, and the criterion is the pre-purchase expectation. Chiou et al. [11] the customer satisfaction is the whole or accumulated satisfaction. Kotler and Armstrong [40] defined the customer satisfaction would be determined by whether the product's functional features meet consumer expectation. If the features fail to meet the consumer expectation, the consumer will not feel satisfied and vice versa.

To summarize, customer satisfaction is the psychological status after a consumer making a product or service purchase. Such psychological status is a comparison between the pre-purchase expected performance and the post-purchase actual performance. If the expected performance is greater than the actual performance, consumers will feel unsatisfied and vice versa.

3. Framework, Hypothesis, and Design

3.1 Framework and Hypothesis

The research of Yang et al. [66] has proved that customer satisfaction is the foundation of WOM, and customer satisfaction not only acts as the direct factor of increasing WOM amounts, but gives an amplifying effect on marketing campaigns. This study applied this finding as the base of the research structure development. In order to explore the eWOM's influence on consumer purchase decision, the research framework is divided into two parts, "the behaviors of gathering WOM before purchasing" (Fig. 3) and "the behaviors of spreading WOM after purchasing" (Fig. 4), and further to discuss their differences. The hypotheses are as follows.

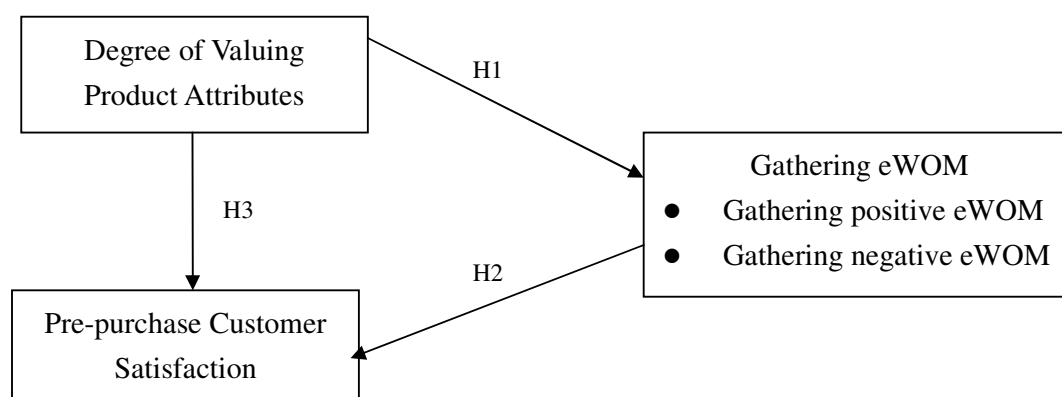


Figure 3 Framework before Purchasing

H1: The degree of consumers' valuing the product attributes would have effects on gathering-eWOM activities.

H1a: It will increase the activities of gathering positive eWOM if consumers highly valuing the product attributes.

H1b: It will increase the activities of gathering negative eWOM if consumers highly valuing the product attributes.

H2: The gathering-eWOM activities have effects on consumers' pre-purchase customer satisfaction.

H2a: The activities of gathering positive eWOM would increase consumers' pre-purchase customer satisfaction.

H2b: The activities of gathering negative eWOM would decrease consumers' pre-purchase customer satisfaction.

H3: The degree of consumers' valuing the product attributes would have effects on the pre-purchase customer satisfaction.

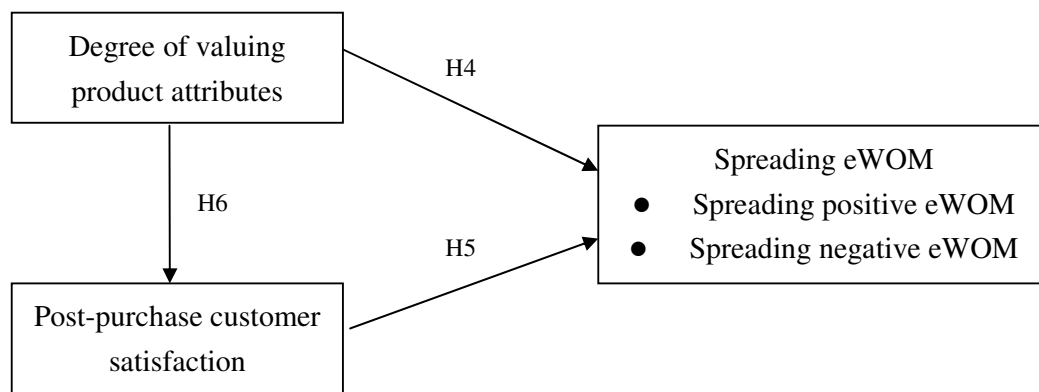


Figure 4 Framework after Purchasing

H4: Different degrees of consumers' valuing product attributes would have effects on the behaviors of spreading eWOM.

H4a: Consumers' highly valuing product attributes would increase the activities of spreading positive eWOM.

H4b: Consumers' highly valuing product attributes would increase the activities of spreading negative eWOM.

H5: Post-purchase customer satisfaction would affect eWOM spreading behaviors.

H5a: Increasing post-purchase customer satisfaction would increase activities of spreading positive eWOM.

H5b: Increasing post-purchase customer satisfaction would reduce activities of spreading negative eWOM.

H6: The degree of consumers' valuing product attributes would have effects on post-purchase customer satisfaction.

3.2 Definition of Variables and Measurement Items

3.2.1 eWOM

Westbrook [63] defined the eWOM as by using Internet-based technologies, informal communications directed at other consumers about the ownership, usage, or characteristics of particular goods and services and/or their sellers. As the power of eWOM constantly expands, potential buyers would always refer to other buyers' reviews of a particular product before

making a purchase [16]. According to the delivered words of WOM, it is classified as positive WOM and negative WOM. On these bases, this study has defined the electronic word-of-mouth as “the activities of gathering/spreading positive or negative WOM by using Internet.”

Regarding measuring eWOM, we grouped it into four parts: “Gathering positive eWOM”, “Gathering negative eWOM”, “Spreading positive eWOM” and “Spreading negative eWOM”. For the bases of developing measurement items, the scale for gathering positive eWOM has adopted the researches of Podoshen [50], Crosby et al. [15], Hennig-Thurau et al. [31] and Chiou et al. [11]. The scale for gathering negative eWOM has employed the researches from Podoshen [50], Crosby et al. [15], Hennig-Thurau et al. [31], Chiou et al. [11] and Bansal and Voyer [4]. The scale for spreading positive eWOM is adopted from the study of Yang et al. [66]. The spreading-negative-eWOM scale was developed from the researches of Zeithaml et al. [68], Gremler and Gwinner [26] and Yang et al. [66]. All the items had been developed with a concept of using Internet and aimed at the cell phone industry (Fig. 2). In addition, this study has adopted the 6-point Likert scale to measure how consumers attach importance to an item (“1” represents “Completely Disagree” and “6” indicates “Completely Agree”).

Table 2 Measurement Items of eWOM

Aspect	Measurement Item	Reference
Gathering positive eWOM	1. I believe sufficient information is provided on Internet.	Podoshen [50]
	2. If not having sufficient knowledge on the going-to-buy cell phone, I would google some positive information online.	
	3. Before buying a cell phone, I would refer to the on-line users’ experiences and positive feedbacks about the cell phone.	
	4. I would gather the information about positive experiences from on-line users.	
	5. If there are positive articles about a brand’s cell phones, I	Crosby et al. [15]

	would have good impression on cell phones of that brand.	Hennig-Thurau et al. [31]
	6. If there are some feedbacks about a brand's cell phones equipped with diversified and practical functions, I would have good impression on that brand's cell phones.	Chiou et al. [11]
	7. In general, if on-line users give positive feedbacks to a brand's cell phones, it would affect my purchase inclination.	
	1. When buying a cell phone, I would refer to online users' experiences and negative feedbacks to the brand's cell phones.	Podoshen [50]
	2. If having read negative articles about a brand's cell phones, I would have negative impression on that brand's cell phones.	
Gathering negative feedbacks	3. If the online reviews are about that brand's cell phones are merely with mediocre functions and not really functional, I would not favor that brand's cell phones.	Crosby et al. [15] Hennig-Thurau et al. [31]
	4. In general, if on-line users give negative feedbacks to a brand's cell phones, it would affect my purchase inclination.	Chiou et al. [11]
	5. I would have done massive googling to obtain the needed negative eWOM to prevent myself from buying this cell phone.	Bansal & Voyer [4]
	1. I often talk about the strong points of this brand's cell phones to others online.	
	2. The times I mentioned about the strong points of this brand online are obviously more than other similar brands.	
Spreading positive eWOM	3. I took every single opportunity to recommend others buying cell phones from this brand.	Yang et al. [66]
	4. When mentioning this brand, I would talk about this brand's positive details.	
	5. Once starting discussing this brand, it is hard for me to stop sharing.	
	6. I usually write something positive about this brand online.	
	7. I am proud of my cell phone and its brand.	
Spreading negative	1. I would tell others about this cell phone's shortcomings online.	Zeithaml et al. [68]

eWOM	2. I will discourage others online from buying this cell phone.		
	3. I would not recommend this cell phone to others.	Gremler & Gwinner [26]	
	4. I often write negative reviews about this brand on Internet.		
	5. When mentioning this brand's cell phones, I would tell others about their negative details.	Yang et al. [66]	

316 3.2.2 Product Attribute

317 “Product attribute” is how consumers view a product. Whether tangible or intangible,
 318 everything can be categorized as product attribute as long as it has connection with the
 319 product. It can be a concept, a personal service, a characteristic or all of above [10]. Thus,
 320 this research defined it as “the elements which a cell phone presents, such as appearances and
 321 functions, and such elements are the main reasons for consumers to make a cell phone
 322 purchase.”

323 The scale of product attribute has employed the researches of Wei [62], Liu [44] and Wu
 324 [65] as the development foundation of measurement items (Fig. 3). In addition, this study has
 325 adopted the 6-point Likert scale to measure how consumers attach importance to an item
 326 (“1” represents “Completely Disagree” and “6” indicates “Completely Agree”).

327 **Table 3 Measurement Item of Product Attribute**

Measurement Item	Wei [62]	Liu [44]	Wu [65]	This Study
1. Connecting quality	✓	✓	✓	✓
2. Long battery life	✓	✓	✓	✓
3. Simple to use		✓	✓	✓
4. Intuitive user interfaces	✓	✓	✓	✓
5. Easy to carry	✓	✓	✓	✓
6. Price	✓		✓	✓
7. Novel appearance	✓	✓	✓	✓
8. Cool product color		✓	✓	✓
9. Easy maintenance		✓	✓	✓
10. Convenient for data transfer			✓	✓
11. Large storage capacity	✓		✓	✓
12. With many special functions	✓	✓	✓	✓

13. Cell Phone Brand	✓		✓
14. Call Setup Success Rate	✓		✓
15. After-sales service	✓	✓	✓
16. Phone Weight		✓	✓
17. Key agility		✓	✓
18. Warranty time period		✓	✓
19. With clear manual guide		✓	✓
20. With backlight screen		✓	✓
21. Large display screen		✓	✓
22. Support downloaded ringtones		✓	✓
23. Built-in games		✓	✓
24. With simple multi-function key		✓	✓

3.2.3 Customer Satisfaction

Tse and Wilton [58] defined that customer satisfaction is a response to the discrepancy between a consumer's prior expectations and his or her perception of the actual performance regarding the purchase. Accordingly, this study defined the customer satisfaction as "the psychological status after a consumer purchasing a product or service. This psychological status is a comparison between the expected product performance before purchasing and the actual product performance after purchasing."

The scale of customer satisfaction employed the research of Tzeng [59] to develop the measurement items. Synovate Report [55] pointed out that when selecting consumer electronics, Asia Pacific users more likely to consider on price (65%), quality (57%) and product functions (46%), which also applies to Taiwan consumers (price-65%, quality-57%, product functions-46%). Therefore, these factors were included in the scale. All the measurement items have been developed with a concept of using Internet and aim at the cell phone industry. In addition, this study has employed the 6-point Likert scale to measure the degree of consumers' valuing the item ("1" represents "Completely Disagree" and "6" indicates "Completely Agree").

346 **Table 4 Measurement Item of Customer Satisfaction**

Aspect	Measurement Items
Customer Satisfaction	1. I think this cell phone will meet my expectation.
	2. Overall, I am satisfied with owning this cell phone.
	3. Overall, I am satisfied with selecting this cell phone, and it is a right decision.
	4. Overall, I am satisfied with the additional functions of the cell phone which I bought on line.
	5. I am satisfied with the price of the cell phone which I bought on line.
	6. I am satisfied with the quality of the cell phone which I bought on Internet.
	7. I am satisfied with the overall functions of the cell phone which I bought on Internet.

347 **3.3 Questionnaire and Sampling Design**

348 This research is to discuss eWOM; therefore, distribution of the e-questionnaires has its
349 applicability. There are five parts in this questionnaire, which are “experiences in using cell
350 phones and Internet”, “e-Word of Mouth”, “cell phone product attribute”, “customer
351 satisfaction” and “demographic variables (backgrounds of the respondents)”. The survey time
352 was from April 25th 2010 to June 4th 2010, and totally 1,148 copies were retrieved. There are
353 three questions designed for the purpose of threshold screening, which were “Did you ever
354 buy any cell phones online?”, “Is the cell phone you are using now purchased online?”, “Did
355 you ever gather information on Internet because of buying a cell phone?” Among the
356 retrieved 1,148 copies, 950 copies did not meet the threshold criteria. Therefore, the valid
357 questionnaires were merely 198 copies, and the effective response rate was 17.2 %.

358 **3.4 Object and Scope**

359 This research focuses mainly on how eWOM exerts effects on consumers’ behaviours of
360 buying cell phones online. The research objects were those who ever googled or spreaded the
361 information about cell phone industry and those who ever purchased cell phones online. The
362 research scope is “Cell phone websites”, “Cell phone forums” and “Message boards of
363 Buying Cell Phones online in Bulletin Boards System”.

364

4. Analysis and Results

4.1 Sample Distribution

Table 5 shows male is the predominant gender, which is 53%. We suggest it is because males are more interested in electronic goods and would, thus, search and purchase more often than females. As a result, more males were engaged in answering the questionnaires. Concerning the age, the largest group was between the ages of 21 to 30, which is 89%. This research deemed this age group prefers novel and showy high-tech gadgets. This group is also considered as the dominant buyers for shopping online, which represents the following research of this study is representable. Regarding marriage status, single is the largest group, which is 93%. About the occupation, most respondents are students, which is 58%. About the education degree, most of the respondents are with college degree or in college, which is 49%. The second largest group is graduate schools or above, which is 48%. Most of the respondents' average monthly income is under TWD\$20,000 (approximately USD\$666), which is 62%.

Table 5 Sample Distribution

Item		Samples	%
Gender	Male	105	53 %
	Female	93	47 %
Age	20 or under	5	2 %
	21 - 30	177	89 %
	31 - 40	13	7 %
	41 - 50	3	2 %
	51 - 60	0	0 %
	61 or above	0	0 %
Marriage status	Married	14	7 %
	Single	184	93 %
Occupation	Military, government and school personnel	16	8 %
	Agriculture and fisheries	1	1 %
	Manufacturing	7	3 %

	Service industry	22	11 %
	Financial and commercial	12	6 %
	Electronics industry	10	5 %
	Student	115	58 %
	Homemaker	0	0 %
	Freelance	3	2 %
	Miscellaneous	12	6 %
Education	Junior high and under	1	1 %
	Senior high school	5	2 %
	College	97	49 %
	Graduate school and above	95	48 %
Personal average monthly income (TWD)	20,000 or under	123	62 %
	20,001 - 35,000	44	22 %
	35,001 - 50,000	22	11 %
	50,001 - 65,000	4	2 %
	65,001 - 80,000	2	1 %
	80,001 or above	3	2 %

4.2 Reliability and Validity

4.2.1 Reliability

This research employed the Cronbach's α coefficient to measure the consistency among items of each aspect. Cronbach [14] deemed that α coefficient less than 0.35 would be considered as low reliability. If the alpha is between 0.35 and 0.7, it has medium reliability. When the value is greater than 0.7, it would be deemed as high reliability. In the measurement aspect, only the product interface (0.639) and fundamental elements (0.599) were slightly low, but the rest were all above 0.7 (as demonstrated in Table 6), which indicates that the scale of this research is with good reliability.

Table 6 Cronbach's α Value of each Aspect

Aspect		Cronbach's α
eWOM	Gathering positive WOM	0.911
	Gathering negative WOM	0.853
	Spreading positive WOM	0.924
	Spreading negative WOM	0.897
Product attributes	Product service	0.844

	Easy to use	0.787
	Additional functions	0.818
	Product interface	0.639
	Vogue appearance	0.832
	Fundamental elements	0.599
Customer satisfaction	Pre-purchase customer satisfaction	0.942
	Post-purchase customer satisfaction	0.951

390 4.2.2 Validity

391 This research has adopted the content validity and the construct validity, and further
392 classified the construct validity as convergent validity and discriminant validity.

393 1. Content Validity

394 Concerning eWOM, the items of gathering positive eWOM are based on the researches
395 of Podoshen [50], Crosby et al. [15], Hennig-Thurau et al. [31] and Chiou et al. [11]. The
396 items of gathering negative eWOM have consulted the researches of Podoshen [50], Crosby
397 et al. [15], Hennig-Thurau et al. [31], Chiou et al. [11] and Bansal & Voyer [4]. The items of
398 spreading positive eWOM are mainly based on the research of Yang et al. [66]. The items for
399 spreading negative eWOM are referred to the researches of Zeithaml et al. [68], Gremler &
400 Gwinner [26] and Yang et al. [66]. The items of product attribute are created from the
401 researches of Wei [62], Liu [44] and Wu [65]. The items of customer satisfaction were
402 developed from the researches of Tzeng [59] and Synovate Report [55]. To conclude, the
403 scale of this study is with content validity.

404 2. Convergent Validity

405 Convergent validity is about examining consistency between observable variables and
406 latent variables. Raine-Eudy [51] argued only if factor loadings greater than 0.5, it can be
407 included in the factor, which has been employed by this research as the screening criterion.
408 Moreover, the average variance extracted (AVE) is to calculate the average variance

409 explanatory power of observable variables for the latent variable. Higher the AVE of the
 410 latent variables means higher the convergent validity of the latent variables has. Fornell and
 411 Larcker [22] suggested that the value must be greater than 0.5, and the test of significance of
 412 path coefficient must reach a significance level. Generally, the t value is the criterion for
 413 judgment. Providing its absolute value is greater than 1.96, the parameter estimation would
 414 reach a significance level of 0.05. If it is greater than 2.58, then it comes to a significance
 415 level of 0.01. If the value is greater than 3.29, it would have reached the significance level of
 416 0.001.

417 In respect of eWOM, Table 7 demonstrates the standardized factor loadings of each
 418 variable is greater than 0.5. The AVE and composite reliability (CR) of gathering positive
 419 eWOM are 0.636 and 0.913 respectively, and the t values are greater than 3.29. The AVE and
 420 CR of gathering negative eWOM are 0.680 and 0.862 respectively, and all the t values are
 421 over 3.29. The AVE and CR of spreading positive eWOM are 0.675 and 0.926 respectively,
 422 and all their t values are over 3.29. The AVE and CR of spreading negative eWOM are 0.688
 423 and 0.898, and all the t values have exceeded 3.29. In conclusion, all the AVEs and CRs have
 424 achieved what the criteria require, which indicates that the scale of eWOM has convergent
 425 validity.

426 **Table 7 Convergent Validity of eWOM**

Aspect	Item	Standardization Factor Loading	t value	CR	AVE	SMC (R^2)
Gathering positive eWOM	Variable 1	0.769	12.452	0.913	0.636	0.591
	Variable 2	0.843	14.328			0.711
	Variable 3	0.728	11.547			0.530
	Variable 4	0.835	14.134			0.697
	Variable 5	0.782	12.753			0.612
	Variable 6	0.821	13.750			0.675
Gathering positive eWOM	Variable 1	0.951	16.303	0.862	0.680	0.905
	Variable 2	0.834	13.627			0.695
	Variable 3	0.664	10.177			0.441

Spreading positive eWOM	Variable 1	0.832	14.122	0.926	0.675	0.693
	Variable 2	0.789	13.095			0.622
	Variable 3	0.906	16.239			0.821
	Variable 4	0.786	13.004			0.617
	Variable 5	0.828	13.991			0.685
	Variable 6	0.782	12.799			0.611
Spreading negative eWOM	Variable 1	0.772	12.389	0.898	0.688	0.595
	Variable 2	0.814	13.434			0.662
	Variable 3	0.904	16.060			0.817
	Variable 4	0.822	13.581			0.676

Regarding product attributes, Table 8 shows that all the standardized factor loadings have exceeded 0.5. The AVE and CR of product service are 0.524 and 0.846 respectively, and their t values all are greater than 3.29. The AVE and CR of easy to use are 0.664 and 0.797, and the t values are all over 3.29. The AVE and CR of product interface are 0.494 and 0.658 respectively, and all their t values are greater than 3.29. The AVE and CR of vogue appearance are 0.733 and 0.845, and all t values have exceeded 3.29. The AVE and CR of fundamental elements are 0.429 and 0.6, and their t values are all greater than 3.29. To conclude, only the AVE and CR of fundamental elements are close to the reference values, but others have reached the criteria, which represents the scale of product attributes has convergent validity.

Table 8 Convergent Validity of Product Attribute

Aspect	Item	Standardization Factor Loading	t value	CR	AVE	SMC (R^2)
Product service	Variable 1	0.788	12.568	0.846	0.524	0.621
	Variable 2	0.680	10.251			0.462
	Variable 3	0.706	10.777			0.498
	Variable 4	0.729	11.260			0.531
	Variable 5	0.711	10.881			0.505
Easy to use	Variable 1	0.897	11.392	0.797	0.664	0.805
	Variable 2	0.724	9.503			0.525
Additional function	Variable 1	0.869	11.335	0.821	0.696	0.755
	Variable 2	0.798	10.520			0.636

Product interface	Variable 1	0.784	10.696	0.658	0.494	0.614
	Variable 2	0.611	8.422			0.373
Vogue appearance	Variable 1	0.947	12.500	0.845	0.733	0.897
	Variable 2	0.755	10.186			0.570
Fundamental elements	Variable 1	0.632	8.145	0.6	0.429	0.399
	Variable 2	0.677	8.630			0.459

About customer satisfaction, Table 9 shows that all the standardized factor loadings are greater than 0.5. The AVE and CR of pre-purchase customer satisfaction (about product evaluation) are 0.705 and 0.944 respectively, and all the t values are greater than 3.29. The AVE and CR of post-purchase customer satisfaction are 0.741 and 0.953, and all t values have exceeded 3.29. In conclusion, all the AVEs and CRs have met the criteria, which represents that the scale of customer satisfaction has convergent validity.

Table 9 Convergent Validity of Customer Satisfaction

Aspect	Item	Standardization Factor Loading	t value	CR	AVE	SMC (R^2)
Pre-purchase customer satisfaction	Variable 1	0.870	15.260	0.944	0.705	0.756
	Variable 2	0.857	14.907			0.735
	Variable 3	0.870	15.263			0.757
	Variable 4	0.819	13.868			0.670
	Variable 5	0.751	12.215			0.564
	Variable 6	0.864	15.099			0.747
	Variable 7	0.843	14.524			0.711
Post-purchase customer satisfaction	Variable 1	0.870	15.328	0.953	0.741	0.758
	Variable 2	0.908	16.463			0.825
	Variable 3	0.871	15.331			0.758
	Variable 4	0.847	14.661			0.717
	Variable 5	0.786	13.080			0.617
	Variable 6	0.871	15.351			0.769
	Variable 7	0.870	15.321			0.757

3. Discriminant Validity

Koufteros [41] proposed that the square roots of AVE of latent variables all must be greater than the correlation coefficients among other latent variables, which would be considered as having discriminant validity. Based on Table 10 and Table 11, the pre-purchase

and post-purchase frameworks' AVEs of the diagonal are greater than the correlation coefficients among other latent variables. Furthermore, all the mean values, standard deviation and correlation coefficients of each variable are listed in the Table 12 and Table 13. All the figures show the variables in this research have good discriminant validity.

4.3 Structural Equation Modeling, SEM

4.3.1 Framework before Purchasing

First, the goodness of fit of frameworks was examined, and the results are as shown in the Table 14. According to Table 14, χ^2/df and GFI have reached the reference values, and others are close to the reference values, which means the goodness of fit of this model is reasonable and acceptable.

Table 14 Goodness of Fit of Framework before Purchasing

Index of Goodness of Fit	Reference Value	Reference	Results
Absolute Fit Index			
χ^2/df	< 5	Marsh & Hocevar [46]	2.620
GFI	0.80 - 0.89 reasonable fit > 0.90 excellent fit	Joreskog & Sorbom [37]	0.813
AGFI	> 0.80 good fit = $\leq$ 0.05 very good fit 0.05 - 0.08 right fit	Bagozzi & Yi [3]	0.768
RMSEA	0.08 - 0.10 mediocre fit > 0.10 poor fit	Huang [34]	0.091
Incremental Fit Index			
NFI			0.824
CFI	> 0.90	Huang [34]	0.882
NNFI			0.866

461 **Table 10 Discriminant Validity of Pre-purchase Framework**

	Gathering positive eWOM	Gathering negative eWOM	Product service	Easy to use	Additional functions	Product interface	Vogue appearance	Fundamental elements	Pre-purchase customer satisfaction
Gathering positive eWOM	0.797								
Gathering negative eWOM	0.473	0.825							
Product service	0.246	0.206	0.724						
Easy to use	0.492	0.245	0.383	0.815					
Additional functions	0.257	-0.114	0.313	0.295	0.834				
Product interface	0.232	0.290	0.575	0.373	0.190	0.703			
Vogue appearance	0.266	0.090	0.327	0.279	0.349	0.314	0.856		
Fundamental elements	0.180	0.129	0.514	0.278	0.291	0.447	0.170	0.655	
Pre-purchase customer satisfaction	0.491	0.258	0.199	0.366	0.298	0.091	0.176	0.008	0.840

462 **Table 11 Mean, Standard Deviation and Correlation Coefficient of Pre-purchase Framework**

	Mean	Standard deviation	Gathering positive eWOM	Gathering negative eWOM	Product service	Easy to use	Additional functions	Product interface	Vogue appearance	Fundamental elements	Pre-purchase customer satisfaction
Gathering positive eWOM	4.965	0.641	1								
Gathering negative eWOM	4.808	0.674	0.473	1							
Product service	4.890	0.664	0.246	0.206	1						
Easy to use	5.081	0.619	0.492	0.245	0.383	1					
Additional functions	4.081	1.064	0.257	-0.114	0.313	0.295	1				
Product interface	5.058	0.706	0.232	0.290	0.575	0.373	0.190	1			
Vogue appearance	4.684	0.834	0.266	0.090	0.327	0.279	0.349	0.314	1		
Fundamental elements	4.644	0.879	0.180	0.129	0.514	0.278	0.291	0.447	0.170	1	
Pre-purchase customer satisfaction	4.637	0.573	0.491	0.258	0.199	0.366	0.298	0.091	0.176	0.008	1

463 **Table 12 Discriminant Validity of Framework after Purchasing**

	Spreading positive eWOM	Spreading negative eWOM	Product service	Easy to use	Additional functions	Product interface	Vogue appearance	Fundamental elements	Post-purchase Customer satisfaction
Spreading positive eWOM	0.822								
Spreading negative eWOM	0.278	0.829							
Product service	0.228	0.334	0.724						
Easy to use	0.083	0.271	0.383	0.815					
Additional functions	0.226	-0.005	0.313	0.295	0.834				
Product interface	0.229	0.320	0.575	0.373	0.190	0.703			
Vogue appearance	0.176	0.130	0.327	0.279	0.349	0.314	0.856		
Fundamental elements	0.412	0.231	0.514	0.278	0.291	0.447	0.170	0.655	
Post-purchase Customer satisfaction	0.366	0.352	0.197	0.284	0.157	0.254	0.216	0.181	0.861

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468 **Table 13 Mean, Standard Deviation and Correlation Coefficient of Post-purchase Framework**

	Mean	Standard deviation	Spreading positive eWOM	Spreading negative eWOM	Product service	Easy to use	Additional function	Product interface	Vogue appearance	Fundamental element	Post-purchase customer satisfaction
Spreading Positive eWOM	3.839	1.002	1								
Spreading Negative eWOM	4.691	0.662	0.278	1							
Product service	4.890	0.664	0.228	0.334	1						
Easy to use	5.081	0.618	0.083	0.271	0.383	1					
Additional functions	4.081	1.064	0.226	-0.005	0.313	0.295	1				
Product interface	5.058	0.706	0.229	0.320	0.575	0.373	0.190	1			
Vogue appearance	4.684	0.834	0.176	0.130	0.327	0.279	0.349	0.314	1		
Fundamental elements	4.644	0.879	0.412	0.231	0.514	0.278	0.291	0.447	0.170	1	
Post-purchase customer satisfaction	4.802	0.638	0.366	0.352	0.197	0.284	0.157	0.254	0.216	0.181	1

469 The path analysis was then employed to examine the influence relation among the
 470 variables. Figure 5 and Table 15 demonstrate that product attribute gives positive significant
 471 effect on gathering positive eWOM; therefore, H1a is sustained. Further, it also gives positive
 472 significant effect on gathering negative eWOM, which indicates H1b is also sustained.
 473 Therefore, H1 is sustained, which means that when consumers attach greater importance to
 474 cell phones' product attributes, they are more likely to gather eWOM online. Gathering
 475 positive eWOM has positive significant effect on pre-purchase customer satisfaction;
 476 therefore, H2a is sustained. However, gathering negative eWOM has no significance effect
 477 on pre-purchase customer satisfaction"; therefore, H2b is not sustained. As a result, H2 is
 478 only partially sustained, which indicates if consumers gather more positive WOM before
 479 their purchasing, it is more likely to increase their pre-purchase customer satisfaction. But
 480 product attribute has no significant effect on pre-purchase customer satisfaction; therefore,
 481 H3 is not sustained, which means no significant correlation was found between product
 482 attributes and pre-purchase customer satisfaction.

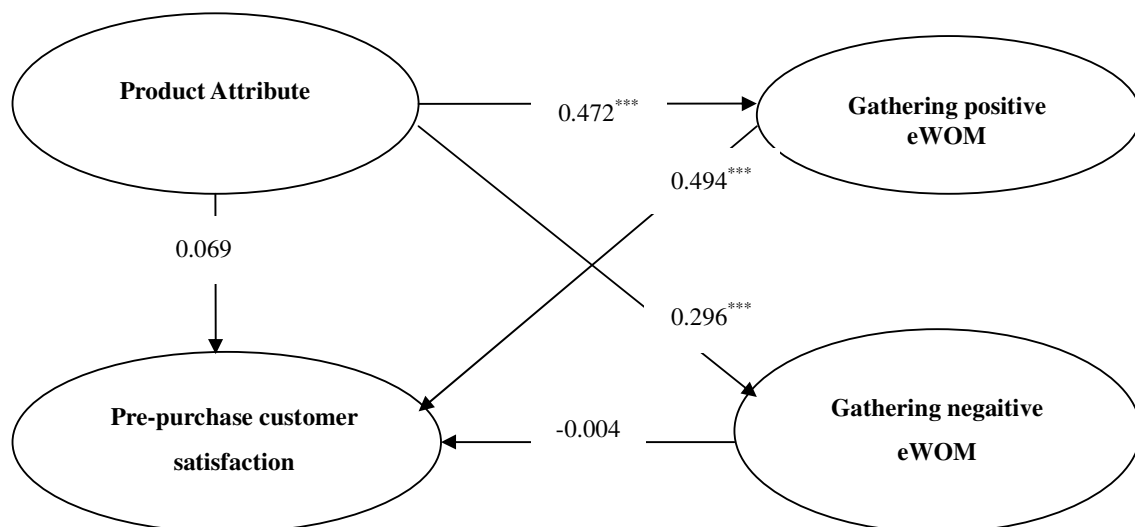


Figure 5 Path Analysis of Pre-Purchase Framework

483 Note: In order to keep the paper neat, observable variables and residual items are not listed.

484 Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 15 Path Analysis of Framework before Purchasing

Path Analysis	Standardized Coefficient	S.E	C.R	<i>p</i>
Product attributes → Gathering positive eWOM	0.472	0.109	5.356	***
Product attributes → Gathering negative eWOM	0.296	0.124	3.537	***
Gathering positive eWOM → Pre-purchase customer satisfaction	0.494	0.078	5.738	***
Gathering negative eWOM → Pre-purchase customer satisfaction	-0.004	0.054	-0.058	0.954
Product attributes → Pre-purchase customer satisfaction	0.069	0.100	0.774	0.439

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

At the end, mediation effect was examined. Baron and Kenny [5] suggested that if three regression equations satisfy the three conditions listed below, then it is considered having mediation effect.

1. In the model, the independent variables (product attributes) give significant effects on mediators (gathering eWOM).

2. In the model, the independent variables (product attributes) and the mediators (gathering eWOM) both have significant effects on dependent variables (pre-purchasing customer satisfaction).

3. After examining mediators (gathering eWOM) and independent variables simultaneously for the dependent variables (pre-purchase customer satisfaction), if the initial significant correlation between independent variables and dependent variables becomes not much significant due to the existence of mediators, but mediators are still having significant relation with independent variables, the mediation effect is supported.

Baron and Kenny [5] also pointed out that if the independent variables' effect on the dependent variables has turned from significant to insignificant due to the input of a mediator, it is said to have complete mediation. While the effect reduced, but still remains significant, it is considered to have partial mediation.

This research has examined the correlation between product attributes and gathering eWOM, between product attributes and pre-purchase customer satisfaction, between gathering eWOM and pre-purchase customer satisfaction. The results are demonstrated in Table 16. Product attribute is significantly correlated with gathering eWOM. Product attribute has significant correlation with pre-purchase customer satisfaction. Gathering eWOM is also significantly correlated with pre-purchase customer satisfaction. More examinations then were done in order to check how the product attribute and gathering eWOM work on pre-purchase customer satisfaction. The result showed there is no significant correlation between product attribute and pre-purchase customer satisfaction. Moreover, it was found that the standardized coefficient of product attribute for pre-purchase customer satisfaction is 0.036, which was very close to 0, and it means product attribute would not exert effects on pre-purchase customer satisfaction. To summarize, product attribute would give effects on pre-purchase customer satisfaction through gathering eWOM; therefore, gathering eWOM exerts complete mediation effect.

Table 16 Mediation Effect of Framework before Purchasing

Path Analysis	Standardized Coefficient	S.E	C.R	<i>p</i>
Product attributes → Gathering eWOM	0.497	0.100	5.246	***
Product attributes → Pre-purchase customer satisfaction	0.274	0.083	3.333	***
Gathering eWOM → Pre-purchase customer satisfaction	0.525	0.114	4.012	***
Product attributes, Gathering eWOM → Pre-purchase customer satisfaction	0.036	0.101	0.370	0.711

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

4.3.2 Post-purchase Framework

First, the goodness of fit of framework was examined, which is shown in the Table 17. Table 17 demonstrates χ^2/df , GFI and CFI have reached the reference values, and others are

close to the reference values, which represents this model's goodness of fit of framework is reasonable and acceptable.

Table 17 Goodness of Fit of Framework after Purchasing

Index of Goodness of Fit	Reference Value	Reference	Results
Absolute Fit Index			
χ^2/df	< 5	Marsh & Hocevar [46]	2.327
GFI	0.80 - 0.89 reasonable fit > 0.90 excellent fit	Joreskog & Sorbom [37]	0.804
AGFI	> 0.80 good fit =< 0.05 good fit	Bagozzi & Yi [3]	0.760
RMSEA	0.05 - 0.08 right fit 0.08 - 0.10 mediocre fit > 0.10 poor fit	Huang [34]	0.082
Incremental Fit Index			
NFI			0.847
CFI	> 0.90	Huang [34]	0.906
NNFI			0.894

The path analysis was then conducted to examine the effect relationships among the variables. According to Figure 6 and Table 18, product attribute gives positive significant effect on spreading positive eWOM; therefore, H4a is supported. And it also gives positive significant effect on spreading negative eWOM; therefore, H4b is sustained. To conclude, H4 is supported, which implies that when consumers attach more importance to cell phones' product attributes, they are more likely to spread eWOM online. Post-purchase customer satisfaction has positive significant effect on the behavior of spreading positive eWOM; therefore, H5a is supported. Moreover, post-purchase customer satisfaction gives negative significance effect on spreading negative eWOM; therefore, H5b is also supported. To conclude, H5 is varified, indicating higher the customer satisfaction, consumers are more likely to spread positive eWOM, but less likely to spread negative eWOM. H6 is supported by the finding that the product attribute has positive significant effect on post-purchase customer satisfaction. This result revealed that if consumers value the product attributes of

cell phones more, it would be more likely to influence their post-purchase customer satisfaction.

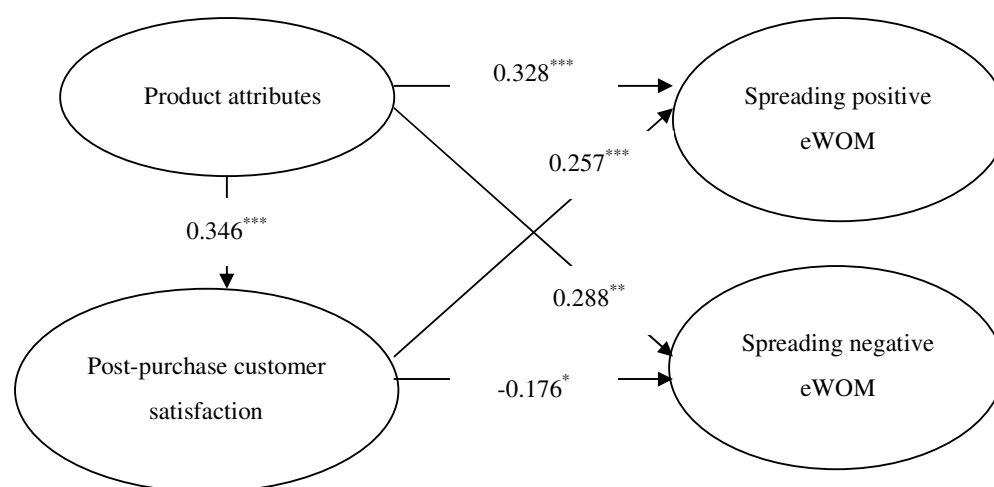


Figure 6 Path Analysis of Post-Purchase Framework

Note: In order to keep the paper neat, observable variables and residual items are not listed.

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 18 Path Analysis of Framework after Purchasing

Path Analysis	Standardized Coefficient	S.E	C.R	<i>p</i>
Product attributes → Spreading positive eWOM	0.328	0.167	3.853	***
Product attributes → Spreading negative eWOM	0.288	0.171	3.131	**
Post-purchase customer satisfaction → Spreading positive eWOM	0.257	0.125	3.401	***
Post-purchase customer satisfaction → Spreading negative eWOM	-0.176	0.128	-2.149	*
Product attributes → Post-purchase customer satisfaction	0.346	0.098	4.171	***

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

A test on a mediation test was performed in the last step. This research conducted examinations to examine the relationships between product attribute and post-purchase customer satisfaction, and between product attribute and spreading eWOM as well as between post-purchase customer satisfaction and spreading eWOM. Table 19 shows there was a significant correlation between product attribute and post-purchase customer

satisfaction. We also found a significant correlation between product attributes and spreading eWOM, and a significant correlation was observed between post-purchase customer satisfaction and spreading eWOM. Further, more examinations were carried out to test the relationships of product attribute, post-purchase customer satisfaction and spreading eWOM. The test showed a significant correlation between product attribute and spreading eWOM, whose standardized coefficient was lower than the one of product attributes on spreading eWOM; therefore, we believed post-purchase customer satisfaction has partial mediation effect.

Table 19 Mediating Effect of Pre-Purchase Framework

Path Analysis			Standardized Coefficient	S.E	C.R	<i>p</i>
Product Attribute	→	Post-purchase customer satisfaction	0.344	0.101	4.184	***
Product Attribute	→	Spreading eWOM	0.390	0.145	4.760	***
Post-purchase customer satisfaction	→	Spreading eWOM	0.695	0.109	5.314	***
Product Attribute, Post-purchase customer satisfaction	→	Spreading eWOM	0.364	0.238	3.320	***

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

4.3.3 Conclusion of Hypotheses

To summarize, the results of hypothesis testing are shown in Table 20.

Table 20 Hypothesis Testing Results

	Hypothesis	Testing Results
H1	The degree of consumer valuing the product attributes would give impacts to activities in gathering eWOM	Sustained
H1a	It will increase the activities in gathering positive eWOM if consumers highly valuing the product attributes.	Sustained
H1b	It will increase the activities in gathering positive eWOM if consumers highly valuing the product attributes.	Sustained
H2	The activities in gathering eWOM lay effects on the pre-purchase customer satisfaction of a consumer.	Partially sustained

H2a	The activities in gathering positive eWOM would increase the pre-purchase customer satisfaction of a consumer.	Sustained
H2b	The activities in gathering negative eWOM would decrease the pre-purchase customer satisfaction of a consumer	Not sustained
H3	The degree of consumer valuing the product attributes would have effects on the pre-purchase customer satisfaction of product evaluation	Not sustained
H4	Different degrees in consumer valuing product attributes would have effects on the behaviors of spreading eWOM	Sustained
H4a	Consumers highly valuing product attributes would increase the activities in spreading positive eWOM.	Sustained
H4b	Consumers highly valuing product attributes would increase the activities in spreading negative eWOM.	Sustained
H5	Post-purchase customer satisfaction would affect eWOM spreading behavior.	Sustained
H5a	Increasing post-purchase customer satisfaction would increase activities in spreading positive eWOM.	Sustained
H5b	Increasing post-purchase customer satisfaction would reduce activities in spreading negative eWOM.	Sustained
H6	The degree of consumers valuing product attributes would give effects on post-purchase customer satisfaction.	Sustained

563 5. Conclusion and Suggestion

564 5.1 Conclusion

565 For product attributes and customer satisfaction, the pre-purchase framework shows
566 product attribute did not significantly influence pre-purchase customer satisfaction. But the
567 post-purchase framework indicates that product attribute has significantly positively
568 influenced post-purchase customer satisfaction. The most likely causes of this result is that
569 consumers would be able to perceive product attributes, such as appearance, screen, function,
570 only after having actual engagement with the product. Therefore, before making a purchase,
571 there are no possibilities for consumers to gain actual experiences from the product attributes
572 and, thus, it would not influence their expected satisfaction. In other words, the product
573 attributes will influence consumers' satisfaction only if consumers have experienced the

574 product.

575 For product attributes and eWOM, product attributes are having positive significant
576 correlation with eWOM both in gathering positive eWOM and gathering negative eWOM in
577 the pre-purchase framework and also in spreading positive eWOM and spreading negative
578 eWOM in the post-purchase framework. This result revealed that if consumers weight a cell
579 phone's product attributes more, they are more likely to gather this phone's positive and
580 negative eWOM in order to learn more about this phone and to reduce their purchase risk.
581 Furthermore, it also shows that if consumers value product attributes more, they are more
582 likely to spread this cell phone's positive and negative eWOM in order to share their real
583 experience and perception.

584 For eWOM and customer satisfaction, gathering positive eWOM has positive significant
585 correlation with pre-purchase customer satisfaction in the pre-purchase framework, but
586 gathering negative eWOM does not significantly influence pre-purchase customer
587 satisfaction. The cause may be that before making a purchase, consumers tend to gather only
588 positive eWOMs to increase their satisfaction in order to prove their purchase of that phone is
589 worthwhile and to support their decision being right. In addition, the post-purchase
590 framework shows that post-purchase customer satisfaction is positively significantly
591 correlated with spreading positive eWOM, and is negatively significantly correlated with
592 spreading negative eWOM. This result reveals that if the consumers have higher customer
593 satisfaction, they are more likely to spread positive eWOM, but less likely to spread negative
594 eWOM.

595 Concerning product attributes, eWOM and customer satisfaction, the pre-purchase
596 framework demonstrates that product attributes has no significant influence on pre-purchase
597 customer satisfaction, and only could generate influences via gathering eWOM, which has full
598 mediation effect; accordingly, before making a purchase, gathering eWOM deeply influences
599 consumer buying decision. Further, the post-purchase framework reveals that product

attributes not only have positive significant correlation with spreading eWOM, but could influence spreading eWOM via post-purchase customer satisfaction, which is with partial mediation effect. Therefore, the product attributes and the degree of customer satisfaction considerably influence on the activities of consumers' spreading eWOM.

5.2 Suggestion

Product attributes have positive significant influence on both pre-purchase gathering eWOM and post-purchase spreading eWOM, indicating product attributes influence profoundly on eWOM. On this basis, this study suggests cell phone manufacturers could do online and street-intercept surveys to learn more about consumer needs. And manufacturers could develop cell phones based on the diverse needs of different groups, for example, the seniors would need a phone with loud ring tones, large screen and keys, and positioning system etc, but for business use, the phones should be able to connect to Internet, receiving emails and able to conduct video conferences.

For eWOM and customer satisfaction, this research showed that positive eWOMs would affect consumers' satisfaction before consumers' making a purchase. Accordingly, it is suggested that cell phone manufacturers should keep their eyes on every negative reviews and eWOM online. Once negative words turning up, they should be deeply investigated, and the complaints should be addressed in order to control the negative image to be proliferated. This study also suggested that cell phone manufactures could offer new phone replacement warranty, provide full and complete product information and thorough after-sale service, such as extended warranty, free home pick-up service, giving replacement phones while fixing, in order to increase customer satisfaction and to make customers be willing to spread more and better positive eWOM, as Engel et al. [17] said, "your best salesman is a satisfied customer"

5.3 Contribution

There are many researches on eWOM, but, little has worked on how cell phone product attributes influence consumers' behaviors on eWOM. The empirical results of this study

showed that cell phones' product attributes indeed would positively, significantly influence consumers' pre- and post-purchase eWOM behaviors. Besides, this research has developed pre- and post-purchase behavior models in order to learn the differences and to know more on the consumer behaviors. On these grounds, this study does have its academic value. We have obtained empirical results demonstrating that gathering positive eWOM do influence the pre-purchase customer satisfaction, the product attributes would affect the pre-purchase customer satisfaction only via gathering eWOM, and the post-purchase customer satisfaction would positively and significantly have influences on spreading eWOM. These grounds all prove eWOM definitely has crucial and profound influences on consumer purchase decisions. With this ground, this study is of real worth for empirical reference.

5.4 Limitation and Future Work

The most important limitation lies in the fact that the survey takers in this research were only qualified if their in-use cell phones had been purchased online. Therefore, we recommend that the following researches could add samples of the cell phones which were purchased online and compare their differences. Moreover, this study also suggests the future researches could add more aspects, such as loyalty, to give a further exploration.

Reference

- [1] Aaker, D. A. (1996). *Building strong brands*. New York: The Free Press.
- [2] Arndt, J. (1967). Role of product-related conversations in the diffusion of a new product. *Journal of Marketing Research*, 4(3), 291-295.
- [3] Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Academy of Marketing Science*, 16(1), 17-94.
- [4] Bansal, H. S., & Voyer, P. A. (2000). Word-of-mouth processes within a services purchase decision context. *Journal of Service Research*, 3(2), 166-177.
- [5] Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in

- 651 social psychological research: Conceptual, strategic, and statistical considerations.
652 *Journal of Personality & Social Psychology*, 31(6), 1173-1182.
- 653 [6] Bone, P. F. (1992). Determinants of word-of-mouth communication during product
654 consumption. *Advances in Consumer Research*, 19(1), 579-583.
- 655 [7] Brown, J. J., & Reingen, P. H. (1987). Social ties and word-of-mouth referral behavior.
656 *Journal of Consumer Research*, 14(3), 350-362.
- 657 [8] Cardozo, R. N. (1965). An experimental study of consumer effort, expectation and
658 satisfaction. *Journal of Marketing Research*, 21, 244-249.
- 659 [9] Chen, S. Y. (2004). How source credibility of word-of-mouth in Internet forum influence
660 message's trust. Unpublished master thesis, National Taiwan University of Science and
661 Technology, Taiwan.
- 662 [10] Chen, Y. R. (2005). Discussion on product attributes and lifestyle influencing
663 consumers' decision making on purchasing behavior - sleepy product as an example.
664 Unpublished master thesis, Da Yeh University, Taiwan.
- 665 [11] Chiou, J., Droge, C., & Hanvanich, S. (2002). Does customer knowledge affect how
666 loyalty is formed?, *Journal of Service Research*, 5(2), 113-124.
- 667 [12] Chiou, W. H. (1999). *Marketing management - market analysis and strategy planning*,
668 *1st Edition*. Taipei: Best-Wise Publishing.
- 669 [13] Churchill, G. A., & Surprenant, C. (1982). An investigation into the determinant of
670 customer satisfaction. *Journal of Marketing Research*, 19, 491-504.
- 671 [14] Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests.
672 *Psychometrika*, 16(3), 297-334.
- 673 [15] Crosby, L. A., Evans, K. R., & Cowles, D. (1990). Relationship quality in service selling:
674 An interpersonal influence perspective. *Journal of Marketing*, 54(3), 68-81.
- 675 [16] Doh, S. J., & Hwang, J. S. (2009). How consumers evaluate eWOM (electronic
676 word-of-mouth) messages. *CyberPsychology & Behavior*, 12(2), 193-197.

- 677 [17] Engel, J. F., Kegerreis, R. J., & Blackwell, R. D. (1969). Word of mouth communication
678 by the innovator. *Journal of Marketing*, 33(3), 15-19.
- 679 [18] Fei, T. (2000). Theory examination and extension of online market maven - A research
680 on their online information gathering, WOM spreading, online shopping behaviors and
681 personal traits. Unpublished master thesis, National Cheng Chi University, Taiwan.
- 682 [19] File, K. M., & Prince, R. A. (1993). Positive word-of-mouth: Customer satisfaction and
683 buyer behaviour. *The International Journal of Bank Marketing*, 10(1), 25-29.
- 684 [20] FIND (2011a). <http://www.find.org.tw/find/home.aspx?page=many&id=295>.
685 Assessed 17 December 2011.
- 686 [21] FIND (2011b). <http://www.find.org.tw/find/home.aspx?page=many&id=300>.
687 Assessed 17 December 2011.
- 688 [22] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with
689 unobservable variables and measurement error. *Journal of Marketing Research*, 18,
690 39-50.
- 691 [23] Ganesh, J., Arnold, M. J., & Reynolds, K. E. (2000). Understanding the customer base
692 of service providers: An examination of the differences between switchers and stayers.
693 *Journal of Marketing*, 64(3), 65-87.
- 694 [24] Gelb, B. D., & Sundaram, S. (2002). Adapting to word of mouse. *Business Horizons*,
695 45(4), 21-25.
- 696 [25] Goldsmith, R. E., & Horowitz, D. (2006). Measuring motivations for online opinion
697 seeking. *Journal of Interactive Advertising*, 6(2), 1-16.
- 698 [26] Gremler, D. D., & Gwinner, K. P. (2000). Customer-employee rapport in service
699 relationships. *Journal of Service Research*, 3(1), 82-104.
- 700 [27] Hawkins, D. I., Best, R. J., & Coney, K. A. (2004). *Consumer behavior: Building*
701 *marketing strategy*, 9th Edition. Boston: McGraw-Hill.
- 702 [28] Hanson, W. A. (2000). *Principles of Internet marketing*. Ohio: South-West College

- Publishing.
- [29] Hempel, D. J. (1977). Consumer satisfaction with the home buying process: Conceptualization and measurement. In H. K. Kieth (Ed.), *The conceptualization of consumer satisfaction and dissatisfaction*. Cambridge, Mass: Marketing Science Institute.
- [30] Hennig-Thurau, T., & Walsh, G. (2003). Electronic word-of-mouth: Motives for and consequences of reading customer articulations on the Internet. *International Journal of Electronic Commerce*, 8(2), 51-74.
- [31] Hennig-Thurau, T., Gwinner, K. P., Walsh, G., & Gremler, D. D. (2004). Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the Internet. *Journal of Interactive Marketing*, 18(1), 38-52.
- [32] Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing*, 46, 92-101.
- [33] Hoffman, D. L., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of Marketing*, 60(3), 50-68.
- [34] Huang, F. M. (2007). *Theories and application of structural equation model, 5th Edition*. Taipei: Wu-Nan Book.
- [35] Hunt, H. K. (1977). *Conceptualization and measurement of consumer satisfaction and dissatisfaction*. Cambridge, MA: Marketing Science Institute.
- [36] Jian, P. Y. (2001). The study of attribute with product familiarity. Unpublished master thesis, Tamkang University, Taiwan.
- [37] Joreskog, K. G., & Sorbom, D. (1988). *LISREL 7: A guide to the program and application*. Chicago, IL: SPSS Inc.
- [38] Kotler, P. (1999). *Marketing management: An Asian perspective, 2nd Edition*. Singapore: Prentice-Hall.
- [39] Kotler, P. (2000). *Marketing management: Millennium edition, 10th Edition*. Prentice

- 729 Hall.
- 730 [40] Kotler, P., & Armstrong, G. (2006). *Marketing: An introduction, 6th Edition*. Prentice
- 731 Hall.
- 732 [41] Koufteros, X. (1999). Testing a model of pull production: A paradigm for manufacturing
- 733 research using structural equation modeling. *Journal of Operations Management*, 17(4),
- 734 467-488.
- 735 [42] Lefkoff-Hagius, R., & Mason, C. H. (1993). Characteristic, beneficial, and image
- 736 attributes in consumer judgments of similarity and preference. *Journal of Consumer*
- 737 *Research*, 20(1), 100-110.
- 738 [43] Litvin, S. W., Goldsmith, R. E., & Pan, B. (2008). Electronic word-of-mouth in
- 739 hospitality and tourism management. *Tourism Management*, 29(3), 458-468.
- 740 [44] Liu, D. A. (2000). The research on market segmentation on digital mobiles - Students
- 741 from great Taipei region as an example. Unpublished master thesis, Taiwan Soochow
- 742 University, Taiwan.
- 743 [45] Lo, W. K. (1986). *Marketing communication, 1st Edition*. Taipei: San Min Book.
- 744 [46] Marsh, H., & Hocevar, D. (1985). Application of confirmatory factor analysis to the
- 745 study of self-concept: First- and higher-order factor models and their invariance across
- 746 groups. *Psychological Bulletin*, 97(3), 562-582.
- 747 [47] Mittal, V., Ross, W. T. Jr., & Baldasare, P. M. (1998). The asymmetric impact of negative
- 748 and positive attribute-level performance on overall satisfaction and repurchase intentions.
- 749 *Journal of Marketing*, 62, 33-47.
- 750 [48] Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of
- 751 satisfaction decisions. *Journal of Marketing Research*, 17(4), 460-469.
- 752 [49] Park, C. W, Jaworski, B. J., & MacInnis, D. J. (1986). Strategic brand concept-image
- 753 management. *Journal of Marketing*, 50, 135-145.
- 754 [50] Podoshen, J. S. (2008). The African American consumer revisited: Brand loyalty,

- 755 word-of-mouth and the effects of the black experience. *Journal of Consumer Marketing*,
756 25(4), 211-222.
- 757 [51] Raine-Eudy, R. (2000). Using structural equation modeling to test for differential
758 reliability and validity: An empirical demonstration. *Structural Equation Modeling*, 7(1),
759 124-141.
- 760 [52] Richins, M. L. (1983). Negative word-of-mouth by dissatisfied consumers: A pilot study.
761 *Journal of Marketing*, 47(1), 68-78.
- 762 [53] Singh, J., & Pandya, S. (1991). Exploring the effect of consumers' dissatisfaction level
763 on complaint behaviors. *European Journal of Marketing*, 25(90), 7-21.
- 764 [54] Strahilevitz, M., & Myers, J. G. (1998). Donations to charity as purchase incentives:
765 How well they work may depend on what you are trying to sell. *Journal of Consumer*
766 *Research*, 24(4), 434-446.
- 767 [55] Synovate Report (2008). No more geek - Internet becomes the main information
768 provider of consumer electronics.
769 http://advertising.microsoft.com/taiwan/research?Adv_ResearchReportID=753.
770 Accessed 7 October 2009.
- 771 [56] Tanimoto, J., & Fujii, H. (2003). A study on diffusional characteristics of information on
772 a human network analyzed by a multi-agent simulator. *The Social Science Journal*, 40(3),
773 479-485.
- 774 [57] TARP (1989). *Measuring the grapevine-consumer response and word-of-mouth*. Office
775 of Consumer Affairs.
- 776 [58] Tse, D. K., & Wilton, P. C. (1988). Models of consumer satisfaction formation: An
777 extension. *Journal of Marketing Research*, 25, 204-212.
- 778 [59] Tzeng, W. C. (2006). Formation and influence of eWOM - Cell Phone as the example.
779 Unpublished master thesis, Fo Guang University, Taiwan.
- 780 [60] Wang, J. C. (2006). Effects of online negative word-of-mouth on receiver's attitude

- 781 toward product in different brand awareness. Unpublished master thesis, National Chiao
782 Tung University, Taiwan.
- 783 [61] Wang, Z. Z. (2004). Influence on expertise and tie strength on purchase decision in
784 word-of-mouth of Internet: An e-mail analysis. Unpublished master thesis, National
785 Taiwan University of Science and Technology, Taiwan.
- 786 [62] Wei, S. L. (2000). Study on the purchasing behavior of the customers and market
787 segmentation of the mobile telephone service - A case study for the residents in northern
788 Taiwan. Unpublished master thesis, National Chiao Tung University, Taiwan.
- 789 [63] Westbrook, R. A. (1987). Product/consumption-based affective responses and
790 postpurchase processes. *Journal of Marketing Research*, 24(3), 258-270.
- 791 [64] Westbrook, R. A., & Oliver, R. L. (1991). The dimensionality of consumption emotion
792 patterns and consumer satisfaction. *Journal of Consumer Research*, 18(1), 84-91.
- 793 [65] Wu, Z. Y. (2001). The linkage of product attribute and design parameter - Take cellular
794 phone as an example. Unpublished master thesis, National Taipei University, Taiwan.
- 795 [66] Yang, X. C., Zhang, X. H., Wu, J., & Xu, J.(2008). Impact of marketing efforts and
796 customer satisfaction on word-of-mouth-study based on mobile phone user in China.
797 *Journal of Chinese Marketing*, 1(1), 41-46.
- 798 [67] Young, S., & Feigin, B. (1975). Using the benefit chain for improved strategy
799 formulation. *Journal of Marketing*, 39(3), 72-74.
- 800 [68] Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences
801 of services quality. *Journal of Marketing*, 60(2), 31-46.
- 802 [69] Zheng, S. C. (2006). *Business management: Global oriented operation, 1st Edition*.
803 Taipei: Future Career Management Corporation.