
Determinants and consequences of social media apps usage: from the perspective of the value theory

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Abstract: Among a large number of available mobile applications (apps), social media apps are widely used by users. However, some negative effects might occur when people rely too much on social media apps. This study applies empirical research to discuss the values that social media apps can provide to users, and to explore the impact of social media apps usage. The results indicated that information value, social value, fashion value, and perceived social presence have a significant influence on users' usage of social media apps. However, growing usages on social media apps could lead to users' social interaction overload. Moreover, users' dependency on social media apps has a significant and positive influence on their virtual social self-efficacy, but feeling exhausted due to social interaction overload, has a negative influence on users' virtual social self-efficacy. Finally, users' virtual social self-efficacy has a significantly positive influence on their real social self-efficacy. Some suggestions are given by this study.

Keywords: social media apps; theory of consumption values; theory of information overload; social cognitive theory; dependency; exhaustion.

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1 Introduction

Due to the rapid progress of wireless communication technology, such as 4G, 5G and Wi-Fi, and the popularity of smartphones and even tablets, together provide extremely high portability of mobile devices, which not only enable users exchange information and knowledge with others more convenient, but also let people linked closely through using these mobile devices to communicate (Lee et al. 2012). Most mobile devices include a variety of built-in functions, such as Bluetooth, GPS, NFC, etc., and these functions allow for the development of different types of mobile application services or apps (Xu et al., 2015; Lin et al., 2015; He et al., 2015; Varshney and Vetter, 2002; Mahatanankoon et al., 2005; Anckar and D'incan, 2002). Among a large number of available apps, social media apps (e.g., LINE, WhatsApp, WeChat, and so on) are most widely used by users and they are the most interwoven with users' daily lives (Hu et al., 2014). Social media apps are mobile services developed by associating virtual communities with mobile devices; they provide helpful mobile technologies for individuals to interact and communicate with one another on common topics (Schubert and Hampe, 2005). In other words, social media apps combine social-related functions and wireless communication techniques and are applied to mobile devices (Kayastha et al., 2011).

Currently, there are already many social media apps flooded in the mobile apps market (Kayastha et al., 2014). Some of these apps, such as Facebook Messenger, Google Hangouts, etc., are mobile-version social media apps developed by existing social networking websites in response to the growing trend of mobile services. Other social media apps, such as WhatsApp, LINE, and WeChat, recently emerged in response to the popularity of mobile services. All these social media apps allow users to share their current moods and locations with others at any time and place (Yazji et al., 2014). Users can also use these apps to exchange pictures, texts, video/audio messages, and other data in real time (Schubert and Hampe, 2006). Further, with these apps, users can even make friends with people who have similar interests or are interested in similar topical subject (Thilakarathna et al., 2013). Such these social media apps are quite different from the past social network sites because they are not fixed at desktop; they are ubiquitous in nature, i.e., users can perform these social media services at anytime and anywhere.

In literature, there are already many researches on social media apps. Some of these researches explored satisfaction and loyalty of users to this type of service. For example, Park et al. (2011) studied users' satisfaction with the message exchange function of the mobile instant messaging software that they were using. Also, Zhou et al. (2010) conducted a survey of people who use popular Chinese social media apps, such as Renren, Kaixin and QQ, and found that users' loyalty to these apps when the apps are high in quality and provide good information. Furthermore, Suki (2012) conducted interviews with college students who use Facebook's mobile apps and found that system quality, information quality, and users' perceived trust are the factors that influence users' loyalty to this application. Other researches also focused on the motivations and intentions behind which people use social media service. For example, Yang and Lin (2019) conducted an empirical research to understand what factors make the elderly willing to adopt ubiquitous mobile social service. The results indicated that social motivation, enjoyment motivation, fashion motivation, perceived interactive richness and

apps self-efficacy are positive influential factors. Besides, Zhou and Li (2014) conducted researches on WeChat and QQ users, and reported that various social influence factors, such as subjective norms, group norms, and social status, have a significant impact on a user's intention to continue using social media apps. Also, Shambare (2014) studied college students' intentions underlying their use of the short messaging service provided by WhatsApp, and found that the students' perception of the application's usefulness and user-friendliness has a significantly influence on their intentions of using the application. In addition, Gao and Bai (2014) explored users' intentions regarding whether they were planning to continue using mobile social networking services, such as Facebook and MySpace, and indicated that service quality, information quality, and network externality have an influence on users' satisfaction with the services and their intentions to continue using the services.

From an overview of the past studies about social media apps, we found that most of them focused on users' satisfaction, loyalty, motivations, and behavioural intentions toward their social media apps usage. However, it is important for mobile service providers in developing or promoting their social media apps to understand what are the values of social media apps to users. Although many social media apps have powerful features, what are the essential values from the perspective of users? And if users are addicted to social media apps to stay connected with people, would they feel overloading from bombarding social messages and help requests? Furthermore, what are the consequences of social media apps usage on their social interactive abilities in virtual world and real world? In the era of people using desktop computers at fixed locations, some researchers have already paid attentions to the social impacts of using social network sites. For example, Lai and Yang (2016) found that interpersonal needs, enjoyment needs and pursuit of fashion have influences on the usages of social interaction features on Facebook website, and such usages in Facebook could positively enhance the individual's perceived social ties, including strong and weak social ties. Recently, Yubo and Xiaoyu (2019) reported that through the survey of 204 college students using 'Sina Weibo', China's equivalent of Twitter, a significantly positive correlation was found between online social support, social media usage and social self-efficacy. Thus, regarding these new ubiquitous communication apps, it is also worth exploring further how the users are impacted by their usages.

In light of the above literature reviews and discussion, this study is trying to propose an integrated model to explore which values are important for users to use social media apps, whether they would feel overloading and exhausted, and further discuss the impacts on users' social communication capabilities in both virtual world and real world after using social media apps. For these research motivations, this study applies empirical research in combination with three theories, namely, theory of consumption values (Sheth et al., 1991), which provides us the spectrum of values, theory of information overload (Anderson and de Palma, 2005), which discuss the possible overloading, and social cognitive theory (Bandura, 1977), which allows us to explore social self-efficacy in the virtual world and real world.

2 Literature review and hypothesis inferences

2.1 Theory of consumption values

By consumption value, it means the degree to which a consumer feels his/her need is satisfied from what he/she paid and what he/she obtained (Zeithaml, 1988; Parasuraman et al., 1988, 1988). In many research studies, it is thought consumption values can be basically classified into utilitarian value and hedonic value. The former emphasises the real functionality and utility of a product or service that can be brought to a consumer, while the latter pays more attention to a consumer's emotional and mental feelings that can be aroused by a product or service. Sheth et al. (1991) further proposed the theory of consumption values, which gives a complete description of five value dimensions that consumers perceived from a product or service they received. These value dimensions influence consumers' choice, decision making or purchase behaviour. The theory of consumption values includes three fundamental propositions:

- 1 consumer choice is a function of multiple consumption values
- 2 the consumption values make differential contributions in any given choice situation
- 3 the consumption values are independent of one another.

The theory of consumption values identifies five consumption values, namely, functional value, social value, emotional value, epistemic value, and conditional value (Sheth et al., 1991). The functional value indicates a consumer needs can be satisfied by the function and utility a product or service provides; the social value indicates a consumer is able to get recognition from social groups or communicate with others through the features of a product or service; the emotional value indicates a product or service is able to trigger a consumer's emotions or change a consumer's emotional state; the epistemic value indicates a consumer's curiosity that can be aroused from a novelty product or service; and the conditional value indicates a consumer's perceived utility that can be acquired while a consumer facing a product or service as the result of the specific situation (Prasad and Jha, 2014).

To date, multiple research studies apply the theory of consumption values to explore and discuss user intention and user behaviour toward the use of various technological products or services. For example, Kim et al. (2011) studied the intention to purchase digital items in the virtual community, and indicated virtual community members' intention to purchase is strongly affected by the perceived emotional value and social value but not at all affected by the functional value. Shang et al. (2012) specially explored the intention of virtual community members to purchase ornamental items for virtual roles, and the results again proved the emotional value and social value have a significant influence on the purchase intention. Rezaei and Ghodsi (2014) applied the theory of consumption values to study the intention of massively multiplayer online role-playing game (MMORPG) players to continue purchasing the games, and found the functional value is helpful in increasing the players' intention to continue purchase the games, while the social value and emotional value are not influential in this aspect. Wang (2014) studied the intention to the continuous use of mobile government from the viewpoint of functional value, and indicated the functional value has a positive and significant influence on users' satisfaction and users' trusts. The aforesaid studies have successfully utilised the theory of consumption values in various situations. In this

research, we performed a focus group discussion (six regular users), referred to the above previous studies, and then identified five values that users of social media apps perceive as follows.

- *Information value.* One of the major features of social media apps is to allow users to get, at any time and place, information they are interested in or feel useful to them. For example, social media apps enable users to obtain, at any time and place, information (e.g., news and gossip) that is shared by other people and unknown to the users before, or to obtain from the groups the users joined, in real time, the information the users are interested in (e.g., discount or promotion of product). Social media apps can even allow users to obtain all necessary information in connection with their daily life, e.g., information about food, clothing, living, transportation, education, sports, entertainment, etc. In other words, social media apps provide users with great convenience in getting all kinds of required information. From earlier relevant literature, it is found convenience is always one of the critical and decisive factors influencing users' intention to use a product or service (Deng et al., 2010; Kang et al., 2015; Okazaki et al., 2008; Pura, 2005; Yen, 2012). In other words, social media apps have an information value to users. Thus, this study proposes the following hypothesis:

H1 User-perceived information value of social media apps has a positive influence on social media apps usage.

- *Social value.* The most important features of social media apps are to allow a user to interact and communicate with an individual or a group of people, to share current location with family or friends, or to make friends or chat with unacquainted people by searching for nearby users or joining in interesting groups at any time and place. Therefore, for users, the establishment and maintenance of social relationship with others is an important value they can get from social media apps (Wang et al., 2013; Yen, 2012; Yu et al., 2013). Thus, this study proposes the following hypothesis:

H2 User-perceived social value of social media apps has a positive influence on social media apps usage.

- *Emotional value.* On the other hand, there are times when users just want to kill time with social media apps. For instance, some users would chat with family members and friends, browse or respond to friends' posts, watch interesting news or information, or play interactive games with friends via social media apps when they take public transport. Sometimes these user behaviours do not mean the users really want to get substantial informative or social benefits, but simply want to kill time and relax. When a user gets emotional satisfaction through social media apps usage, the emotional value of social media apps perceived by the user will increase. Earlier literature also pointed out the emotional value has a critical influence on a user's decision-making process about the use of a product or service (Deng et al., 2010; Kim et al., 2011; Pura, 2005; Wang et al., 2013). Fernández-Robin et al. (2019) indicated that hedonic motivation is very important for the intention to use WhatsApp. Both Zhang et al. (2017) and Zong et al. (2019) also reported the importance of perceived enjoyment to continuance intention of WeChat in China. Thus, this study proposes the following hypothesis:

H3 User-perceived emotional value of social media apps has a positive influence on social media apps usage.

- *Work support value.* There are even users who use social media apps to discuss business in real time or have an online meeting (Cheung et al., 2011; Cheung and Lee, 2009). The emergence of social media service has brought new management practices to many enterprise organisations. That is, these enterprise organisations utilise social media services to establish new business modes, such as collaboration, knowledge sharing and communication (Cao and Yu, 2019). Recent research studies point out that social media apps can effectively upgrade personal work performance and productivity (Cao and Ali, 2018; Alalwan et al., 2017; Landers and Schmidt, 2016; Dwivedi et al., 2015; Aral et al., 2013; Moqbel et al., 2013). In other words, for users, the value of supporting personal work performance provided by social media apps usage indeed exists. Thus, this study proposes the following hypothesis:
H4 User-perceived work support value of social media apps has a positive influence on social media apps usage.

- *Fashion value.* Furthermore, social media apps allow users to share newest and instant information with one another and can therefore be considered as a symbol of fashion. Some marketing-related research points out users tend to purchase or use a product or service when they think the product or service meets the essential factor of being fashionable (Watchravesringkan et al., 2010). Miller et al. (1993) proposed the fashion theory, which pointed out the desire to pursue fashionable things is innate to everyone. Presently, social media apps have become an important channel and tool used by many people to do their social activities. Social media apps provide people with completely new ways and forms of socialising with others, allowing users to obtain the newest information, to interact, social and keep close contact with others, to kill time, and to discuss business immediately, at any time and place. In other words, social media apps usage has been considered behaviour of keeping up with the times. Thus, this study proposes the following hypothesis:
H5 User-perceived fashion value of social media apps has a positive influence on social media apps usage.

2.2 *Social presence*

Social presence is defined as the degree to which a medium allows users to connect with and to experience other users through it while they feel as being psychologically present before other users and could feel a sense of human contact (Lee et al., 2009). Some early-stage social media, such as e-mails and websites, do not give users too much feeling of social presence because these media lack body language or verbal cues and therefore have limited ability to convey natural language, preventing users from giving instant feedback during their communication or interaction with others (Xu et al., 2012). Users' desire to make social contact with others through these media might reduce if the feeling of social presence the media can give users is low (Kreijns et al., 2003). Compared to the conventional social media, social media apps provide versatile social functions, such as video communication function and audio/video messages, which enable users to clearly express the messages they want to convey during their interaction or communication with others at any time and place. Hwang and Lombard (2006) pointed out in their study that

users' intention to continuous usage of social media services to satisfy their social needs will be stronger if they have a strong feeling of 'being together' when they chat with one another via these social media services. Further, another feature of social media apps is they allow users to get immediate feedback during their communication and interaction with one another, just as in a face-to-face communication, even if they do not really meet one another. It is also found in many studies that instant feedback can enhance users' feeling of social presence (Tan et al., 2012; Rice, 1993; Qiu and Benbasat, 2005; Suh and Shin, 2008). Han et al. (2015) found in their study that social media services enable users to feel a real-time communication, which in turn increases users' interaction willingness and frequency.

In view that social networking sites and mobile social media have been recently widely used by people as tools to contact, interact and communicate with others either in their hedonic life or work, many researches on information system are aimed at the influence of user perceived social presence on various online social services. Presently, it has been proven by some studies that social presence indeed has a direct influence on users' behavioural intention or actual information technology usage (Xu et al., 2012; Lee et al., 2009; Hassanein and Head, 2005). According to the above-mentioned facts, this study intends to verify whether user's perceived social presence has an influence on the social media apps usage and accordingly, proposes the following hypothesis:

H6 User-perceived social presence of social media apps has a positive influence on social media apps usage.

2.3 Dependency and social interaction overload

Following the progress of networking technologies and information services, more and more people heavily rely on community networking or mobile social services in their daily life. Social media apps could help users to maintain and expand their social circles, and should be valuable for users to engage in social interaction. In addition, social media apps have integrated user's private information with his/her networking social relationships, making the user impossible to engage in various daily activities, including but not limited to information acquisition, social interaction, entertainment, and business discussion, without using social media apps. This is also the reason why many mobile users heavily depend on social media apps (Tran and Huynh, 2015). Nowadays, due to the ubiquitous feature of networking, people's social relationships quickly expand in the networking virtual world, resulting in surprisingly increased and closer interpersonal connections, much more frequent interaction behaviours than before, which phenomenon consequentially brings about people's increasing reliance on social media services in various social interactions (Koroleva et al., 2010, 2011). Thus, this study proposes the following hypothesis:

H7 The degree of social media apps usage by a user has a positive influence on the degree of the user's dependency on social media apps.

Information overload theory has been adopted by many scholars to explain consumer behaviour of purchase decision making. Jacoby et al. (1974) pointed out in their research that information overload describes the difficulty of effectively and correctly making a purchase decision when a consumer receives too much information about the item to be purchased within a very short period of time (Abdel-Khalik, 1973; Cohen, 1980;

Chewning and Harrell, 1990). Since a person's cognitive processing capacity with regard to information is limited (Miller, 1956; Simon, 1979), information overload might occur when the quantity of information received by a person exceeds the quantity of information that can be processed by the person.

The similar phenomenon of information overload also occurs on usage of social media apps. Once users receive too many emotional support messages or material assistance requests from other users, increased social interaction overload might occur (Yang and Lin, 2017; Pielot et al., 2014). Social overload is defined as a situation that individuals provide too much social support to other people embedded in their social media service (Maier et al., 2014). Besides, in the virtual social networks, while individual users could have their own big interpersonal relation networks, they might not be interested in having social interactions with some of the people in the networks. For instance, some 'friends' in the social networks actually do not meet frequently or have met only once, and some of them might be a friend's friend. Moreover, people might not want to frequently interact with an acquainted friend if they do not have common topics to talk about. Users who often have to reply to messages from people they are not interested in or often receive out-of-date messages might also lead social interaction overload occurrence (Laumer et al., 2013). Based on the above discussion, this study proposes the following hypothesis:

H8 The degree of social media apps usage by a user has a positive influence on the degree of social interaction overload encountered by the user.

Ellison et al. (2007) pointed out that people want to seek social activities or emotional supports from their social networks. However, users who are overly dependent on community networks or mobile social services would spend a lot of time and energy caring about or handling other people's massive needs for emotional supports, which might further lead the users to a nervous, anxious or even tired state (Bawden and Robinson, 2009). In addition, when people encountering with mass-media information explosion would have the feeling of information overload, which finally leads to negative emotions like boredom, weariness, anxiety and exhaustion (Klapp, 1986). Cao and Yu (2019) also expressed that excessive social media apps usage will inevitably lead users to face or handle social-related or work-related messages and demands all the time and accordingly feel exhausted. Thus, many previous researches have proven that overdependence on technological products or service would eventually lead to users' feeling of exhaustion (Tran and Huynh, 2015; Haghighi et al., 2011; Mak et al., 2011). Thus, this study proposes the following hypothesis:

H9 The degree of a user's dependency on mobile social apps has a positive influence on the degree of exhaustion felt by the user.

Hall and Baym (2012) indicated that users might feel pressured when they have to be available to their friends all the time. In other words, users would experience social interaction overload when the requests of social support become more than what individuals are comfortable in offering, and might feel anxious or exhausted (Maier et al., 2015). For users, when massive online interaction overload is more serious, they may tend to suspend participation in interactive activities (Jones et al., 2004). Yang and Lin (2018) also mentioned that due to the ubiquitous feature of social media service, users may be making too much effort to respond requests or messages of other people and even feeling exhausted with social media apps (Yang and Lin, 2018). Therefore, social

overload might lead users to an anxious emotion and feel tired of social interactions (Yang and Lin, 2018; Laumer et al., 2013; Maier et al., 2012, 2014, 2015). Thus, this study proposes the following hypothesis:

H10 The degree of social interaction overload encountered by a user has a positive influence on the degree of exhaustion felt by the user.

2.4 Social cognitive theory

Social cognitive theory was advanced in 1970s by Albert Bandura to explain human behaviours based on general interactions between personal behaviours and environments. This theory mentioned that self-efficacy is the belief in one's capabilities to achieve a certain task, it is the most critical factor that significantly influences human behaviours (Bandura, 1977, 1982; Bandura and Schunk, 1981; Chapin, 2007). In other words, self-efficacy is the evaluation and confirmation made by a person according to past experiences on his/her own ability and the measurement made of the person about his/her capacity of showing good performance in a certain skill. According to Woolfolk and Hoy (1990), the drive of people to evaluate their self-efficacy comes from the results of mutual influences between external environments and personal capabilities and performances that are experienced by people. Neither computer self-efficacy nor mobile- apps self-efficacy is concerned by this study. Instead, we focus on social self-efficacy, which is the evaluation of one's own capabilities of well interacting and communicating with others in social activities (Sherer and Adams, 1983; Smith and Betz, 2000).

Since social media apps can provide users with great utility and convenience in their daily lives and work, many users have been good in using social media apps in things that require communications and interactions with others. Thus, on one hand, in the real world, users' social capabilities may increase while they use social media apps to assist with handling a large quantity of social activities almost every day. On the other hand, Jeong and Kim (2011) also indicated that users' degree of social service dependency has positive association with social self-efficacy in the virtual world. Such the effect is especially significant for those with relatively weak real social capacities (Iskender and Akin, 2010). Thus, this study proposes the following two hypotheses as follows:

H11 The degree of dependency on social media apps has a positive influence on user virtual social self-efficacy.

H12 The degree of dependency on social media apps has a positive influence on user real social self-efficacy.

However, there are also users who fall into a state of social interaction overload and feel stressed or exhausted after social media apps usage when they are overly dependent on social media apps (Bawden and Robinson, 2009). Users' capabilities in their virtual social activities are inevitably reversely affected when the state of social interaction overload occurs and brings negative emotions to users. Bock et al. (2010) pointed out that the engagement in social activities through social media apps usage might lead to too many social supports and social messages. This situation not only forces the user to spend additional time to handle or screen out unnecessary contents and to locate the messages that are really needed by the user, but also renders the user not having surplus time to handle the social relationship that really needs to be maintained, or missing information

that has a real close relation with the user. It means the user would not be able to well maintain their virtual social relationships. As claimed in literature, a person’s feeling of anxiety in social activities might adversely affect his/her social self-efficacy (Smith and Betz, 2002). Thus, this study proposes the following two hypotheses as follows:

H13 The degree of social interaction overload due to social media apps usage has a negative influence on user virtual social self-efficacy.

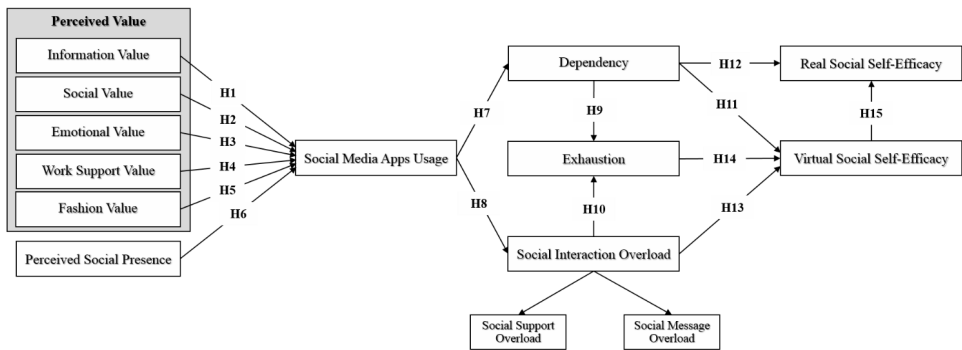
H14 The degree of exhaustion due to social media apps usage has a negative influence on user virtual social self-efficacy.

The past face-to-face social and interaction behaviour mode is gradually changed through the appearance of various social media service. Now, most people are more accustomed to social and interact with others via community network services or mobile social services (Yang and Lin, 2019; Lai and Yang, 2016; Kayastha et al., 2014). No matter in the virtual world or real world social relationships, people’s social interaction behaviours always include communicating and exchanging information with others as well as giving emotional supports (Procidano and Heller, 1983). A user’s capability of establishing and maintaining good relation with others in real social situations may be upgraded when the user gets recognition from others and has a sense of achievement in the virtual social environment. Based on the above discussion, this study further proposes the following hypothesis:

H15 User’s virtual social self-efficacy has a positive influence on user’s real social self-efficacy.

According to the above hypotheses [H1] to [H15], this study proposes a research hypothesis model as shown in Figure 1.

Figure 1 Research model



3 Research process

3.1 Measurement development

After developing the research model, this study further developed measurement items for each variable in the model. For the purpose of measuring the individuals’ ‘perceived value’ of using social media apps, this study classified the perceived value into

'information value', 'social value', 'emotional value', 'work support value' and 'fashion value', and defined the perceived value as the degree to which a user feels the usage of social media apps brings him/her different values, including information, social, emotional, work support, and fashion value. Using the above five perceived values as a basis, this study further referred to the measurement items in the questionnaire proposed by Yang and Lin (2014), Chen and Lin (2015), and Kim et al. (2007), and adjusted the contents of the original measurement items according to the properties of social media apps. Finally, 20 measurement items were developed for the variable 'perceived value'.

For measuring individuals' '*perceived social presence*' through using social media apps, this study considered this concept in terms of 'affective', 'interactive' and 'cohesive' aspects, and defined this variable as the degree to which a user feels like being social with others in a real environment through using social media apps. This study further referred to the measurement items in the questionnaire proposed by Rourke et al. (2007), Saude et al. (2012), Lee (2014), and McCreery et al. (2015), and adjusted the contents of their original measurement items according to the properties of social media apps. Finally, total seven measurement items were developed for the variable 'perceived social presence'.

This study defined the variable '*social media apps usage*' as the degree to which a user uses social media apps at any time and place, and referred to the measurement items in the questionnaire proposed by Kim et al. (2013), and adjusted the contents of their original measurement items according to the properties of social media apps. Total seven measurement items were developed for the variable 'social media apps usage'.

For measuring individuals' '*dependency*' after using social media apps, this study defined the variable as the degree to which a user becomes dependent on social media apps after using them. This study further referred to the measurement items in the questionnaire proposed by Chen et al. (2015), and adjusted the contents of their original measurement items according to the properties of social media apps. Totally five measurement items were developed for the variable 'dependency'.

For measuring individuals' '*social interaction overload*' after using social media apps, this study divided the concept into 'social support overload' and 'social message overload', and defined this variable as the degree to which a user feels overloaded with social supports and social messages after usage of social media apps. This study further referred to the measurement items in the questionnaire proposed by Maier et al. (2015) and Laumer et al. (2013), and adjusted the contents of their original measurement items according to the properties of social media apps. There are five items for 'social support overload' and six items for 'social message overload', and 11 measurement items were developed for the variable 'social interaction overload'.

For measuring individuals' '*exhaustion*' after using social media apps, this study defined the variable as the degree to which a user feels exhausted or burned-out after using social media apps. This study further referred to the measurement items in the questionnaire proposed by Maier et al. (2015), and adjusted the contents of their original measurement items according to the properties of social media apps. Totally four measurement items were developed for the variable 'exhaustion'.

This study defined the variable '*virtual social self-efficacy*' as the degree to which a user feels confident in his/her ability to establish and maintain good online relationships with others through using social media apps, and defined the variable '*real social self-efficacy*' as the degree to which a user feels confident in his/her ability to establish and maintain good relationship with others in real-world social occasions. This study

referred to the measurement items in the questionnaire proposed by Deshmukh et al. (2009), and adjusted the contents of their original measurement items according to the properties of social media apps. Totally 24 measurement items were developed for the variables ‘virtual/real social self-efficacy’.

3.2 *Pretesting*

Based on the questionnaire designed in this study, we first conducted a questionnaire pretest and used the five-point Likert scale to measure the responses. The pretest respondents were users who have already been using mobile devices and applied for 3/4G mobile internet access, and have been frequently using social media apps. Totally 75 questionnaires were collected from the respondents in the pretest. This study also conducted several preliminary tests to examine the reliability and validity of the questionnaires collected in the pretest. According to the pretest results, we deleted or modified improper measurement items in order to obtain the final questionnaire that were formally administered. The formal questionnaire used in this study is shown in Appendix.

4 **Data analysis**

4.1 *Analysis of descriptive statistics*

After the pretest was completed, the formal questionnaire was posted online for one month in 2015. Several online survey platforms were used to post the questionnaire hyperlinks, including the Q_ary Board of the PTT Bulletin Board System (BBS), various online forums related to mobile services, and multiple social networking sites (e.g., Facebook and Google Plus) and social media apps (e.g., LINE and FB Messenger) in Taiwan. In total, 371 questionnaires were obtained from those online platforms. After excluding those with invalid and careless responses, 346 questionnaires were identified as effective samples, the effective rate of questionnaire is 93.3%. Detailed demographic information of the respondents that were included in the analysis is shown in Table 1.

As illustrated in Table 1, in the final sample of respondents, the percentages of male and female respondents were 43.93% and 56.07%, respectively. The age distribution was also balanced: 51.44% were older than 35, and 48.56% were younger.

Table 1 Demographic of respondents

<i>Item</i>	<i>Sample composition</i>	<i>Frequency</i>	<i>Percentage</i>
Gender	Male	152	43.93%
	Female	194	56.07%
Age	Below 25	66	19.08%
	26–35	102	29.48%
	36–45	49	14.16%
	Over 45	129	37.28%
Education	Senior high/vocational school and lower	40	11.56%
	College	203	58.67%
	Graduate school and higher	103	29.77%

Table 1 Demographic of respondents (continued)

<i>Item</i>	<i>Sample composition</i>	<i>Frequency</i>	<i>Percentage</i>
Job	Freelancer	49	14.16%
	Service industry	79	22.83%
	Financial sector	5	1.45%
	Military, public service or educational circles	94	27.17%
	Electronic and information industry	13	3.76%
	Manufacturing	28	8.09%
	Life sciences and healthcare	13	3.76%
	Student	52	15.03%
	Housewife or retired persons	13	3.76%
People to communicate with using social media apps	Family member	289	83.53%
	Friend	320	92.49%
	Colleague/classmate	318	91.91%
	Supervisor/master	129	37.28%
Most frequently used social media apps	LINE	345	99.71%
	FB messenger	281	81.21%
	Instagram	59	17.05%
	Skype	84	24.28%
	WeChat	95	27.46%
	WhatsApp	28	8.09%
	BeeTalk	32	9.25%
	Weibo	37	10.69%
	Others	49	14.16%
Daily duration of using social media apps	Less than 1 hour	43	12.43%
	1–3 hours	99	28.61%
	3–5 hours	142	41.04%
	Longer than 5 hours	62	17.92%

4.2 Analysis of measurement model

Structural equation modelling (SEM) was applied in this study to test the research hypotheses. Before the analysis of hypotheses can be initiated, it is important to test the validity and reliability of the measurement items.

Kerlinger and Lee (1999) expressed that the reliability test could measure the stability and the consistency of a measurement questionnaire. Hair et al. (2016) suggested the items of measurement in each variable should have a Cronbach's α value higher than 0.6 and a composite reliability (CR) value higher than 0.7 to meet the required levels of reliability. In this study, all of the variables have a Cronbach's α value and a CR value higher than 0.7, which indicates that the questionnaire scale of this study is reliable.

The validity test was divided into convergent validity test and discriminant validity test. In the test of convergent validity, a factor analysis is conducted to examine whether

multiple measurement questions in the same variable will converge into single factor. Hair et al. (2016) mentioned that the factor loading of each of the measurement questions in the same variable should be higher than 0.5. As shown in Table 2, in this study, each of the measurement questions had a factor loading that was higher than the threshold value. Furthermore, convergent validity needs to be measured using the average variance extracted (AVE). Fornell and Larcker (1981) elaborated that the value of each variable's AVE should be higher than 0.5, which would ensure that the measurement questions have an acceptable level of convergent validity. As shown in Table 2, all of the variables had AVE value satisfies the threshold value in this study, which indicates that the questionnaire scale achieved an acceptable level of convergent validity.

Table 2 Analyses of reliability and validity

<i>Variable</i>	<i>Factor loading</i>	<i>Cronbach's α</i>	<i>CR</i>	<i>AVE</i>	
Information value (Iv)	Iv1	.837	.756	.891	0.804
	Iv2	.859			
Social value (Sv)	Sv1	.818	.912	.931	0.695
	Sv2	.842			
	Sv3	.857			
	Sv4	.847			
	Sv5	.711			
	Sv6	.769			
Emotional value (Hv)	Hv1	.901	.871	.939	0.886
	Hv2	.905			
Work support value (Wv)	Wv1	.935	.937	.959	0.888
	Wv2	.946			
	Wv3	.945			
Fashion value (Fv)	Fv1	.890	.886	.929	0.814
	Fv2	.924			
	Fv3	.893			
Perceived social presence (Sp)	Sp1	.826	.922	.938	0.720
	Sp2	.843			
	Sp3	.907			
	Sp4	.802			
	Sp5	.814			
	Sp6	.859			
Social media apps usage (Sau)	Sau1	.835	.912	.931	0.695
	Sau2	.910			
	Sau3	.819			
	Sau4	.780			
	Sau5	.785			
	Sau6	.766			

Table 2 Analyses of reliability and validity (continued)

<i>Variable</i>	<i>Factor loading</i>	<i>Cronbach's α</i>	<i>CR</i>	<i>AVE</i>	
Dependency (De)	De1	.792	.844	.895	0.681
	De2	.800			
	De3	.847			
	De4	.803			
Social interaction overload (Si)	Sis1	.889	.908	.923	0.574
	Sis2	.911			
	Sis3	.808			
	Sis4	.868			
	Sim1	.826			
	Sim2	.839			
	Sim3	.875			
	Sim4	.887			
	Sim5	.854			
Exhaustion (Ex)	Ex1	.886	.942	.958	0.852
	Ex2	.956			
	Ex3	.949			
	Ex4	.902			
Virtual social self-efficacy (Vs)	Vs1	.844	.925	.937	0.603
	Vs2	.779			
	Vs3	.792			
	Vs4	.659			
	Vs5	.698			
	Vs6	.869			
	Vs7	.865			
	Vs8	.733			
	Vs9	.850			
	Vs10	.874			
Real social self-efficacy (Rs)	Rs1	.632	.951	.957	0.671
	Rs2	.802			
	Rs3	.768			
	Rs4	.808			
	Rs5	.639			
	Rs6	.712			
	Rs7	.837			
	Rs8	.875			
	Rs9	.650			
	Rs10	.875			
	Rs11	.799			

The test of discriminant validity is to measure whether different variables could be discriminated from one another in order to effectively represent different concepts. In the light of Hair et al. (2016) and Fornell and Larcker (1981), the square root of a variable's AVE should be higher than the correlation coefficient between that variable and another variable in the same model. As shown in Table 3, in this study, the square root of the AVE value of all variable is higher than the correlation coefficients between the variable and all other variables in the same row or column. The results of this test indicate that the variables used in this study meet the required discriminant validity levels.

Table 3 Square root of AVE and correlation between variables

	<i>Iv</i>	<i>Sv</i>	<i>Hv</i>	<i>Wv</i>	<i>Fv</i>	<i>Sp</i>	<i>Sau</i>	<i>De</i>	<i>Si</i>	<i>Ex</i>	<i>Vs</i>	<i>Rs</i>
<i>Iv</i>	<i>0.896</i>											
<i>Sv</i>	0.682	<i>0.833</i>										
<i>Hv</i>	0.631	0.757	<i>0.941</i>									
<i>Wv</i>	0.488	0.583	0.550	<i>0.942</i>								
<i>Fv</i>	0.487	0.568	0.559	0.573	<i>0.902</i>							
<i>Sp</i>	0.328	0.536	0.538	0.493	0.577	<i>0.848</i>						
<i>Sau</i>	0.488	0.592	0.565	0.654	0.687	0.659	<i>0.834</i>					
<i>De</i>	0.322	0.423	0.329	0.442	0.534	0.458	0.664	<i>0.825</i>				
<i>Si</i>	0.305	0.352	0.298	0.44	0.514	0.491	0.640	0.656	<i>0.757</i>			
<i>Ex</i>	0.198	0.209	0.157	0.307	0.372	0.272	0.409	0.650	0.628	<i>0.923</i>		
<i>Vs</i>	0.334	0.435	0.366	0.376	0.604	0.426	0.488	0.454	0.337	0.254	<i>0.776</i>	
<i>Rs</i>	0.313	0.399	0.300	0.378	0.327	0.304	0.345	0.257	0.274	0.163	0.565	<i>0.819</i>

Notes: The values in italics type shown along the diagonal are respectively a square root of the AVE of a specific variable, while all other values are correlation coefficients between two variables, respectively.

Iv: Information value; *Sv*: social value; *Hv*: emotional value; *Wv*: work support value; *Fv*: fashion value; *Sp*: perceived social presence; *Sau*: social media apps usage; *De*: dependency; *Si*: social interaction overload; *Ex*: exhaustion; *Vs*: virtual social self-efficacy; *Rs*: real social self-efficacy.

Further, this study conducted a one-sample t-test to examine whether the mean of the scores of all the measurement questions in each variable was significantly different from the median of 3. The measurement items were measured on a five-point Likert scale. As shown in Table 4, the mean of the scores of all measurement items for each of the variables was significantly higher or lower than the median of 3, except for the 'virtual social self-efficacy' variable.

Table 4 One-sample t-test of variables

<i>Variable</i>	<i>Iv</i>	<i>Sv</i>	<i>Hv</i>	<i>Wv</i>	<i>Fv</i>	<i>Sp</i>	<i>Sau</i>	<i>De</i>	<i>Si</i>	<i>Ex</i>	<i>Vs</i>	<i>Rs</i>
Mean	3.75*	3.86*	3.72*	3.54*	3.29*	3.33*	3.45*	3.24*	3.30*	2.87*	3.05	3.46*

Notes: *Indicates significant at $p < 0.001$; Mean is compared to median 3, $N = 346$.

4.3 Analysis of structural model

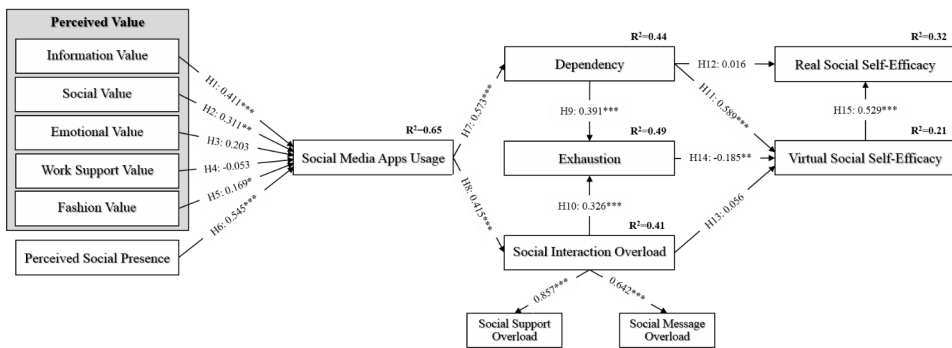
After all the variables used in the measurement model passed the reliability test and the validity test, this study further tested the model fit of the hypothetical model. Having a good model fit is a necessary condition in testing a hypothesis, and higher model fit indicates the model is closer to the sample (Byrne, 2010). Although the chi-square (χ^2) test is generally regarded as one of the best tests for measuring model fit, it was not suitable in this case because the χ^2 statistics were inappropriate for a large sample size like the one used in this analysis (Bentler and Bonett, 1980). Therefore, this study conducted a test of goodness-of-fit. Several important indices were selected according to the suggestions of Schreiber (2008), Jackson et al. (2009), and Schreiber et al. (2006) to assess the goodness of fit of the model used in this study. As shown in Table 5, all of the important indices were in line with the ideal standards of model fit, which indicated that our hypothetical model had a good model fit.

Table 5 Fit indices of the hypothetical model

Fit index	Recommend value	Measurement model value	Source
χ^2/df	<3	2.063	Joreskog and Sorbom (1984)
GFI	>0.9	0.912	Bentler and Chou (1987)
AGFI	>0.8	0.883	Bentler and Chou (1987)
CFI	>0.9	0.955	Cheung and Rensvold (2002)
RMSEA	<0.08	0.071	Browne and Cudeck (1989)

After confirming that model used in this study had a good model fit, SEM was applied to examine the proposed hypotheses based on the structural model used in this study. The results are shown in Figure 2 and in Table 6.

Figure 2 Results of structural model analysis



Notes: *p-value < 0.05; **p-value < 0.01; ***p-value < 0.001 (two-tailed)

Table 6 Results of hypothesis testing

<i>Hypothesis</i>	<i>Independent</i>	<i>Dependent</i>	<i>Estimate</i>	<i>t-value</i>	<i>Result</i>
1	Information value	Social media apps usage	0.411	4.176	Supported
2	Social value	Social media apps usage	0.311	2.804	Supported
3	Emotional value	Social media apps usage	0.203	1.746	Unsupported
4	Work support value	Social media apps usage	-0.053	-0.769	Unsupported
5	Fashion value	Social media apps usage	0.169	2.391	Supported
6	Perceived social presence	Social media apps usage	0.545	6.414	Supported
7	Social media apps usage	Dependency	0.573	7.568	Supported
8	Social media apps usage	Social interaction overload	0.415	4.214	Supported
9	Dependency	Exhaustion	0.391	5.887	Supported
10	Social interaction overload	Exhaustion	0.326	5.214	Supported
11	Dependency	Virtual social self-efficacy	0.589	5.304	Supported
12	Dependency	Real social self-efficacy	0.016	0.162	Unsupported
13	Social interaction overload	Virtual social self-efficacy	0.056	0.828	Unsupported
14	Exhaustion	Virtual social self-efficacy	-0.185	-2.026	Supported
15	Virtual social self-efficacy	Real social self-efficacy	0.529	7.242	Supported

5 Conclusions and future research

Social media apps are mobile services most widely used by general consumers since the emergence of various mobile devices, such as smartphones and tablet computers. Social media apps have thoroughly changed many social habits that people had long been accustomed to. The values of social media apps vary from user to user. In light of this fact, the purpose of this study is to explore what values of social media apps would have an influence on the users' usage of them and how the social media apps usage would impact users' mentality and/or sociality.

5.1 Discussions on hypothesis testing

First, it should be pointed out that according to Table 6, 'perceived social presence' is the most important determinant of social media apps usage (H6). This is because the currently prevalent social media apps provide more and more features that give users the true feeling of being interacting and communicating with others directly. For example, voice calling, video calling, group calling, video conferencing, live streaming, etc. all allow users interacting and communicating with others via social media apps to have an

idea about the site other parties are currently at, giving the users a strong feeling of being present at the same site and interacting with others face to face.

Second, it is found that the values from social media apps usage are mainly information value, social value, and fashion value (H1, H2 and H5). In other words, most social media apps users feel the usage of social media apps. On one hand, allows them to communicate and interact with different persons and to gain various interesting and useful information from other people's sharing behaviour, and on the other hand, proves they can catch up with fashion trends and be a person at the cutting edge of the times.

However, work support value is not a significant determinant of social media apps usage (H4). Such a finding is different from the reports in the literature, in which they claimed that social media apps can effectively upgrade personal work performance and productivity (Cao and Ali, 2018; Alalwan et al., 2017; Landers and Schmidt, 2016; Dwivedi et al., 2015; Aral et al., 2013; Moqbel et al., 2013). It is reasonable to claim the work support value if we are talking about the usage of work or project discussion group/community established by an organisation, which called as 'enterprise social media' in literature (Landers and Schmidt, 2016). However, in this study, respondents were coming from different organisations and most of their social media apps usage purposes are for private field (an observation in Table 1: only 37.28% people communicate with their supervisors/masters). Thus, they might react negatively (though slightly) the blurring boundaries between work and home life, which introduced by social media (Landers and Schmidt, 2016). It might explain that in Table 6, work support value is not a significantly positive antecedent of usage, instead, has a negative (though insignificant) impact. Besides, neither is emotional value as a significant determinant of social media apps usage (H3). This finding is also different from the studies of Fernández-Robin et al. (2019) and Zong et al. (2019). It is conjectured that the possible reason is owing to the measurements that their emotional motivation focuses on 'playfulness', but our emphasis is on 'relaxation'. While using social media apps usage, people might not feel relaxed, but might perceive playfulness.

About the consequences of the social media apps usage, Table 6 indicates that it would lead to users' growing dependency on social media apps as well as social interaction overload (H7 and H8), which cause exhausted (H9 and H10). That is, social media apps have been used by users as their main media of communication and interaction with others, but excessive usage of social media apps has also adversely affected users' daily life when they are forced to use social media apps to deal with different people and reply to a large quantity of messages from friends, family members, colleagues, etc. Massive and densely sent social messages tend to make social media apps users exhausted, stressed and tensed.

Regarding the impact on users' sociality, two direct impacts do not hold in Table 6: users' dependency on social media apps could not have a direct influence on their real-world social self-efficacy (H12) and social interaction overload does not directly affect users' virtual-world social self-efficacy (H13). As stated, social interaction overload would make users feel exhausted. Once if they feel exhausted, users might lose their self-confidence and doubt their abilities to deal with various social activities in the virtual world (H14). While they rely to use social media apps and do not yet feel exhausted, they would still have confidence in their ability to make new friends with people or keep close contact with old friends in the virtual social environment (H11). Further, the confidence and sense of achievement users got in various social activities in the virtual world through social media apps usage could influence on users' real-world

social self-efficacy (H15). In addition, since the interaction and communication behaviour in the virtual world might extend to the social activities in the real world, thus, though the direct effects do not exist, the indirect effects exist: (overload (+) exhaustion (-) virtual social self-efficacy) and (dependency (+) virtual social self-efficacy (+) real social self-efficacy). The indirect increase of real social self-efficacy is different from the claims of previous researchers (e.g., Xu and Tan (2012), stating that those who frequently engage in social networking would be poor at socialising in real life, eventually leading to many problems (e.g., ignoring real life relationships, etc.). Xu and Tan (2012) also claimed that social network service addiction is different internet addiction in the aspect that users have more control over social network websites. Here, we further suggest tentatively that the social media apps usage dependency may be different from social network service addiction in the aspect that the apps usage is ubiquitous, i.e., users can perform these services at anytime and anywhere. Thus, those users would not stay at fixed places and play computers in house, they might go outside to carry out various regular activities in daily life, and social media apps are just tools with the information, social, and fashion values mentioned in this study. They might feel exhausted, but would neither lose their virtual social self-efficacy, nor the real social self-efficacy.

5.2 *Implications for academia*

This study makes the following contributions to academia. First, keeping in mind that social media apps are recently emerged new communication tools. Most of previous studies focused on users' satisfaction, loyalty, motivations, and behavioural intentions toward their social media apps usage. Some studies have applied the theory of consumption values to explore how the different values would impact users' using online social media community (e.g., Kaur et al., 2018). Also, other studies have shown that if users spend too much time on social media services, it can cause unintentional fatigue (e.g., Dhir et al., 2019; Lee et al., 2016). However, most of previous researches only focused on single aspect, either antecedents or consequences, and aimed at 'social media service usage' or 'social network sites', but not 'social media apps'. Further, very few prior studies explored the impact of social media apps usage on user's social self-efficacy. This study uses a combination of the theory of consumption values, the theory of information overload, and the social cognitive theory as a basis to propose an integrated research model to discuss what values social media apps can provide to users when they use these apps and how the usage of social media apps would impact users' mentality or sociality. The model proposed by this study can be applied in future researches or by other scholars to study the values that can be obtained by users or the impacts that might be imposed on users after the use of various new social media services.

Second, our empirical findings indicate that some perceived values may lose the ability to predict a person's use of information technology products or services, and also are sensitive to application situations (e.g., private personal usage or public enterprise usage). Our findings also make the whole picture of consequences of the entire social media apps usage clearer. The results also point out that the impact of social media apps usage dependency may be different from social network service addiction.

5.3 Implications for practice

The research findings of this study also have some implications for practice. Overall, the analysis results implied that social media apps can bring some positive values to users and benefit them in their daily life and social interaction. However, using social media apps might also result in some negative impacts. In view of this, this study first suggests that social media apps providers should try to match user's favourite topics and personal interests before sending push notifications. By filtering those less-favourable messages and sending users the information that actually interests them, it could avoid users from being bombarded with massive spam messages. Second, social media apps should be designed to allow users to manage incoming messages according to the degree of close relationship between friends, e.g., different prompt sounds, images, delivery time lags, or different time periods for delivery, etc. Third, currently, the search function for past data/dialogue in most of social media apps are poor. Such searching function should be improved, especially for important friends of users. Finally, for the social interaction functions, it is suggested that social media apps providers create more varied message images, such as emoticons and interactive stickers in order to improve the accuracy and diversity of users' communication and interaction when they are on social media apps. It is believed that by providing more personalised services and more vivid virtual social communication choices on social media apps, even if users are wildly engaging in social media apps, they would not feel exhausted from overloading, lose enthusiasm for using social media apps and reduce confidence in communicating with others.

5.4 Limitations and future research

Despite the fact this study provides meaningful findings for academia and practice, there are a few limitations that future researches might need to address. First, the findings allow us to suggest tentatively that the social media apps usage dependency may be different from social network service addiction. This proposition needs to be further examined in the qualitative and quantitative methods. Second, since perceived values are sensitive to application situations, it is encouraged to survey social media apps usage in other situations. In addition, since the emotional value is a complex construct, future research is encouraged to validate the value incorporating both 'playfulness' and 'relaxation' sub-constructs. Third, while social media apps provide versatile features, the social media apps providers must collect a large quantity of user private information, such as private location and friends list, before users can enjoy various values that can be brought by such apps to users. In view that this subject is not particularly explored in this study, future researches may be conducted to further discuss what privacy concerns users might have while using social media apps. Fourth, in view that the samples used in this study are drawn only from mobile users in Taiwan who have already been using social media apps, the analysis results from this study are not necessarily generalisable to other areas or populations having different cultures and consumption habits. Therefore, future researches may be conducted to further analyse the social media apps users in other countries or areas and compare the results with the findings of this study.

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Appendix

Measurement items

Perceived value: The degree to which a user feels the usage of social media apps brings him/her different values, including information, social, emotional, work support, and fashion value.

Information value

- Iv 1. Social media apps enable me to *obtain*, at any time and place, information that is shared by other people and *unknown to me before*, including news and gossip.
 - Iv 2. Social media apps enable me to *obtain the information I am interested in*, in real time and at any time and place, from the groups I joined, such as stars-related pages and brand fan groups.
-

Social value

- Sv 1. Social media apps enable me to receive, at any time and place, *my friends' and family members' recent news*, as well as *audio/video messages about their moods and daily life stories*.
 - Sv 2. Social media apps enable me to share with my friends and family members, at any time and place, my recent news and *audio/video messages about my moods and daily life stories*.
 - Sv 3. Social media apps enable me to check in at any time and location and instantly share *the current scenes before me* with my friends and family members by giving a text description or posting *pictures and/or audio/video messages* I collected.
 - Sv 4. Social media apps enable me to *send and share* with my friends and family members at any time and place *interesting and useful information*, such as news and gossips, which I obtained from various channels.
 - Sv 5. Social media apps enable me to participate in *mobile communities* I am interested in, such as *brand fan communities and movie/singing stars-related communities*, and to interact and communicate with other community members at any time and place.
 - Sv 6. Social media apps enable me to interact and communicate with others via *pictures, texts, or audio/video messages* at any time and place, and to maintain good interpersonal relationship.
-

Emotional value

- Hv 1. Social media apps enable me to interact and communicate with others at any time and place to *kill time*.
 - Hv 2. Social media apps enable me to interact and communicate with others at any time and place to *relax my mind*.
-

Work support value

- Wv 1. Social media apps enable me to control *work-related messages* at any time and place.
 - Wv 2. Social media apps enable me to create a closed work team to conveniently discuss *work-related things* with team members at any time and place.
 - Wv 3. Social media apps enable me to know *the progress of my current task* at any time and place.
-

Measurement items (continued)

Perceived value: The degree to which a user feels the usage of social media apps brings him/her different values, including information, social, emotional, work support, and fashion value.

Fashion value

-
- Fv 1. The usage of social media apps enables me to *catch up with fashion trends* in my friends and family circles.
- Fv 2. My usage of social media apps lets my friends and family members feel I am *fashionable*.
- Fv 3. My usage of social media apps lets people think I am not *behind the times* in using technology.
-

Perceived social presence: The degree to which a user feels like being social with others in a real environment through using social media apps.

- Sp 1. My usage of the video communication function provided by social media apps to interact and communicate with others similarly has the effect of *face to face communication* even if we did not really meet one another.
- Sp 2. When using social media apps to interact and communicate with others, the usage of *texts, images, and/or audio/video messages* enables me to clearly express *what I want them to know*.
- Sp 3. When I use social media apps to interact and communicate with others, the person at the other end gives me a *friendly feeling*, just like we are *talking face to face*.
- Sp 4. When I feel depressed, I can always get *support and encouragement* from others via social media apps at any time and place, just like they are *standing by my side*.
- Sp 5. When I use social media apps to interact and communicate with another person, I can always tell whether he/she is *talking with me seriously*, even if we are not *talking face to face*.
- Sp 6. When I use social media apps to interact and communicate with another person, I can always fully understand *what he/she wants to express*, even if we are not *talking face to face*.
-

Social media apps usage: The degree to which a user uses social media apps at any time and place.

- Sau 1. I use social media apps at any time and place to obtain *information I am interested in*.
- Sau 2. I use social media apps at any time and place to *interact and communicate with other people*.
- Sau 3. I use social media apps at any time and place to follow up *people I am interested in*.
- Sau 4. I will open my social media apps from time to time for checking whether there is *any message left* by someone.
- Sau 5. I use social media apps at any time and place to handle *work-related things*.
- Sau 6. I use social media apps at any time and place to follow up my *work progress*.
-

Dependency: The degree to which a user becomes dependent on social media apps after using them.

- De 1. I have to spend more *time* than I planned on using social media apps.
 - De 2. I will unconsciously *check* my social media apps for any *new message*.
 - De 3. I *am accustomed to get all necessary information in connection with* my daily life, including food, clothing, living, transportation, education, sports, and entertainment, via social media apps.
 - De 4. I will use social media apps whenever *I am free*.
 - De 5. I will feel restless when my social media apps do not work normally.
-

Social interaction overload: The degree to which a user feels overloaded with social supports and social messages after usage of social media apps.

Social support overload

- Sis 1. I spent too much time and energy on *caring about my friends and family members* on my social media apps.
 - Sis 2. I spent too much time and energy on *handling my friends' and family members' problems* on my social media apps.
 - Sis 3. I always think I *have the responsibility to bring joy* to all my friends and family members on my social media apps.
 - Sis 4. I spent too much time and energy on *coordinating and handling work-related things* via social media apps.
-

Social message overload

- Sim 1. From my social media apps, I received *too many messages*, including group conversations and private messages, and I failed to *browse and reply* to them one by one.
 - Sim 2. From my social media apps, I received too many friends' *posts or news updates*, and I failed to *browse and reply* to them one by one.
 - Sim 3. From my social media apps, I received too many *notifications or advertisements*, either news push notifications or news feeds, and I failed to *browse* them one by one.
 - Sim 4. There are too many *meaningless messages* (including group conversations and private messages), *notifications or advertisements* (either news push notifications or news feeds) on my social media apps.
 - Sim 5. There are too many *uninterested messages* (including group conversations and private messages), *notifications or advertisements* (either new push notifications or news feeds) on my social media apps.
-

Exhaustion: The degree to which a user feels exhausted after using social media apps.

- Ex 1. I often feel I *spent too much time* on social media apps and that makes me exhausted.
 - Ex 2. I often *feel tense* after using social media apps and that makes me exhausted.
 - Ex 3. I often *feel stressed* when using social media apps and that makes me exhausted.
 - Ex 4. To me, *reading and replying* to messages on social media apps all the time makes me fretful and exhausted.
-

Virtual social self-efficacy: The degree to which a user feels confident in his/her ability to establish and maintain good relationships with others through using social media apps.

- Vs 1. I will actively contact others to make friends with them on social media apps.
 - Vs 2. On social media apps, I will actively try to contact a person I am interested in.
 - Vs 3. On social media apps, I will actively introduce myself.
 - Vs 4. I am confident in my ability to make friends with others on social media apps.
 - Vs 5. On social media apps, I am able to communicate with others with fervor and assurance.
 - Vs 6. On social media apps, I can get along well with other people.
 - Vs 7. My interpersonal relationship on social media apps is good.
 - Vs 8. I am able to draw people's attention on social media apps.
 - Vs 9. I am able to keep good contact with friends on social media apps.
 - Vs 10. I am able to get recognition from friends on social media apps.
-

Real social self-efficacy: The degree to which a user feels confident in his/her ability to establish and maintain good relationships with others in real social occasions.

- Rs 1. In real social occasions, it is easy for me to make new friends.
 - Rs 2. In real social occasions, I will actively contact others to make friends with them.
 - Rs 3. In real social occasions, I will actively try to contact a person I am interested in.
 - Rs 4. In real social occasions, I will actively introduce myself to people.
 - Rs 5. In real social occasions, I am confident in my ability to make friends with others.
 - Rs 6. In real social occasions, I am able to communicate with others with fervour and assurance.
 - Rs 7. In real social occasions, I can get along well with other people.
 - Rs 8. In real social occasions, my interpersonal relationship is good.
 - Rs 9. In real social occasions, I am able to draw people's attention.
 - Rs 10. In real social occasions, I am able to keep good contact with friends.
 - Rs 11. In real social occasions, I am able to get recognition from friends.
-