TAM2-based Study of Website User Behavior—Using Web 2.0 Websites as an Example

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Abstract - In recent years, we have seen a return of web-based applications built with new ideas and new commercial models. The key momentum for the development of such applications is the Web 2.0 technology. Web 2.0 websites are dynamic and characterized by user interaction, sharing, and participation. The emergence of this new business model brings new business opportunities. In fact, website users are the main contributors of business opportunities. Thus, for operators of Web 2.0 websites to enjoy the business opportunities, understanding user behavior is of great importance.

In this study, Technology Acceptance Model 2 (TAM2) is adopted as the research framework to explore relationships between constructs associated with Web 2.0 website user behavior. Data are collected through a questionnaire survey. Hypotheses are proposed and validated through Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) in order to understand user acceptance of Web 2.0 websites. Results show that most of the hypotheses proposed on the basis of TAM2 are empirically supported. It can be inferred that the current Web 2.0 websites are generally accepted by users. Moreover, from the research results, users' intentions and behavior associated with use of Web 2.0 websites can be understood; hence, the results serve as a reference for those planning to start a business on Web 2.0 websites. It is believed that Web 2.0 websites will continue to be the source of new business opportunities on the web.

Keywords: web 2.0, technology acceptance model 2 (TAM2), confirmatory factor analysis (CFA), structural equation modeling (SEM).

1   Introduction

Web 2.0 is the next-generation foundation of the Internet formed by a series of economic, social, and technical tendencies; it is a more mature and special medium that is characterized by user participation, interaction, and openness [1]. In the Web 2.0 era, users' participation in websites can attract visitors or a larger number of users. The business opportunities behind the increased popularity of Web 2.0 websites are considerable. Having stepped out of the shadow of the dot-com crisis in 2000, Web 2.0 now allows users to express their creative ideas, perceive the world from different perspectives, and share their feedbacks in text, photos, videos, and even audio formats. The number of such communication channels, from Wikipedia to Windows Live, continues to grow rapidly. The present web system is different; information provided or shared by other users on the web is sufficient to satisfy the demand of

other users. As a result, users no longer rely on website operators to provide information. Many portal sites have worked together to create value for their websites and attract user attention.

The chairman of PChome Online, Jan Hung-tze, mentioned, "From downloading to uploading, reading to sharing, this is not a change of era but a natural stage of web development" [2]. The most attractive features of Web 2.0 are that it is free, unbounded, and innovative. Therefore, for those ready to enter the Web 2.0 market, it also means competition and renovation; they must first understand the technologies of Web 2.0 and contemplate how to market their sites in order to increase their popularity. More importantly, they must know what is acceptable to and really expected by users of Web 2.0 websites. After all, the "human" factor remains the primary factor of the unlimited business opportunities. Understanding their demands is the key to enjoying the benefits and values of Web 2.0.

At present, when developing a Web 2.0 site, the focus is primarily placed on providing users the space and mechanisms to create a personal website. Commercial mechanisms are seldom integrated into websites. For most operators of Web 2.0 websites, their profit comes from web advertisement. If an operator plans to develop a new Web 2.0 site and manage it as a commercial one, attracting the confluence of "humans" and their intention to engage in "interaction" and "sharing" will be a crucial challenge.

Among the current studies performed using Technology Acceptance Model 2 (TAM2), most have focused on financial affairs or software development in order to determine user acceptance of innovative information systems.

However, studies that apply TAM2 to explore web user acceptance are quite limited. Therefore, based on TAM2 introduced by Venkatesh and Davis [3], we aim to investigate user's intentions to use Web 2.0 websites and their usage behavior; further, we analyze the factors that should be considered when developing a new Web 2.0 website. The research results are expected to serve as a reference for those planning to start their business on Web 2.0 websites.

2   Literature Review

In this paper, the Technology Acceptance Model 2 (TAM2), an extension of TAM introduced by Venkatesh and Davis [3], is adopted to explore user acceptance of Web 2.0 websites. According to research findings, appropriate suggestions for new creators of Web 2.0 websites are proposed. The following is a review of literature associated with TAM, TAM2, and Web 2.0.

2.1   Technology Acceptance Model (TAM)

In 1975, Fishbein and Ajzen [4] proposed the Theory of Reasoned Action (TRA), as shown in Figure 1. This theory later became widely recognized in the area of psychological studies. According to TRA, one's behavioral intention affects his/her actual behavior. It is also stressed that one's behavioral intention for having a certain behavior is simultaneously affected by his/her attitude and subjective norms. Whether in terms of explanatory power or theoretical foundation, TRA has received a considerable degree of support and recognition [5].
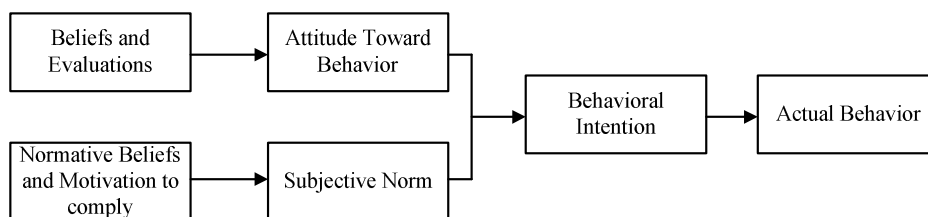
Figure 1. Framework of Theory of Reasoned Action (TRA)
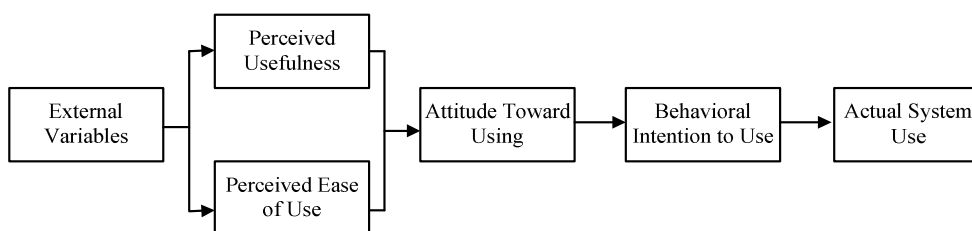
Source: Fishbein and Ajzen [4]

Figure 2. Technology Acceptance Model (TAM)

Source: Davis [6]

Davis [6] employed TRA to explore the relationship among perception, factors of affections, and technology usage, and he used the derived findings to construct TAM, which proposes that users' acceptance of a new system is affected by their attitude toward using the system.

This simple theory is expected to be applicable across different technology behaviors, user genders, and user groups. In other words, the fundamental idea of TAM is consistent with that of TRA—attitude and intention are determinants of beliefs. Figure 2 shows a framework of TAM.

Compared with TRA, there are two additional constructs in TAM:

(1) Perceived Usefulness:
This is the degree to which one believes that using a particular information technology or system can enhance his/her job performance. In other words, the more one perceives a new

technology or system as useful, the more positive is his/her attitude toward using the technology or system.

(2) Perceived Ease of Use:
This is the degree to which one believes that a particular information technology or system is easy to use. In other words, the more one perceives a new technology or system as easy to use, the more positive is his/her attitude toward using the technology or system.

Other constructs include:
(3) Attitude toward Using:
A user's attitude toward a new information technology is simultaneously influenced by perceived usefulness and perceived ease of use of the technology. Higher perceived usefulness of a technology or system leads to a more positive attitude toward using it.

(4) Behavioral Intention to Use:
A user's behavioral intention to use a new

system is influenced by his/her attitude and perceived usefulness of the system. From the experience and research of many researchers, perceived usefulness and perceived ease of use are considered to be standard instruments with substantial values [7]. Therefore, applications of such instruments to learning of information technology are numerous [8].

2.2 Technology Acceptance Model 2 (TAM 2)

In 2000, TAM2 (as illustrated in Figure 3) was developed by Venkatesh and Davis [3] on the basis of TAM. Two processes, the Social Influence Processes (Subjective Norm, Voluntariness, and Image) and the Cognitive Instrumental Processes (Job Relevance, Output Quality, Result Demonstrability, and Perceived Usefulness), were integrated into this model. The two processes were considered to be crucial to the study of user acceptance.

Davis et al. [9] developed TAM to explain why users accept or reject an innovative information system. TRA, which was introduced by Fishbein and Ajzen [4], was intended to be used to explain and predict employee behavior. TAM highlights the influence derived from external variables and internal beliefs and indicates that system usage can be explained on the basis of the perceived ease of use and perceived usefulness.

The internalization effect mentioned in both TRA and TAM implies that subjective norms may influence one's intention to use and also perceived usefulness of a technology; furthermore, it affects one's attitude, subjective norms, constructs of the TRA model, and perceived usefulness and perceived ease of use in TAM. In both models, attitude is considered to be influential to behavioral intention. Davis argued that the effect of subjective norms on behavioral intention to use could be ignored; hence, variables of subjective norms were not considered in TAM. However, in the extension of TAM, TAM2, Venkatesh and Davis [3] revisited these variables.
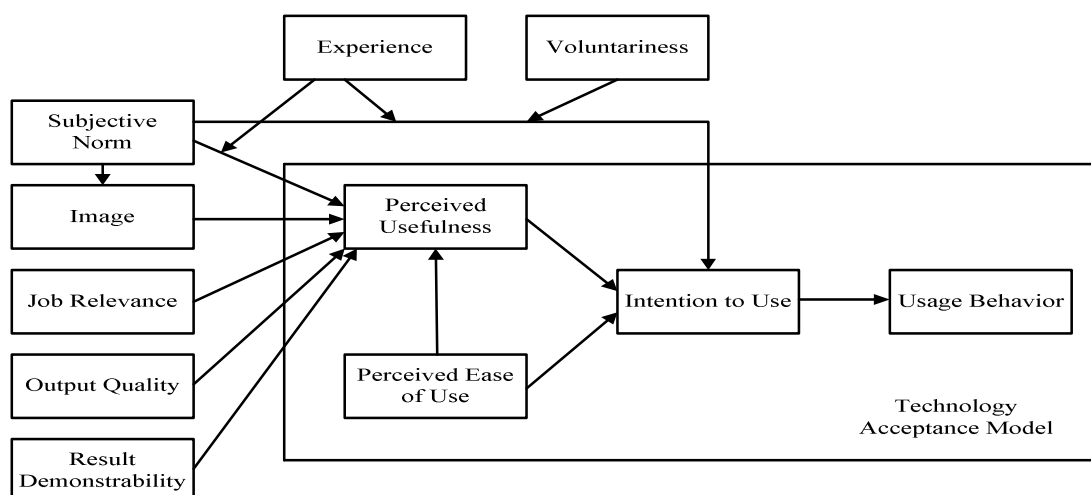

Figure 3. Technology Acceptance Model 2 (TAM 2)

Source: Venkatesh and Davis (2000)

In terms of explanatory power, TAM explains only 40%–50% of technology acceptance [10], whereas TAM2, as pointed out by Davis, reaches 60% [3].

2.2.1   Social Influence Processes

TAM2 reflects the impacts of "subjective norm," "voluntariness," and "image." The relationship among the three constructs is an important factor that affects user acceptance or rejection of an innovative system.

"Subjective norm" is one of the components of TRA; it is a direct determinant of behavioral intention and also a key factor of the theoretical foundation of TAM. TAM 2 proposes that subjective norm is the medium of social influence processes; it is defined as "a person's perception that most people who are important to him think he should or should not perform the behavior in question" [4]. In Theory of Planned Behavior (TPB), the effect of subjective norm is recognized [11].

Venkatesh and Davis [3] found in a study on subjective norms that usages of innovative systems should be differentiated. Thus, "voluntariness" was proposed to distinguish usage contexts into mandatory and voluntary settings. In TAM2, voluntariness is set as a moderating variable and defined as "the extent to which potential adopters perceive the adoption decision to be non-mandatory" [12–14]. As observed by Hartwick and Barki [13], even when users perceive system use as mandated by the organization, usage intentions may still vary because some users are unwilling to comply with such mandates.

"Image" refers to the belief of a group important to an individual that a certain

behavior should be implemented and implementation of this behavior by the individual can persistently enhance the quality of internal works of the organization [15–17].

2.2.2   Cognitive Instrumental Processes

The four cognitive instrumental processes in TAM2 are the determinants of perceived usefulness; they are "job relevance," "output quality," "result demonstrability," and "perceived ease of use."

"Job relevance" is a key component of the matching process in which a potential user judges the effects of using a particular system on his/her job. In TAM2, it is defined as "an individual's perception regarding the degree to which the target system is applicable to his/her job." Kieras and Polson [18] and Polson [19] argued that the knowledge on job situations, which can be used to determine what tasks can be performed within a given system, varies with users.

"Output quality" is defined as "the degree to which an individual judges the effect of a new system." In other words, it is the degree to which one thinks that a new system can perform required tasks [20].

TAM2 theorizes that "result demonstrability," defined by Moore and Benbasat [14] as the "tangibility of the results of using the innovation," will directly influence perceived usefulness. This implies that users will have more positive perceptions of the usefulness of a system if positive results are readily discernable. In other words, if the result demonstrability of a system is low, users of the system may attribute their achievement to work behavior rather than usage of the system.

TAM2 retains "perceived ease of use" from TAM as a direct determinant of "perceived usefulness." If an innovative system can be used with less effort, it will used to a greater extent. This is consistent with the definition of perceived ease of use. Many studies have empirically revealed that perceived ease of use is significantly linked to intention to use, both directly and indirectly, via its impact on perceived usefulness [9, 21]. Although beyond the scope of the present extension of TAM, other research studies have begun to establish models and hypotheses on the basis of perceived ease of use.

Venkatesh and Davis [3] also incorporated "experience" as a moderator variable into TAM2. Users' acceptance of an innovative system could vary with increase in their experiences. Thus, their acceptance was tested at three time points, including the time before system implementation (before use), one month after implementation (during use), and three months after implementation (after use). As pointed out by Hartwick and Barki [13], although subjective norm has a significant effect on user intentions prior to system development, the effect may become non-significant three months after system implementation.

Before a system is developed, users should have a certain degree of knowledge and beliefs about the system. If the knowledge or the beliefs are vague, a wide spectrum of opinions may be proposed [13]. After improvement of the system, users must enhance their knowledge about the system.

Since 1989, TAM (Davis [6]) and TAM2 (Venkatesh and Davis [3]) have been constantly studied and adopted. However, most of the previous studies that have applied TAM2 to innovative systems have focused primarily on the antecedents of perceived usefulness.

In this paper, in addition to these antecedents, those of perceived ease of use will be investigated in order to improve and facilitate effective usages of Web 2.0 websites.

2.3   Web2.0

According to Wikipedia, although Web 2.0 suggests a new version of the World Wide Web, this term does not refer to an update of any technical specifications, but rather corresponds to changes in the ways end-users utilize the Web. The main feature of Web 2.0 is that it encourages end-users to share information and enrich the resources that can be shared. Dale Dougherty, Vice CEO of OReilly Media, mentioned that since the 2000 dot-com crisis, the Internet industry has entered a period of evolution, which can also be called a renaissance of the Web. During this period, various Web applications and management models have been developed. Thus, similar to naming software updates, the previous Web era was named Web 1.0, and the current as Web 2.0 [22]. Chou [23] mentioned that the basic idea of Web 2.0 is to share pleasant things, including personal preference, ideas, or resources, with strangers on the web.

During 2003–2005, the Internet began to become more mature. New websites were set up and multimedia technologies were developed. Users showed different behaviors on the web. At present, we have been led by Web 2.0 to overcome the dot-com crisis caused by the immaturity of the Internet. The supply on the web is no longer greater than the demand. The websites that have survived the dot-com crisis, such as Amazon.com, eBay online auction, and some blogs developed in early years, have become the focus of experts in related areas. According to Brandon [24], these survivors of the

dot-com crisis have certain important characteristics that are basic properties of Web 2.0 websites and have constituted the economic model of Web 2.0 websites. As the Internet has gradually become the leading provider of information and media, users do not simply use it to write or receive emails. They have begun to post their feedbacks to certain events on personal blogs, upload videos and photos, and share information with both acquainted and unacquainted visitors. Some users create and publish photo albums on the Web. Web 2.0 is a new era of web usages. In this era, the Web is deemed as a new platform. Web 2.0 is facilitated by the participation and personalization of all users and the sharing of information among them. Therefore, the essence of Web 2.0 lies in "interaction, participation, and sharing."

According to Wikipedia, the characteristics of Web 2.0 services are as follows:

(1) Users are allowed to engage in collaboration and share information on the web.

(2) Compared with conventional Web pages, Web 2.0 websites provide users with experience closer to using desktop software.

(3) Externality: In this new Web system, website accessibility and popularity will be increased with increase in the number of users. For enterprises, network externality is the core value of Web 2.0. Integrating Web 2.0 into the life of users and developing various services to suit their demands are the goals that Web 2.0 is aimed at achieving.

(4) Return: For enterprises, profit is the ultimate goal and return. On the Internet, the tasks that should be performed prior to gaining profits is to attract users, satisfy their needs, and provide feedback to the society.

Through a review of literature, it could be discovered that studies on the Internet using TAM2 are quite limited. Among the few studies that apply TAM2, the focus is usually placed on factors of technology. Some of the studies employ TRA, TPB, and TAM to construct a framework for research on the behavioral model of user acceptance. TAM2 is seldom adopted to explore the behavior of Internet users. Therefore, by using TAM2 as the main framework, we aim to investigate users' intentions to use and the behavior of using Web 2.0 websites; further, we analyze the feasibility of developing innovative Web 2.0 websites. On the basis of our findings, we will propose suggestions to those planning to start a new business on Web 2.0 websites.

3 Hypotheses

In addition to findings of the previous researches, the extended TAM, TAM2, introduced by Venkatesh and Davis [3], is adopted as the theoretic foundation of the research model. The focus of this study is to explore a user's intention to use Web 2.0 websites. This implies that users are free to choose to use Web 2.0 websites; hence, it is not necessary to classify their usages into voluntary or mandatory contexts. Therefore, "voluntariness" is excluded from our model. Moreover, user experience is not considered because it is assumed that Web 2.0 users are relatively more experienced than general web users. Most of the respondents in our survey have used Web 2.0 websites for more than three months. The following hypotheses are proposed:

H1: Users' "subjective norm" has positive influence on "intention to use" Web 2.0 websites.

Subjective norms influence one's intention to use a system, whether one likes to do it or not. If people important or powerful enough to this person think that using the system is necessary, this person will use it as normally expected. Taylor and Todd [25] found that subjective norms have significant influence on behavioral intention.

H2: Users' "subjective norm" for using Web 2.0 websites has positive influence on "perceived usefulness."

TAM2 indicates that subjective norms influence the intention to use through perceived usefulness and calls it as an internalization process. Lin [20] employed TAM2 as a theoretic foundation to probe into the intangible services provided on tourist websites. It was discovered that the beliefs of people important to consumers will affect consumers' tendency of using tourist websites. Hence, it can be inferred that if people important to a user consider that it is necessary to use Web 2.0 websites, the user is more likely to perceive the Web 2.0 websites as useful.

H3: Users' "subjective norm" for using Web 2.0 websites has positive influence on "image."

H4: Users' "image" for using Web 2.0 websites has positive influence on "perceived usefulness."

Moore and Benbasat [14] defined "image" as "the extent to which use of an innovation is perceived as enhancement of one's status in a social system." Pfeffer [17] argued that by practicing behaviors expected by group norms, individuals can "gain support of the entire group and society, and the performance of the entire group can also be enhanced." Venkatesh and Davis [3] defined perceived usefulness as "the extent to which the object of adoption is thought to enhance the individual's performance on the job." Irrespective of how users share their blogs or photo albums on Web 2.0 websites, they can attract people with the same interest to post messages or share ideas on the websites. If a larger number of friends or peers important to these users believe it is necessary to use such Web 2.0 websites, the users are more likely to perceive the websites as useful.

H5: "Job relevance" of Web 2.0 websites has positive influence on users' "perceived usefulness" of the websites.

Kiera and Polson [18] and Polson [19] mentioned that users can enhance their work efficiency if they are clear about their job-related knowledge. It can be inferred that job relevance has direct influence on perceived usefulness. If users have more knowledge about the functions and services of a Web 2.0 site, they can easily enjoy the benefits of Web 2.0 and increase their perception of the usefulness of the Web 2.0 site.

H6: "Output quality" of Web 2.0 websites has positive influence on users' "perceived usefulness" of the websites.

When users consider a system to be contributive to the execution of tasks, they will perceive an improvement of work efficiency. Such perception is perceived output quality. Previous studies have empirically indicated that perceived output quality has a positive relationship with perceived usefulness [26]. If consumers are satisfied with the product or service quality of a website, they tend to perceive the website as useful [20]. It is thus inferred that users will evaluate the services or functions of Web 2.0 websites, and the more satisfied the users are, the more they will perceive the sites as useful.

H7: "Result demonstrability" of Web 2.0 websites has positive influence on

users' "perceived usefulness" of the websites.

In TAM 2, as defined by Moore and Benbasat [14], result demonstrability is "tangibility of the results using the innovation, which will directly influence perceived usefulness." Lin [20] discovered that the more the benefits of a website can be readily discerned, the more useful it will be considered.

H8: Users' "perceived ease of use" of Web 2.0 websites has positive influence on their "perceived usefulness" of the websites.

H9: Users' "perceived usefulness" of Web 2.0 websites has positive influence on their "intention to use" the websites.

H10: Users' "perceived ease of use" of Web 2.0 websites has positive influence on their "intention to use" the websites.

Previous studies have empirically indicated that perceived ease of use has indirect influence on intention to use, and perceived ease of use influences intention to use through perceived usefulness [3]. Lin [20] employed TAM2 to probe into consumer behaviors of tourist websites, and it was discovered that perceived usefulness has significant impact on intention to use. Consumers' perceived usefulness of tourist websites has positive impact on their intention to use the websites, and their perceived ease of use of the websites affects their intention to use the websites through perceived usefulness.

H11: Users' "intention to use" Web 2.0 websites has positive influence on their "usage behavior."

User attitude is influenced by perceived usefulness and perceived ease of use; intention to use is directly influenced by user attitude and perceived usefulness. Perceived ease of use influences perceived usefulness. Thus, the intention to use will ultimately influence usage behavior [27].

Venkatesh and Davis [3] tested user acceptance at three time points to explore the effect of "experience" as a "moderator." In this paper, as mentioned earlier, the effect of experience is not considered. Moreover, the research subjects are users of Web 2.0 websites. These users are not forced to use Web 2.0 websites. All of them have used or are still using Web 2.0 websites. Therefore, the moderator "voluntariness" is excluded from our model. On the basis of the proposed hypotheses, the research framework can be constructed as shown in Figure 4.
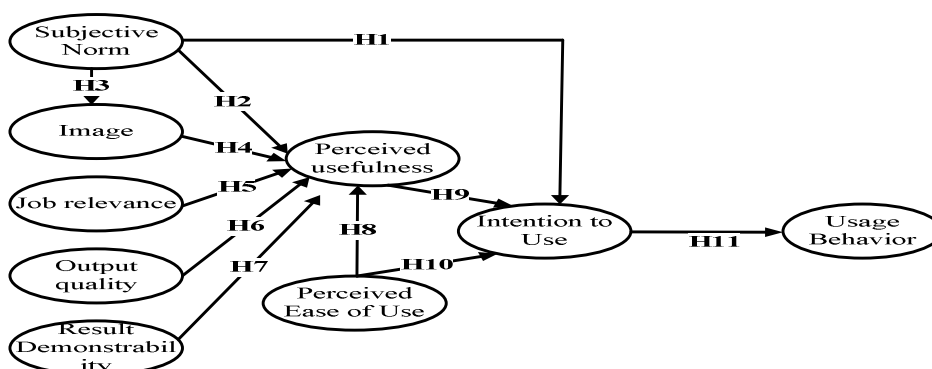

Figure 4. Research framework

4   Data Analysis and Results

By using TAM2 as the basis of our research, we analyzed the intention to use and usage behavior of Web 2.0 website users. Research data were collected through both online questionnaires and paper-and-pencil questionnaires.

The sampling period spanned one month, and the subjects were users of Web 2.0 websites. A total of 400 valid responses were obtained (164 of 200 paper-and-pencil questionnaires were collected; 36 copies were invalid. The valid response rate was 82.0%; 236 online questionnaires were collected.).

Table 1.   Descriptive analysis

Item	Category	Percentage (%)	Item	Category	Percentage (%)
Gender	Male	48.50	Experience of using the Internet	No more than 1 year	1.75
	Female	51.50		2–4 years	12.75
Age	Under 25 years old	76.00		5–7 years	31.50
	26–35 years old	21.50		8–10 years	34.50
	36–40 years old	1.50		More than 11 years	19.50
	41–45 years old	0.75	Number of days surfing on the Internet per week	No more than 1 day	2.75
	Over 46 years old	0.25		1–2 days	8.00
Education	Under (including) senior or vocational high school degree	22.00		3–4 days	11.50
	College degree	6.75		5–6 days	16.75
	University degree	55.75		7 days	61.00
	Graduate degree or above	15.50	Number of hours spent on the Internet per day	Less than 1 hour	5.25
Occupation	Student	75.75		2–4 hours	40.25
	Public servants, service industry	6.00		5–7 hours	28.75
	Industrial, commercial, agricultural, forestry, fishery industries	10.75		8–10 hours	9.00
	Others	7.50		More than (including) 10 hours	16.75

4.1 Basic analysis of the sample

As shown in Table 1, the collected sample comprises 48.5% male subjects and 51.5% female subjects, implying that the sample is characterized by an even distribution of gender. Subjects under the age of 25 are the majority (76.0%), and 71.25% of the subjects have an education background up to or above university degree. Moreover, the majority of subjects (75.75%) are students. With regard to the usage of the Internet, it is discovered that users with 8–10 years of experience constitute the main proportion (34.5%), followed by those with 5–7 years of experience (31.5%). This reveals that most of the subjects have sufficient experience in using the Internet. Approximately 61% of the subjects reported to use the Internet every day. 40.25% reported to use the Internet for 2–4 h a day and 28.75% reported to use it for 5–7 hours a day. These figures highlight that most of the subjects are heavy users of the Internet.

4.2 Reliability analysis

Reliability is a measure of trustworthiness or stability of the result of a questionnaire (or a scale). If subjects provide consistent answers in multiple tests by using the same questionnaire, the questionnaire has high reliability. Conversely, if the gap between the results derived from two tests is large, the reliability of the questionnaire is low [28]. According to Cuieford [29], 0.50~0.70 is the most commonly observed range of Cronbach's α, followed by 0.70~0.90. Values of Cronbach's α greater 0.9 indicate high reliability of the scale. In this paper, all the constructs of the questionnaire had values of Cronbach's α between 0.62 and 0.89, and the overall reliability reached 0.9461. This implies that the proposed questionnaire featured high reliability.

4.3 Content validity

Chang [30] pointed out that content validity refers to an extent or level to which a measure represents all the facets of a concept. It indicates the representativeness of the test content, sampling adequacy, and whether or not the content of the questionnaire represents all the constructs of the measurement. In this study, the questionnaire was developed on the basis of domestic and foreign literatures and modified through a discussion with experts. Therefore, the questionnaire used in this study featured an acceptable level of content validity.

4.4 Structural Equation Modeling (SEM)

Structural Equation Modeling (SEM) is a language that describes social science theories in a systematic manner and explores relationships between variables [31]. It can be used to test the interdependence between two or more than two variables. A typical SEM includes a "measurement model" and a "structural model." The former explores the relationship between observed variables and latent variables, whereas the latter examines the relationship between latent variables [32]. In SEM, confirmatory factor analysis (CFA) is adopted to test the factorial structure between items [33] and the hypothesized relationship between the observed variables and latent variables; CFA can also be applied to validity/reliability tests and validation of theories [34]. It is one of the most valuable parts of SEM [35].

In SEM, the difference between theoretic data and actually observed data should be evaluated from multiple perspectives. The

purpose of evaluating the overall model fit is to assess whether the theoretic model can effectively explain the observed data. In other words, the model is employed to assess the gap between the theoretic model and actually obtained data [36]. Bagozzi and Yi [37] mentioned that a complete SEM should involve measurement in three aspects, including Preliminary Fit Criteria, Overall Model Fit Criteria, and Fit of Internal Structure of Model Criteria. The purposes of these criteria are explained as follows: Preliminary Fit measures the error term of the model. The Overall Model Fit tests the fit between the overall model and data, i.e., the external quality of the model. The Fit of Internal Structure of Model assesses the significance level of the estimated parameters and reliability of each index and latent variable. In other words, it measures the internal quality of the model.

In LISREL analysis, for a sample size of 100–150 samples, the Maximum Likelihood Estimation (MLE) is suggested [38]. Chiou [33] pointed out that in SEM, the sample size should exceed 200. Unless the covariance matrix coefficients are ideal, analysis with fewer than 200 samples may derive instable results. To sum up, CFA was adopted in this study to test the theoretic model. In the assessment of the overall model fit, we used MLE and set the significance level at 0.05 to test the fit of the theoretic model. The fit indexes proposed by Bagozzi and Yi [37] were employed to evaluate the fit of the proposed model. In this study, a total of 400 valid responses were collected; hence, the sample size met the abovementioned requirements. The results of related tests are shown as follows.

4.4.1 Model-fit evaluation

In terms of preliminary fit criteria, all factor loadings were between 0.27 and

0.91, and all error variances were non-negative and reached a significance level. With regard to the fit of the internal structure of the model, the composite reliability (CR) of each construct was computed. According to Bagozzi and Yi [37], the CR should be greater than 0.6. In this study, all the CR values were between 0.79 and 0.89, indicating good reliability. The average variance extracted (AVE) of the latent variables shows the average explanatory power of all variables for a particular latent variable. A higher AVE value (AVE > 0.5) indicates higher reliability and convergence validity of the latent variable. In this study, the AVEs of latent variables were between 0.52 and 0.73. It is inferred that these variables have a certain level of reliability and convergence validity.

Table 2 shows the results of the overall model fit. As shown in this table, the AGFI values were under the ideal value of 0.9. However, according to Bagozzi and Yi [37], AGFI values above 0.8 can be considered as acceptable. Thus, all the test results were within the respective acceptable ranges.

4.4.2 Discriminant validity

Discriminant validity is intended to ensure that items of different concepts should not be highly correlated with each other. As pointed out by Hatcher [39] and Ahire et al. [40], discriminant validity can be measured by testing if the χ^2 difference between paired variables in the nested CFA model is significant. In this study, there were 9 latent variables, and a total of 36 pairs of variables could be formed. As shown in Table 3, all the $\Box\chi2$ values (difference between $\chi2$ in the nonrestrictive model and restrictive model) reached a significance level of P-value < 0.001 (degree of freedom = 1 and p-value =

0.001, $\chi2 = 10.827$). The nonrestrictive model showed better fit and supported discriminant validity. Thus, the variables adopted in this study featured good discriminant validity.

4.4.3 SEM analysis

Through LISREL test of the theoretic model, 11 hypotheses were proposed. The path coefficient and t-value of each hypothesis are shown in Figure 5. As presented in Table 4, 10 of the 11 proposed hypotheses were supported, and only 1 hypothesis was not supported.

5 Conclusions

The research by Wu et al.[41] is extended in this study to explore the website user behavior. In this paper, linear structural modeling was adopted to empirically test the correlations involved in the proposed model and interactions between the constructs. On the basis of the test results, the following conclusions were proposed.

Users' acceptance of Web 2.0 websites is mainly influenced by beliefs of people important to the users. Moreover, higher perceived usefulness of a website influences users to continue using the website. Therefore, when developing a new Web 2.0 site, demands of users for interaction with others should be considered, because users attach importance to the usefulness of the website perceived by people important to them.

For users, taking suggestions by people important to them helps them gain a higher status in their groups. Moreover, the empirical results revealed that if a website is considered as providing higher interactivity, it can also be perceived as more useful by users. Thus, functions provided on Web 2.0 websites, such as RSS, delivery of web pages, and file or video uploads/downloads, are intended to increase the "interactions" among users. If there is greater interaction among users, a larger amount of information can be shared by users, and the site can certainly be perceived as more useful.

Web 2.0 services are provided by the websites. Web 2.0 websites use such services to attract users and visitors. If these services have well-designed interfaces and back-end operators, a larger number of users and visitors can be attracted to use them, and the spirit of Web 2.0, "interactivity," can also be realized. Users then perceive a higher level of usefulness of the website.

Table 2. The items tested for overall model fit

Item	Ideal results	Results
χ^2 (Chi-square)	Smaller the better	886.60
χ^2/d.f. (normed Chi-square) (.d.f. = 626)	<3	1.42
NFI (Normed fit index)	>0.9	0.98
NNFI (Non-normed fit index)	>0.9	0.99
CFI (Comparative fit index)	>0.9	0.99
GFI (Goodness of fit index)	>0.9	0.90
AGFI (Adjusted goodness of fit index)	>0.9	0.87
RMR (Root mean square residual)	<0.05	0.037
RMSEA (Root mean square error of approximation)	<0.05	0.032

Table 3. Test of discriminant validity

Paired variables	Nonrestrictive χ^2	df	Restrictive χ^2	df	$\Box\chi^2$	$\Box$df	P-value
P-I	132.89	26	450.13	27	317.24	1	P < 0.001
P-W	75.36	19	550.12	20	474.76	1	P < 0.001
P-O	65.98	13	446.69	14	380.71	1	P < 0.001
P-F	117.99	26	453.11	27	335.12	1	P < 0.001
P-V	164.19	43	662.72	44	498.53	1	P < 0.001
P-E	70.3	19	630.32	20	560.02	1	P < 0.001
I-W	84.98	26	938.94	27	853.96	1	P < 0.001
I-O	45.17	19	421.16	20	375.99	1	P < 0.001
I-F	107.14	34	699.62	35	592.48	1	P < 0.001
I-V	152.09	53	1659.78	54	1507.69	1	P < 0.001
I-E	69.99	26	639.16	27	569.17	1	P < 0.001
I-U	125.22	34	1380.34	35	1255.12	1	P < 0.001
I-H	51.47	19	670.7	20	619.23	1	P < 0.001
W-O	36.93	13	326.62	14	289.69	1	P < 0.001
W-F	86.77	26	535.58	27	448.81	1	P < 0.001
W-V	140.5	43	600.33	44	459.83	1	P < 0.001
W-E	39.5	19	572.66	20	533.16	1	P < 0.001
W-U	134.41	26	816.56	27	682.15	1	P < 0.001
W-H	27.65	13	631.64	14	603.99	1	P < 0.001
O-F	80.56	19	288.53	20	207.97	1	P < 0.001
O-V	133.65	34	356.86	35	223.21	1	P < 0.001
O-E	15.57	13	354.52	14	338.95	1	P < 0.001
O-U	65.35	19	355.78	20	290.43	1	P < 0.001
O-H	16.91	8	306.2	9	289.29	1	P < 0.001
F-V	176.07	53	398.43	54	222.36	1	P < 0.001
F-E	50.89	26	536.27	27	485.38	1	P < 0.001
F-U	165.96	34	508.32	35	342.36	1	P < 0.001
F-H	45.63	19	620.26	20	574.63	1	P < 0.001
V-E	46.39	44	108.61	43	62.22	1	P < 0.001
V-U	194.16	53	639.66	54	445.5	1	P < 0.001
V-H	102.37	34	616.44	35	514.07	1	P < 0.001
E-U	92.43	26	405.85	27	313.42	1	P < 0.001
E-H	21.34	13	508.03	14	486.69	1	P < 0.001
U-H	67.79	19	557.14	20	489.35	1	P < 0.001

Notes: P = Subjective Norm, I = Image, W = Job Relevance, O = Output Quality, F = Result Demonstrability, V = Perceived Usefulness, E = Perceived Ease of Use, U = Intention to Use, H = Usage behavior.
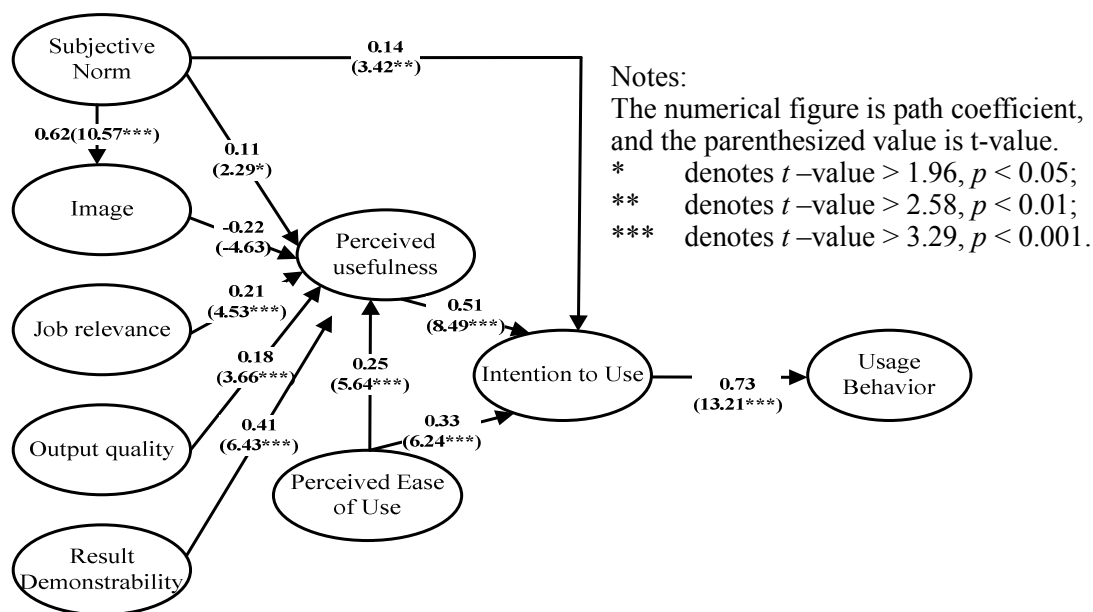
Figure 5. Path coefficients and relationships of the variables

Moreover, if users have the belief that using Web 2.0 websites can enhance the interaction and sharing with people in their groups, they will perceive improvement of their status among the users in their groups. Some users post articles or journals on blogs and share them with net users, both acquainted and unacquainted. Therefore, the importance of "interactivity" cannot be neglected in innovative Web 2.0 websites. To create positive user experience, irrespective of the aspects of perceived ease of use of the interface, accessibility of web content, or interactivity between user communities, operators of Web 2.0 websites should make the benefits of their sites readily discernable. By demonstrating the results of using their websites, they can enhance user participation and ensure their continued use of the websites.

On the basis of TAM2, this study probed into user acceptance of Web 2.0 websites and analyzed the relationships among subjective norm, image, job relevance, output quality, result demonstrability, perceived usefulness, perceived ease of use, intention to use, and usage behavior. The results indicated that except for the effect of "image" on "perceived usefulness," all the other social influence processes and cognitive instrumental processes of TAM2 influence users' perception of the degree of interaction and sharing enhanced by Web 2.0. Such perception determines whether users will continue to use Web 2.0 websites and it further increases time and frequency of using the websites. The results also empirically revealed that since the dot-com crisis in 2000, Web 2.0 has been extensively accepted by general users. A larger number of business opportunities created using Web 2.0 can be expected.

Table 4. Test of relationships between constructs

	Hypotheses	Estimated values	Test results
H1	Users' "subjective norm" has positive influence on "intention to use" Web 2.0 websites.	0.14 (3.42)	Supported
H2	Users' "subjective norm" for using Web 2.0 websites has positive influence on "perceived usefulness."	0.11 (2.29)	Supported
H3	Users' "subjective norm" for using Web 2.0 websites has positive influence on "image."	0.62 (10.57)	Supported
H4	Users' "image" for using Web 2.0 websites has positive influence on "perceived usefulness."	-0.22 (-4.63)	Unsupported
H5	"Job relevance" of Web 2.0 websites has positive influence on users' "perceived usefulness" of the websites.	0.21 (4.53)	Supported
H6	"Output quality" of Web 2.0 websites has positive influence on users' "perceived usefulness" of the websites.	0.18 (3.66)	Supported
H7	"Result demonstrability" of Web 2.0 websites has positive influence on users' "perceived usefulness" of the websites.	0.41 (6.43)	Supported
H8	Users' "perceived ease of use" of Web 2.0 websites has positive influence on their "perceived usefulness" of the websites.	0.25 (5.64)	Supported
H9	Users' "perceived usefulness" of Web 2.0 websites has positive influence on their "intention to use" the websites.	0.51 (8.49)	Supported
H10	Users' "perceived ease of use" of Web 2.0 websites has positive influence on their "intention to use" the websites.	0.33 (6.24)	Supported
H11	Users' "intention to use" Web 2.0 websites has positive influence on their "usage behavior."	0.73 (13.21)	Supported

Note: The numerical figure is path coefficient, and the parenthesized value denotes the *t*-value.

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