

Literature Review

2.1 Theories of Human Behavior

The development of various theories to understand human behavior and development of appropriate interventions has had a long history. Many psychologists had come up with new models to explain various factors that affect the complex human behavior.

2.1.1 Theory of Reasoned Action (TRA)

Theory of Reasoned Action was proposed by Ajzen and Fishbein (1975, 1980). The theory is used to predict behavioral intention. The theory consists of three constructs: behavioral intention, attitude and subjective norms. According to Theory of Reasoned Action (Figure 2.1), a person's behavioral intention depends on the person's attitude about the behavior and subjective norms. It is assumed that if a person intends to do a behavior, then it is likely that he or she will do it.

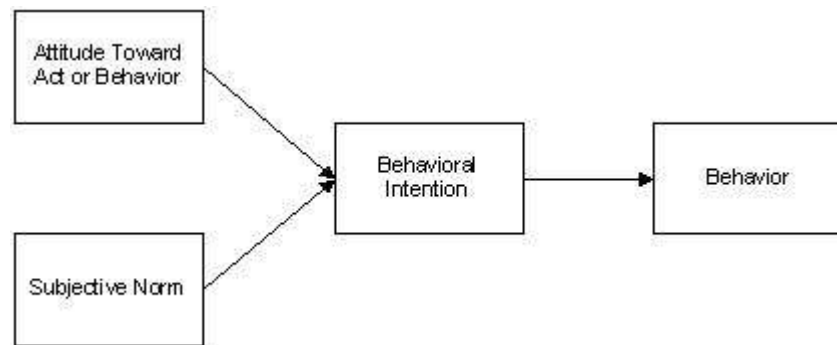


Figure 0.1: Theory of Reasoned Action Model (TRA)

Behavioral intention signifies the relative strength of a person's intention to perform a behavior. Beliefs on the consequences of performing the behavior will in turn contribute to the attitude of the person towards the behavior. If the person perceives positive outcome from performing a behavior, that person will have positive attitude toward the said behavior. Meanwhile, subjective norms refer to the combination of perceived expectations

from the relevant others along with the intention to comply with the expectations. A positive subjective norm is assumed when the relevant others sees that performing the behavior will bring positive outcome and the person wants to meet these expectations.

Theory of Reasoned Action was recognized as a good theory to predict behaviors that are under a person's volitional control. For behaviors that are not fully under volitional control, even though a person may be motivated to perform a behavior by his or her own attitude and subjective norm, other obstacles will prevent the person from performing the behavior. Therefore, Theory of Reasoned Action could not be used in such cases to predict the behavior of a person (Sheppard et al., 1988).

2.1.2 Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB) states that personal attitudes, subjective norms and perceived behavioral control will together determine an individual behavioral intentions and behaviors (Ajzen, 1985). TPB (Figure 2.2) is as an extension of Theory of Reasoned Action. The theory is designed to predict and explain human behavior in specific contexts as the original Theory of Reasoned Action failed in dealing with behaviors over which people have incomplete volitional control. The theory existed as many researchers argued that behavior intention cannot be the exclusive determinant of a behavior. This is especially true in cases where circumstances limit the actual behavior i.e. Behaviors over which people have incomplete volitional control.

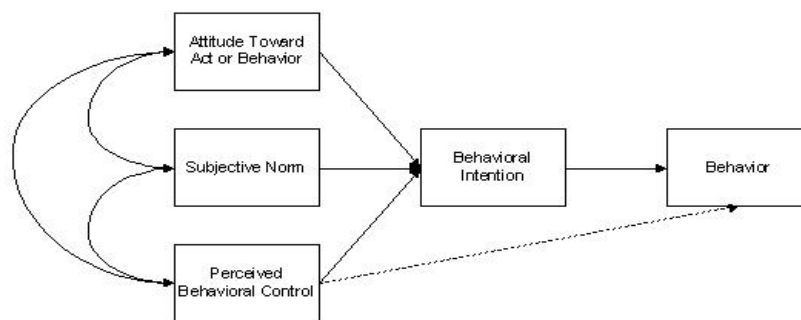


Figure 0.2: Theory of Planned Behavior Model (TPB)

As with the original Theory of Reasoned Action, in Theory of Planned Behavior the central factor is the individual's intention to perform a given behavior. Intentions meanwhile indicates how hard people are willing to try or how much of an effort they are planning to exert to perform the behavior. It is assumed to capture the motivational factors that influence a behavior. Generally, the stronger the intention, the more likely the behavior will be performed. However, the performance of a behavior can only take place if the behavior in question is under volitional control; that is if the person can decide at will to perform or not to perform the behavior. This condition poses a problem as not all behaviors fulfill this requirement. The existence of non-motivational factors such as availability of requisite opportunities and resources such as time, money, skills and cooperation of others will also affect behavior. All the factors collectively represent a person actual control over the behavior.

In the Theory of Planned Behavior, perceived behavioral control is acknowledged as more important than actual control. This is the added concept forming the Theory of Planned Behavior from the original Theory of Reasoned Action that has only attitudes and subjective norms. Perceived behavioral control refers to the person's perception of the ease or difficulty of performing the behavior of interest. It can differ across situations and actions. According to Theory of Planned Behavior, perceived behavioral control together with behavioral intention can be used to predict achievement of a behavior.

2.2 Theories of Technology Acceptance

Adoption of information technologies by individuals and organizations has been a topic of interest since the early days of computerization. This is so to determine the success of a new technology and how well it is accepted in the social system. The adoption of information technologies by individuals and organization is part of the process of

implementing information systems. However, the study of adoption of information system is a complex subject. Poor theory development (Dickson et al., 1980) and inadequate measurements of construct were some of the obstacles faced in these studies. This situation has a major impact in the implementation of information systems.

2.2.1 Innovation Diffusion Theory (DOI)

Many researchers soon realized the situation and called for innovation of new theories and models to tackle the problems faced. Innovation Diffusion Theory (DOI) has been used in many studies by researchers in information system to study the problem faced in implementation of new technologies.

The theory proposed by Rogers' (1983) on the diffusion of innovations was the stepping stone for more models to conceptualize the complex social and behavioral processes affecting individuals in new information technologies adoption. According to Rogers (1983), there are 5 general attributes of innovations that had shown to consistently influence adoption in a variety of diffusion studies. These attributes are Relative Advantage, Compatibility, Complexity, Observability and Trialability. Relative Advantage is the degree to which an innovation is perceived as being better than its precursor. Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters. Complexity is the degree to which an innovation is perceived as being difficult to use. Observability is the degree to which the results of an innovation are observable to others and Trialability is the degree to which an innovation may be experimented with before adoption.

According to Rogers (1995), information regarding the technologies will flow through the social system to potential users. This information will then be digested by the potential users to form perceptions of the innovation. The formed perception will then play a role in affecting the adoption of the technology. Moore and Benbasat (1991) in their study

extended the set of perceptions proposed by Rogers (1983) on the theory of diffusion of innovation to include seven perceived characteristics of an innovation which served as predictors for information technology adoption. The additional two perceived characteristics are image and voluntariness. Image is the degree to which an innovation is perceived to enhance one's image or status in one's social system and Voluntariness of use is the degree to which the use of the innovation is perceived as being voluntary or free will.

The construct Image was an aspect of Relative Advantage as stated by Lu et al. (2005). However Moore and Benbasat (1991) argued that this attribute should be separated and be observed as a factor on its own based on previous studies that find the effect of Image to be different enough from Relative Advantage.

Voluntariness of use according to Moore and Benbasat (1991) is also deemed necessary for the study of innovation diffusion as considerations must be given to whether individuals are free to implement personal adoption or rejection of the innovation. This can be evident in cases where use of a particular innovation may be governed by corporate policy. Such corporate policies may take the freedom of adoption out of the users.

The definition by Rogers (1983) was based on perception of the innovation and not on perception of actually using the innovation. Moore and Benbasat (1991) argued that diffusion of innovation occurs due to cumulative decisions of the individuals to adopt them in the perceptions of using the innovation rather than the perception of the innovation per se. Therefore some researchers redefined the terms of the characteristics in term of potential adopters' use, trial or observation of the innovation and called them the Perceived Characteristics of Innovation (PCI).

However, there are some researchers that argued capturing all the factors in Perceived Characteristics of Innovation is troublesome and that some of the attributes may not be clearly discriminated in actual scenarios by technology adopters.

Davis (1989) developed Technology Acceptance Model (TAM). Technology Acceptance Model has two constructs, perceived usefulness and perceived ease of use. Agarwal and Prasad (1998) noted that Rogers's model is widely used to predict and explain technology diffusion in the context of information system innovation but the information technology domain, Technology Acceptance Model is widely used.

2.2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

Unified Theory of Acceptance and Use of Technology (UTAUT) a relatively new technology acceptance model formulated by Venkatesh et al (2003). Unified Theory of Acceptance and Use of Technology (Figure 2.3) aims to explain users' intention to use an information system and subsequent usage behavior. It has four key constructs namely performance expectancy, effort expectancy, social influence and facilitating conditions that serves as direct determinants of usage intention and behavior. Few other factors (gender, age, experience, voluntariness of use) are posited to mediate the said four constructs in determining usage intention and behavior.

The theory was developed based on eight previous models used by researchers in the area of information system adoption. The eight models are Theory of Reasoned Action, Technology Acceptance Model, motivation model, Theory of Planned Behavior, combined theory of planned behavior/Technology Acceptance Model, model of personal computer use, diffusion of innovations theory and social cognitive theory.

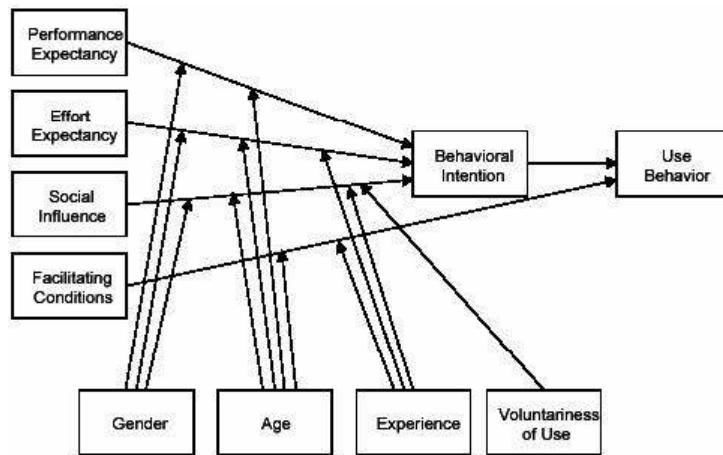


Figure 0.3: Unified Theory of Acceptance and Use of Technology Model (UTAUT)

2.2.3 Technology Acceptance Model (TAM)

There are many ways that can be used to test the adoption and usage of information technology. Application of various models of planned behavior is one of the ways. The Technology Acceptance Model (TAM) by Davis, 1989 is one of the most widely accepted models of planned behavior to study the adoption of information technology.

Theory of Reasoned Action (Fishbein and Ajzen, 1980) is a model of human behavior that postulates the reasoning flow from beliefs and evaluation to the development of an attitude towards performing a behavior. Thus, attitudes bring about the evaluation of intention to perform the behavior resulting in execution of the behavior. In the context of the study for information system acceptance, the relevant behavior is adoption of the technology. The original Technology Acceptance Model (Figure 2.4) by Davis (1989) proposed two variables, namely perceived usefulness and perceived ease of use. Perceived usefulness is the degree to which an individual believes that using a particular system would enhance his or her job performance and perceived ease of use is the degree to which an individual believes that using a particular system would be free of physical and mental effort.

Technology Acceptance Model is usually used to explain the relationship between usage (current or future anticipated usage) perceived usefulness and perceived ease of use. Davis et al. (1989) compared Theory of Reasoned Action and Technology Acceptance Model and concluded that Technology Acceptance Model included an “attitude” element and an “intention” element in contrast with Theory of Reasoned Action. The study also found positive relationship between perceived usefulness and perceived ease of use and attitude, between attitude and behavioral intention and between behavioral intention and usage. Agarwal and Prasad (1998) is also in agreement that in Technology Acceptance Model “attitude” serves as key mediating construct between beliefs and usage intention.

Agarwal and Prasad (1998) proposed an additional construct to the original Technology Acceptance Model to capture the effect of individual differences to adoption of information technology. They argued that the construct “Personal Innovativeness (PI)” be included to help further understand how both perceptions are formed and the subsequent role they play in the formation of usage intentions.

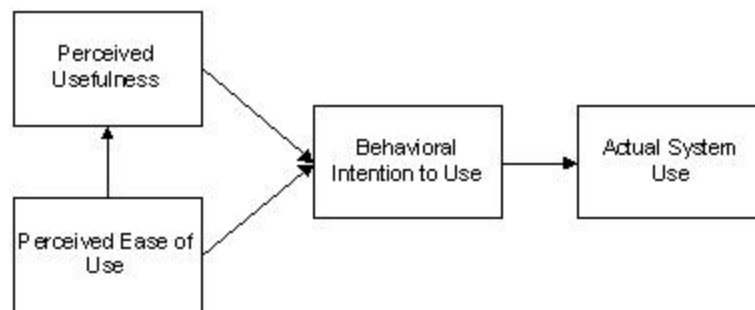


Figure 0.4: Technology Acceptance Model

2.3 Perceived Usefulness

Perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance”. (Davis 1989). Therefore, in the context of information system adoption, a system that is high in perceived usefulness is

one that is believed to bring positive outcome from its usage. Many previous researches have shown that perceived usefulness directly affects computer usage. Therefore, many users find that if the system is useful to them and they will then adopt the system and therefore lead to usage of the system. According to previous researches using Technology Acceptance Model, perceived usefulness is the primary indicator determining the intention to use a computer system and technology acceptance (Davis, 1989; Chau et al., 1996; Venkatesh and Davis, 2000). Lu et al. (2005) indicated that PU is indeed a significant factor affecting adoption of wireless Internet services via mobile technology. Pagani (2004) conducted a study to find out the determinants of 3G mobile multimedia services adoption and gathered that perceived usefulness is one of the most important determinants of adoption. In the context of Malaysia, Norazah (2011) also confirmed perceived usefulness as a determinant for 3G mobile services adoption by subscribers. However, on the other hand, few studies indicated that there is no significant impact of perceived usefulness on the predicted future use of information system.

2.4 Perceived Ease of Use

Perceived ease of use is defined as “the degree to which an individual believes that using a particular system would be free of physical and mental effort” (Davis, 1989). This attribute is noted to be one of the major behavioral beliefs influencing users’ intention to adopt information technology in the conventional or other modified Technology Acceptance Models. On even grounds, an application that is perceived to be easier to use will be more likely to be adopted. Lu et al. (2005) mentioned in their study that perceived ease of use is posited to influence behavioral intention in two ways. First is by a direct effect and secondly indirectly through perceived usefulness. This construct has been shown in a variety of studies to positively influence behavioral intention to adopt a system (Fagan

et al., 2008; Norazah & Norbayah, 2009; Norazah et al., 2008). Study by Pagani (2004) also indicated that perceived ease of use influenced the adoption of 3G multimedia mobile services. However, empirical support for this construct as a determinant for usage intention has been inconsistent and some showed to be less significant than perceived usefulness (Hu et al., 1999; Lucas and Spittler, 1999; Subramaniam, 1994). In some studies, perceived ease of use has no influence over the behavioral intention to adopt a system (Ruiz-Mafe et al., 2009). The variable findings noted in the various studies may be attributed to the different situation and technology studied (Lu et al., 2005). The result of the study done by Norazah (2011) highlighted the importance of perceived ease of use in influencing users to adopt the 3G mobile service function in the Malaysia setting.

Meanwhile in terms of Wireless Internet Mobile Technology (WIMT) adoption, perceived ease of use is recognized as an important determinant for adoption. A survey done by Clark (2000) on 800 professionals in England revealed that perceived ease of use is among the top five factors in order of significance for determining the use of handheld devices. This point is further supported by few other studies in technology.

2.5 Personal Innovativeness towards Information Technology

Individual differences variables can potentially affect how an individual can respond to new innovation. This attribute has come a long way in the study of individual behavior towards innovation diffusion in general and in the domain of marketing in particular (Agarwal and Prasad, 1998). In the earlier researches, this construct is conceptualized in terms of its operational definitions where individuals are characterized as innovative if they adopt an innovation early. Thus, the consumers are segmented into “innovator” and “noninnovators” and this measure can only be applied at time of adoption of an innovation. The limitation of this is that it does not allow for prediction and

subsequent management intervention as “innovativeness” can only be measured after the decision to adopt is made. This phenomenon has exploded many recommendations by researchers in this field to explicate the construct more clearly and to develop ways to measure it directly (Goldsmith and Hofacker, 1991).

At the same time, researchers in the marketing domain also noted that it is important to draw a distinction between global innovativeness and domain specific innovativeness (Flynn and Goldsmith, 1993). Goldsmith and Hofacker (1991) argued that global innovativeness has low predictive value in specific innovation adoption. Domain specific innovativeness on the other hand has been posited to exhibit significant influence on behaviors within a specific domain.

Concurrent with this, Agarwal and Prasad (1998) in their study on personal innovativeness on information technology argued that personal innovativeness is indeed an important concept for examining the acceptance of information technology acceptance. Therefore, in their study, focus was placed to investigate personal innovativeness in terms of domain specific rather than global innovativeness and they defined their construct in the domain of information technology known as personal innovativeness towards information technology. Personal innovativeness towards information technology is defined as the willingness of an individual to try out any new information technology. Personal innovativeness towards information technology is conceptualized as a trait i.e., a relatively stable descriptor of an individual that is invariant across situational consideration. This is as noted by Webster and Martocchio (1992) that traits are generally not influenced by environmental or internal variables.

Personal innovativeness towards information technology as proposed by Agarwal and Prasad (1998) are manifested in technology acceptance behavior through its relationship with beliefs or perceptions. They argued that personal innovativeness towards

information technology serves as a key moderator for the antecedents as well as the consequences of perceptions. As an antecedent moderator, personal innovativeness towards information technology determines the relative use of alternative channels for information seeking in the process of perception development. Rogers (1995) noted that “innovators” possessed certain characteristics behavior in contrast with “non-innovators”, for example innovators are active information seekers about new ideas and are more cosmopolite than later adopters. He also suggested that innovators have greater exposure to mass-media and rely less on subjective evaluation of other members of the social system about the expected outcome of adopting new innovation. Therefore, personal innovativeness towards information technology serves to moderate the relationship between the type of communication channel utilized by adopters to learn about an information technology innovation and the development of perception towards the innovation. As a result of this moderation, individuals with higher personal innovativeness towards information technology will develop more positive perception of the innovation with less reliance on interpersonal resources. Personal innovativeness towards information technology epitomizes risk taking behavior in adopters. Individuals with higher personal innovativeness towards information technology are also expected to be more prone to risk taking and able to cope with higher level of uncertainties as compared to individuals with lower personal innovativeness towards information technology. Therefore, individuals with higher personal innovativeness towards information technology required less positive perceptions to adopt a new information technology as compared to their counterparts with lesser personal innovativeness towards information technology.

Personal innovativeness is a new construct in addition to the original Technology Acceptance Model described by Davis (1989). Agarwal and Prasad (1998) explained that personal innovativeness has implications in both theory and practice. From the practice

point of view, personal innovativeness towards information technology helps in identifying individuals who are more likely to adopt information technology earlier than others (Agarwal and Prasad, 1998). Meanwhile, Rogers (1995) explained that these individuals can then serve as key change agents and leaders to further help in diffusion of new technology. This attribute plays a significant role in cases of limited implementation resources as these individuals can be the main target and later they serve as source for further diffusion of the new technology. From the theoretical point of view according to Agarwal and Prasad (1998), the inclusion of personal innovativeness towards information technology furthers the understanding of adoption intentions by explicating the role of individual traits. This is clearly a step ahead of the conventional Technology Acceptance Model.

2.6 Social Influences

Social influences in this particular research are referred to perceived pressure from social networks in making certain behavioral decisions. In the field of sociology, social network effects have been linked to various organizational behavior phenomena in numerous studies. In these studies, the social networks tend to be viewed as formal networks in organizational and work settings.

Earlier studies in innovation diffusion studies also regarded social influences as an important element for adoption of new innovations. Salanchik and Pfeffer (1978) stated that individuals use social information when they develop statements about attitudes or needs. This social information consists of information about past behavior and what other individuals in the social network think. They posited that this phenomenon is attributed by the need to develop socially acceptable and legitimate rationalizations for action. Innovations create uncertainties about its expected consequences for potential adopters. As

human beings are generally uncomfortable with unfamiliarity and uncertainties, they tend to consult their social network for information before making decision for adoption (Burkhardt and Brass, 1990).

Recently, researchers such as Agarwal and Karahanna (2000) and Lu et al. (2003) have in technology acceptance studies incorporated the construct, social influences into their research. Sarker and Wells (2003) in their exploratory research project to understand the mobile hand held device use and adoption noted that social factors are an important determinant for usage of the technology. They stated that the continuous availability and responsiveness associated with mobile device use fit the fast-paced society in the United States and that the people always rely on information for decision making. The adoption of a new technology also signify social status and contribute to the users' perception of an enhanced sense of self-importance as they are viewed as user of "a cool thing", "a young thing" and "a rich thing". This is especially true in societies where penetration of a new technology is not substantial. The condition is also emphasized in the study by Sarker and Wells (2003). On the other hand, in Asian countries, smart-phones are treated by the younger generation as new items to show off in public (Lu et al., 2005). In an earlier study in China back in 1998, (Samson and Hornby, 1998) it was noted that 73% of the executive class in big cities owned mobile phones not only for convenience but also as a symbol of status. Brass et al. (1998) explained that social influences are stronger in friendship networks which affect people's attitudes and sense of support and attachment. Sarker and Wells (2003) noted typically in wireless mobile environment, for an individual to use the data services of a mobile device they must have acquaintances who use the same features. Another study by Jarvenpaa et al. (2003) also emphasized the friendship network in affecting the assimilation aspect of socialization. They found that mobile handheld devices are used to maintain social connectedness among intimate friends. Sarker and Wells (2005)

also stated that in the case of a major city in Thailand, mobile device use is motivated by the social practice of engaging in “more or less meaningless conversation” as a leisure activity when stuck in traffic jam.

The original Technology Acceptance Model by Davis (1989) has evolved over the years. The Technology Acceptance Model 2 (TAM2) was introduced by Venkatesh and Davis (2000). This new model incorporates the construct social influences processes to further explain users’ adoption behavior. This construct aims to reflect the impacts of three interrelated social forces impinging on an individual facing the opportunity to adopt or reject a new system: subjective norm, image and voluntariness.

Subjective norm 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”. This is adapted from Theory of Reasoned Action (TRA). The rationale for the direct effect of subjective norm on intention for adoption is based on compliance as people may choose to perform a behavior, even if they are not themselves favorable towards the behavior or its consequences, if they believe one or more important referents think they should, and they are sufficiently motivated to comply with the referents (Venkatesh and Davis, 2000). Subjective norm can also influence adoption intention via indirect path through perceived usefulness: internalization and identification.

Internalization of social influences refers to the process by which, when one perceives that an important referents thinks one should use a system, one incorporates the referent’s belief into one’s own belief structure (Warshaw, 1980). In the context of technology adoption, if a superior or co-worker suggests a particular system might be useful, a person may come to think that it is actually useful and intend to use it (Venkatesh and Davis, 2000). Internalization has an indirect effect towards intention for adoption via an indirect effect through perceived usefulness. Technology Acceptance Model 2 (TAM2)

theorizes that internalization unlike compliance will occur in the both contexts of mandatory and voluntary, where even when a system use is organizationally mandated, users' perception about usefulness will still increase in response to positive social information (Venkatesh and Davis, 2000)

Image refers to the degree to which use of an innovation is perceived to enhance one's status in one's social system (Moore and Benbasat, 1991). Technology Acceptance Model 2 (TAM2) theorizes that subjective norm will positively influence image as if an important member of the social network believe that an individual should perform a behavior, and then performing it will elevate his or her social standing within the group (Venkatesh and Davis, 2000). This elevated status will provide greater productivity at work. Thus an individual will perceive that by using a system, will lead to improvement in his or her job performance i.e. perceived usefulness. This identification effect is captured in Technology Acceptance Model 2 (TAM2) by the effect of subjective norm on image, and effect of image on perceived usefulness. Technology Acceptance Model 2 (TAM2) also theorizes that like internalization, identification will occur in both voluntary and mandatory contexts.

Voluntariness is defined in Technology Acceptance Model 2 (TAM2) as "the extent to which the potential adopters perceive the adoption decision to be non-mandatory". Subjective norm is found to have significant effect in the mandatory setting but not in the voluntary setting. This direct compliance is theorized to take effect whenever an individual perceives that a social actor want him or her to perform a specific behavior and the social actor possesses the ability to reward the behavior and punish the nonbehaviour (Warshaw, 1980). However, Hartwicks and Barki (1994) noted in their study that usage intention may vary even in the mandatory contexts as some users may be unwilling to comply with such mandates.

The Technology Acceptance Model 2 (TAM2) was tested in four organizations in a longitudinal study. Subjective norm is found to be influencing perceived usefulness via internalization and identification. Internalization is explained in which people incorporate social influences into their own usefulness perceptions while identification is explained in which peoples use a system to gain status and influence within the work group and thereby enhance their work performance. Beyond this indirect effect via perceived usefulness, subjective norm also has a direct effect toward intention to adopt an innovation in the context of mandatory usage but not in voluntary usage (Venkatesh and Davis, 2000). Davis et al. (1989) earlier also found that social influences have no influence over voluntary adoption in their study. Ventakesh and Davis (2000) also found that as individuals gained direct experience with a system over time, they will rely less on social information in forming perceived usefulness and adoption intention but will continue to judge a system's usefulness on the effect of potential boost of social status.

In the context of adoption of Wireless Internet Services via Mobile Technology (WIMT), Lu et al. (2005) found that social influences in the form of subjective norm and image have a direct positive impact on perceived usefulness and perceived ease of use. However, subjective norm and image were found to have no significant direct effect toward intention to adopt Wireless Internet Services via Mobile Technology when the usage is non-mandatory.