THE ADOPTION OF E-LEARNING: AN INSTITUTIONAL THEORY PERSPECTIVE

Pi-Tzong Jan
Institute for Information Industry, Taiwan
i750712@iii.org.tw (Corresponding Author)

Hsi-Peng Lu
Department of Information Management
National Taiwan University of Science and Technology, Taiwan
lu@mail.ntust.edu.tw

Tzu-Chuan Chou
Department of Information Management
National Taiwan University of Science and Technology, Taiwan
tcchou@mail.ntust.edu.tw

ABSTRACT
Several models have been proposed in the literature to understand e-learning acceptance in which social environmental factors are not primarily addressed. This paper aims to improve understanding of what social forces influence employee's attitude and intention of e-learning adoption within an organizational context. Drawing upon the institutional theory, this study proposes a model to examine three social environmental factors of coercive, normative and mimetic pressures within the e-learning context. An empirical study involving 172 subjects and the partial least square method was conducted to test this model. The results indicate that normative and mimetic pressures significantly influence the attitude and intention of adopting e-learning, while coercive pressures appear not to. Attitude plays a mediating role between both normative and mimetic institutional pressures and e-learning adoption. For organizations, the results suggest that training managers may need to build an e-learning community to create normative expectations and provide success stories of high profiles employee's e-learning experience to promote the adoption of their e-learning. The paper contributes to a deeper understanding of the social factors that promote the use of e-learning in on-job training.
Keywords: e-learning, institutional theory, technology adoption, beliefs

1. INTRODUCTION

In the era of the knowledge economy, knowledge workers need to enhance knowledge and skills continuously to advance their career development. "E-learning" has been expected to play an important role in providing continuing education for knowledge workers. A new and important learning model (Keller & Cernerud, 2002; Tosun & Baris, 2011), it is now a fundamental tool for organizations to gain a competitive edge. Many corporate-organizations are embracing e-learning as a means to provide learning and to enhance the skills of knowledge workers (Shachtman, 2000; Fletcher, 2004; Nelson, 2003; Marki, Maki, Patterson, & Whittaker, 2000; Longworth & Davies, 1996; Govindasamy, 2002; Yilmaz, 2012). In the training and human resource development literature, e-learning is regarded as a training medium (Salas, et al., 2002), instructional strategy (Burgess & Russell, 2003), or learning environment (DeRouin, Fritzsche, & Salas, 2005) to deliver the training to employees by the use of computer and web-based technologies.

E-learning provides both organizations and employees with benefits. On the one hand, by offering e-learning, organizations can reduce the cost of training, increase the availability of training, and offer new possibilities to integrate various types of learning contents (Gasco, Llopis, & Gonzalez, 2004; Rosenberg, 2001; Wilson, 2004; Moore & kearsley, 1996; Chiu & Wang, 2008; Little, 2001). On the other hand, e-learning can be extremely beneficial to employees, especially by providing courses to employees on demand, anytime and anywhere (Burgess & Russell, 2003); tailoring learning courses based on learners' needs (Ely, Sitzmann, & Falkiewicz, 2009); and being compatible with the learners' preferred learning styles (Atack, 2003; Forman, Nyatanga, & Rich, 2002; Haigh, 2004; Yu, Chen, Yang, Wang, & Yen, 2007; Moore, 1996; Little,2001; Zhang, Zhao, Zhou, & Nunamaker, 2004; Trombley & Lee, 2002; Zhang & Zhou, 2003).

Owing to the enormous benefits, both organizations and employees have been motivated to adopt e-learning, respectively. Govindasamy believed that e-learning offered another avenue to enhance teaching and learning (Govindasamy, 2002). In fact, the percentage of America's enterprises using e-learning in the employee training programs rose from 8% in 1999 to 29% in 2006. Worldwide, e-learning has experienced rapid growth (Bersin, 2007).

Besides considering the potential of e-learning as a tool to enhance education and training performance, we need to create more advanced Internet technologies to facilitate the development of e-learning. It is still a great

challenge to persuade an organization and its employees to accept this new technology in their on-the-job training. Not surprisingly then, a variety of theoretical models have attempted to develop explanations of the determinants of individual acceptance and the use of e-learning systems. Within these studies, a central construct and recurrent theme is the notion of an individual's cognition about the outcomes associated with the use of the e-learning system, also referred to in the literature as beliefs (e.g. Ajzen & Fishbein, 1980; Ajzen & Madden, 1986; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). Beliefs represent the cognitive structures that an individual develops after collecting, processing, and synthesizing information about a technology system, and they incorporate individual assessments of various outcomes associated with technology use. Beliefs have been shown to have a profound impact on subsequent individual behaviors toward technology system usage. Hence, the belief formation process is clearly worthy of further investigation (Agarwal, 2000).

Although prior empirical studies have traced some of the factors that drive beliefs (Agarwal, 2000), most of these studies have been chosen to focus upon a specific and limited set of antecedents (Agarwal & Prasad, 1999; Venkatesh, 2000; Venkatesh & Davis, 2000). For example, a number of studies investigated two systemic beliefs: perceived usefulness (PU) and perceived ease of use (PEOU) of e-learning, using the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw,1989; Selim, 2003; Raaij & Schepers, 2008; Chen & Hsu, 2007; Yu & Yang, 2005; Pituch & Lee, 2006; Liaw, 2007, 2008; Ong, Lai, & Wang, 2004; Stoel & Lee, 2003; Lee, Yoon, & Lee, 2009; King & He, 2006). Chang and Tung combined the innovation diffusion theory (IDT) with the technology acceptance model to propose a new hybrid technology acceptance model to find out learners' behavioral intentions to use e-learning. They introduced compatibility, perceived usefulness, perceived ease of use, perceived system quality and computer self-efficacy as core determinant beliefs of learners' behavioral intentions to use e-learning (Chang & Tung, 2008). Roca and Gagne applied the self-determination theory (SDT) to examine the effects of motivational factors affecting TAM constructs in e-learning in a work setting. They reported that three determinant beliefs (i.e. perceived autonomy support, perceived competence, and perceived relatedness) influenced perceived usefulness, playfulness, and ease of use in e-learning adoption (Roca & Gagne, 2008). Other determinant beliefs such as learner computer anxiety, instructor attitude toward e-learning, e-learning course flexibility, e-learning course quality, and diversity in assessments also seem to affect learners' satisfaction (Sun, Tsai, Finger, Chen, & Yeh, 2008). Perceived usefulness and self-efficacy were shown to influence behavioral intention to use e-learning (Liaw, Huang, & Chen, 2007).

However, due to the exposure to the social environment, social actors (e.g. individuals, groups and organizations) are likely to develop their beliefs, attitudes and behaviors consistent with those of their environments (Carley & Kaufer, 1993).

The fundamental argument made in this research is that individuals form beliefs about e-learning adoption within a milieu of influences emanating from the social context in which they interact with technology systems. However, extant research has not examined how social factors shape individual beliefs about e-learning system adoption.

The primary purpose of this study, therefore, is to draw upon institutional theories to present empirical evidence that coercive, normative, and mimetic social forces exhibit significant and differential impacts on individual beliefs about the use of e-learning systems.

After the introduction in section 1, the paper is organized as follows. In Section 2, a theoretical background and conceptual model are presented. Section 3 provides an overview of the methodology. The results of the data analysis are discussed in Section 4. Finally, the managerial and theoretical implications, limitations, and conclusions of the study are presented in Section 5.

2 THEORETICAL BACKGROUNDS AND CONCEPTUAL MODEL

2.1 Theoretical Background

Several theoretical bases inform the conceptual framework of this study, which essentially suggests that an individual's beliefs about technology use are influenced by two dominant sources of influence at varying distance from internal psychological processes: individual factors and social influences (Lewis, Agarwal, & Sambamurthy, 2003). It is important to point out that we are not hypothesizing that the belief drivers themselves are causally related. Rather, we are suggesting that it is useful, from a conceptual perspective, to begin using a taxonomy of such factors by categorizing them on the basis of how distal they are from the target of technology acceptance, videlicet, the individual user. Beliefs about technology use represent the core dependent variables for this research. The discussion below elaborates upon each of the key factors.

Perceptions about the characteristics of technology are not invariant across individuals. Indeed, individuals perceive a new technology from the vantage point of their own internal cognitive processes and develop beliefs about them. In order to sort out the range of factors that shape beliefs mental models, Lewis, Agarwal, and Sambamurthy (2003) proposed a conceptualization of concentric sources of influence, staring with the most proximate set of factors (i.e. individual characteristics), outside which lies a more distal set of influences factors (i.e. social milieu within which the individual is situated and institution forces that surround the individual).

In the literature, there are several technology acceptance behaviors that consider the importance of beliefs (Table 1). Such beliefs have been utilized to explain both system usage (Adams, Nelson, & Todd,1992; Moore & Benbasat, 1991) and usage intentions (Davis, Bagozzi, & Warshaw, 1989; Mathieson, 1991). As shown in Table 1, although most of the technology acceptance models consider various social influence factors, such as subjective norms in TRA, TPB and TAM, social factors in MPCU and UTAUT, and images in IDT, the discussion is generally fragmented and there is a lack of specific focus on social issues (Venkatesh, Morris, Davis, & Davis, 2003; Yang, Chiu, & Chen, 2011).

It is important to emphasize that this study is focused on the use of technology by individuals embedded within an organizational context. In the effort to understand technology use, numerous attributes of organizations have been studied; these studies suggest that institutional factors have a highly significant influence on individual technology use (Fuerst & Cheney,1982; Leonard-Barton,1987; Raymond,1988; Sanders & Courtney,1985; Boynton, Zmud, & Jacobs, 1994; Delone,1988; Leonard-Barton & Deschamps,1988; Monge, Cozzens, & Contractor, 1992).

Shared beliefs, attitudes, and behaviors are some of the most fundamental characteristics of a social group. The theory of social contagion claims that these beliefs, attitudes, and behaviors similarities are caused by social actors (e.g. individuals, groups and organizations) adapting their beliefs, attitudes, or behaviors to those of other actors in the network to which they are linked (Leenders, 2002).

To be more specific, within the technology acceptance context, social contagion refers to the social actors' attitudes of technology adoption that are significantly influenced by other actors (e.g. family and colleagues for individuals, customers, suppliers and partners for companies) who have direct connections or share similar social networks.

The underlying logic of the influences of social ties on social actors' beliefs, attitudes, and behaviors towards technology acceptance is that the social ties may have built up a collection of implicit rules, which may be both imposed on and upheld by the actors' beliefs, attitudes, and behaviors.

Table 1 The Literature of Technology Acceptance Behaviors

Model (Theory)	behavioral intentions are determined by (Beliefs)		proposed by	remark
	individual factors	social influence factors		
The theory of reasoned action (TRA)	individual's attitude	subjective norms	Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975	
The theory of planned behavior (TPB)	individual's attitude individual's perception of behavioral control	subjective norms	Ajzen, 1985 ; 1988 ; 1991	
The technology acceptance model (TAM)	perceived usefulness perceived ease of use	subjective norms	Davis, 1989; Venkatesh & Davis, 2000	an adaptation of TRA
The Model of Personal Computer Utilization (MPCU)	technology complexity facilitating conditions	social factors	Thompson et al, 1991	based on Triandis' theory of human behavior (Triandis, 1977)
computer	outcome expectations–		Compeau &	applied and

utilization	performance outcome expectations– personal self-efficacy affect anxiety		Higgins, 1995	extended the Social Cognitive Theory (SCT)
Innovation Diffusion Theory (IDT)	relative advantage ease of use visibility compatibility results demonstrability voluntariness of use	image	Rogers, 1995; Moore & Benbasat,1991	
The Unified Theory of Acceptance and Use of Technology (UTAUT)	performance expectancy effort expectancy facilitating conditions	social influence	Venkatesh et al., 2003	an unified model which integrates elements across the eight models
The Technology Readiness Index (TRI)	Innovativeness Optimism Discomfort insecurity	none	Parasuraman, 2000	

In the literature, there are several innovation adoption theories that consider these implicit and implied rules. The institutional theory points out that the beliefs, attitudes and behaviors of individuals and organizations are strongly influenced by various networks and interactions (Scott, 2001). It also addresses the role of institutions in understanding the behavior of social actors, and provides a perspective which can help assess the institutions' formal and informal rules that can strongly shape the beliefs, attitudes and behaviors of social actors (North, 1989; 1990; Burkhardt, 1994).

The institutional theory holds that the institutions' influences on the beliefs, attitudes and behaviors of social actors are secret but pervasive. Scott noted that institutionalization should be better viewed as the 'social process by which individuals came to accept a shared definition of social reality' (Scott, 1987) and defined institutions as 'social structures that have attained a high degree of resilience' (Scott, 2001).

Once internalized, or encoded into actors through a socialization process, institutions transform into a particular pattern of attitudes and behaviors, which will shape actors' future attitudes and behaviors and provide stability, order, continuity and meaning to social life. When institutions are established, they become authoritative guidelines for social behaviors (Scott, 2004). Thus organizational structures and processes become ingrained in the organization, and become 'taken for granted' as 'the way these things are done' (Scott, 1987). Therefore, the actors may not even realize that their behaviors are in fact partly shaped by institutions.

The emphasis of institutional theory on social actions is taken mean gaining legitimacy rather than monetary or utility optimization (Harcourt, Lam, & Harcourt, 2005; DiMaggio & Powell, 1983). A common means of gaining legitimacy is to align with some rationalized institutional myth (Meyer & Rowan, 1977), which is occasionally manifested by the adoption of structural attributes displayed by other significant organizations through some isomorphic process (DiMaggio & Powell, 1983).

It suggests that once institutions are established, they create constraints that are locally rational in an economic sense, but collectively they may be suboptimal. From this point of view, institutional theories are totally different from the rational economic perspective, which emphasizes economic optimization, individual self-interest, and conscious decision making.

Although the institutional theory has been primarily applied at the organizational level (DiMaggio & Powell, 1983; Ang & Cummings, 1997; Liang, Saraf, Hu, & Xue, 2007), it was nonetheless applicable at the individual level. Scott pointed out that institutions could operate at the level of 'localized interpersonal relationships' (Scott, 2001). Therefore, in this study, the institutional theory has been drawn on to organize social factors and to expand the depth and breadth of their work.

2.2 Conceptual Model and Hypotheses

Drawing upon the institutional theory, this study proposes a conceptual model, as shown in Figure 1, to investigate how institutional forces influence the acceptance of e-learning by individuals. In this model, we postulate that three institutional forces influence both the attitudes and the intention of e-learning.

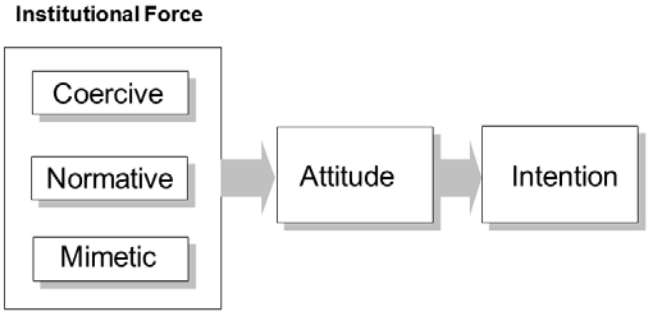

Figure 1 Conceptual Model

2.2.1 Attitude and intention

Attitude and intention are two widely examined variables in the literature of technology acceptance. Attitude indicates a person's general feeling of favorableness or unfavorableness toward some particular technology system (Ajzen, 1991; Morris & Dillon, 1997; Ajzen & Fishbein, 1980; Fishbein & Azjen, 1975). Behavioral intention refers to a user's intention to use a technology system. According to the original definition, behavioral intention encompasses the user's motivational factors that influence technology system usage behavior. These factors indicate how much effort a user will put forth in using a technology system (Ajzen, 1991). Most existing theories empirically verify that individuals' social behaviors are motivated by their behavioral attitudes. For example, TAM postulates the attitudinal explanations of intention to use a specific technology or service (Davis, 1989). In addition, the TRA and TPB models also posit that adoption intention is jointly determined by the attitude toward subjective norm and perceived behavioral control (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975; Ajzen, 1991).

Empirically, several studies have also confirmed that attitude has a significant influence on the intention to accept e-learning system usage (Yu, et al., 2007; Yu, 2006; Raaij & Schepers, 2008; Ong, Lai, & Wang, 2004; Alenezi, Karim, & Veloo, 2010). Therefore, we propose a hypothesis as follows:

H1. Learners' attitudes will positively influence their intention to accept e-learning system usage.

2.2.2 Institutions

In TAM, two systemic beliefs (i.e. perceived usefulness and perceived ease of use) are determinants of attitude, while no determinant is incorporated to explain attitude in the original TRA and TPB. Chang and Tung (2008) combined IDT and TAM by proposing compatibility, perceived usefulness, perceived ease of use, perceived system quality and computer self-efficacy as determinants of attitude in the e-learning context. However, as discussed above, those proposed determinants of attitude are technical and individual level factors. In this study, we postulate institutional forces as determinants of attitude.

The institutional theory focuses on the pursuit of legitimacy in the eyes of important societal stakeholders and accentuates the significance of the institutional environment as attitudes and behaviors of social actors (Grewal & Dharwadkar 2002). The theory indicates that in modern societies, social actors are typified as systems of rationally ordered rules and behaviors (Weber, 1946; Teo, Wei, & Benbasa, 2003). Therefore, there are general social conceptions of appropriate structures, beliefs, attitudes and behaviors. Early studies in the institutional theory identified three mechanisms by which institutional changes occur that promote similarities in structures and processes. As introduced by DiMaggio and Powell and Scott, these mechanisms for isomorphism are coercive, normative and mimetic (DiMaggio & Powell, 1983; Scott, 2001). These three mechanisms move 'from the conscious to the unconscious, from the legally enforced to the taken for granted' (Hoffman, 1997).

2.2.2.1 Coercive pressures

Coercive pressures are defined as both formal and informal pressures exerted on social actors to adopt the same attitudes, behaviors and practices, because they feel pressured to do so by more powerful actors (DiMaggio & Powell, 1983). The previous empirical evidence suggests that, at the organizational level, coercive pressures may stem from a variety of sources, like regulatory agencies, suppliers, customers, parent corporations and other key constituents (Teo, Wei, & Benbasa, 2003). In general, there are two types of coercive pressures, which are

regulation and competition. Regulatory pressures may rise from government and professional regulatory agencies (Harcourt, Lam, & Harcourt, 2005). Competitive pressures arise from the threat of losing competitive advantage. Early studies have cited the influence of coercive isomorphism pressures on innovation acceptance. For example, Zhu et al. indicated that the regulatory environment plays an important role in e-business diffusion (Zhu, Kraemer, Xu, & Dedrick, 2004). Wang and Cheung (2004) found that coercive pressure was positively related to travel agencies' adoption of e-business.

At the individual level, it seems unlikely that there are coercive pressures from regulatory agencies and other key constituents identified at the organizational level. However, at the individual level, e-learning individuals may still face coercive pressures from other sources, like management commitment and support. For example, employees may perceive coercive pressures to use e-learning for on-the-job training when their manager has already been using e-learning. Therefore, we propose a hypothesis as follows:

H2. Individuals who perceive higher coercive pressures are more likely to use e-learning.

2.2.2.2 Normative pressures

Normative pressures, associated with the professionalization of fields and disciplines, occur when social actors voluntarily, but unconsciously, replicate other actors' same beliefs, attitudes, behaviors and practices. The institutional theory proposes that social actors are more likely to copy a certain action if that action has been taken by a large number of other actors. Social actors are then been forced to adopt certain behavior due to their expectation for legitimacy and not necessarily for suitability (Flanagin, 2000). However, this copying or imitation is not coerced by any powerful actors, nor is it conscious. Instead, attitudes, behaviors and practices demonstrated for a long time by most actors in the same social context become so legitimized as the 'right' way things are done that individuals often come to believe that these practices and behaviors indicate the 'only' way to do things (Harcourt, Lam, & Harcourt, 2005; Johnson, Dowd, & Ridgeway, 2006). The normative pressures may guide social actors who have not adopted the innovation to experience discord and hence discomfort when peers whose approval they value have adopted the innovation (DiMaggio & Powell, 1983; Van Den Bulte & Lilien, 2001). Several studies have demonstrated this imitation in the past. For example, Krassa and Granovetter suggested that decisions to undertake in a particular behavior depended on the considerable number of similar others in the environment which had already done likewise (Krassa, 1988; Granovetter, 1978).

In the context of e-learning, normative pressures indicate that individuals will be more likely to adopt e-learning if they perceive that a considerable number of other individuals in their workplace had already adopted e-learning, as individuals may be afraid that they will be loneliness and lack of competitiveness if they do not adopt e-learning. In many cases, individuals may be afraid that they will be deemed 'old fashioned' if they do not follow the current trend. These phenomena have been described before as Bandwagon theories (Abrahamson & Rosenkopf, 1993) and theories of fads (Abrahamson, 1991). Therefore, we propose a hypothesis as follows:

H3. Individuals who perceive higher normative pressures are more likely to use e-learning.

2.2.2.3 Mimetic pressures

Mimetic pressures force social actors to seek examples of established behaviors and practices to follow through voluntarily and consciously copying the same behaviors and practices of other high-status and successful actors (DiMaggio & Powell, 1983), due to the belief that actions taken by successful actors will be more likely to get positive outcomes. In addition, through imitating, actors can reproduce with a minimal effort on search costs and experimentation costs, and avoid risks inherent from being the first-movers (Teo, Wei, & Benbasa, 2003).

In the e-learning context, individuals may selectively imitate the attitudes and behaviors that have been adopted by higher status individuals. Individuals may believe that they may get promoted to the higher position by mimicking what their supervisors or high-ranking managers are doing, i.e. benchmark learning. It indicates that individuals will be more likely to adopt e-learning if they perceive high status people have already adopted e-learning. Therefore, we propose a hypothesis as follows:

H4. Individuals who perceive higher mimetic pressures are more likely to use e-learning.

2.2.3 Control variables

Demographic variables may have the potential to influence e-learning adoption, especially when social factors are considered. We have included age, gender and income in our research model as control variables.

In recent years, researchers have suggested that age and gender play the important roles when examining social factors (Mazman, 2011; Dabaj, 2009). For example, older individuals tend to be more likely to be salient to social influences (Morris & Venkatesh, 2000). Older people tend to be more cautious and to seek greater certitude than younger people before they act (Botwinick, 1973). Similarly, women tend to be slightly more

persuadable than men (Copper, 1979) and more sensitive to others' opinions and thus more salient to social influences (Venkatesh et al., 2003; Venkatesh & Morris, 2000). Ong and Lai (2006) also found that men's perceptions of usefulness were more significant and more salient than women's in determining behavioral intention to use e-learning. In addition, wealthy individuals appear more likely to use e-learning. Individuals with high income may perceive higher time value (Goldman & Johansson, 1978; Stigler, 1961); thus the usage of e-learning may bring more benefits to those individuals. Therefore, this factor may suggest that they may be more inclined to adopt e-learning. Rogers suggests that e-learning is more likely to be adopted if the innovation meets a felt need. Therefore, we speculate that individuals with higher incomes are more likely to adopt e-learning (Rogers, 1995).

3 RESEARCH METHODOLOGIES

3.1 Measurements

To ensure the content validity of the scales used, the questionnaire was designed based on an intensive review of the literature. It was then reviewed by academic researchers with expertise in innovation adoption, e-learning, and survey methodology. Wherever possible, existing measures that had been used in previous studies were adopted. The questionnaire was also pre-tested on organization's employees who had e-learning experiences. The feedback from the pre-test was used to improve the readability and the quality of the questions in the instrument. The questionnaire is shown in the appendix, and the design of the measurement items is described below.

The measures for the institutional forces (i.e. coercive, normative and mimetic) were adapted from Teo, et al. (2003) and Liang, et al. (2007). Specifically, for coercive force, the respondents were asked the degree to which e-learning was required for their on-the-job training. For normative forces, the respondents were asked to indicate the degree to which others in their social network were using e-learning. For mimetic force, the respondents were asked the degree to which they agreed that individuals who were using e-learning had a high status. In all these measures, a Likert-type scale of 1-7 was used. A score of 1 indicates 'strongly disagree' with the statement, whereas the score of 7 indicates 'strongly agree' with the statement.

The scale with four items for attitudes was adapted from Davis, Lee, Park, Chatzoglou, et al., Demet, et al., and Venkatesh, et al. (Davis, 1989; Lee, 2010; Park, 2009; Chatzoglou, Sarigiannidis, Vraimaki, & Diamantidis, 2009; Demet, Cigdem, & Fethi, 2011; Venkatesh et al., 2003). The scale with three items for adoption intention of e-learning was adapted from Demet, et al., Chatzoglou, et al., Lee, et al., Bhattacherjee, and Liu, et al. (Demet, Cigdem, & Fethi, 2011; Chatzoglou, et al., 2009; Lee, Hsieh, & Ma, 2009; Lee, et al., 2011; Bhattacherjee, 2001a,2001b; Liu, Chen, Sun, David, & Kuo, 2010). Similarly, a Likert-type scale of 1-7 was used for these measures.

The measures for controls of age, income, and gender were adapted from Venkatesh et al., Demet et al., and Chatzoglou et al. (Venkatesh et al., 2003; Demet, et al., 2011; Chatzoglou et al., 2009). The respondents were asked to identify the pre-defined groupings of their age, gender, and income.

3.2 Data Collection

The sampling methods used in this survey were convenient sampling and snowball sampling. The questionnaire and the system information were disseminated to a convenient sample of respondents and contacts in their social networks. Respondents were chosen from different organizations of various size and sectors such as private companies (eq. Quanta Computer Inc., Trend Micro Inc., Delta Electronics Co., Alibaba.com, and Gemtek Technology Co.), research institutes (eq. Institute for Information Industry, Industry Technology Research Institute, and National Applied Research Laboratories), and the public sector (Science & Technology Advisory Group, Ministry of Economic Affairs, and Ministry of Education Affairs). Each organization had implemented e-learning and most respondents had experience in using it. The participants used in this study were all full-time knowledge-work employees with several years of working experience. Therefore, the samples were considered as appropriate.

A total of 200 questionnaires were distributed. Individuals were informed that participation in the study was voluntary and that their responses would be confidential and be analyzed only at the aggregated level. A total of 172 questionnaires were returned. Thirteen of them were partially completed and consequently excluded from the data analysis, resulting in a total of 159 effective responses (80 per cent).

The respondent profile is presented in Table 2. Among the 159 respondents, 98 per cent respondents were using various e-learning, and 2 per cent were not using any e-learning. Regarding gender and age, 47 per cent were male, 53 per cent were female, 1.3 per cent were under 24 years old, and 88.7 per cent were between 25 and 50 years old. As for income, most of them had monthly incomes between NTD 10,001 to 80,000, among which 19.5

per cent were between NTD 10,001 and 20,000, 22 per cent were between 20,001 and NTD 40,000, 22.6 per cent were between NTD 40,001 and NTD 60,000, and 28.3 per cent were between NTD 60,001 and NTD 80,000.

Table 2 Demographics of the Respondents (N=159)

Demographics	Item	Frequency	Percentage
Gender	Male	75	47.2
	Female	84	52.8
Age	Under 24 years	2	1.3
	25-34 years	65	40.9
	35-49 years	76	47.8
	50 or over years	16	10.1
Income (per month)	Less than NTD 10,000	3	1.9
	NTD 10,001-NTD 20,000	5	3.1
	NTD 20,001-NTD 40,000	39	24.5
	NTD 40,001-NTD 60,000	69	43.4
	NTD 60,001-NTD 80,000	23	14.5
	NTD 80,001 or more	20	12.6
Education	High school	1	0.6
	College	7	4.4
	University degree	55	34.6
	Master/Doctoral degree	96	60.4
Working Experience	Under 2 years	11	6.9
	2-5 years	31	19.5
	6-10 years	35	22
	11-15 years	36	22.6
	16 or over years	46	28.9

4 DATA ANALYSES AND RESULTS

4.1 Instrument Validation

The partial least square (PLS) method was used for assessing scales validity and testing the hypotheses. Unlike LISREL-type structural equation modeling (SEM), which is based on the covariance structure of the latent variables, PLS is a component-based approach for a predictive research model (Jöreskog & Sörbom, 1993; Lohmoller, 1989; Chin, 1998a) and thus can avoid two problems: inadmissible solutions and factor indeterminacy (Fornell & Bookstein, 1982). PLS examines the significance of the relationships between research constructs and the predictive power of the dependent variable (Chin, 1998b); thus, it is better suited for explaining complex relationships and building theories. As Wold argued, 'In large, complex models with latent variables PLS is virtually without competition' (Wold, 1985). In addition, PLS places minimal restrictions on the sample size and residual distributions (Anderson & Gerbing, 1988; Chin, Marcolin, & Newsted, 2003; Chin 1998b).

PLS analyzes simultaneously a measurement model describing the relationships between a research construct and the indicators used to measure the construct (i.e., factor loadings) and a structural model depicting the relationships between research constructs (i.e., path coefficients)(Fornell & Bookstein, 1982).

We display descriptive statistics for the measurement items in Table 3. Unlike LISREL-type SEM, which provides global good-of-fitness indices, PLS provides t-statistics for factor loadings. As shown in Table 3, all of the t-statistics of the factor loadings are significant at the $p < 0.001$ level.

Table 3 The Measurement Model

Construct	Item	Loading	Std. Error	t-Statistic	CR	AVE	Cronbach's α
Coercive	CF1	0.8721	0.0293	29.8036	0.888	0.726	0.822
	CF2	0.7786	0.0675	11.5293			
	CF3	0.8999	0.0277	32.4686			
Normative	NF1	0.8835	0.0252	35.0326	0.931	0.818	0.885
	NF2	0.9319	0.0137	68.2707			
	NF3	0.8979	0.0246	36.4701			
Mimetic	MF1	0.9228	0.0180	51.3621	0.945	0.852	0.913
	MF2	0.9417	0.0103	91.7620			

	MF3	0.9034	0.0178	50.8604			
Attitude	BE1	0.8087	0.0311	26.0348	0.918	0.737	0.876
	BE2	0.8312	0.0363	22.9071			
	BE3	0.9005	0.0244	36.8968			
	BE4	0.8901	0.0193	46.0846			
Intention	IN1	0.8856	0.0150	58.8732	0.933	0.822	0.896
	IN2	0.9313	0.0190	49.0050			
	IN3	0.9031	0.0258	34.9559			

Note: All t-statistics are significant at the 0.001 level; CR=Composite Reliability; AVE=Average Variance Extracted; NA: not applicable to single-item measures

Based on the results of the measurement model, we analyzed the convergent validity, discriminate validity and reliability of all of the multiple-item scales, following the guidelines in the literature of Fornell and Larcker (Fornell & Larcker, 1981). We assessed reliability in terms of item reliability and composite reliability. Item reliability was examined by means of factor loadings of the items of the construct. It is widely accepted that items with loadings of 0.7 or more have adequate item reliability. Table 3 shows that all factor loadings are higher than 0.7, indicating acceptable item reliability. Construct composite reliability is similar to and superior to Cronbach's alpha because it considers the actual factor loadings instead of assuming an equal weight for each item (Fornell & Larcker, 1981). The composite reliabilities in our measurement model ranged from 0.888 to 0.945, which were all above the recommended value of 0.7, suggesting adequate construct reliability (Nunnally, 1978).

We assessed convergent validity in terms of average variance extracted (AVE), which explained the variance that was measured by the construct in relation to the measurement error. Convergent validity requires an AVE of no less than 0.5 (Fornell & Larcker, 1981). Table 3 shows that all AVE values were above the recommended value of 0.5 (ranging from 0.726 to 0.852), thus demonstrating adequate convergent validity.

Discriminate validity was assessed by comparing the AVE of each individual construct with the shared variances between this individual construct and all of the other constructs. A higher AVE than shared variance for an individual construct suggests discriminate validity (Fornell & Larcker, 1981). Table 4 shows the inter-construct correlations of the diagonal of the matrix. A comparison of all of the correlations and square roots of the AVEs on the diagonal indicated adequate discriminate validity.

Table 4 Correlations of Latent Variables

	Coercive	Normative	Mimetic	Attitude	Intention
Coercive	**0.852**				
Normative	0.539	**0.905**			
Mimetic	0.480	0.402	**0.923**		
Attitude	0.335	0.393	0.408	**0.859**	
Intention	0.471	0.432	0.394	0.737	**0.907**

Note: Diagonals represent the square root of average variance extracted, and the other matrix entries are the factor correlation; NA: not applicable to signal-item measures.

4.2 Structural Model Estimation and Hypotheses Testing

The structural model was assessed by estimating the path coefficients and the R2 values. Path coefficients indicate the strength of the relationships between the independent variables and dependent variable. R2 values indicate the amount of variance explained by the exogenous variables and measure the predictive power of the structural models (Barclay, Higgins, & Thomson, 1995). We calculated path coefficients and t-statistics for hypothesized relationships using a bootstrapping technique. Results of hypothesis testing are presented in Figure 2 and discussed in the following paragraphs.

The significant path coefficient from attitude to adoption ($b = 0.735$, $p < 0.001$) provided support for H1. As indicated by path coefficients, normative and mimetic forces had significant influences on attitude ($b = 0.244$, $p<0.01$ and $b=0.276$, $p < 0.001$). This result confirmed our theoretical expectation and provided support for H3 and H4. However, as indicated by path coefficient, coercive forces had no significant impacts on attitude ($b = 0.071$, NS), suggesting rejection of H2.

Regarding controls, the paths from age, income and gender to e-learning adoption were all insignificant ($b = 0.012$, 0.016, 0.019, respectively). As shown in Figure 2, our model explained 23.2 per cent of the variance in

attitude and 54.4 per cent in e-learning adoption intention. The magnitude of these R2s provides additional evidence in support of the research model.

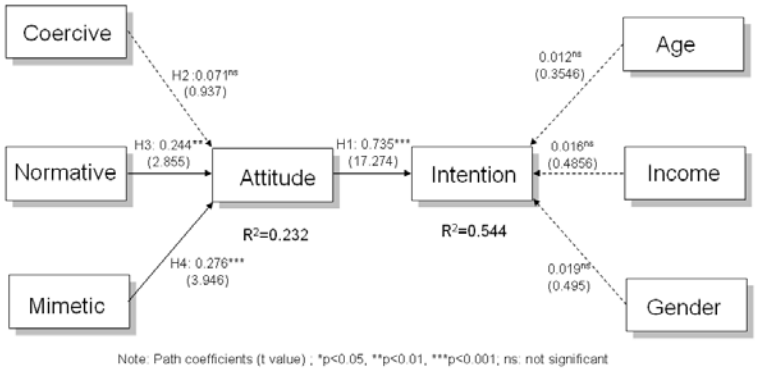

Figure 2 Results of Conceptual Model

4.3 Mediating Effect Analyses

As demonstrated in Figure 2, normative and mimetic forces relate significantly to attitude, and in turn attitude relates to e-learning adoption. This causal chain signifies the mediating effect of attitude on the relationship between institutional forces and e-learning adoption. To test this mediating effect, we followed Baron and Kenny's procedure to examine two more models (Baron & Kenny, 1986).

The first model (see Figure 3) removes the mediator of attitude and connects all three institutional forces to adoption directly. The second model connects all three institutional forces directly to e-learning adoption in addition to the mediating links, as shown in Figure 4. Another run of PLS analysis was conducted to test these two models. The model shown in Figure 3 yielded significant links from coercive, normative and mimetic forces to e-learning adoption. In addition, the explained variance of e-learning adoption significantly drops from 0.544 to 0.306. The results of the model shown in Figure 4 demonstrate that the direct effects of normative and mimetic forces on e-learning adoption are insignificant. Meanwhile, the explained variance of e-learning adoption only slightly increases from 0.544 to 0.594. These results jointly indicate that the influences of normative and mimetic forces on e-learning adoption are completely mediated by attitude.

However, in the model we tested, although coercive forces had no significant influence on attitude of e-learning adoption, they had direct significant influence on e-learning adoption when not mediated by attitude. This remains an interesting question for future research.

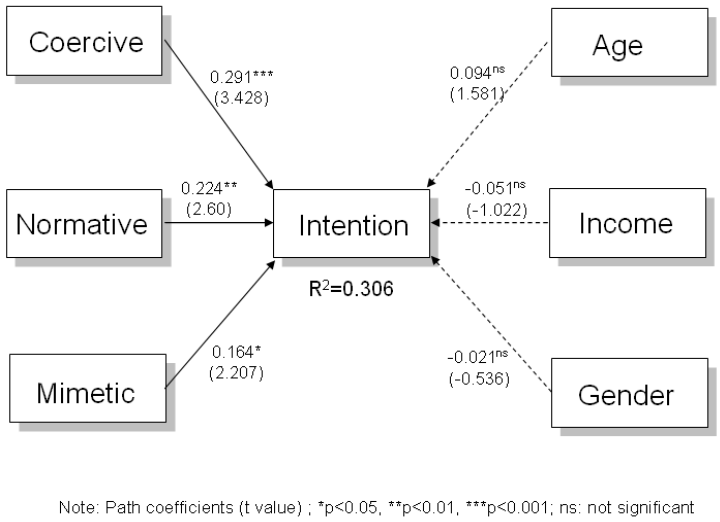

Figure 3 Result of Model with Direct Effects Only

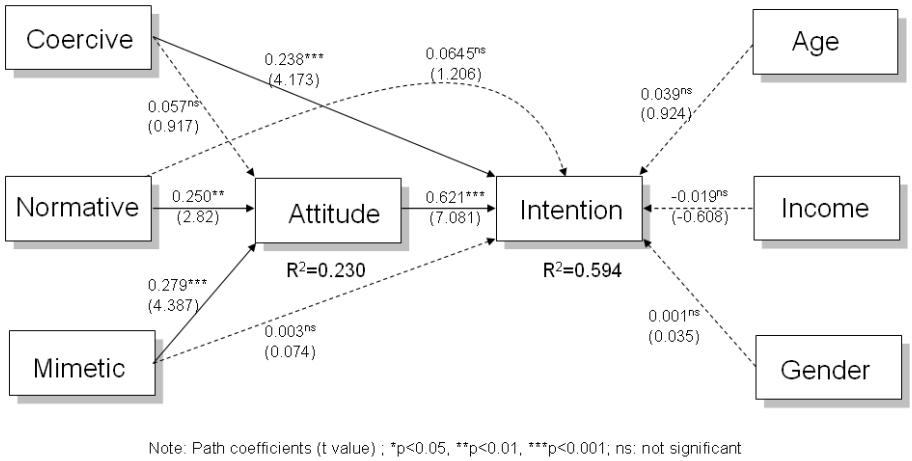

Figure 4 Results of Model with both Direct and Indirect Effects

5. DISCUSSION AND CONCLUSIONS

This study examines social factors by applying the institutional theory. The analysis results have provided insightful managerial and theoretical implications as discussed in the following.

5.1 Implications

With the preceding analysis results, we demonstrate how institutional forces influence attitude and intention of using e-learning. The results have managerial implications for training managers in human resource development and theoretical implications for researchers.

First, our analysis illustrates that two types of institutional forces, normative and mimetic, have a significant influence on attitude and intention to use e-learning. These findings may shed light on how training managers could better plan their e-learning program and thus accelerate the rate of adoption. The results indicate that e-learning can benefit from social influences that could result in an organization's employees jumping on the e-learning bandwagon. When an increasing number of employees do that, organizational investments in human capital could be more efficient. To be specific, training managers may need to work on improving normative and mimetic forces. Regarding normative forces, training managers may need to build an e-learning community and conduct referral champions to create normative expectations. Regarding the mimetic forces, it appears that the high-profiles of e-learning adopters may influence e-learning adoption of others with lower profiles. Training managers may provide success stories of the e-learning experiences high-profile employees and enhance word of mouth marketing in the e-learning context.

Secondly, our results reveal that mimetic pressures have higher influences on attitude and intention than normative pressures (b = 0.276, 0.244, respectively). This finding suggests that it may be more efficient for training managers to exert mimetic forces than normative forces to promote the adoption of their e-learning.
Thirdly, our analysis demonstrates that attitude plays a mediating role between institutional forces and intention. This finding clearly depicts a mechanism in which the institutional forces, particularly normative and mimetic, influence the formation of employee's attitudes toward using e-learning, which in turn determine the intention of using e-learning. It suggests that training managers should improve their e-learning to promote the employee's positive attitude. It is evident that social factors, in particular the normative and mimetic forces, are key determinants of attitude.

Fourthly, our analysis shows no significant influence of coercive institutional forces on attitude or intention of using e-learning, but it has significant influence on e-learning adoption directly. This finding suggests that organization may provide certain training courses available only on the Internet and provide incentives for e-learning users to improve their attitude.

Fifthly, the control variables of age, gender and income demonstrate no significant impact on the intention to use e-learning. This is consistent with previous studies on e-learning. For example, Cheng et al. analyzed the invariance across TAM constructs and found that age, gender, prior experience, and work experience difference had no significant influence on attitude and intention to use e-learning (Cheng, et al., 2011). This finding

suggests that the training managers may not need to be segmented in terms of demographic characteristics when promote e-learning on-the-job training.

Lastly, this study contributes significantly to the literature in several areas. To the best of our knowledge, our study is a trial study of applying the institutional theory at the individual level, unlike most previous studies, which applied institutional theory at the organizational level. In addition, our study also contributes to the technology acceptance literature by examining institutional factors in e-learning settings, while previous studies examine e-learning primarily from technical and individual perspectives. Although previous studies also investigate social factors, such as social norms and image, our model incorporates a richer set of social factors with expanded depth and breadth.

5.2 Limitation and Future Research Directions

Although this study makes significant contributions to the literature and provides valuable insights, it has also several limitations. Our findings must be interpreted in the light of these limitations.

First, our sample involved only the specific and limited organizations in a particular geography. The findings may not be fully generalized to other organizations in other geographies. Special caution should be taken when generalizing or extrapolating these findings to different cultural and social environments.

Secondly, the research model explains 54.4 per cent and 23.2 per cent of the variance of intentions and attitudes, respectively. The 45.6 per cent and 76.8 per cent of the variance left unexplained suggest that some factors important to the acceptance of e-learning are omitted in the study. Future studies may use a richer set of variables, including not only social factors but also individual factors, as predictors to provide better explanatory power for e-learning behaviors.

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APPENDIX

Appendix A. Questionnaire items used in this study

Items	Mesures
Coercive forces (adopted from Teo, et al., 2003 and Liang, et al., 2007)	
CF1	Many of my on- job training requires me to use e-learning.
CF2	Many training courses can be accomplished only when using e-learning.
CF3	My learning interactions with my company, friends, and other businesses force me to use e-learning.
Normative forces (adopted from Teo, et al., 2003 and Liang, et al., 2007)	
NF1	I have seen what others do using e-learning.
NF2	Many people in my social network (friends, family, workmates, and classmates) use e-learning.
NF3	E-learning is very visible in my social network (friends, family, workmates, and classmates)
Mimetic forces (adopted from Teo, et al.,2003 and Liang, et al., 2007)	
MF1	People around me who use e-learning have more prestige than those who do not
MF2	People around me who use e-learning have a high profile
MF3	Using e-learning is a status symbol for people around me
Attitude (adopted from Davis, 1989 and Lee, 2010 and Park 2009 and Chatzoglou, et al., 2009 and Demet, et al., 2011 and Venkatesh et al., 2003)	
BE1	Using e-learning is a good idea
BE2	I would feel that using e-learning is pleasant
BE3	In my opinion, it would be desirable to use e-learning
BE4	In my view, using e-learning is a wise idea intention
Adoption intention(adopted from Demet, et al., 2011 and Chatzoglou, et al., 2009 and Lee, et al., 2009 and Lee, et al., 2011 and Bhattacherjee, 2001a,2001b and Liu, et al., 2010)	
IN1	I would continue to use e-learning for my learning needs
IN2	Continuing to use e-learning for handling my on-job training is something I would do in the future
IN3	I would continue to see myself using e-learning for handling my on-job training.

Appendix B. Factor Structure Matrix of Loadings and Cross-Loadings

Scale Items	MF	CF	ATT	NF	GEN	IN	AGE	INCOME
MF1	**0.9228**	0.4872	0.3842	0.4239	-0.0249	0.3768	0.0097	-0.0147
MF2	**0.9417**	0.4298	0.4107	0.3377	-0.0347	0.3480	0.0716	0.0661
MF3	**0.9034**	0.4106	0.3259	0.3520	-0.0280	0.3693	0.1141	0.0944
CF1	0.3225	**0.8721**	0.2972	0.4979	-0.0059	0.4098	0.0363	0.0844
CF2	0.2663	**0.7786**	0.1268	0.3282	-0.0018	0.3266	-0.0511	0.0981
CF3	0.5545	**0.8999**	0.3464	0.4951	0.0964	0.4402	-0.0000	0.0109
BE1	0.2612	0.3550	**0.8087**	0.3665	-0.0592	0.5711	0.0281	-0.0231
BE2	0.4512	0.3238	**0.8312**	0.4036	0.0910	0.5927	0.0174	0.0652
BE3	0.3212	0.2377	**0.9005**	0.3031	-0.0882	0.6696	0.0769	0.0350
BE4	0.3577	0.2423	**0.8901**	0.2812	-0.0168	0.6909	0.1288	0.0763
NF1	0.3125	0.4484	0.3229	**0.8835**	0.0521	0.3002	0.0721	0.1869
NF2	0.3893	0.5009	0.3332	**0.9319**	0.0940	0.4119	0.0480	0.0947
NF3	0.3830	0.5081	0.4003	**0.8979**	0.0755	0.4454	-0.0509	0.1054
gen	-0.0318	0.0469	-0.0197	0.0821	**1.0000**	0.0013	-0.1129	-0.1346
IN1	0.3532	0.3446	0.8070	0.3780	0.0080	**0.8856**	0.0150	0.0108
IN2	0.3714	0.4830	0.5936	0.4045	-0.0099	**0.9313**	0.1175	0.1128
IN3	0.3444	0.4862	0.5362	0.3939	0.0034	**0.9031**	0.0862	0.0349
age	0.0679	0.0064	0.0745	0.0198	-0.1129	0.0732	**1.0000**	0.5313
income	0.0505	0.0617	0.0469	0.1403	-0.1346	0.0540	0.5313	**1.0000**

Appendix C. Structural Model

	Entire Sample estimate	Mean of Subsamples	Standard error	T-Statistics
NF->ATT	0.2440	0.2296	0.0855	2.8550
CF->ATT	0.0710	0.1098	0.0758	0.9371
MF->ATT	0.2760	0.2702	0.0699	3.9458
ATT->IN	0.7350	0.7404	0.0425	17.2742
GEN->IN	0.0190	0.0463	0.0384	0.4947
AGE->IN	0.0120	0.0468	0.0338	0.3546
INCOME->IN	0.0160	0.0472	0.0329	0.4856