



## The Acceptance of Workplace Users for a New IT with Mandatory Use

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### Abstract

The paper discusses the acceptance of workplace users for a new information technology (IT) with mandatory use. The learning intention of users is employed to define the acceptance. Through three intermediate variables, workload pressure, perceived ease of use, and perceived usefulness, four exogenous variables including computer knowledge of users, technology support, subjective norms, and training were investigated to analyse the determinants that affect the learning intention. For the above analysis, a causal model with an IT of Enterprise Resources Planning (ERP) systems was constructed. As an empirical study, 112 workplace users were sampled to validate the model. The results indicated that, except training factor, all of the exogenous variables have significant direct or indirect effects on user learning intention respectively. The training factor, even though does not affect the user learning intention, has significant relations with technology support and subjective norms. The results provide both theoretical and practical implications for organizations in implementing new IT with mandatory use, especially the IT of ERP systems.

*Keywords:* Mandatory use, Technology Acceptance Model, Enterprise Resources Planning

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### 1. Introduction

Business organizations constantly upgrade Information Technology (IT) to enhance their global competitiveness. However, a new IT may put pressure on users. Many of the stressors of human computer interaction at work are similar to stressors that have historically been observed in automated jobs (Smith et al., 1999). Generally, computer technology may involve higher demands on learning, and thus be one of the main causes of perceived increases in work load (Bond et al., 1998; Mikkelsen et al., 2002). This may be quite common for users with less computer knowledge, because they need to spend more time to learn the new IT. If such pressure can not be reduced, it may lower user learning effectiveness, and as a result, lead to poor IT performance.

Enterprise Resources Planning (ERP) is one of the most popular forms of IT among new IT for businesses. According to a report from IDC (International Digital Company, 2002), the ERP market should grow 10.5% annually over the next years, with total global production values increasing up to \$11.7 billion. In Taiwan, a portion of businesses have implemented ERP systems, but in many cases unsuccessfully. A study by the Industrial Technology Intelligence Services Centre (ITIS, 1998), indicated that the key factors in successful implementation of an ERP system include: users, organizational system and features of

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software, and most importantly, the users. Hence, when implementing new IT, improvement of user acceptance is one of the most important issues for organizational management.

In the relevant literature, most of the subjects are students and most of the implemented IT systems are personal software, such as image processing programs, (Davis et al., 1989), WWW (Lederer et al., 2000) and E-Mail (Adams et al., 1992). Generally, these IT systems are not mandatory for users, who themselves can decide whether to adopt the new IT. For those IT, user intention (Davis et al., 1989; Jackson et al., 1997) is generally employed to define user acceptance for the new IT. However, for some IT, use could be mandatory for users (Venkatesh and Davis, 2000; Venkatesh et al., 2003), such as the ERP systems for workplace users. For those IT, no matter what the user intention is, once they are implemented, all of users will be forced to use it. Furthermore, for any of new IT, the first problem users have to face is learning it. Thus, from user perspective, for a new IT with mandatory use, learning intention is more appropriate to define user acceptance. In addition, in practice, a learning process usually increases extra workload of users, thus, implementing a new IT may put pressure on users (Bond et al., 1998), especially during the initial stage. In such situations, reducing pressure on users to increase learning effectiveness should be a practical consideration for organizational management. Previous studies do not discuss about learning behaviour for mandatory users of new IT in great detail.

The purpose of this paper is to discuss the acceptance for workplace users for a new IT (ERP system) with mandatory use. Since, for a new IT with mandatory use, the first problem users have to face is learning it, the learning intention of users is investigated to measure their acceptance. The workload pressure of users, which may cause from learning the new IT, will also be discussed. Based on the Technology Acceptance Model (TAM) and the features of ERP system, 4 exogenous variables and two intermediate variables, perceived ease of use (PEOU) and perceived usefulness (PU), are then employed to analyse the determinants of learning intention. The 4 exogenous variables include one user-related factor, user computer knowledge, and 3 external environment factors: technology support, subjective norms and training. A causal model was then constructed for the analysis. Finally, as an empirical analysis, 112 workplace users from firms in Taiwan that had just implemented new ERP systems were surveyed to validate the research model.

## **2. Literature reviews**

The purpose of this paper is to discuss the learning intention among workplace users of a new ERP IT system. Accordingly, the literature is reviewed by the user behaviours of IT and the ERP system.

### *2.1 The user behaviours of IT*

Based on the theories of TRA (Theory of Reason Action) (Ajzen and Fishbein, 1980) and TPB (Theory of Planned Behaviour) (Ajzen, 2002), the Technology Acceptance Model (TAM) (Davis, 1989) is one of the most popular models for studies of IT and user behaviour. TAM employs user intention to define acceptance of use of a given IT system. Through 3 intermediate variables user attitude, PEOU and PU, a causal model was constructed to analyse the user intention when using the IT. The results of the TAM indicate that intentions of users were mainly affected by their attitudes, and the user PEOU and PU for the new IT were the most direct factors to affect the attitudes. Additionally, the PEOU also has a direct effect on the PU for the new IT. For TAM, PU was the major factor and PEOU was the minor factor among determinants of user acceptance of a new IT. TAM has been widely applied in subsequent research, including personal package (Lederer et al., 2000; Gefen and Straub,

2003), B2B information system (Lin, 2006), organizational contexts (Chau, 1996; Igbaria et al., 1997), and user profiles (Wixom and Todd, 2005).

Since TAM derives from TRA, which is concerned with rational, volitional, and systematic behaviour, TAM generally is applied to explain the behaviour that user has control. That is why TAM employs intention to define user acceptance for a certain IT. However, the IT (ERP) discussed in this paper is mandatory for users, and at the first stage users have to face with a new IT is learning it, thus this paper focus user acceptance on their learning intention toward a new IT.

Furthermore, the frameworks of IT have become more and more complex as technology advances. To more completely analyse user behaviour, Davis et al. (1992) suggested that it is necessary to investigate the exogenous variables that affect TAM further. There were three main categories of exogenous variables have emerged in subsequent work (Hong et al., 2002), classified as follows:

### *2.1.1 Individual difference*

Individual difference is an important factor affecting new technology acceptance by users (Nelson, 1990). Computer self-efficacy and computer knowledge have frequently been employed to explain individual differences. For example, the study of Venkatesh and Davis (1996) indicated that PEOU of users to use an IT was significantly affected by their computer self-efficacy. For different populations, the same results were also obtained (Igbaria and Maragahh, 1995; Agarwal and Prasad, 1999; Hong et al., 2002). The studies also show that professional computer knowledge of users in using an IT had a positive effect on their PEOU and PU to use the IT (Hong et al., 2002), and so did the general computer knowledge of users (Thong, 1999).

Computer self-efficacy is derived from the variable of perceived behavioural control in the TPB model. Ajzen (2002) indicated that both of those two variables, basically, are the same. TPB proposed that perceived behavioural control of users is one of the important factors to affect their intention. Based on TPB, the relevant studies (Hartwick and Barki, 1994) indicated that IT skill of users (computer knowledge) is one of the important factors to affect their perceived behavioural control. The above results imply that user computer knowledge is a determinant of their computer self-efficacy. The relevant studies also confirmed the result. For example, there were significant correlations between computer confidence (similar to computer self-efficacy) and computer knowledge (Levine and Donitsa-Schmidt, 1998), computer achievement and computer self-efficacy (Torkzadeh and Koufteros, 1994), and computer anxiety (negative computer self-efficacy).

### *2.1.2 System features*

System features are generally defined as the design of the user interface, such as the layout of computer screens and the function keys (Hong et al., 2002). The relevant literature indicates that system features have direct and indirect effects on user PU and PEOU to use an IT (Hong et al., 2002). Furthermore, for ERP implementation, ERP tool selection is one of the key critical successful factors (KCSFs). The relevant literature proposed that the features of ERP system such as compatibility, credibility, integration, reliability and modularity should be considered in the ERP selection (Bueno and Salmeron, 2008a), and so does technological complexity of system (Bueno and Salmeron, 2008b).

### *2.1.3 Organizational support*

Most of the previous research has measured the variable by subjective norms of organizations, which is derived from TPB and generally defined as the support of colleagues, supervisors, and top managers (Davis et al., 1992; Cale and Eriksen, 1994; Karahanna and

Straub, 1999; Teo et al., 2003; Amold et al., 2006). The TPB suggested that subjective norm is a prominent factor to affect user attitude and intention. This result has been supported in subsequent research. For example, Karahanna and Straub (1999) showed that user intentions to use an IT are determined by the subjective norms of the organization for potential users, and are attitudes toward use of the IT for current users. Hansen et al. (2004) illustrated that for on-line buying, subjective norms had a direct effect on user attitude, and through which it also had an indirect effect on user intention. Hartwick and Barki (1994) found that subjective norm had a significant effect on behavioral intention in mandatory settings but not in voluntary settings. Venkatesh et al. (2003) also suggest that social influence (similar to subjective norm) is not significant in voluntary contexts; however, it becomes significant when use is mandated. Moreover, research has also demonstrated that the support and the participation of top managers is one of the key critical success factors (KCSFs) for an ERP system to be implemented successfully (Bingi et al., 1999; Umble et al., 2003; El Amrani et al., 2006; Bueno and Salmeron, 2008b).

In addition to subject norms, technology support and training are other forms of organizational support. The research indicates that technology support from the organization can effectively improve user PEOU and PU to use a new IT system (Hartwick and Barki, 1994; Igbaria et al., 1995). Training was also an important factor in successfully implementing an ERP system (Bingi et al., 1999; Al-Mashari et al., 2003). Sufficient training reduces user anxiety (Mikkelsen et al., 2002), and improves user performance (Chou, 2001a), user intention (Bueno and Salmeron, 2008b) and computer self-efficacy (Torkzadeh and Van Dyke, 2002), especially for female users (Chou, 2001b).

## *2.2 ERP systems*

ERP systems grew out of the MRP (Material Requirement Planning) and MRP II (Manufacturing Resource Planning) systems of manufacturing industry. In addition to contain the functions of MRP and MRPII, an ERP system integrates all of the operating information of a business into a database and unique applications programs, and it provides uniform operating interfaces (Bingi et al., 1999). Comparing to conventional IS, ERP systems are much more integrated and flexible because of their integrated component-based software and their evolving architecture and expanding functionality, promising cross-functional integration of all information flowing through a company (El Amrani et al., 2006).

The above features of an ERP system imply that it is generally complicated IT and costly system (Al-Mashari et al., 2003; Luo and Strong, 2004; King and Burgess, 2006; Kuma et al., 2002; Somers and Nelson, 2003; Hsu and Chen, 2004; Bueno and Salmeron, 2008b). Hence, a training lesson and technology support may be necessary for users. Furthermore, ERP systems need to be constructed on complex network frameworks. Hence, in addition to professional knowledge of business administration, such as material management, production planning and accounting, users may also need computer knowledge, especially network knowledge. In addition, since most of the ERP system users are business employees, the systems generally are mandatory for users. In sum, an ERP system usually has several salient features: high cost, training, mandatory use, and knowledge of computers.

Most of the studies about ERP focus on the KCSFs of ERP implementation (e.g Al-Mashari et al., 2003; Umble et al., 2003, Somers et al., 2003; Holland and Light, 1999). An investigation reviewed 45 articles from hundreds of journals indicated that the most widely cited categories for KCSFs of ERP implementation are change management and top management support (Finney and Corbett, 2007). Further, the key task for change management is to build user acceptance of the ERP project and a positive employee attitude (Kumar et al., 2002; Holland and Light, 1999).

### 3. Research model

The purpose of this paper is to discuss the learning intention among workplace users of a new ERP IT system. Based on the TAM model, the research model is constructed as in Figure 1. Since an ERP system is usually costly for business, once it is implemented, modification of system features is often not feasible. For simplifying the research model, this paper only focuses the exogenous variables on individual difference and organizational support. By the features of the ERP system, those variables are respectively defined as one internal variable, user computer knowledge, and 3 external environment variables: technology support, subjective norms, and training. Furthermore, for the mandatory use feature of the ERP system, workload pressure on the user to learn the new IT system is also considered.

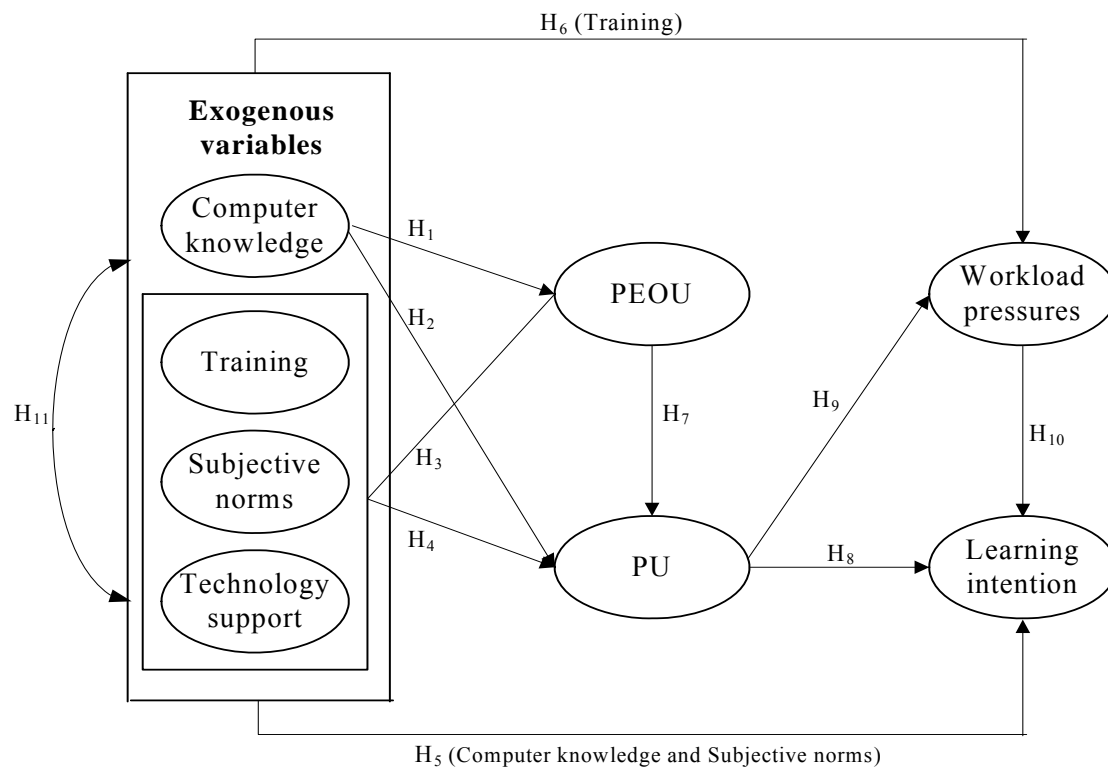


Figure 1. The research model.

#### 3.1 The exogenous variables

Computer self-efficacy and computer knowledge have frequently been employed to explain individual differences of users for accepting a new IT. Generally, users with higher computer knowledge have stronger computer self-efficacy. Thus, computer knowledge could be a determinant of self-efficacy. The previous studies also confirmed this result that computer knowledge of users is an important factor to affect their computer self-efficacy (Hartwick and Barki, 1994). Therefore, only computer knowledge defines the variable of individual difference in this paper. Computer knowledge has been shown to have significant direct and indirect effects on the PEOU and PU in previous research, with library users (Hong, 2002), and employees of small-scale business (Thong, 1999). Based on this, the following hypotheses were constructed:

*H1: Computer knowledge will have a positive effect on PEOU.*

*H2: Computer knowledge will have a positive effect on PU.*

Research on the ERP system illustrates that the participation of top managers and training were two of CSF (Critical Successful Factors) in implementing an ERP system successfully (Bingi et al., 1999; Al-Mashari et al., 2003; Umble et al., 2003; El Amrani et al., 2006). The participation of top managers is one of the subjective norms of organizations. In addition to subjective norms and training, technology support is also a form of organizational support. Research indicates that technology support has significant effects on user PEOU and PU to use a new IT (Hartwick and Barki, 1994; Igarria et al., 1995). From the above relevant studies, this paper constructs other exogenous variables: subjective norms, training and technology support, and named them as *external environment*. The related hypotheses are as follows:

*H3: External environment will have a positive effect on PEOU.*

*H4: External environment will have a positive effect on PU.*

Furthermore, studies also show that the computer knowledge (Geissler and Horridge, 1993) and computer skills (Kay, 1993) of users significantly affected their computer usage (Novitzki, 1991) which could be considered a measuring index of learning intention for a new IT. Subjective norms also had direct effects on user attitude and intention (Karahanna and Straub, 1999; Hansen et al., 2004), especially for an IT whose use is mandatory (Venkatesh and Davis, 2000; Venkatesh et al. 2003). Therefore, we have hypothesis:

*H5: Part of exogenous variables (computer knowledge and subjective norms) will have positive effects on learning intention.*

In addition, sufficient training was verified to be a significant factor to reduce user anxieties toward computers (Mikkelsen et al., 2002). In practice, those anxieties may cause from workload press. Hence, we have hypothesis:

*H6: Part of exogenous variables (Training) will have negative effects on workload pressure.*

### 3.2 The endogenous variables

In the TAM, Davis et al. (1989) proposed that the attitude and intention of users to use an IT were affected by their PU, and the PU was determined by their PEOU. The above propositions have been supported by subsequent researches (Adams et al., 1992; Venkatesh and Davis, 1996; Chau, 1996; Lederer et al., 2000; Gefen and Straub, 2003; Wixom and Todd, 2005). In addition, Lee et al. (2005) integrated extrinsic (perceived usefulness and ease of use) and intrinsic (perceived enjoyment) learning motivators into the TAM for explaining students' intention to use a new Internet-based learning medium. Hence, the following hypotheses *H7* and *H8* are made.

*H7: PEOU will have a positive effect on PU.*

*H8: PU will have a positive effect on learning intention.*

Generally, motivation is one of the main drivers of learning behaviors. For the researches about motivations on IT-related attitudes, task value is one of the important motivations for learning (Coffin and MacIntyre, 1999; Wigfield and Eccles, 2000). The task value, which is defined as one's perception of interest, importance and usefulness on the task, is similar to the variable PU in TAM. Coffin and MacIntyre (1999) indicated that task value motivation of users is a determinant of their anxiety (may cause from workload pressure) to learn an IT. Hence, we have the following hypotheses:

*H9: PU will have a negative effect on workload pressure.*

*H10: Workload pressure will have a negative effect on learning intention.*

Finally, this paper investigates the exogenous variables of the model from user's internal factor (computer knowledge) and external environment (subjective norms, training and technology support). Practically, there could be internal correlations among those exogenous variables. For example, a training lesson may also improve user computer knowledge (Geissler and Horridge, 1993; Ropp, 1999) and performance (Torkzadeh and Koufteros, 1994). The instructors for training lesson and the engineers for technology support may come from the same departments such as Information Centre, which indicates that there could be correlations between the user perceptions on training and on technology support. Therefore, we have one additional hypothesis:

*H11: There will be correlations among the exogenous variables.*

## 4. Methodology

### 4.1 Instruments

Based on the research model, except for the training variable which was measured by training hours, a self-reporting scale was designed to measure the other variables. The scale used a 5-point Likert scale (5 = strongly agree; 4 = agree; 3 = uncertain; 2 = disagree; 1 = strongly disagree) to define participant agreement with each statement. Higher scores represent greater agreement with each statement. The negative statements were reversed when scored. To validate the scale, 12 ERP users of workplace were invited to revise and pre-tested the questionnaire. After eliminating 4 statements for ambiguity, the final scale was shown in the second field of Table 1.

Table 1. The statements, reliabilities and validities of measurement model.

NO.	Statements and constructs with ( $\bar{x}$ , $s^2$ )	Cronbach' $\alpha$	Composite Reliability	Average Extracted Variance
<b>Computer Knowledge</b> (3.49, 0.77)				
C1	I know CPUs, CD/RW, RAM, Drivers and ADSL well. I know LAN, Databases, Server and network cards well.	.931	.964	.898
C2	I know application software of web pages well, such as "Frontpage". I am familiar with downloading and uploading data from websites.			
C3	I know backup software well, such as "Ghost". I know compressed software well, such as "WinZip".			
<b>Technology support</b> (3.38, 0.63)				
T1	If I have problem with the new ERP system, there is always someone to help me at work.	.804	.871	.697
T2	I feel the engineers of IT department can always resolve my problem with the new ERP system in a timely fashion.			
T3	I feel the engineers of IT department support me well on the new ERP system.			
<b>Subjective Norms</b> (3.55, 0.64)				
O1	I feel my boss cares very much about my feelings about using the new ERP system.	.791	.873	.706
O2	I feel most of my colleagues can discuss the new ERP system with me on their own initiative.			
O3	I feel most of my colleagues enjoy learning the new ERP system.			
<b>PEOU</b> (3.16, 0.64)				
E1	I feel the new ERP system is easy to use.	.844	.910	.772

E2	I feel the new ERP system is easier to operate than the previous system.			
E3	I feel it is not difficult for me to learn the new ERP system well.			
<b>PU</b> (3.15, 0.73)				
U1	I feel the new ERP system is more powerful than the previous system.	.885	.937	.833
U2	I feel the new ERP system saves me a lot of time.			
U3	I feel the new ERP system is very useful for my job.			
<b>Workload Pressure</b> (3.73, 0.70)				
W1	I feel the new ERP system will crowd out my regular work.	.700	.794	.576
W2	I feel I have no extra time to learn the new ERP system.			
W3	I feel learning the new ERP system will increase my workloads.			
<b>Learning intention</b> (3.58, 0.63)				
A1	I enjoy learning the new ERP system.			
A2	I will spend extra time to try the advanced functions of the new ERP system.	.798	.881	.713
A3	I am interested in discussing the new ERP system with my colleagues.			
<b>Training</b> (2.21, 0.86)				
	Training hours: 4 = over 16 hours, 3 = 9-16 hours, 2 = 1-8 hours and 1 = 0 hours.	--	--	--

#### 4.1.1 The computer knowledge

This part of scale was modified based on the studies by Levine et al. (1998). The statements are designed to evaluate general computer and network knowledge of users. After the above pretest, 6 items remained, which were reorganized into 3 statements (*C1* to *C3*) with two items each. Higher scores represent a higher level of computer knowledge.

#### 4.1.2 The external environment

This part of scale was modified after the studies of Igbaria et al. (1995) and Mikkelsen et al. (2002). The statements are designed to measure user perceptions about subjective norms and technology support. The former is defined as the learning climate among colleagues and the attitudes of top managers. The latter is explained as the assistance from IT sections of organization. Higher scores represent a higher perception of organizational support among users. After the above pre-testing, 6 items remained, 3 for subjective norms (*O1* to *O3*) and 3 for technology support (*T1* to *T3*).

As for the training variable, since training programs usually vary by companies, it is not easy to measure them objectively. Thus, this paper defined training as the training hours users had attended and measured in the demographic section. The measurement of the training variable was classified into four levels based on training hours (4 = over 16 hours; 3 = 9-16 hours; 2 = 1-8 hours and 1 = 0 hour).

#### 4.1.3 The intermediate variables

This part of scale was modified after the questionnaire of Davis et al. (1989), which was designed to measure the variables of PEOU and PU in Figure 1. Higher scores represent higher user perceptions of ease of use and greater usefulness for the new IT. After the above pre-testing, 6 items remained, 3 for PEOU (*E1* to *E3*) and 3 for PU (*U1* to *U3*).

#### 4.1.4 The workload pressure and learning intention

After the pre-testing, 6 items remained in the final part of scale. The first 3 items (*W1* to *W3*), based on the anxiety scale of Mikkelsen et al. (2002), were designed to assess user

perception of workload pressure, defined as user anxiety about the extra workload created by the need to learn the new IT system. The other 3 items (*A1* to *A3*) were based on the scale of Ai-Khaldi and Ai-Jabri (1998) and Igbaria et al. (1997), and are designed to evaluate user learning intention, defined as the interest and willingness to learn and use the new IT. Higher scores represent stronger workload pressure and more positive learning intention.

#### 4.2 *The population and sample*

The ERP system providers, companies like SAPAG, Oracle, PeopleSoft and JD Edwards and Bann, define the modules in different ways. Since most of the companies in Taiwan use the Oracle ERP system, the research population consists of the firms that have just adopted or will implement this system in Taiwan. Based on information from Oracle agents in Taiwan, this paper screened firms which had just implemented ERP System in the previous year during this study. By the firms feature, we first classify those firms as two types: technological and traditional firms. According to the ratio of the two types, four listed companies including three technological firms (Hanpin, Ralec and Tsannkuen) and one traditional firm (Yonyu Plastic) were selected, and all of the ERP users in those firms were then surveyed respectively.

The survey was personally distributed. The sample size was 122 with a total of 112 valid responses, 77.1% from technology businesses and 22.1% from traditional businesses, and 56.9% from male users and 41.3% from female. By education, they comprised 19.2% high school and vocational school level, 33.9% college level, 41.3% university level and 5.5% of graduate level. The average age and seniority of the participants were 33.35 (S.D. = 6.57) years and 6.28 years (S.D. = 5.13) respectively.

#### 4.3 *Data analysis*

According to the research model, there are 1 manifest (Training) and 7 latent constructs, which form 21 paths (15 regression paths and 6 correlation paths). The 7 latent constructs include 3 exogenous variables (computer knowledge, subjective norms, technology support) and 4 endogenous variables (PEOU, PU, workload pressure and learning intention). For analysing the causal relations among the constructs in the model, a LISREL (Linear Structure Relations) model with standardized scores is employed in this paper.

Since the  $\chi^2$  Test is sensitive to sample size, the ratio of  $\chi^2$  to degree of freedom ( $\chi^2/df$ ) is adopted to test the fit of the overall LISREL model instead, which was suggested to ideally be less than 3 (Hair et al., 1998). Additionally, several other popular indices were applied to evaluate the model in this paper, including the AGFI (Adjusted Goodness of Fit Index), CFI (Comparative Fit Index), RMSR (Root Mean Square Residual) and RMSEA (Root Mean Square Error of Approximation). The AGFI and CFI are suggested to be greater than 0.8 and 0.9 respectively (Bentler, 1990). The RMSR and RMSEA are recommended to be less than 0.08 and 0.10 respectively (Hair et al., 1998). All of the above suggested values for a good fit of model are restated in the second row of Table 3. The Cronbach's  $\alpha$ , composite reliability, and average extracted variance of construct are employed to evaluate the measurement models used in this paper.

### 5. Results

Since the samples are surveyed from 2 different forms of industries of firms: traditional firm and Electron firm, we first test the effect of firm nature on the 8 constructs of the model (Figure 1) before the LISREL analysis. The *t* test with Levene test was employed to test the firm nature effects with mean scores. The results, as shown in Table 2, reveal that none of the Levene tests is significant at  $\alpha = 0.05$ , indicating that the homogenous assumptions are held.

Further, the *t*-tests indicate that most of the effects (except subjective norms) are not significant. This outcome may result from the firms implementing the same ERP system (Oracle). Although the subjects are from different forms of industries of firms, they use the same ERP system. Thus, they may have consistent perceptions on it.

Table 2. The effects of firm nature on constructs of the model with *p*-value.

Constructs	Computer Knowledge	Technology support	Subjective norms	Training	PEOU	PU	Workload pressure	Learning intention
<b>(Leven Test)</b>	(.080)	(.136)	(.223)	(.887)	(.181)	(.012)	(.547)	(.056)
<b><i>t</i>-Test</b>	.632	.337	.000**	.072	.060	0.614	.508	.466
			(a < b)					

\**p* < .05, \*\**p* < 0.01.

a: Electron firm.

b: Traditional firm.

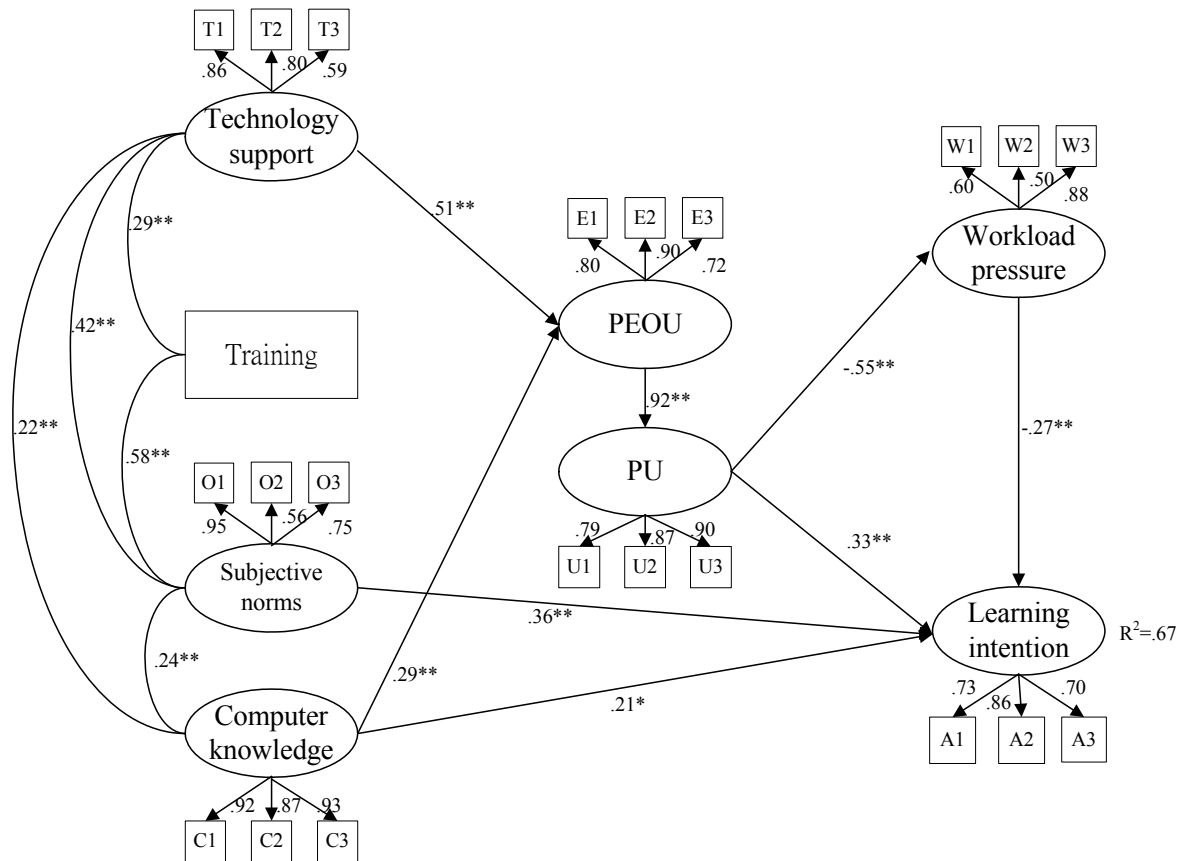
Based on the research model shown in Figure 1, the LISREL is employed to analyse the causal relations among the constructs in the model. In the following sections, the proposed model is firstly assessed, and the structure model is then discussed.

### 5.1 The assessment of model

The results of the LISREL analysis for Figure 1, named as the initial model, are shown in Table 3. A ( $\chi^2/df$ ) value of 1.70 is obtained, significantly less than the suggested value 3. The other indices generally fit the suggested values. Therefore, the proposed model, basically, is fit. Since several path coefficients among constructs are not significant at  $\alpha = 0.05$ , the LISREL was performed again with those paths eliminated. The resulting named modified model is also presented in Table 3. It indicates that the indices still fit the suggested values. Therefore, the modified model is still a good fit. The estimators of path coefficients are illustrated in Figure 2, and the model explain 67% of the variance of the learning intention ( $R^2 = 0.67$ ).

Table 3. The results of goodness of fit tests of research model.

Test Indices	$\chi^2$	df	$\chi^2/df$	AGFI	CFI	RMSR	RMSEA
Suggested value	--	--	<3	>0.800	>0.90	<0.08	<0.10
Initial model	313.4	184	1.70	0.726	0.910	0.050	0.058
Modified model	323.4	197	1.64	0.740	0.912	0.054	0.077



Note: \*  $p < .05$  and \*\*  $p < .01$ .

Figure 2. The result of LISREL analysis of the research model.

Since the assessments of overall model are adequate, the measurement model is then evaluated further. The result of Figure 2 indicates that all of the path coefficients of the indicators in the model are greater than 0.50, the cut off value suggested by Hair et al. (1998), and most exceed 0.70. From the path coefficients, all of the composite reliabilities and average extracted variances of constructs are found and shown in the third and fourth fields of Table 1, respectively. Both of the indices exceed 0.7, the cut off values recommended by Hair et al. (1998). The Cronbach  $\alpha$  of the constructs is also shown in the second field of Table 1. All of them exceed 0.7 and most of them are over 0.8. In sum, the reliability and validity of the measurement models are adequate, and the explanatory power of user learning intention is 67%.

### 5.2 The structure model

The results of Figure 2 indicate that PU has direct effects on workload pressure ( $\beta = -0.55$ ) and learning intention ( $\beta = 0.33$ ) respectively. Since workload pressure also has a direct effect on learning intention ( $\beta = -0.27$ ), there is an indirect effect of PU on learning intention ( $\beta = -0.55 * -0.27$ ). The total effect of PU on learning attitude is calculated thusly:  $\beta = 0.33 + (-0.55 * -0.27) = 0.48$ . Similarly, since PEOU has a direct effect on PU ( $\beta = 0.92$ ), the total effect for PEOU on workload pressure and learning intention would be  $\beta = 0.92 * -0.55 = -0.51$  and  $\beta = (0.92 * -0.55 * -0.27) + (0.92 * 0.33) = 0.44$  respectively. Totals for other effects among the constructs are found in Table 4.

Table 4. The total effects of research variables.

	PEOU	PU	Workload pressure	Learning intention
Computer Knowledge	.29	.26	-.15	.34
Technology Support	.51	.47	-.26	.22
Subjective norms				.36
Training				
PEOU		.92	-.51	.44
PU			-.55	.48
Workload pressure				-.27

Figure 2 and Table 4 also show that, among exogenous variables, computer knowledge has significant (total) effects on the workload pressure ( $\beta = -0.15$ ) and learning intention ( $\beta = 0.34$ ) respectively, as does the technology support ( $\beta = -0.26$  and  $\beta = 0.22$ ). Though subjective norms does not affect the PEOU, PU, and workload pressure, it has a direct and positive effect on learning attitude ( $\beta = 0.36$ ). Training has no significant effect on any of the endogenous variables, but it does have a significant positive correlations with technology support ( $r = 0.29$ ) and subjective norms ( $r = 0.58$ ) respectively, as does computer knowledge ( $r = 0.22$  and  $r = 0.24$ ). In addition, there is also a significant correlation between technology support and subjective norms ( $r = 0.42$ ).

Based on the above analysis, except the hypotheses *H2*, *H4* and *H6*, the others are confirmed (*H1* and *H7* to *H10*) or partly confirmed (*H3* and *H11*).

## 6. Discussion

### 6.1 The intermediate variables

The results indicate that improving the PEOU of users can increase their PU, and improving the PU of users can develop their positive acceptance (increasing learning intention) for a new IT. This result supports prior research about TAM (Davis, 1989) that shows that PU and PEOU have positive effects on user attitudes and intention to use a new IT. Generally, for a new IT system, users need to spend extra time to learn how to use it, and then perceive its usefulness. This is especially true of users with less computer knowledge. During the learning process, this may cause greater workload pressure as users worry about workloads increasing. Furthermore, users generally have user inertia for the previous IT system, which may decrease their perceived ease of use for a new IT system. In addition, compared to the current system, a new IT usually is more powerful, but also more complex. This may also cause users to perceive the usefulness of the IT negatively. Hence, during the initial stage of implementing a new IT system, improving the PEOU of users to indirectly (through PU) reduce their workload pressure should be an important consideration for managers.

## 6.2 *The exogenous variables*

The results indicate that, through PEOU and PU, computer knowledge of users and a portion of the external environmental factors have significant effects on learning intention of a new IT system. Generally, the most common ways for users to learn a new IT system is reading the manual, undergoing training, and obtaining support from technology departments and co-workers. The first of these is strongly related to the computer knowledge of users, and while the others may be affected by the external environment.

### 6.2.1 *Computer knowledge*

The results indicate that computer knowledge has significant effect on PEOU, but not PU. The former result supports several previous studies (Thong, 1999; Hong et al., 2002). Generally, computer knowledge is the factor that most directly affects user PEOU for a new IT system. Users with higher level of computer knowledge usually have more experience using computers and reading manuals, and as a result, they find the new IT less challenging. Furthermore, since PEOU is strongly related to the PU, computer knowledge will have indirect effect on PU. This result implies that computer knowledge indirectly affects PU through PEOU.

### 6.2.2 *External environment*

This paper defines the external environment as technology support, subjective norms, and training. The results indicate that the level of technology support of organization has positive effects on user PEOU for a new IT system. This result supports the prior research of Hartwick and Barki (1994) and Igarria et al. (1995). Though the subjective norms factor does not affect user PEOU, it has a positive and direct effect on user learning intention for the new IT system. This result also supports the previous researches (Karahanna and Straub, 1999; Hansen et al., 2004; Bueno and Salmeron, 2008b) which showed that user attitudes and intention toward use of a new IT system were directly or indirectly affected by the subjective norms of the implementing organization, and especially when the use of IT is mandatory (Venkatesh and Davis, 2000; Venkatesh et al., 2003).

Furthermore, the training factor has no effect on any of the endogenous variables, but is significantly and positively related to the other two external environment factors, technology support and subjective norms. The former result is different from the previous findings that training can significantly improve user anxiety (Mikkelsen et al., 2002), learning performance (Chou, 2001a; 2001b), and PEOU (Bueno and Salmeron, 2008b) in using a new IT system. This result may be due to differences in training methods. The post-investigation of this paper shows that most of the firms in Taiwan adopt seed teachers to train their users as a cost saving measure. In this system, only a small number of users from different departments are assigned to participate in the training programs provided by the ERP vendors, after which they back to their original department to train other users. Thus, in practice, except those seed teachers, most of the users do not have any formal training about the new ERP system. This may result in the effect of training factor being not significant on the user's learning intention toward the system.

In addition, another result shows that all of the three variables of external environment have no any direct effect on PU. However, since PEOU is strongly related to the PU, the technology support will have indirect effect on PU through PEOU. Further, since the other two variables (training and subjective norm) is significant related to the technology support, those two variables will have latent and indirect effects on PEOU and PU. These results imply that, as the computer knowledge, all of the three variables of external environment have indirect effect on PU through PEOU.

## **7. Conclusion**

The purpose of this paper is to discuss the acceptance of users for a new IT with mandatory use. In practice, for those IT with mandatory use, the first problem users have to face is learning it. Previous studies do not consider such learning behaviour in great detail. The proposed model could provide theoretical implications for further theory development. Furthermore, as an empirical study, this paper investigated 112 workplace users to validate the model. The results could provide practical information for organizations in implementing new IT.

The results show that technology support and subjective norms can effectively improve user learning attitude for a new IT. Generally, technology support offers advanced technology assistance, and colleagues (subjective norms) provide general, but timely help. Users with a higher level of computer knowledge tend to need the former support, whereas users with lower levels of computer knowledge are likely to need the latter help. This paper suggests that companies organize teams as “QC Circles” (Quality Control Circles). Users with higher level computer knowledge should be assigned to be the leaders of teams to offer their members general help, while the technology department concentrates their support on the leaders. These resource allocations can not only utilize the manpower of technology department, but also improve subjective norms among users for learning the new IT.

The results also show that, through PEOU, improving the computer knowledge of users can significantly increase their positive learning intention of a new IT system. Since IT advances rapidly, users need to be pushed to constantly learn new IT knowledge. This paper suggests that in addition to offering users a variety of learning methods, such as the information from IT exhibitions, IT magazines, and expert lectures, promotion of the concept of lifelong learning to improve user self-learning is also an effective way to enhance user IT knowledge. Encouraging employees to study part-time at schools is another way to increase their IT knowledge.

For users of ERP system, different department of users use different modules. Thus, the department of users may be a significant factor to affect their behaviour to use the ERP system. Furthermore, since an ERP system is usually costly for business, once it is implemented, modification of system features is often not feasible. Hence, the factors of system features were not considered in this paper. However, from user’s perspective, those factors may affect the users’ adoption of a new IT system. Thus, for the completeness of the model, those factors may be incorporated for further research. The sample size in this study only consists of 4 firms with 112 respondents. Although the validation and reliability of the research model were verified by statistical indexes, more firms and samples should still be needed to validate the results.

In fact, ERP is not a new IT anymore. The first ERP systems were implemented in 1990 (about 20 years ago). However for the users that never use it before, it could still be considered as a new IT for them. In Taiwan, over 95% of businesses are small-medium scale, many of which are similar to the manufacturers discussed in this paper. Some of these firms have implemented an ERP system, while others may implement one in the future. The results of this paper may provide useful information for the managers of those businesses. Furthermore, our findings may also offer useful information for managers implementing a new IT system, especially when use of the IT is mandatory. Due to sociocultural differences, the results of this paper may not be applicable to other cultures. However, the research models may offer useful references for further research.

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