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The usage intention of e-learning for police education and training

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Abstract

Purpose – The purpose of this paper is to adopt the revised and integrated technology acceptance model (TAM) and the successful model of the information system as a framework suitable for discussing factors the affecting the usage intention of e-learning for police education and training.

Design/methodology/approach – To attain the aforementioned objective, this study employed the questionnaire survey approach for the collection of information from Taiwan's border police officers. A total of 277 questionnaires were completed and validated.

Findings – The results showed that the subjective norms, perceived ease of use, and perceived usefulness positively influenced the usage intention of e-learning for police education and training. Second, subjective norms, job relevance, system quality, service quality, and ease of use were found to act positively on the police's perceived usefulness of e-learning. Lastly, system quality and service quality acted positively on the police's perceived usefulness of e-learning.

Originality/value – The present study integrated TAM2 and information systems successful model into the research framework for building e-learning efficacy indicators. The good validation results obtained suggest the theoretical importance of this integrated model. The model and research findings closed the research gap especially in the application of police e-learning.

Keywords E-learning, Usage intention, Police education and training

Paper type Research paper

Introduction

Among the numerous education and training methods, e-learning is worth trying because it has a low variable cost, is rich in flexible learning contents, free of temporal and spatial constraints, and is cost effective. As a result of the coming of the era of knowledge economy, it has become important to incorporate information technology into e-learning, so as to improve the training efficacy (Slechtova *et al.*, 2015). The police in Taiwan have indicated interest in employing e-learning for personnel training, in order to substantially reduce training cost and improve professional knowledge and competitiveness.

It is also important to consider the necessity of e-learning for the police. There are nearly 70,000 police officers in Taiwan and police service agencies spread across the country. The different types of police engage in tasks including traffic control, administration, crime detection, aviation, and port regulation, and in this case, e-learning provides the police with a more autonomous, convenient, and effective lifelong learning opportunity.

As a result of the importance of police education and training, the National Police Administration has requested each police officer to spend eight hours (about a day) on discipline training each quarter of the year. Consequently, it is important to review the current method of police education and training, in comparison with the e-learning models adopted by other companies. To make police training and education more flexible and to obtain a greater learning efficacy, one simple way is to connect the computer sets of the police administration authority at each police service implementation agency to the e-learning platform via the internet and to split the eight-hour training across three months.

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These are some reasons why the police administration authority should promote e-learning-based police education and training.

Taiwan's police should work on promoting e-learning; but in doing so, it is critical to take the staff's intention into consideration (Ajzen and Driver, 1991). Whether the employees accept e-learning or not is based on the following factors: ease of use of the interface, functional completeness, interaction, service quality, system quality, and information quality (Lu *et al.*, 2005). When implementing e-learning, it is necessary to ensure that the user interface is simple and easy, and the functions are highly interactive to attract the police to use e-learning without feeling lost or helpless.

Davis (1989) applied the technology acceptance model (TAM) to predict and explain users' information technology acceptance level and behavior. Davis (1989) suggested that TAM is useful for understanding the behavior intention of trainees. Later, many researchers (e.g. Halawi and McCarthy, 2007; Pituch and Lee, 2006) explored e-learning and proposed some modifications for improvement. For example, Venkatesh and Davis (2000) modified TAM into TAM2 by including more influential variables. These researchers explored the development of personal TAM for building a more comprehensive model. Apart from TAM, the information systems successful model (ISSM) is another key model for e-learning evaluation. For example, Chan and Lu (2004), Roca *et al.* (2006), and Ahn *et al.* (2007) all used ISSM in their studies.

As earlier mentioned, in order to use e-learning for education and training, it is critical to first determine the police's behavior intention for e-learning. This can be achieved by using integrated TAM2 and ISSM for building the e-learning effect assessment indicators. Presently, not many studies have explored this topic (Kim *et al.*, 2008; Lin *et al.*, 2011).

In view of the lack of studies on this topic, as well as the importance of TAM2 and ISSM integration, the present study built a theory-based logical context from the perspective of TAM2 and ISSM integration, and explored the effect of each dimension of the study model. The aim was to determine the factors influencing the e-learning behavior intention of the police. Apart from closing the research gap, the findings here can be used by the police in planning and implementing e-learning in the future.

Literature review and hypotheses development

Literature review

E-learning implication. E-learning is a process which involves the use of digital media for the transfer of various types of information and knowledge to the user (Khlaisanga and Likhitdamrongkiatb, 2015).

TAM. The TAM was proposed by Davis (1989) based on the theory of reasoned action (TRA) and the theory of planned behavior, and can be used to examine the impacts from external variables on behavior intention. Davis (1989) explored important factors affecting users' information technology acceptance and use at work. In the model, the perceived usefulness aspect refers to the user's subjective expectation for a specific information system to improve their work performance. As for the aspect of perceived ease of use, it is about the users' belief that the operation of a specific system is simple and easy. According to TAM, external variables would affect the users' behavior intention toward using new technology via perceived usefulness and perceived ease of use (Cheng, 2012).

Based on the TAM model, Venkatesh and Davis (2000) developed the TAM2 model. TAM2 contains two theoretical processes: the social influence process and the cognitive instrumental process. The social influence process comprises subjective norms, voluntariness, and image, while the cognitive instrumental process comprises job relevance, output quality, result demonstrability, and experience. The difference between TAM2, a modified TAM, and TAM is the elimination of impacts from the social factor of the TRA in TAM, which makes the operation much easier. Conversely, such a modification also

limits the information that can be acquired from the system, and substantially reduces the explanatory power of the model. To solve the problem, TAM2 keeps two factors of TAM, perceived ease of use and perceived usefulness, but eliminates the attitude variable in order to eliminate the complicated interactive effect between the two because of the inclusion of subjective norms. To make the theoretical model more comprehensive, two other aspects, social influence factors and cognitive instrumental process, were also added. Consequently, TAM2 is more comprehensive than TAM, both in terms of the theoretical aspect and the explanatory power.

ISSM. DeLone and McLean (1992) used the net benefits of information systems as the dependent variables and integrated the mathematical theory of communication of Shannon and Weaver (1949), as well as the theory of information influence of Mason (1978), to propose a measurable information system called the ISSM. The ISSM is composed of six constructs. There are two input constructs: system quality and information quality, and four output constructs: user satisfaction, IS use, individual impact, and organization impact. Later, Pitt *et al.* (1995) modified the model of DeLone and McLean (1992) by adding service quality to the model. They suggested that service quality positively affects the users' satisfaction and utilization of the information system. Therefore, the service quality concept was added to the evaluation model, while system quality, information quality, user satisfaction, information system use, impacts on individuals, and impacts on the organization of the original ISSM were retained.

In addition, in 2003, DeLone and McLean explored and summarized more than 100 related studies from various information system journals and periodicals (such as *Information System Research*, *Journal of Management Information Systems*, and the *MIS Quarterly*). They also integrated the service quality construct into the original model. Later in 2003, DeLone and McLean (2003) proposed the revised ISSM. Moreover, DeLone and McLean (2003) combined the individual and organizational impacts, and named it the net benefit. They also divided the information system into six parts, information quality, system quality, service quality, system usage condition, user satisfaction, and system benefits, to assess information system success. It can be found from this model that the variables affecting the usage intention of the information system are system quality, information quality, service quality, and the use satisfaction of these four variables.

E-learning promotion by Taiwan's Police Administration Authority: current status and challenges

Taiwan began to implement the e-learning policy in 2006 when the internet became more accessible. The National Police Administration of Taiwan also began promoting police e-learning, and beginning from 2012, certified staffs had to spend at least ten hours on e-learning each month. Nonetheless, the working hours and nature of police work are different from those of general civil servants because the e-learning schedule of the police can be easily interrupted by enforcement plans or unscheduled duties from time to time. Furthermore, the promotion of e-learning is not helpful in improving the overall work performance of police units; therefore, the heads of police units are not motivated to promote e-learning.

Hypotheses development

The present study explored the association between the revised TAM, ISSM, and the usage intention and then proposed 12 hypotheses.

Subjective norm. The term "subjective norm" refers to the condition in which an individual's usage intention becomes affected if the "important" people around the individual consider a behavior necessary (Fishbein and Ajzen, 1975). Davis *et al.* (1989)

carried out an empirical comparison between TRA and TAM, and found that subjective norms affect perceived usefulness and usage intention. Furthermore, Venkatesh and Davis (2000) proposed TAM2 and suggested that subjective norms also influence usage intention through perceived usefulness. Therefore, it is possible for police officers to be affected by the important people around them and to view things, such as innovation-related matters, as important because of the suggestions from others. The present study made the following hypotheses:

H1. Subjective norm exerts a positive effect on the perceived usefulness of e-learning for police education and training.

H2. Subjective norm exerts a positive effect on the usage intention of e-learning for police education and training.

Job relevance. Job relevance is about the supportive function of a system for an individual at work (Venkatesh and Davis, 2000). According to TAM2, job relevance differs from the social influence process because of its direct perceived judgment effect. Hasan (2003) and Barbeite and Weiss (2004) pointed out that if a system provides the users with beneficial technical support or valuable training, the users' personal capability and perception will be substantially improved. Moreover, the perceived usefulness of such individuals about the system will improve. The present study made the following hypothesis:

H3. Job relevance exerts a positive effect on the perceived usefulness of e-learning for police education and training.

System quality, perceived usefulness, and perceived ease of use. System quality covers system inquiry functions, document transmission speed, response time, as well as software and hardware access speed (DeLone and McLean, 1992). In other words, system quality should include system inquiry, document transmission rate, feedback time as well as software and hardware access rate. If the users' perception of network quality is relatively good and safe, it will be believed that the system has greater usefulness. Therefore, the perceived usefulness on technology will increase (DeLone and McLean, 1992). Regarding the relationship between system quality and perceived usefulness, Lin *et al.* (2011) stated that if the public considers the rapid inquiry function of a digital system as excellent, the public will view the system and its services as useful. Besides, Sagar (2006) stated that the ease of use is related to several items of system quality, including support, reliability, safety, and option of accessible environment, ease of log in, and flexibility. Therefore, system quality has a direct influence on the perceived ease of use.

In terms of the association between system quality and perceived ease of use, Hsu and Lin (2008) found that system quality affects the users' perceived ease of use of online shopping. Focusing on the behavior of internet users, Venkatesh and Agarwal (2006) stated that the inquiry function, document transmitting speed, system response time, as well as software and hardware access speed significantly affect the users' perceived ease of use. Altogether, system quality has a significant impact on perceived usefulness and ease of use. Therefore, the present study proposed the following hypotheses:

H4. System quality exerts a positive effect on the perceived usefulness of e-learning for police education and training.

H5. System quality exerts a positive effect on the perceived ease of e-learning for police education and training.

Information quality, perceived usefulness, and perceived ease of use. This study focused on information quality because of the value and usefulness of information system output (outcome) to users. Information quality refers to the ability of a system to provide correct

information and a great deal of information for learning. It covers areas including the correctness, comprehensiveness, security, easiness and uncomprehensibility, reliability, accuracy, and timeliness of a system's information output (DeLone and McLean, 1992, 2003). Cheng (2012) suggested that if an e-learning system provides pluralistic and effective courses, users would view the system as being capable of providing accurate information and knowledge, and thereby perceive the system as useful. As a result, the present study made the following hypothesis:

H6. Information quality exerts a positive effect on the perceived usefulness of e-learning for police education and training.

Regarding the relationship between information quality and perceived ease of use, Davis (1989) stated that "perceived ease of use" is the users' perceived ease of use of the system. Therefore, users with better skills on information technology will have better perceived ease of use of the system. This will reduce the difficulty of using the system and lower the mental and physical efforts on learning. Moreover, Cheng (2012) pointed out that if an information system provides learners with convenient learning materials and well-designed courses, the e-learning system will be regarded as simple and easy. Therefore, information quality may exert a positive effect on the users' perceived usefulness and ease of use. Therefore, the present study made the following hypothesis:

H7. Information quality exerts a positive effect on the perceived ease of use of e-learning for police education and training.

Service quality, perceived usefulness, and perceived ease of use. Service quality refers to the difference between the anticipated and the actual perceived quality of services provided by a system. It covers tangibility, reliability, responsiveness, assurance, and empathy (Cheng, 2012). Bhattacherjee (2001) believed that perceived usefulness is exhibited by users prior to using the system. When users have higher perceived service quality, the acceptance of perceived usefulness will also be increased. The study of Saeed *et al.* (2003) showed that service quality has an influence on perceived usefulness and perceived ease of use. Pai and Huang (2011) stated that a successful website should provide timely, professional, and individually tailored services. Pai and Huang (2011) also pointed out that service quality could exert a big impact on perceived usefulness. Cheng (2012) suggested that service quality plays a critical role in determining the users' acceptance of e-learning. The researcher further indicated that service quality influences the users' perceived usefulness and ease of use (Cheng, 2012). In other words, service quality acts on both perceived usefulness and ease of use. The present study made the following hypotheses:

H8. Service quality exerts a positive effect on the perceived usefulness of e-learning for police education and training.

H9. Service quality exerts a positive effect on the perceived ease of use of e-learning for police education and training.

Perceived ease of use and perceived usefulness. Davis (1989) stated that perceived ease of use affects the perceived usefulness of technology and indirectly affects the acceptance of new technology.

It can be found from TAM that perceived ease of use affects perceived usefulness (Davis *et al.*, 1989; Venkatesh and Davis, 2000). Furthermore, Wu and Chen (2005) found that if users believe that the system is easy to learn, they would regard the system as a useful service. If all other conditions are kept constant, then the easier the information system, the higher the effectiveness. In other words, an easy e-learning system is more likely to improve the users' intention. Therefore, the perceived usefulness of the police will increase, if the e-learning of

the education and training system can be easily used. The present study made the following hypothesis:

H10. Perceived ease of use exerts a positive effect on the perceived usefulness of e-learning for police education and training.

Perceived usefulness and usage intention. Regarding the association between perceived usefulness and usage intention, Adamson and Shine (2003) found that if users have higher perceived usefulness and perceived ease of use, the corresponding usage intention would increase.

Venkatesh and Agarwal (2006) discussed the behavior of internet users and found that if a website frequently updates useful information, its usage intention would continually increase. As a result, the police may view e-learning for education and training as good for improving work performance and learning, and therefore has a higher e-learning usage intention. The present study made the following hypothesis:

H11. Perceived usefulness exerts a positive effect on the usage intention of e-learning for police education and training.

Perceived ease of use and usage intention. Regarding the effect of perceived ease of use on usage intention, Doll and Torkzadeh (1988) found that the ease of use of the information system would improve the usage intention of users. Chang *et al.* (2005) conducted a study on public e-services and showed that a simplified and easy to use e-public service system can attract users to the system repeatedly. For the present study, if the police perceives e-learning for education and training as being easy, the learning effect and user intention will improve. The present study made the following hypothesis:

H12. Perceived ease of use exerts a positive effect on the usage intention of e-learning for police education and training.

Method

Research framework

The framework of this study is shown in Figure 1.

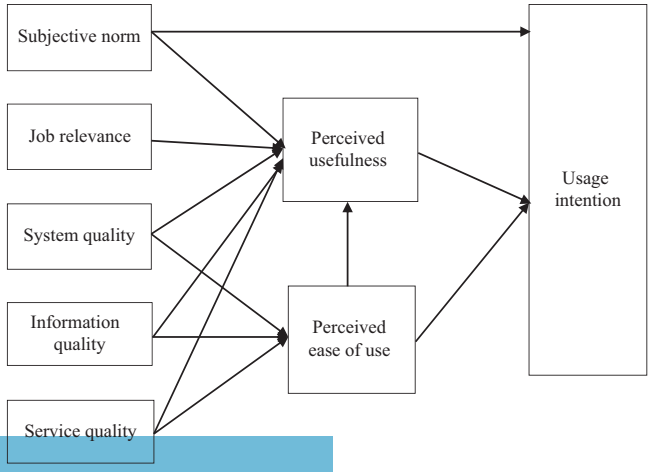

Figure 1.
Research models

Sampling

In order to increase the heterogeneity of the samples, frontline police officers were chosen as study subjects, excluding the directors and deputy directors of the harbor police departments of Kaohsiung Port, the largest commercial port of Taiwan. To facilitate a more concrete understanding of the study variables, the study population was limited to police officers who had worked there for more than six months before the questionnaire survey. As a result of the limited manpower and financial resources, the convenient quota sampling approach was adopted. To increase the questionnaire retrieval rate, questionnaires were completed and submitted on site. During the monthly education and training, the questionnaire survey was explained to the subjects before its implementation on site. A total of 301 questionnaires were distributed, and to protect the privacy of the participants, only the researcher had access to the information. A total of 291 completed questionnaires were retrieved, and 279 were valid (92.69 percent). Since the study variables are subjective evaluation indicators and each questionnaire was filled out by the same person, the common method variance (CMV), which may enhance the relationship between the variables, was of concern here (Podsakoff and Organ, 1986). To solve this problem, the researcher adopted two strategies to eliminate CMF. First, the present study used a two-stage information collecting approach (Kao, 2017). In the first stage, the researcher first distributed questions related to the independent variables. Two weeks later (stage 2), the dependent variables were presented to the same respondents.

Measures of research variables

The variables studied in this work can be separated into research and control variables. The different variables are explained as follows.

Subjective norm. It refers to the level of influence of important people around an individual during e-learning. This study developed two questionnaire items based on Taylor and Todd (1995) and Venkatesh and Davis (2000) and kept the essence of the original definitions.

Job relevance. Job relevance refers to the degree of association between an e-learning system and the work of the user. According to Venkatesh and Davis (2000), the present study developed two questionnaire items and retained the essence of the original definitions.

System quality. System quality refers to the rating of the functions of an e-learning system and the users' rating of the system, in terms of the information provided by the system and the efficacy of information transmission. In reference to Ahn *et al.* (2007) and Roca *et al.* (2006), the present study developed three questionnaire items.

Information quality. Information quality refers to the output of correct and sufficient information by a system for learning purpose. The present study developed two questionnaire items according to Ahn *et al.* (2007) and Roca *et al.* (2006), without altering the essence of their definitions.

Service quality. Service quality refers to the gap between what is anticipated and eventually experienced by the user about services provided by the e-learning system. The present study developed two questionnaire items according to Roca *et al.* (2006) without altering their original definitions.

Perceived usefulness. Perceived usefulness refers to the learning effect of using the e-learning system on the users. According to Davis (1989) and Venkatesh and Davis (2000), the present study developed five questionnaire items without altering the essence of the original definitions.

Perceived ease of use. Perceived ease of use refers to the learning effect of the e-learning system on the users. According to Davis (1989) and Venkatesh and Davis (2000), the present study developed five questionnaire items without altering the essence of the original definitions.

Usage intention. Usage intention refers to the level of the users' intention to use the e-learning system. The present study developed two questionnaire items based on Venkatesh and Davis (2000) without altering their original definitions.

After following Brislin's (1986) recommendations with regard to ensuring the accuracy and conceptual equivalence of both the Chinese and English versions, all questions in this study were translated and back-translated by bilingual native speakers of both languages. The participants rated items on a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) (Chen and Kao, 2012).

Control variables. Prior research showed that the time an individual joined the group would influence his interpersonal interaction, leading to an effect on employee behavior (Kao, 2015). Thus, this paper also listed employees' years of work as a control variable. Besides this, the age and education levels of members may also affect data analysis (Hsieh *et al.*, 2012), and the weekly hours spent online may also affect the usage intention of the respondents, so these are also control variables. The control variables used in this paper have been widely used by many researchers (Kao, 2017).

Data collection and informed consent

The participants were asked to fill the questionnaires on site. To enhance the response rate, the questionnaires were immediately collected after completion. In order to obtain informed consent from the participants, the objectives and procedure of this research were well explained. Questions were taken from the volunteer participants and answered accordingly. The participants were assured of the confidentiality and anonymity of their response (Kao, 2017).

Results

Basic analysis

This paper collected a total of 319 questionnaires, of which 279 were valid. The sample structure of this study is presented as follows: Most of the respondents were male (87.46 percent). Their average age was 45.56 years, and they had in average, 13.89 years of education. Most of the respondents work for the frontline service divisions. The respondents' average year of service was 21.84 years. According to the aforementioned information, the research subjects of this study were mostly males of about 45 years of age. In average, they had worked in the police department for about 22 years, and the majority of them were university or college graduates. In Taiwan, the harbor police is a type of border police, and their work (e.g. preventing smuggling and illegal immigration) is highly specific and homogenous. Police turnover here is low; therefore, the service years of harbor police are longer than those of other police. Lastly, the majority of police officers in Taiwan have at least a college or university degree.

Statistical analysis revealed a significant relationship between the number of hours spent on internet surfing and the perceived usefulness. The relationships between the research variables and other control variables were not significant, and all these variables obtained an acceptable reliability coefficient (0.7 and above), showing a positive relationship between these variables. Furthermore, this paper conducted CFA, using LISREL as the maximum likelihood to compare these eight different underlying constructs. As shown by the CFA results in Table I, it can be seen that the eight concepts in this paper are different underlying constructs.

Hypothesis testing

To test the association between the independent and dependent variables, hierarchical regression analysis (HRA) was performed in the present study. Furthermore, to present the

Research variable	χ^2/df Observed value	χ^2/df Ideal value	GFI Observed value	GFI Ideal value	NNFI Observed value	NNFI Ideal value	PGFI Observed value	PGFI Ideal value	RMSEA Observed value	RMSEA Ideal value
Subjective norm	4.21	1.00~5.00	0.94	> 0.8	0.95	> 0.9	0.68	⩾0.5	0.061	⩽0.08
Job relevance	4.39		0.92		0.93		0.61		0.071	
System quality	4.35		0.93		0.94		0.65		0.065	
Information quality	3.06		0.96		0.96		0.73		0.056	
Service quality	3.99		0.95		0.96		0.70		0.059	
Perceived usefulness	4.77		0.90		0.91		0.57		0.074	
Perceived ease of use	2.88		0.97		0.98		0.78		0.049	
Usage intention	2.75		0.98		0.98		0.81		0.043	
References	Schumacker and Lomax (1996)		Jöreskog and Sörbom (1989)		Bagozzi and Yi (1988)				Baumgartner and Homburg (1996)	

Table I.
Goodness of fit indicators for research variables

hypotheses testing and the result tables neatly, the study developed three testing processes and three result tables (Tables II-IV) according to the dependent variables. The results are presented as follows.

The relationships between subjective norm, perceived usefulness, perceived ease of use, and usage intention. This study tested assumption models and the influence of control variables on research variables with HRA. As shown by the results in Table II, it can be seen that Model 2's subjective norm reached a significant level ($\beta = 0.621$, $p < 0.001$), demonstrating that subjective norm has a strong explanatory power on usage intention; hence, *H2* is supported. In Model 3, the effect of perceived usefulness on usage intention is significant ($\beta = 0.634$, $p < 0.001$), suggesting that perceived usefulness has a very strong explanatory power on usage intention. Therefore, *H11* is supported. Moreover, it can be learnt that Model 4's perceived ease of use has reached a significant level ($\beta = 0.642$, $p < 0.001$), demonstrating that the perceived ease of use has a strong explanatory power on usage intention; hence, *H12* is supported. In addition, in the segment on control variables, it can be seen from Table II that age, education level, years of service, and the number of hours spent on internet surfing have no significant influence on usage intention.

	Model number 1	2	3	4
Control variables				
Age	−0.026	0.019	−0.008	0.014
Education level	0.075	0.032	−0.005	0.007
Years of work	0.013	−0.074	−0.039	−0.047
The number of hours spent on internet surfing	0.049	0.017	−0.049	−0.012
Model-independent variables				
Subjective norm		0.621***		
Perceived usefulness			0.634***	
Perceived ease of use				0.642***
F	0.609	107.816***	104.221***	138.743
Adj. R^2	−0.006	0.541	0.569	0.608

Notes: $n = 279$. Dependent variable: usage intention. ***表$p < 0.001$

Table II.
Hierarchical regression analysis

	Model number						
	1	2	3	4	5	6	7
Control variables							
Age	−0.022	0.023	0.025	−0.002	0.023	0.011	0.019
Education level	0.097	0.051	0.017	0.049	0.004	0.034	0.024
Years of work	0.065	−0.012	−0.012	0.013	0.011	−0.007	0.005
The number of hours spent on internet surfing	0.124	0.091	0.108	0.101	0.029	0.080	0.061
Model-independent variables							
Subjective norm		0.593***					
Job relevance			0.601***				
System quality				0.507***			
Information quality					0.571***		
Service quality						0.511***	
Perceived ease of use							0.599***
F	1.731	101.201***	99.214***	58.627***	87.848	59.322***	141.055***
Adj. R^2	0.011	0.619	0.631	0.504	0.501***	0.527	0.708

Notes: $n = 279$. Dependent variable: perceived usefulness. ***表$p < 0.001$

Table III. Hierarchical regression analysis

	Model number			
	1	2	3	4
Control variables				
Age	−0.041	−0.021	0.000	−0.009
Education level	0.08479	0.039	−0.010	0.0086
Years of work	0.072	0.012	0.019	−0.012
The number of hours spent on internet surfing	0.068	0.041	0.046	0.023
Model-independent variables				
System quality		0.573***		
Information quality			0.591***	
Service quality				0.584***
F	0.921	88.178	85.244	88.064
Adj. R^2	−0.001	0.571	0.520	0.572

Notes: $n = 279$. Dependent variable: perceived ease of use. ***表$p < 0.001$

Table IV. Hierarchical regression analysis

The relationships between subjective norm, job relevance, system quality, information quality, perceived ease of use, and perceived usefulness. As shown by the results in Table III, it can be seen that Model 2's subjective norm reached a significant level ($\beta = 0.593$, $p < 0.001$), demonstrating that subjective norm has a strong explanatory power on perceived usefulness; hence, *H1* is supported. In Model 3, the effect of job relevance on perceived usefulness is significant ($\beta = 0.601$, $p < 0.001$), suggesting that job relevance has a very strong explanatory power on perceived usefulness; therefore, *H3* is supported. Moreover, we can learn that Model 4's system quality has reached a significant level ($\beta = 0.507$, $p < 0.001$), demonstrating that system quality has a strong explanatory power on perceived usefulness; hence, *H4* is supported. In Model 5, the effect of information quality on perceived usefulness is significant ($\beta = 0.571$, $p < 0.001$), suggesting that information quality has a very strong explanatory power on perceived usefulness; therefore, *H6* is supported. In Model 6, the effect of service quality on perceived usefulness is significant ($\beta = 0.511$, $p < 0.001$), suggesting that service quality has a very strong explanatory power on perceived usefulness; therefore,

H8 is supported. Moreover, it can be seen that Model 7's perceived ease of use has reached a significant level ($\beta = 0.599$, $p < 0.001$), demonstrating that the perceived ease of use has a strong explanatory power on perceived usefulness; hence, *H10* is supported. In addition, in the segment on control variables, it can be seen from Table IV that age, education level, years of service, and the number of hours spent on internet surfing have no significant influence on perceived usefulness.

The relationships between system quality, information quality, service quality, and perceived ease of use. Table IV shows that Model 2's system quality has reached a significant level ($\beta = 0.573$, $p < 0.001$), demonstrating that system quality has a strong explanatory power on the perceived ease of use; hence, *H5* is supported. In Model 3, the effect of information quality on perceived ease of use is significant ($\beta = 0.591$, $p < 0.001$), suggesting that information quality has a very strong explanatory power on perceived ease of use; therefore, *H7* is supported. Moreover, it can be seen that Model 4's system quality has reached a significant level ($\beta = 0.584$, $p < 0.001$), demonstrating that service quality has a strong explanatory power on perceived ease of use; hence, *H9* is supported. Besides, in the segment on control variables, it can be seen from Table IV that age, education level, years of service, and the number of hours spent on internet surfing have no significant influence on perceived ease of use.

Conclusion and discussion

Conclusion

The present study revealed that subjective norms have a positive effect on the usage intention of e-learning for police education and training. The respondents thought that the e-learning system will be accepted by their friends, supervisors, and colleagues. It is positive and meets the expectation of the society. This study also found that job relevance has a positive effect on e-learning for police education and training, suggesting that the respondents believed that e-learning is helpful for work and can enhance work efficiency, as well as performance. From the data analyses, it was found that perceived ease of use and perceived usefulness had a positive effect on the user intention of e-learning for police education and training. When other conditions were kept constant, the easier the information system, the better the police usage intention. It can be said that for the police officers, the easier the e-learning system for education and training, the higher the perceived usefulness. The present study showed the positive effect of system quality on the perceived ease of use and perceived usefulness of the e-learning system for police education and training. According to the respondents, the system quality of the e-learning system for police education and training should cover the system inquiry function, document transmission speed, response time, and hardware/software access speed. The respondents believed that if the e-learning system has a good system quality, then e-learning will be useful.

In addition, the study showed that information quality acted positively on the perceived usefulness and ease of use of the e-learning system for police education and training. The e-learning system provides the police with convenient learning materials and well-designed courses, making the users (the police) perceive the e-learning system for education and training as simple and easy. Therefore, the information quality of e-learning has a positive effect on the users' perceived usefulness and ease of use. Finally, the data analysis revealed that service quality can act positively on the perceived usefulness and ease of use of the e-learning system for police education and training. The service quality of a successful website should be timely, professional, personalized, and these indicators are critical for determining whether the e-learning system can be accepted by the users or not. Therefore, service quality can positively affect the e-learning users' perceived usefulness and perceived ease of use.

Theoretical and practical implications

The result of this study includes the following theoretical and practical implications.

Theoretically, the findings of the present study support the notion that easy operation, good system quality, as well as professional and personalized service quality, are factors determining whether the police authority can increase officers' e-learning or not. The present study also demonstrated that to implement the e-learning system for police education and training, the first task is to explore the intention and objectives of the police. Furthermore, the present study proposed an integrated research framework that combines TAM2 and ISSM for developing effective e-learning indicators. Good validation results were obtained in this study, suggesting the theoretical significance of the integrated model. Meanwhile, the present study also contributed to closing the research gap, especially in police e-learning, with its research findings and model.

Based on its findings, the present study also provides the following practical implications and suggestions.

First of all, the results of this study revealed that e-learning usage may be affected by the presence of important people around the users, such as their friends, acquaintances, colleagues, and supervisors. An e-learning system that is easy for the users and capable of obtaining the required information will be beneficial for the police at work and helpful for increasing the police's usage intention. Therefore, the present study suggests that for police administration agencies interested in implementing the e-learning system or those that have already implemented the e-learning system, they should assess the design of the user interface to create a more convenient man-machine communication. In addition, the usage and acceptance of e-learning by the police can be further enhanced if the e-learning system enables the police to acquire information effectively and easily.

Second, the present study revealed that the easier the e-learning system, the better the learning effects. Furthermore, innovative suggestions offered by important people around the police can affect the police's use of the e-learning system as well. It was also found that the e-learning system for police education and training provides officers with good supportive functions at work. As a result, the present study suggests that when incorporating the e-learning system, the police administration authority of Taiwan should provide better technical support or training plans. When promoting e-learning, the police administration authority can also present successful e-learning cases from domestic or foreign government agencies. The agencies should also think of ways to aid the police in understanding the benefits of e-learning for work, such as adding more learning channels, improving work performance, and simplifying the work procedure.

In terms of e-learning inquiry, it was found in this study that if e-learning provides good inquiry, document transmission, and response functions, the police would view e-learning as helpful for their work. The respondents also expect the e-learning system to offer timely and well-updated course content which has a clear interface and good course design. It is also critical for the e-learning service to be professional and personalized to make the use of the system easier, another way for enhancing the usage intention. Therefore, the present study suggests that the police administration authority should develop a stable and easy-to-remember operation interface and use procedure. Thereafter, the police can easily, conveniently, and timely find out their learning condition and obtain the required assistance. It is also recommended that the police should establish a consulting hotline for technical support and ensure that the consultants respond in a friendly way. Lastly, the system should be more user-friendly and provide instant trouble-shooting services.

Eliminating technological hindrance is essential for creating a comprehensive e-learning environment as well as a convenient and simple e-learning platform, good for improving the police's e-learning usage intention. Another good idea is to design innovative e-learning courses and teaching. One example is to incorporate digital technology into the conventional

classroom lectures for blended learning. It is time to promote task-oriented, and real situation-like self-learning.

Lastly, with modern technology advancement, both the individual and the organization have to deal with the impacts from information equipment and knowledge management. Therefore, improving the information equipment and knowledge management environment of the police administration system is critical. For example, the police administration authority can launch e-learning to improve the core capability of its staff, present e-learning cases for discussion, and experience exchange among police agencies, as well as integrate the e-learning resources.

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