

The Human Resource Development Strategies on Information Technology Semi-Professionals Adoption of the Local Government

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Abstract

The technology acceptance model (TAM) has been applied in different contexts to investigate a wide range of information technologies (ITs), and a cumulative tradition has already been developed in this stream of research. Nevertheless, it was still needed to be empirically investigated for government organizations in order to make sure that different sample profiles would not have a negative effect on the findings. The objective of this research was to develop and test an integrated model of human resource management strategies in local government. The members of matrix structured team were semi-professionals on IT and were organized from different departments for introducing IT using. We discussed the work ability and working willingness as the independent variables and test the moderating effects of personal characteristics on the attitude of IT adoption. Forty-eight team members filled questionnaire. The empirical results based on moderated multiple regression (MMR) modeling approach to provide preliminary evidence supportive of the hypotheses advanced. Specifically, the IT experience and the work ability have interactive effect with adoption attitude. The results indicate that the IT experience plays a strategic role for adoption of IT. Finally, the implications for introducing IT to the local government are presented.

Keywords: Information technology; Technology acceptance model; Human resource management; Matrix organization; Moderator

Introduction

The IT world that surrounds public administration has changed markedly. Technology diffusion within the society has been pervasive, with personal computers and the Internet extending to over one-half of all American households. Internet-based e-business and e-government services are rapidly connecting businesses, households and governments thereby creating a much richer and more subtle IT environment.

Of adults using the Internet, 67 percent have visited a government web site, with 57 percent visiting a federal government site, 54 percent a state government site and 42 percent a local government site [1]. Nearly all federal agencies and most state governments provide some information or services on the web. About four-fifths of city and county governments have web sites, although most lack formal strategic plans or goals for e-government. About two percent offer financial services (tax, bill, parking ticket and license/permit paying) whereas about five times more governments offer non-financial services (requests for services, government records, maps).

Yet, hope springs eternal: Forrester Research estimates that by 2006 governments will receive 15 percent of their total financial collections over the web. The IT infrastructure within public administration has also changed dramatically. There has been larger investment in technology at all government levels. This technology has greater capabilities and is more diffused throughout government agencies. Technical expertise is stronger and also more widely spread. Governments have created structures and processes to deal with the technology, successfully institutionalizing within public administration ideas such as Management Information Systems and Information Resource Management, end user computing and web management functions.

There are many ways to organize an Information Technology department. One way that has worked effectively in organizations is to use a function-based organization in Taiwan. Due to financial consideration, a matrix-based organization is another way to effect

organization. The Matrix Model benefits Information Technology organizations in the following ways: (1) Better leadership than a functional group because there is a one position of responsibility and authority within a project. (2) Better communication between functional areas since the work is coordinated centrally at the project level. (3) Policies and training are improved since there is now a functional manager with the direct focus on the needs of the staff.

A matrix team was organized that is not easy. The Field Theory (cited from Lewin's website¹) is the proposition that human behavior is of both the person and the environment, expressed in symbolic terms: $B = f(P, E)$. This means that one's behavior is related both to one's personal characteristics and to the social situation in which one finds oneself. He believed that our behavior is purposeful; we live in a psychological reality or life space that includes not only those parts of our physical and social environment that are important to us but also imagined states that do not currently exist.

In this paper, we propose a new macrotheory design model, explore computer using ability and participative willingness and their impact adopted attitude and other formal arrangements. Our purpose is to bring organization redesign thinking, through better moderating factors and demographic factors. Another purpose is to investigate the computer using gap between need and ability.

¹<http://www.psychologynotesq.com/psychological-field-theory/>

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Literature Review

Theory development base

Innovation diffusion theory provides a useful perspective on one of the most persistently challenging topics in the IT field, namely, how to improve technology assessment, adoption and implementation. For this reason, diffusion is growing in popularity as a reference theory for empirical studies of information technology adoption and diffusion [2-5].

In the literature of technological innovation diffusion [6] argued that the Roger's classical diffusion theory has limited application in complex, advanced technologies, where the complexity of the technology is beyond a single person's cognitive power and decisions for adoption are often made at the organizational level and involve many steps [7]. Later examined the empirical studies in the IT diffusion and concurred with Eveland and Tornatzky's point that the classical diffusion model focuses its analysis on the individual and has limited applicability to more advanced and sophisticated technologies. For some technological innovations, the diffusion process might be moderated by the fact that sometimes, the adoption of the technology requires extensive specialized knowledge prior to adoption.

Technology Accepted Model (TAM) is a popular model for analyzing technology adoption by users. The model was derived from the theory of reasoned action (TRA), a well-accepted intention model that has been proven successful in predicting and explaining behavior across a wide variety of domains [8]. In the TRA model, Ajzen and Fishbein demonstrated that attitudes toward an object influence intentions and ultimately influence behavior with respect to the objects, that is, its use. Through reshaping the concepts in TRA [9] found that beliefs about the Perceived Usefulness (PU) of adopting an advocated behavior are particularly consequential in determining user adoption intentions. A second factor that also has effect is the Perceived Ease of Use (PEOU).

It is natural, then, to question what factors affect the perceived usefulness. Szajna [10] indicated PU and PEOU are affected by some external variables, such as the task, user characteristics, political influences, organizational factors and the development process. Training, and documentation will positively significant the PEOU of technology [11-16].

On the other hand, the decision to adopt is not based on the individual level but at the organizational level, where managerial influence or other external factors are most important. As several factors have been identified to have effect on PU in previous research, these factors in general fall into two categories: personal and environmental factors.

Personal Influences on the Attitude of Adoption

Individual factors are those associated with a particular user, such as skills and computer experience. Since individual factors are more affiliated with end users than with managers, we focus on personal and environmental factors in the study.

Training is a factor that often used to reduce the effect of knowledge erosion in organizations [17]. For example, Scannell [18] argues that successful implementation of client/server technology requires IS organizations that are responsive to end-user needs. Findings on the effect of training on PU are not consistent. While many studies reported positive relationships, some reported insignificant or reverse effects [15,19,20]. The use of information technology depends on the

technology itself and the level of skill or expertise of the individual using it. Therefore, higher user training may lead to higher user perception of system value.

External Environment influences on the attitude of adoption

Organizational factors are attributes of an organization that can be managed. Environmental factors are those associated with the environment of a particular organization. Quintas [21] speaks of those "powerful external forces" which create pressure in organizations, in turn leading to the need for effective KM. Potential environmental factors include managers' support, employee resistance, information technology support and hardware/software.

This is a common cliché for all change and new technology adoption. For example, Davis [9] stated that support was an important variable that likely to affect perceived usefulness. Other studies indicate also that management support is positively related to usefulness [10-16]. Higher support may lead to high perceived usefulness.

Technology adds value of systems when it can help reduce the cost, time and effort needed for people to share information. IT enables practices by facilitating the storage of knowledge, making stored knowledge accessible, and swiftly circulating relevant knowledge to the appropriate individuals [22]. In general, better information technology in an organization leads to higher perceived usefulness.

Hypotheses

Based on research purpose and literature, this research builds a research model as Figure 1 and, we develop the following four hypotheses.

Hypothesis 1: System use is positively associated with attitude of information technology adoption.

Hypothesis 2: Demographics and system use significantly interactive with attitude of information technology adoption.

Hypothesis 3: Willingness to join IT team is positively associated with attitude of information technology adoption.

Hypothesis 4: Environment factors and willingness to join IT team significantly interactive with attitude of information technology adoption (Figure 1).

Methodology

To empirically test this research framework, a survey instrument was constructed to measure team members of IT adoption in a government department-Bureau of Social affairs. Existing instruments

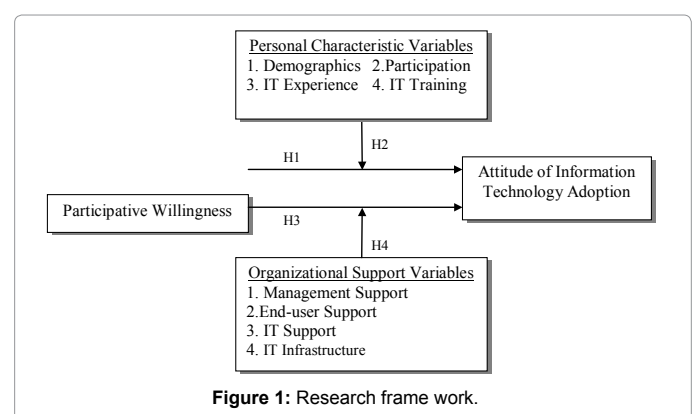


Figure 1: Research frame work.

in the literature were used to help identify items. Since prior instruments were built for different frameworks and sometimes contained conflicting items, new measures were needed to accurately capture the richness of measurement.

Operational definition of Variables

The operational definitions of the major variables in this research framework are summarized in following sections. For each variable the construct is also defined and relevant literature is indicated.

Personal Characteristic Variables: include gender (male/female), age (2005-birth year), education (above bachelor/bachelor/under bachelor), major (social work/not social work).

Duty (team leader/deputy), experience in IT team (by month), experience in IT work, education in IT area (by hour), on-the-job training (by hour).

Computer-using Ability: the average level of computer-using ability. The unit using a five point Likert scale ranging from 1 = very not understand extent to 5 = very understand extent.

Participative Willingness: The unit using a seven point Likert scale ranging from 1 = very like extent to 7 = no choice.

Organizational Support Variables: this construct include management support, End-user Support, IT Support and IT Infrastructure. It includes 24 items question. The unit using a five level scale ranging from 1 = no problem extent to 5 = very serious.

Attitude of Information Technology Adoption: it adopts Lee (1996) measurements. The unit using a five point Likert scale ranging

from 1 = very disagree extent to 5 = very agree extent.

Data Reliability and Validity

Results from an exploratory factor analysis using principal component analysis with varimax rotation are shown in Table 1. The convergent of the factors is demonstrated that all factors loading exceed 0.5 on their own construct, and the discriminant validity is demonstrated that there are no cross construct loadings that exceed 0.5. So, the data holds acceptable validity.

We use Cronbach Alpha to examine the reliability of each of the composite constructs. All of them are higher than the acceptable level (0.6) which implies that the data obtained from the subjects are reliable. The reliability of the multi-item scale for each construct was measured using Cronbach's alpha values and composite reliability measures. Both measures of reliability (0.81~0.92) were above the recommended minimum standard of 0.60 (Table 1).

Findings

Frequencies of information technology adoption measurement are listed in Table 2. Table 3 provides correlations among the research variables for computer-using ability and information technology adoption (Tables 2 and 3).

In order to understand further that the computer using ability and information science and technology to accept the relation of attitudes and receive the potential impact of the demographics factor. In this research, gender, age and other 9 personal characteristic variables were treated as control variable (Table 4).

Component	Eigenvalues	% of Variance	Cumulative %
Factor 1. Management Support	8.940	37.25	37.25
Factor 2. IT Support	3.694	15.39	52.64
Factor 3. IT Infrastructure (hardware)	1.886	7.86	60.50
Factor 4. EU Support (trust)	1.711	7.13	67.63
Factor 5. EU Support (computing)	1.323	5.51	73.14
Factor 6. IT Infrastructure (software)	1.013	4.22	77.36

Note: IT (Information Technology); EU Support (End-user Support).

Table 1: Factor analysis of the organizational support variables (n=48).

Items	1. Strongly Disagree	2. Disagree	3. No comment	4. Agree	5. Strongly Agree	Average
Total						3.59
1. Can improve efficiency		6(12.5)	9 (18.8)	26 (54.2)	7(14.6)	3.71
2. Can improve quality		4 (8.3)	8 (16.7)	32 (66.7)	4 (8.3)	3.75
3. Believe in its exactness	1 (2.1)	2 (4.2)	17 (35.4)	26 (54.2)	2 (4.2)	3.54
4. Reduce working burden	4 (8.3)	11(22.9)	11 (22.9)	20 (41.7)	2 (4.2)	3.10
5. Can improve importance	2 (4.2)	7(14.6)	14 (29.2)	21 (43.8)	4 (8.3)	3.38
6. Feel easy to use PC		4 (8.3)	11 (22.9)	31 (64.6)	2 (4.2)	3.65
7. Feel confident to use PC		3 (6.3)	8 (16.7)	33 (68.8)	4 (8.3)	3.79
8. Like using PC to work		7 (14.6)	4 (8.3)	32 (66.7)	5(10.4)	3.73
9. It's necessary to use PC	2 (4.2)	1 (2.1)	4 (8.3)	32 (66.7)	9(18.8)	3.94
10.It's interesting to use PC		6 (12.5)	13 (27.1)	24 (50.0)	5(10.4)	3.58
11.Feel pressured to use PC	4 (8.3)	20 (41.7)	18 (37.5)	5 (10.4)	1 (2.1)	3.44
12.Increase troubles	2 (4.2)	29 (60.4)	13 (27.1)	4 (8.3)		3.60
13.Increase complexity	1 (2.1)	24 (50.0)	15 (31.3)	7 (14.6)	1 (2.1)	3.35
14.Defects exceed profits	3 (6.3)	26 (54.2)	19 (39.6)			3.67

Note: When calculated the average, the reverse items (No.11-14) had been recoded to the same direction. The average of 87.5% people (n=43) are greater than 3, and 12.5% (n=5) are smaller than 3.

Table 2: Frequencies of information technology adoption measurement (n=48).

Personal Characteristic Variables	Computer-using Ability	IT Adoption
1. Gender	-0.370**	-0.051
2. Age	-0.159	-0.048
3. Education	0.014	-0.022
4. Major in the school (The last one.)	0.278	0.069
5. Key Member of the MIS Team	-0.368*	-0.068
6. Seniority (Seniority of participating the MIS Team.)	0.413**	0.008
7. IT Experience (Before participating the MIS Team.)	0.171	-0.094
8. Computer Skill Training (Including school courses)	0.206	0.067
9. Computer Skill Training (Excluding school courses)	0.053	0.091
10. Computer-using Ability	---	0.366*

Note: significance level: ***0.001, **≤0.01, *≤0.05

Table 3: Correlations for computer-using ability and it adoption (n=48).

Test Factors	Correlation Coefficient
Pearson Correlation for computer-using ability and IT adoption.	0.366*
Partial Correlations for computer-using ability and IT adoption after controlling (partial out) the personal characteristic variables.	
1. Gender	0.374**
2. Age	0.363*
3. Education	0.366*
4. Major in the school (The last one.)	0.362*
5. Is Key Member of the MIS Team?	0.367*
6. Seniority (Seniority of participating the MIS Team.)	0.398**
7. IT Experience (Before participating the MIS Team.)	0.389**
8. Computer Skill Training (Including school courses)	0.361*
9. Computer Skill Training (Excluding school courses)	0.360*

Note: significance level: ***p ≤ 0.001, **p ≤ 0.01, *p ≤ 0.05

Table 4: Partial correlations for computer-using ability and it adoption (n=48).

Approaches for Analyzing Moderating Effect

This research tries to increase understanding of contingency theory and suggested the data analysis techniques for analyzing moderating model. We suggest that the relationship between the dependent variable and independent variable has significant relationship, but the slope/effect is different depending on the level of the contingency factor (i.e. moderator). The relationship is drawn as Figure 2.

Analysis assessment of moderating effect

The purpose of this analysis assessment is to distinguish between the properties of predictor and moderator variables and to clarify the conceptual variables may account for differences in research model. Although most researchers agree that the concept of moderator variables is important, substantial confusion persists as to what specifically a moderator validation model. In general terms, moderator-type can be classified into two basic types. A moderator can be a qualitative (e.g., sex, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or antecedent variable and a dependent or criterion variable [23].

This approach is to alleviate the confusion surrounding moderator variables as well as relevant methodological and theoretical issues. This research was designed to respond [24,25]. Research for assessing moderating effect. Therefore, the moderator was concerned as a quantitative variable in this research. Carte and Russell [24] addressed nine common errors which reviewed from other MIS literature. Sharma

[25] suggest a tree-step approach for distinguish moderating effect. Nevertheless, the increasing researchers still are interested in exploring moderated effect and still have same errors in MIS researches.

We hope to raise awareness about common errors and clarify the analytic approaches for testing moderating effect. Table 5 shows the moderated multiple regression results. The moderating effects (personal characteristics between) between computer-using ability and attitude. The results show gender, seniority, and IT experience levels are moderators. Table 6 shows the frequency of computer skill training needs of MIS team members. The data shows training needs are high. Especially documentation processing and operating system manipulate have higher needs (Tables 5 and 6).

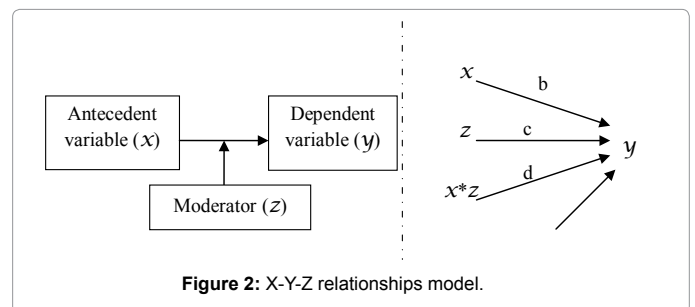


Figure 2: X-Z relationships model.

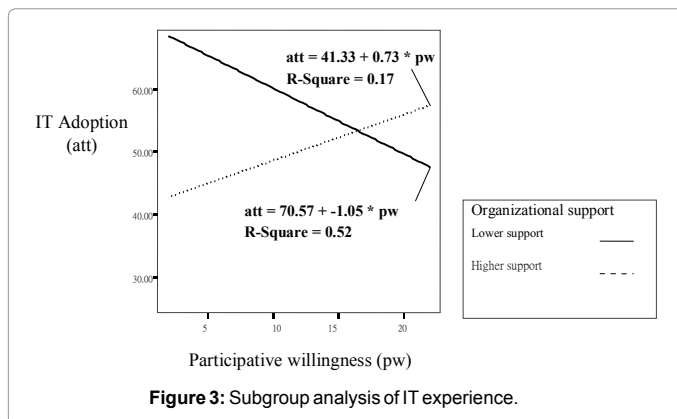
Equation (Predictor/Test Factors)	R ²	ΔR ²	F
Equation 1 (X)	0.134	---	7.10*
Suppose that Gender is a moderator.			
Equation 2 (X,M1)	0.159	0.025	4.25*
Equation 3 (X,M1,X*M1)	0.184	0.050	3.31*
Suppose that Seniority is a moderator.			
Equation 2 (X,M6)	0.158	0.024	4.23*
Equation 3 (X,M6,X*M6)	0.164	0.030	2.89*
Suppose that IT Experience is a moderator			
Equation 2 (X,M7)	0.142	0.008	3.73*
Equation 3 (X,M7,X*M7)	0.185	0.051	3.33*

Note: significance level: *** p ≤ 0.001, ** p ≤ 0.01, * p ≤ 0.05; where: X: Computer-using Ability, M1: Gender, M6: Seniority, M7: IT Experience, X*M: product term of X and M.

Table 5: Moderated multiple regression results.

Items/Needs	No	Little	Rather	Strongly	Average
Computer Operating System	1 (2.1)	3 (6.3)	22 (45.8)	22 (45.8)	2.35
Network Management	9 (18.8)	8 (16.7)	23 (47.9)	8 (16.7)	1.63
Document Processing	3 (6.3)	5 (10.4)	11 (22.9)	29 (60.4)	2.38
Database Management		20 (41.7)	16 (33.3)	12 (25.0)	1.83
Statistics and Spreadsheet Processing	3 (6.3)	14 (29.2)	23 (47.9)	8 (16.7)	1.75
Presentation and Teaching Designing	10 (20.8)	21 (43.8)	13 (27.1)	4 (8.3)	1.23
Computer System Tools Operating	11 (22.9)	17 (35.4)	16 (33.3)	4 (8.3)	1.27
Anti-Viruses Software Operating	1 (2.1)	7 (14.6)	17 (35.4)	23 (47.9)	2.29
Website and Webpage Designing	1 (2.1)	10 (20.8)	18 (37.5)	19 (39.6)	2.15
The Application IT System Planning	20 (41.7)	11 (22.9)	13 (27.1)	4 (8.3)	1.02

Table 6: Frequency of computer skill training needs of MIS team members (N=48).



Interaction assessment of moderating effect

To test the hypotheses, the moderator was entered, followed by the main effects of the attitude of information technology adoption, and then the interaction terms corresponding to Hypotheses, the result was shown in Figure 3. Participative willingness and attitude of acceptance were moderated by organizational support.

Conclusion

This study proposes and tests a model for the semiprofessional IT staffs serve in government institution that need to join IT adoption and system development projects. Due to most of the staffs' education background is not technology area, many conflicts come from whom willing to or assigned to be the IT adoption projects member. A major contribution of this study is the integration of these main moderators into a more cohesive model. Further, besides providing a more rigorous test of the two main effects, the most significant contribution from this study is a better understanding of the importance of personal characteristic factor and support as moderating factors.

The primary study main effects were to empirically test several relationships proposed in the literature: (1) between computer-using ability and IT adoption attitude; (2) between participative willingness of IT project and IT adoption attitude. The results clearly corroborate these main effects and present some interesting insights for pushing semiprofessional to join IT projects while also providing motivation for further research on this important topic. From Technology Acceptance Model, some enablers affect IT adoption attitude [10,16]. Such as computer-using ability and join IT project willing will be the enablers. The moderating effects of this research were to test 2 relationships: (1) moderating effect of personal characteristics on computer-using ability and attitude; and (2) the moderating effect of organizational support on participative willingness and attitude. A drawback of the TAM model is that it does not take into account the organizational context in which a system is implemented. Particularly, individuals with low adoption characteristics appear to wait until management gives a directive to adopt a certain technology [26]. Organizational support is an integral part of the organizational environment in which information systems are utilized. Dennis's thought proper appropriation support (e.g., prior experience, restrictive software, appropriation training), performance is less likely to be improved. The literature has shown that organizational support is the key factor affecting the success or failure of IT adoption [27-30]. Previous studies have observed that top management support can benefit individuals [20,31-35]. Davis [9] stated that organizational support was an important variable likely to affect perceived usefulness.

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