

# **An Empirical Study of Digital Opportunity Center Community Integration Internet Technology in Life**

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## **Abstract**

For a successful information technology environment, only hardware and software facilities are not sufficient and can not guarantee that its community will not suffer from the consequences resulted from digital divide. This research tried to discover the factors that influence living information from the community's viewpoint and tested whether "information literacy" and "information technology skill self-assessment" cause moderator effects in the research model. In addition, it carried out a large-scale investigation community of Digital Opportunity Center of ministry of education, then establishing a research model of "information technology integration in a community." Finally, this research proposed several suggestions in respect to the theory model and the betterment of a community's digital divide.

Keywords: digital divide, information literacy, moderating effect

## **1. Introduction**

As the rapid expansion of Internet infrastructures, the international network has deeply influenced on the dimensions of people work, school education, family life, additionally, it has already become one of the major powerful communication media, except for the other fours which respectively are TV, Radio, newspapers, and magazines. The global as the link of the internet network to become a global village, and further forming a net-society without borders for communication. Burns, et al. (2003) defined that "the objective of science communication "as the five English characters of A.E.I.O.U to present respectively. In the "net-society" and the development of vision, the so-called science communication, is the use of appropriate skills, through appropriate media to promote the appropriate activities and effective dialogue, the public will through the information medium to obtain the required information (knowledge) and services, come to pass message spread with AEIOU in one or more of responses.

The Internet-based Computer-Mediated Communication (CMC), generally being used in

people life, for people to most easily access to information technology, and this information technology to provide a variety of rich communication ways, including e-mail , message board, BBS (Bulletin Board System), chat rooms, instant messaging services, VoIP (ie. Internet phone) and so on. CMC through the computer and internet, due to the integration of information technology without the geographical limits, also overcome the time difference of communication barriers. In remote areas of the utilization of information technology has gradually received much attention, because those information technologies enable to improve the quality of life and shorten the drop of digital divide in rural area. The information literacy has integrated the concept of computing, internet information and the electric media data acquisition, evaluation and use of information capabilities, this view is consistent with Burns et al (2003) referred to the number of stages of scientific communication, in addition, enhancement of information literacy and information retrieval is to promote the smooth flow of information society towards a knowledge-based society of the essential factors, the study conducts the community people's "media richness", "media characteristic", and their personal "information literacy" and "computer anxiety" as the theoretical foundation to implement this research.

## **2. Literature review and theoretical framework**

The media of information technology rapid shortening the communicative speed between the science communicators and receivers, and improve the knowledge communicative diffusing and collecting. The process of communication, behaviors have to use their own understanding of information structure or content to express knowledge; during the process of information transfer to knowledge will be influenced by individual / group capabilities, the so called capabilities which involve individual factors(such as, the core capabilities of information literacy, innovation, technology or communication skills, incentives and social intelligence ), social capital, environment ( such as, geography, cultural norms, common beliefs, existing social network structure, time, economic environment).

Some of studies (Agarwal & Prasad, 1999; Carlson & Zmud, 1999) have indicated that group social factors have significant positively impact on the behavior intention of conducting technology, accordingly, the conducting information technology behavior of group members will be influenced by social pressure, for instance, the others who already adopting the technology, and have further reaction to try to adopt the new information technology, this situation highlights the importance of "social interaction" for the behaviors of adopting a new information technology. Carlson & Zmud (1999) have integrated the media richness theory, the symbolic media, communication patterns, etc., and proposed channel expansion theory in order to clarify the relationship between organization and group communication and the channel of communication.

The media richness theory was first proposed by Daft & Lengel (1986); in the literature of Lee (1994) and Ngwenyama & Lee (1997) is named as “ Information Richness Theory”, which claimed that in different medium of communication with different media rich (media richness/information richness), and the media refers to the richness of communication media can pass through a number of information (Poole, Shannon & DeSanctis, 1992; Purdy & Nye, 2000) Higher level of media delivered information can display in more rich way to information receivers, through the higher level media to progress the social interaction makes information receiver could rapidly and correctly to accept the concept of the other party, and promote communication performance ( Dennis & Kinney, 1998; Purdy & Nye,2000 ) .

Different level of media richness of its information mainly depends on the four factors: (1) Multiple cues, (2)Immediacy of feedback, (3) Language diversity, (4) Personalization (Daft, Lengel & Trevino, 1987; Dennis & Kinney, 1998). According to the previous studies (Agarwal and Prasad, 1999; Hartwick and Barki, 1994), they found it is a significant relationship between groups of social factors and the behavior of technology adoption intention, which indicates the information technology adopting behavior of the member among the group could be effected by others who have already adopted the technology, then others would following to adopt the same new technology as well, this phenomenon highlights the importance of “social interaction”.

Behavior in the use of instant messaging software (such as:MSN, Skypee, yahoo Messenger, GTalk,AIM), the behavior will often be affected by company superior, colleagues, or friends (i.e. social interaction), then quickly adopting the relevant CMC, partners and organizations to communicate back and other social networking continues to expand, will gradually increase the richness of the media perception. Computer anxiety is refer to an individual expected or actual process of interacting with the computer generated a negative belief (Heinssen, Glass, Knight, 1987). Barbeite and Weiss (2004) developed a measurement scale of particularly on the internet environment and self-efficacy to evaluate how internet anxiety impact on the use of network medium. Moreover, Thatcher, et al. (2007) measured internet anxiety through the personal, beliefs, and social support perspective .Furthermore, Bozionelos (2004) tested and verified socioeconomic status and computer anxiety impact on computer users’ behavior, and Saadé and Kira(2007) also found the computer anxiety has a significant influence between individual perceived usefulness and the personal internet using experiences.

Bertot (2003) has summarized in the form of digital divide factors into three categories and further divided it into science and technology (refer to information technology acquire or not), economic (refer to the ability of affording the information infrastructure), information literacy. Accordingly, McClure (1994) mentioned information literacy is not single concept, but an indispensable problem-solving skill; the so-called information literacy should be a combination of four types of literacy, which include traditional literacy, media literacy,

computer literacy, and network literacy. Hu (2005) defined that information literacy is the ability of finding and judging information, the ability of organizing and creating knowledge, and further divided into three levels of concepts, technology and content, primarily be composed by cultural literacy, network literacy, and media literacy .

### **3. Methods and descriptive statistics**

In the past, to solve the moderating effect of research variables mostly adopting multiple regression analysis in order to understand the relationship of interacted effects between variables, however, there is a weakness exists that it only can handle one single dependent variable (Aiken & West, 1991; Baron & Kenny, 1986; Jaccard & Wan, 1995). With the process of moderating effect test, according to Chin et al. (2003) and Goodhue et al. (2007) , this study was adopted SmartPLS Statistics testing software as tool to solve the situation of the research model was not easy to form a positive definite matrix of the case.

This study adopted a quantitative survey to collect data, and used interview to assist the questionnaire design. After connecting the staffs of the digital opportunity centers, assistants to help and explain the content of questionnaire to the respondents, the duration of data collection took around 6 months, a total of 1500 questionnaires will be sent at the same time, and also would be supported by staff on-site interviews. A total of 1225 questionnaires were recovered, finally, a total of 874 questionnaires were valid, with a valid response rate of 71.35%.

### **4. Results and Discussion**

#### **4.1 Measurement model evaluation**

In this study, PLS method was conducted into the modeling and data analysis, using SmartPLS2.0 software of Ringle et al. (2005) developed to process measurement model and structural model analyze with bootstrapping method repeated sampling analysis to obtain the standard error of parameter estimates and t-values. By using PLS analysis, the composite reliability (CR) and average variance extracted volume (AVE) can be respectively assess the reliability and validity of the structural model. Accordingly, this study is based Bagozzi and Yi (1988) recommendations, the selection of the three most commonly used indicator of future evaluation indicators reflect the measurement mode, the indicators are as follows: First, reliability of individual items (ie. factor loading): this indicator is to assess the measuring variables factor loading of the latent variables, testing statistical significance of every variable loading. In this study, all factor loadings were higher than the recommended value of 0.5 and showed significant, the sample factor loadings between 0.6372 ~ 1.0382 coefficient,

consistent with Hair et al. (2006) recommended values. Second, the composition of latent variables of reliability (CR), this value indicates that the internal consistency reliability of the potential construct variables, the value of CR as higher as better. Fornell and Larcker (1981) recommended the value should be 0.6 or above, this study with the CR range of 0.8507 ~ 0.9705, represents a good internal consistency of models. Third, average variance extracted (AVE) which indicates the calculating the explanatory power of the latent variables to the measured variables, if AVE higher, then the potential variables have better discriminant validity and convergent validity, according to Fornell and Larcker (1981) the standard value has suggested must be greater than 0.5, in this study, AVE shows in the range of 0.5904 ~ 0.8048.

#### 4.2 Structural model estimation

By using the PLS to estimate the path relationship between every research construct, among total seven assumed path relationships, there were five assumptions reached the significance level  $\alpha = 0.05$ , the structural model path analysis coefficients for infusing technology information into community residents behavior respectively were : the media property  $\rightarrow$  Media richness(0.368); media richness  $\rightarrow$  Media dependency level (0.693); medium dependency level  $\rightarrow$  adoption behavior (0.299); social interaction  $\rightarrow$  Media richness (0.568); Computer anxiety $\rightarrow$  adoption behavior (0.183).

The empirical result of interacting effect path relationship between the moderators shows information technology and information literacy self-assessment will adjust the level of media dependence to adoption behavior; as for the variance within variables explanatory power. Figure 2 also shows that the model explains a substantial portion of the variance in all the endogenous variables: "media richness" for 71.6 percent, "media dependence" for 48.1 percent and adoption behavior for 61 percent(see Figure 1). Individual potential dependent variables showed good explanatory power of variation, which indicates a construction of model robustness and stability.

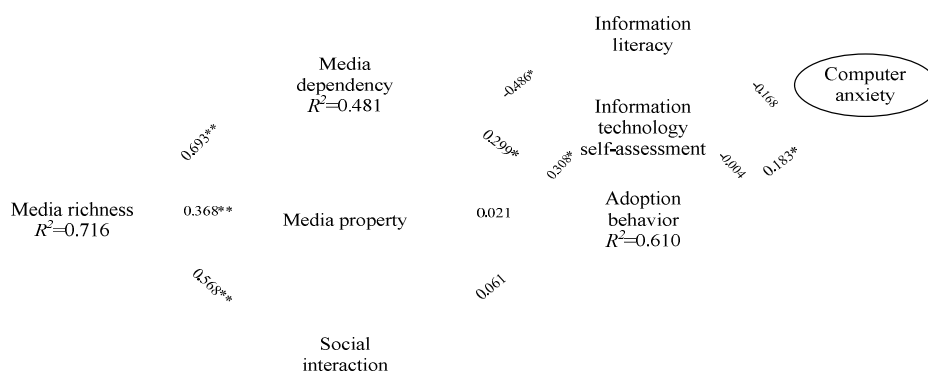


Figure 1 Path coefficients for the research model

### 4.3 moderator effect estimation

In this study, the research model was set up as three levels for transforming the interacting effect of relevant dependent variables in the structural model, the first level without moderators and interacting effects, the second-level without interacting effects, the third level contains both of moderating effect and interacting effects, the interactive question measuring items were adopted Chin et al. (2003) who suggested that using moderating variables multiplication dependent variables to determine the effect of moderating variables.

In this study,  $R^2$  and Cohen's effect size of the coefficient of statistical power as indicators of the original research model  $R^2$  is 0.6014, and then sequentially eliminate dependency level of the media, media characteristics, social interaction and computer anxiety were related to model  $R^2$  To 0.5942,0.5971,0.5955 and 0.5900, and then use the Cohen (1988) effect size criteria (small: 0.02, medium: 0.15 large: 0.35), the factor effect size is between 0.011 ~ 0.029, indicating that the model by moderators effect were very low, can explain all of the research variables are predictors of a few can be ignored.

Table 1. The Cohen's effect size coefficient of research constructs

$R^2$ included=0.6014	Media dependency	Media property	Society interaction	Computer anxiety
$R^2$ excluded	0.5942	0.5971	0.5955	0.5900
Cohen F <sup>2</sup>	0.0181	0.011	0.015	0.029
effect	small	small	small	Small-medium

Table 2 shows that whether the level of information literacy, information literacy of its main effect is significant, and self-assessment of information literacy only has significantly affect in the low level of information literacy model. By contrast, from the perspective of the interacting effect, while the information literacy is low, the interacting effect between the relationship of the media dependency and self-assessment of information literacy to adoption behavior presents significant. In addition, the medium level of information literacy, the significant impact was existing in the relationship of the interacting effect between computer anxiety and adoption behavior. Finally, in the path of social interaction to computer anxiety and adoption behavior to adoption behavior, only significant in the level of medium of information literacy, there is no any significant relationship within other two levels.

Table 2 The Test of Moderating effect modle

Variables	All sample (n=874)			Low level of Information literacy			Medium level of Information literacy			High level of Information literacy		
	Model 1	Model 2	Model 3	Model 1a	Model 2a	Model 3a	Model 1b	Model 2b	Model 3b	Model 1c	Model 2c	Model 3c
<b>Main effect</b>												
Media property → Media richness	0.368**	0.368**	0.368**	0.379**	0.379**	0.379**	0.343**	0.343**	0.343**	0.415**	0.415**	0.415**
Media property → Adoption behavior	0.149**	0.02	-0.021	0.006	-0.033	0.134	0.262**	0.084	0.07	0.125	-0.015	-0.041
Media richness → Media dependency	0.693**	0.693**	0.693**	0.789**	0.789**	0.789**	0.652**	0.652**	0.652**	0.582**	0.582**	0.582**
Media dependency → Adoption behavior	0.143**	0.085**	0.299**	-0.13	0.042	0.573**	0.094	0.087**	-0.107	0.345**	0.145**	0.615**
Social interaction → Media richness	0.568**	0.568**	0.568**	0.594**	0.594**	0.594**	0.579**	0.579**	0.579**	0.463**	0.463**	0.463**
Social interaction → Adoption behavior	0.143**	-0.055	0.061	0.029	0.004	0.005	0.215**	0.124**	0.132**	0.032	0.029	0.038
Computer anxiety → Media richness	0.139**	0.068**	0.183*	0.098	0.059	-0.022	0.157**	0.099**	0.556**	0.144	0.069	0.133
<b>Moderating effect</b>												
Information literacy → Adoption behavior		0.652**	1.039*		0.667**	0.820**		0.526**	0.653**		0.680**	1.002*
Information technology self-assessment → Adoption behavior		0.080**	-0.196		0.145**	0.958**		0.054	0.114		-0.047	-0.012
<b>Interacting effect</b>												
Media dependency * Information literacy → Adoption behavior			0.486*								-0.571	-0.496
Media dependency * Information technology self-assessment → Adoption behavior			0.308*								0.021	-0.166
Computer anxiety * Information literacy → Adoption behavior			-0.168								-0.520**	-0.229
Computer anxiety * Information technology self-assessment → Adoption behavior			-0.004								-0.094	0.145
<b>R<sup>2</sup></b>	0.179	0.594	0.601	0.059	0.558	0.591	0.297	0.522	0.537	0.234	0.573	0.584
<b>ΔR<sup>2</sup></b>		0.422	0.007		0.532	0.033		0.24	0.015		0.35	0.011

## 5. Conclusion and Suggestion

This study has integrated "communicative media", "information literacy" and "community behavior" literature, and proposed a particular path moderating model of the community behavior of Taiwan remote areas community residents, by adopting structural equation model to implement an empirical test, the following results were acquired:

First, from the perspective of medium, the media properties of information technology to the community behavior would not have a significant impact; in addition, social interaction more frequently will have better richness of the communicative medium, it also influences on the individual's media dependency, while deeper media dependency of individual would conduct individual have more easily integrated into the information technology medium. Consequently, the community behavior of community residents is affected by the media richness and dependency of information technology, but the nature of media properties only can be indirectly influenced by communicative richness.

Second, for the perspective of individual self-assessment of information technology, the individual computer anxiety will significantly affect their subsequent integration into the behavior; however, information literacy and information technology self-assessment would be the moderating effect between the degree of media dependency and the community behavior, also make the path of media properties and social interaction to community behavior from significant effect turn to not significant, particularly, when adding interactive effect into the path, the main effect of individual self-assessment of information technology to community behavior would become not significant, which indicates information literacy is the main moderating effect.

Finally, to clarify the moderating effects of information literacy, based on information literacy divided the data into three groups: as low degree of information literacy, their self-assessment of Information Technology have moderate the degree of media dependency and community behaviors, and would also consider the individual self-assessment to information technology will impact on community behavior; for the medium level of information literacy, the information literacy would moderate the path of computer anxiety and community behavior, moreover, by the moderator of information literacy will affect the path relationship of society interaction to community behavior into significant relationship.

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