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An Empirical Study on Personal Health Records System based on Individual and Environmental Features

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Abstract: To promote the adoption of PHR system, understanding the factors that affect patients' adoption of PHR system is of necessity. Based on previous research, this paper tries to develop a model to explore those elements that influence the behavior intentions of patients from the perspective of consumers. It is assumed that individual features and environmental features affect individuals' attitudes to PHR. Data from 265 participants' response to questionnaire was collected. The SPSS and partial least squares (PLS) technique was adopted to examine the casual relationships this paper hypothesized. The results show that affordability and coercive pressure have the significant effect on individuals' attitude towards PHR. Therefore, suggestion regarding what developers, institutions and government should do to improve the adoption rate of PHR was raised.

Keywords: Personal Health Records System, individual features, environmental features, individuals' attitude

1. INTRODUCTION

Personal health records (PHRs) is a tool that can be helpful in maintaining health and wellness as well as a tool to help with illness. The PHR is gaining increasing attention in the United State and European healthcare system[1]. The trend of current healthcare system starts from the doctor-centered system towards a much more interactive patient-centered system. A consumer-controlled personal health record (PHR) system manages to let consumers to have the optimal care in terms of both cost and quality, and resources that could help consumers to maintain heath and prevent potential risks on their health. PHRs also can take healthcare out of the hospital and increase its availability at people's home. Though PHR are still in the very early stages of deployment in United States as well as in Europe, it is estimated that over the next several years many providers and organizations are inclined to acquire and deploy EHR and PHR systems. Meanwhile, many people such as those with chronic and serious conditions that are in urgent need of close monitoring and assistance, are likely to resort to the adoption of PHR systems. It is predicted that by 2020, more than half of the citizens in the United States might adopt PHR system[2].

Nowadays in China, healthcare reform is proposed and promoted. According to the 12th Five-Year Plan (2011-2016), the authority designed a 3521 project for e-health: the '3' refers to healthcare data platform in three levels: country, province and region levels; '5' represents five applications: public health, medical services, new rural medical insurance plan, basic drug plan and general management. The '2' implies two systems: electronic health record (EHR) system and electronic medical record (EMR) system. And '1' represents the special healthcare. In addition, the government has developed supportive e-health policies including national e-health policy, national telemedicine policy, e-government policy and national multiculturalism policy for e-healthy development[3].

Since 2009, community health station of China began to collect health record from citizens in that community. The health record includes basic health information, medical examination records, health examination result and so on. Though there exists the favorable policy and political support, it has to be admitted that there are many drawbacks of this method. Due to the lack of unified national framework, the

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quality of the EHR and EMR systems and its development is low. Health record is not supposed to be in a stable state and should be updated from time to time[3]. However, health records collected by community health stations not only cannot be updated timely but also be proved to be inaccurate and incorrect since many individual do not put enough emphasis on this health records and provide incomplete or even fake information. So this cannot be regarded as an effective or trustful health records and its usefulness is very limited.

Based on this background, the paper tries to explore the individual factors and environmental factors that influences individuals' attitude towards PHR.

2. LITERATURE REVIEW

Based on my literature research, during the period from 1978 to 2012, most of papers focused on four areas of PHR study, which can be listed as: PHR functions evaluation, attitudes held by healthcare organizations and customers towards PHRs, concern over PHR privacy and security, and PHR architecture[4-9].

In terms of papers concerned PHR functions evaluation, to distinguish PHR from EHR, American Health Information Management Association (AHIMA, 2005) formed an electronic health information management workgroup. They proposed that EHR is held and maintained by a health care organization while PHR offer individuals with the control of their own health information. The American Medical Informatics Association's College of Medical Informatics (2005) discussed the definitions, benefits, system characteristics, technical architecture and strategies for overcoming barriers to adopt PHRs. Consumers normally desire online access to tools that could help them manage their health condition[7]. And many patients like the function of secure messaging. And it is considered beneficial for many patients, especially those patients with a chronic illness, to schedule appointments, make inquiries and renew prescriptions with their doctors[8].

And there are many papers exploring attitudes held by healthcare organizations and customers towards PHRs. The research is discussed related to PHRs, PHR features and PHR business models, they concede that further PHR research can increase the likelihood of PHR system adoption and exert positive influence on the healthcare quality and efficiency[6]. A multi-method approach is applying to assess PHR systems and examine socio-cultural, clinical, usability and clinical factors that might influence the adoption of PHR systems[5]. By interviewing potential clinicians and patients, this work identified some technical usability issues. By implementing a web-based Personal Health Record systems, Chung-Feng Liu(2013) proposed an Technology Acceptance Model (TAM), taking physician-patient relationship (PPR) , perceived ease of use (PEOU) and perceived usefulness (PU) into consideration, to find out whether those factors will exert influence on the behavioral intentions(BI) of consumers to adopt the PHRs[1].

It is discussed that the consumer perceptions and acceptance as well as barriers and potential of Electronic Personal Health Records, finding out that costs must decrease so that PHR could access to more people. Reluctance of providers to adopt PHR system is caused by physician resistance, cost, and a lack of trained IT personnel to assist with the construction (Harvard School of Public Health 2009). In addition, health literacy education will be a difficult problem to cope with as well. PHR adoption will increase drastically if certification of PHR systems, development of privacy regulations and data standards could be promoted[9].

Overall speaking, studies over PHR adoption are mainly conducted abroad and many areas concerning PHR adoption has been discussed. However, there are rare researches concerning the barriers towards PHR adoption conducted in China and factors impeding the development of PHR is still unclear.

3. RESEARCH MODEL AND HYPOTHESIS

3.1 Individual features

People with low health literacy include elderly people, who are normally prone to get sick and have chronic diseases. Though PHRs could benefit those elderly people in terms of improving their health condition, they

might find it hard to understand the medical terms and unwilling to share their information because they are more conservative. Also, internet access as well as computer competency are the basic skills for individual to use PHRs[10]. It is estimated that for those people who are familiar with electronic devices and good at using computers, grasping the usage of PHR system is not difficult while for those elderly people or poor people, is extremely difficult[11]. Though elderly people who are normally have low literacy could benefit more by using PHRs, it is likely that most of them would not use PHRs. So, it is proposed:

H1: Literacy will have a significant positive influence on individuals' attitude towards PHR system.

CITL built up a model to estimate the cost of various PHR system and the annual coat of PHR system could range form $39,00,000 to $1,300,000,000.Due to the belief that patients and hospitals are the main beneficiaries, it is considered that patient and hospitals should share the annual cost. According to some case study, there is a hospital charging patient of 60$ one month for using PHR system. 60$ per month is not a small amount of money for many Chinese people, especially for those elderly people who might feel it unnecessary to use PHR system. However, for those middle-aged people whose monthly revenue could reach more than 8000RMB, paying for PHR system would not be the barrier for them to use PHR. So, it is proposed:

H2: Affordability will have a significant positive influence on individuals' attitude towards PHR system.

3.2 Environmental features

Mimetic pressure motivates organizations to imitate other organizations that gained success in the same industry[16]. Due to the pressure from competitors, people made the same adoption decisions as their successful competitors. Based on this theory, it is suggested that if individuals found that people around them experienced the benefit brought by the PHR system, they would feel more motivated to adopt the PHR as well. And the successful case around them could inspire individuals to have more trust on PHR system and also perceive it as an useful tool[12].

H3 Mimetic pressure will have a significant positive influence on individuals' attitude towards PHR system.

Coercive pressures are defined as pressure exerted on organizations by other organizations upon which they are dependent[16]. Because of the coercive pressure, individuals might feel that they have to adopt the technology product promoted by the organization that they join. That is to say, organizations such as government, community play a pivotal role in influencing the adoption decision among individuals[13]. For instance, if the government enacted a regulation requiring all the citizens should learn the knowledge of how to use PHR system, it is without any doubt that much more individuals will feel motivated to use the PHR system.

H4: Coercive pressures will have a significant positive influence on individuals' attitude towards PHR system.

Normative pressures stem from shared views and values among members of a network[16]. It is proposed the viewpoint that normative rules regarding organizational behavior could influence individuals' behavior of IT adoption [15]. Thus, I suggest that, it is the same case for PHR adoption. If professional institution or

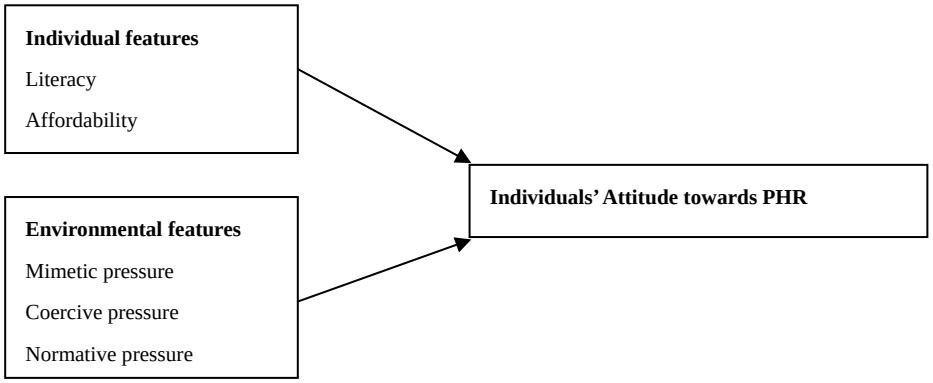

Figure 1. Research Model

well-known experts recommend the adoption of PHR, it is believed that many individuals will feel more willing to use PHR system. Besides that, widespread of reports through TV, radio, internet could also encourage the shared norm that PHR adoption is useful and trustful[1]. Therefore, the following hypothesis is proposed:

H5: Normative pressure will have a significant positive influence on individuals' attitude towards PHR system.

4. RESEARCH METHODLOGY

A two-phase approach was adopted to conduct the survey. Firstly, this paper tried find the construct definition, which is to develop reasonable and accurate definitions for each construct after the literature review. Next step was to develop a pool of items for chosen construct. This study conducted a larger-scale quantitative survey, with the aim of exploring the factors that could influence the adoption of PHR system among individuals. The questionnaire consisted of 60 questions and was conducted between April 10 and May 10, 2014. After one month's data collection, we had a total of 265 valid responses.

Spinning over one month, all the chosen respondents completed the questionnaire, the total number of which is 265. Demographically, 42.74% of respondents were women and 57.26% of respondents were men. Overall speaking, people whose monthly expenses range from 2000 to 5000 RMB accounts for the largest proportion (56.93%), followed by people whose monthly expensed range from 1000~2000（30.19%). And in terms of computer literacy, most of people, which represent 87.92% of the total 265 people, have used computer for more than 5 years, which implies that most of respondents could grasp the basic skill of operating computers. And the participants are regarded as well educated, as 212 have gained Bachelor's degree and 25 have a Master's degree or above; When it comes to perceived health condition,27 people consider their health situation as very healthy and 116 as relative healthy. On the contrary, 106 of respondents think their health condition can be listed as sub-healthy and only a small number of people have chronic disease or seizure. Overall speaking, the health conditions of respondents are good.

5. DATA ANALYSIS

The data analysis involves two steps. The first step is reliability and validity analysis by SPSS and the second step is structural equation model test by PLS.

5.1 Reliability and Validity

Table1 shows the reliability and validity analysis of the data. All the analysis results meets the requirements.

Table1 Reliability and validity analysis

Variable	Factor Loadings	Cronbach's Alpha	AVE	CR
affordability2	.785	0.629	0.576	0.727
affordability3	.733			
affordability4	.725			
literacy1	.766	0.672		
literacy3	.687			
literacy2	.644			

Variable	Factor Loadings	Cronbach's Alpha	AVE	CR
normative pressure3	.868	0.909	0.835	0.954
normative pressure2	.793			
normative pressure1	.775			
coercive pressure1	.782	0.903		
coercive pressure3	.781			
coercive pressure2	.766			
mimetic pressure2	.794	0.890		
mimetic pressure1	.735			
mimetic pressure3	.690			

5.2 Structural Equation Model

After conducting the reliability and validity test, Partial Least Squares (PLS) technique was adopted to build structure model. It is a shown that only the variables “affordability” and “coercive” has been proven supported in the research. Other variables are shown unsupported.

Table2 Hypothesis Testing Results

Hypothesis	P-value	Path Coefficient	Supported
H1.Literacy will have a significant positive influence on individuals‘ attitude towards PHR system.	0.15	0.029	No
H2.Affordability will have a significant positive influence on individuals‘ attitude towards PHR system.	0.002	0.096	Yes
H3. Mimetic pressure will have a significant positive influence on individuals‘ attitude towards PHR system.	0.090	0.067	No
H4. Coercive pressure will have a significant positive influence on individuals‘ attitude towards PHR system.	0.002	0.096	Yes
H5. Normative pressure will have a significant positive influence on individuals‘ attitude towards PHR system.	0.246	0.033	No

6. DISCUSSION

Affordability of individual could affect individuals’ perceived usefulness and trust towards PHR. Many individuals, especially elderly people, feel reluctant to pay for PHR usage and tend to believe they do not need PHR after knowing they need to pay.Coercive pressure also shows the significant on individuals’ attitude towards PHR. When a hospital forces their patients to adopt the PHR, it is a way to change users’ attitude.

In terms of the high cost of PHR, according to our examination result, affordability could exert a significant influence on people’s perceived usefulness and trust towards PHR system. So it is without any doubt that lower price of PHR system could motive individuals to use PHR system. To achieve this goal, the government could enact certain regulations allowing individuals to pay for the expense of PHR system with their medical insurances. Also, for those individuals who do not care about embedded advertisement and selling data, they

could enjoy a lower price of using PHR system, which is to say, the pricing system could be variable according to the needs of different people.

Individuals always thought it spends too much time to adopt a new system. However, if government authorities or hospitals implement the policy by political power, PHR may diffuse quickly. To achieve this goal, government agencies can carry out the PHR diffusion as a strategy of public service provided by the government.

7. CONCLUSIONS

Personal health records system (PHRs) is an increasingly popular area in medical activities. It is conceded that PHRs could improve healthcare documentation, increase information access for patients and providers and help patients to better control the expenses of care. Consumers who use PHR could gain more knowledge about their health conditions, inquire more questions, feel more connected to their physicians and make moves to improve their health. Although PHRs have various potential benefits to patients, hospitals as well as institutions, the supporting evidence of specific benefits and successfully business cases for PHR adoption are limited and wide use and adoption of PHRs has not appear.

To promote the adoption of PHR system, understanding the factors that affect patients' adoption of PHR system is of necessity. Based on previous research, this paper tries to develop a model to explore those elements that influence the behavior intentions of patients from the perspective of consumers. It is assumed that individual features and environmental features affect individuals' attitudes to PHR.

Data from 265 participants' response to questionnaire was collected. The SPSS and partial least squares (PLS) technique was adopted to examine the casual relationships this paper hypothesized. The results show that affordability and coercive pressure have the significant effect on individuals' attitude towards PHR. Therefore, suggestion regarding what developers, institutions and government should do to improve the adoption rate of PHR was raised.Supply chain coordination has become the key strategic area that has direct impact over the success of any enterprise in today's highly competitive business environment.

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REFERENCES

[1] Chung-Feng Liu(2013),Patients' Acceptance towards a Web-Based Personal Health Record System: An Empirical Study in Taiwan,Int. J. Environ. Res. Public Health , 10, 5191-5208

[2] Kim, M. I., & Johnson, K. B(2002). Personal health records: Evaluation of functionality and utility. Journal of the American Medical Informatics Association: JAMIA, 9(2), 171-180

[3] Xiangzhu Gao, Jun Xu,et al(2013).Implementation of E-Health Record Systems and E-Medical Record Systems in China,The International Technology Management Review,3(2), 127-139

[4] E. Reilent(2012), Improving the Data Compatibility of PHR and Telecare Solutions,5th European Conference of the International Federation for Medical and Biological EngineeringIFMBE Proceedings ,37, 925-928

[5] Kahn, V.Aulakh, A.Bosworth(2009), What it takes: Characteristics of the ideal personal health record. Health Affair. 28(2):369-76

[6] Taha, Jessica; Czaja, Sara J(2013), Factors affecting usage of a personal health record(PHR) to manage health. Health Affair, 28(4):1124-1139.

[7] Xiangzhu Gao, Jun Xu,et al(2013).Implementation of E-Health Record Systems and E-Medical Record Systems in

China,The International Technology Management Review, 3(2): 127-139

[8] Kahn, J. S., Hilton, J. F., Van Nunnery, et.al (2010). Personal health records in a public hospital: Experience at the HIV/AIDS clinic at San Francisco general hospital. Journal of the American Medical Informatics Association: JAMIA, 17(2), 224-228

[9] Kim, M. I., & Johnson, K. B. (2002). Personal health records: Evaluation of functionality and utility. Journal of the American Medical Informatics Association: JAMIA, 9(2), 171-180.

[10] I-Chiu Chang(2012), Electronic medical record quality and its impact on user satisfaction — Healthcare providers' point of view, Government Information Quarterly, 29, 235–242

[11] Ming-Chih Tsai (2013), A study of the institutional forces influencing the adoption intention of RFID by suppliers, Information & Management 5059–65

[12] [J.P. Katz, M.D. Pagell, J.M. Bloodgood(2003), Strategies of supply communities, Supply Chain Management: An International Journal , 8 (4):291–302.

[13] Grossman, J. M., Zayas-Caban, T., & Kemper, N. (2009). Information Gap: Can health insurer personal health records meet patients' and physicians' needs? Health Affairs, 28(2), 377-389.

[14] Dave Henderson (2012), The determinants of inter-organizational and internal in-house adoption of XBRL: A structural equation model,International Journal of Accounting Information Systems, 13,109–140

[15] Fulvio Barbarito(2012), Implementing standards for the interoperability among healthcare providers in the public regionalized Healthcare Information System of the Lombardy Region, Journal of Biomedical Informatics,45,736–745

[16] DiMaggio, Paul J., and Walter W. Powell(1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields, American Sociological Review , 48:147-60