WHY ARE PATIENTS WILLING TO AGREETOAN EXCHANGE OF THEIR ELECTRONIC MEDICAL RECORDS? : THE PERCEIVED VALUE PERSPECTIVE

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Abstract – The goal of this present study is to researchhow to motivate individuals to agree to an exchange of their electronic medical records (EMR) based on the perceived value perspective. We used survey methodology to collect data from 300 patients visiting a large hospital in southern Taiwan via questionnaires. Partial least squares is used to analyze the collected data. The results demonstrate that perceived value of EMR exchange and social influence are the primary factors influencingan individual's willingness to exchange his/her EMR. Further, perceived benefits of and perceived privacy concerns of EMR exchange are associated with the perceived value of EMR exchange positively and negatively, respectively. Finally, internet health literacy is positively associated with perceived benefits of EMR exchange but not with the perceived privacy concerns of EMR exchange.

Keywords - Electronic Medical Records, Exchange, Perceived Value.

I. INTRODUCTION

Electronic medical records (EMR), referring to a collection of software applicationsusuallyadopted in the delivery of instructions for patient care, in the upkeep of patients' medical records, and the delivery of radiologic examinations or laboratory testing results (Kuo, Ma, & Alexander, 2014; Sykes, Venkatesh, & Rai, 2011), are expected to achieve many tangible/intangible benefits(Institute of Medicine, 1997). For example, healthcare professionals are allowed to access required patient information without the constraints of time or space via EMR(Kuo et al., 2014). More importantly, healthcare professionals can acquire even more patient information from other healthcare facilities via EMR exchange. With sufficient access to patient information, healthcare professionals may better diagnose and treat patients. From the perspective of hospital management, EMR is also expected to reduce medical costs and to improve healthcare quality (Institute of Medicine, 1997; Zhou et al., 2009).

Despite the plausiblebenefits and conveniences that EMR can introduce, patients and others may however raise disagreement with several ethical issues in this information age (Rothstein, 2007) sincea large volume of medical records may become easily accessible to users who are both outside and inside the healthcare facilities(Sher, Talley, Yang, & Kuo, 2017). In other words, although EMR can decrease the inefficiency of and fragmentation of paper-based medical records, EMR is possibly susceptible to being misused by both unauthorized and authorized users, bringing on a serious rise in people's information privacy concerns (Institute of Medicine, 1997). Such privacy concerns may refrain individuals from exchanging their EMR due to privacy concerns, thus hampering the realization of real EMR value.
The purpose of our study is to researchhow to motivate individuals to agree to exchanging their EMR based on the perceived value perspective they maintain(Zeithaml, 1988). The results are expected to help healthcare authority and healthcare facilities to better leverage EMR exchange.

Research Framework and hypotheses

According to the perceived value perspective from the marketing field (Zeithaml, 1988), perceived value refers to a consumer's overall assessment of product/serviceutility hingedupon perceptions of both what is given and what is received. In other words, consumers will assess the potential gains and losses based on a behavior before engaging in such behavior. Transferring this rationale into our study, whether individuals are willing to exchange their EMR or not depends on their overall assessment of the potential benefits of and risks this exchange. If the potential benefits of exchanging EMR outweigh the potential risks, individuals may perceive a higher value of EMR exchange. So, they will be more prone to exchange their EMR. On the contrary, if they perceive the potential risks of exchanging EMR are higher than the potential benefits, they will perceive a lower value of exchanging EMR, and they will then be less willing to exchangetheir EMR. Further, as perthe theory of planned behavior (Fishbein & Ajzen, 1975), individuals' behavior may be influenced by their important others, such as by friends or relatives. In our study, healthcare professionals may exert an important impact on patients' willingness to exchange their EMR since patients may regard them as an indication of real professionals addressing their

healthcare issues. Finally, health literacy may have an influence on individuals' health-related behaviors(Nielsen-Bohlman, Panzer, & Kindig, 2004). An exchange of EMR aimedat providing physicians with required medical records for better diagnosis and treatment can be considered as a health-related behavior. Therefore, internet health literacy may play an important role when individuals assess the potential benefits of and potential risks of exchanging EMR. We therefore proposed our research framework (See Fig. 1) and respective hypotheses:

H1: Internet health literacy is positively associated with perceived benefits of EMR exchange.
H2: Internet health literacy is relatedto perceived privacy concern of EMR exchange negatively.
H3: Perceived benefits of EMR exchange is associated with perceived value of EMR exchange positively.
H4: Perceived privacy concern of EMR exchange is relatedto perceived value of EMR exchange negatively.
H5: Perceived value of EMR exchange is linked with individual's intention to exchange their EMR positively.
H6: Social influence is positively associatedto individual's intention to exchange their EMR.

II. RESEARCH METHODS

2.1. Measures

We used survey as the primary research method. The questionnaire utilized in our study contains two parts. The first partcollects the participants' demographic information, and the second sectionelicits respondents' perceptions regarding the six constructs researched in this study. The study constructs were gauged by usingformerly validated instruments (Bansal, Zahedi, & Gefen, 2010; Kehr, Kowatsch, Wentzel, & Fleisch, 2015; Norman & Skinner, 2006a; Venkatesh & Bala, 2008; Venkatesh, Thong, & Xu, 2012; Xu, Luo, Carroll, & Rosson, 2011; Zeithaml, 1988), and all items utilized a 7 -point Likert scale (e.g., 1 for strongly disagree, and 7 for strongly agree).

The initialinstrument was then inspected by an expert panel, including one healthcare information management professor and one experienced hospital administration practitioner. These experts were motivated to contribute feedback about the validity and clarity of the instrument that was utilized. Suggestions were composed as a modification reference for the ultimate version of the instrument. Afterwards, we conducted a pilot test to construct the scales through a sampling of 20 patients visiting a large hospital. Minor alterations of words and expressions were made to given items resulting in a final questionnaireusable for further validation.

2.2. Sampling

We obtained approval from the institutional review board of a large hospital prior to proceeding with the investigation. The subject hospital, a 1000-bed Taiwanese hospital, was chosen due to the consideration that it is rather active in using EMR in Taiwan in terms of both volume of internal EMR utilization and the amount of EMR exchanged with other hospitals in the region.

The study chose the large hospital for two main reasons: (1) the subject hospital provides nearly all necessary medical services, which attracts an average of nearly 5,000 outpatients each day; and, (2) the subject hospital is equipped with a well-established EMR system that provides patients with high-quality services. Two trained interviewers recruited patients at two main entrances to the hospital from July 1st to August 31st in 2018. Interviewers collected data via face-to-face interview, during five to ten minutes, from each respondent. Subjects were invited to voluntarily and anonymously complete the survey. In all, 300 complete responses were collected for study.

III. RESULTS AND DISCUSSION

3.1. Descriptive Statistics

Most respondents aged from 30 to 39 years (41%) and were female (70.67%). Of the respondents, 96% were college-educated or above. Non-healthcare workers were slightly more than healthcare ones. Detailed information of the respondents are shown in Table 1.

Characteristics	Category	Frequency	%
Age	20-29	51	17.00
	30-39	123	41.00
	40-49	95	31.67
	50-59	24	8.00
	>=60	7	2.33
Gender	Male	88	29.33
	Female	212	70.67
Occupation	Healthcare	145	48.33

	Non-healthcare	155	51.67
Education	Senior high school	12	4.00
	College	33	11.00
	University	185	61.67
	Graduate school	70	23.33

Table1: Characteristics of Respondents

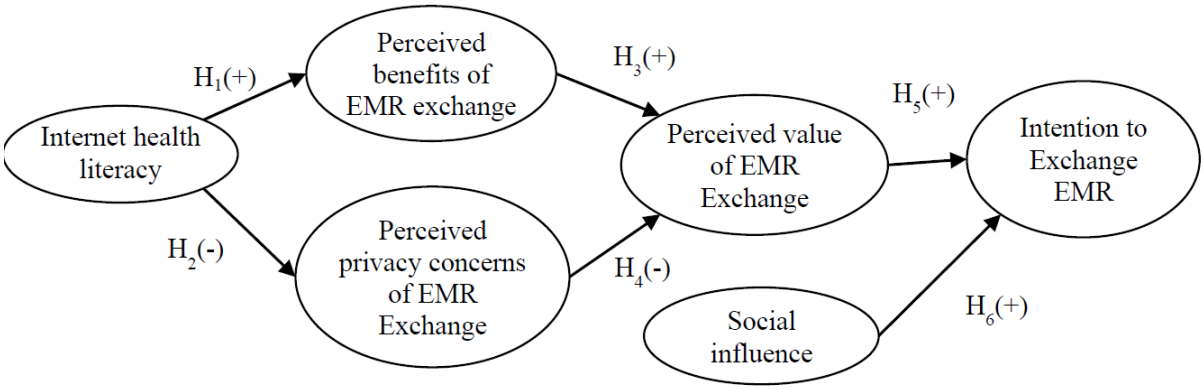

Fig.1: Research framework

3.2. Measurement model

We first assessed the intended measurement model based on the suggested procedures (Hair, Hult, Ringle, & Sarstedt, 2014) for analyzing partial least squares (PLS). Firstly, the item loadings were above the 0.7 cutoff value(Hair et al., 2014), demonstratingadequate item reliability. The composite reliability (CR) of the constructs also surpassed the 0.7 cutoff value(Fornell & Larcker, 1981).

Furthermore, the average variance extracted (AVE) of all the constructs was above 0.5 (Fornell & Larcker, 1981), indicating sufficient convergent validity. Lastly, discriminant validity was evaluated by comparing the square root of each construct's AVE with its correlation with other constructs (See Table 2). Our results showed that the square root of AVE of each construct was higher than the correlation between the construct and other constructs, demonstrating sufficient discriminant validity.

Construct	# of items	Loadings	CR	IHL	PBEMRE	PPCEMRE	PVEE	SI	ITE
IHL	8	0.72-0.93	0.96	0.86					
PBEMRE	3	0.94-0.95	0.96	0.54	0.95				
PPCEMRE	3	0.94	0.96	-0.06	-0.14	0.94			
PVEE	3	0.79-0.93	0.91	0.41	0.64	-0.19	0.88		
SI	3	0.96-0.97	0.98	0.43	0.60	-0.13	0.78	0.97	
ITE	3	0.98-0.99	0.99	0.50	0.71	-0.22	0.71	0.72	0.98

Table 2. Reliability and Validity

Note:

1. IHL denotes internet health literacy, PBEMRE means perceived benefit of EMR exchange, PPCEMRE denotes perceived privacy concern of EMR exchange, PVEE means perceived value of EMR exchange, SI denotes social influence, ITE means intention to exchange EMR
2. Diagonal bold elements show the square root of average variance extracted (AVE)
3. CR denotes composite reliability

3.3. Structural model

We adopted a bootstrapping procedure to assess the structural model and estimate the significance of each path coefficient. Fig. 2 shows the structural model results with path coefficient. According the analysis results, hypothesis H1 was supported ($\beta = 0.54$, $p< 0.05$), indicating that internet health literacy is positively related with patients' perceived benefits of EMR exchange. We however did not identify evidence to support hypothesis H2. That is, internet health literacy was not significantly linked with patients' perceived privacy concerns of EMR exchange ($\beta = -0.06$, $p>0.05$). Regarding hypothesis H3, the results supported that perceived benefits of EMR exchange is a significant and negative predictor of patients' perceived value of EMR exchange ($\beta = 0.63$, $p< 0.001$). Further, we found support of hypothesis H4. That is, perceived privacy concerns of

EMR exchange can significantly reduce patients' perceived value of EMR exchange($\beta = -0.1$, $p < 0.05$). We also confirmed that social influence positively associated with patients' intention to exchange EMR ($\beta = 0.54$, $p < 0.001$), supporting H5. Finally, we affirmed that perceived value of EMR exchange positively contributed to patients' intention to exchange EMR ($\beta = 0.37$, $p<0.001$), thus supporting hypothesis H6.Overall, approximately 57.07% of the variance of intention to exchange EMR could be explained using the proposed model.

3.4. Discussion

The first hypothesis H1 postulates that internet health literacy is positively associated with perceived benefits of EMR exchange. The results supported our hypothesis, indicating individuals with higher internet health literacy are prone to perceive the potential benefits of exchanging EMR. However, our hypothesis H2, stating that internet health literacy is related to perceived privacy concern of EMR exchange negatively, was not supported. The plausible reason for this might be that the primary purpose of internet health literacy is to help individuals assess whether online health information is beneficial or not to their health instead of a privacy-related issue, thus resulting in such a non-significant result. Regarding hypothesis H3, stating perceived benefits of EMR exchange will relate with perceived value of EMR exchange positively, was confirmed, indicating individuals perceiving higher benefits of exchanging EMR can also perceived higher value of exchanging EMR. Hypothesis H4, perceived privacy concern of EMR exchange is relatedto perceived value of EMR exchange negatively, was also supported, indicating that the higher privacy concern regarding exchanging EMR can lower individuals' perceived value of EMR exchange. Hypothesis H5, stating perceived value of EMR exchange is associated with individual's intention to exchange their EMR positively, was confirmed, indicating that individuals may be willing to exchange their EMR if they can perceive higher value of exchanging EMR. Finally, hypothesis H6 was supported. In other words, social influence has a positive relationship with individual's intention to exchange their EMR.

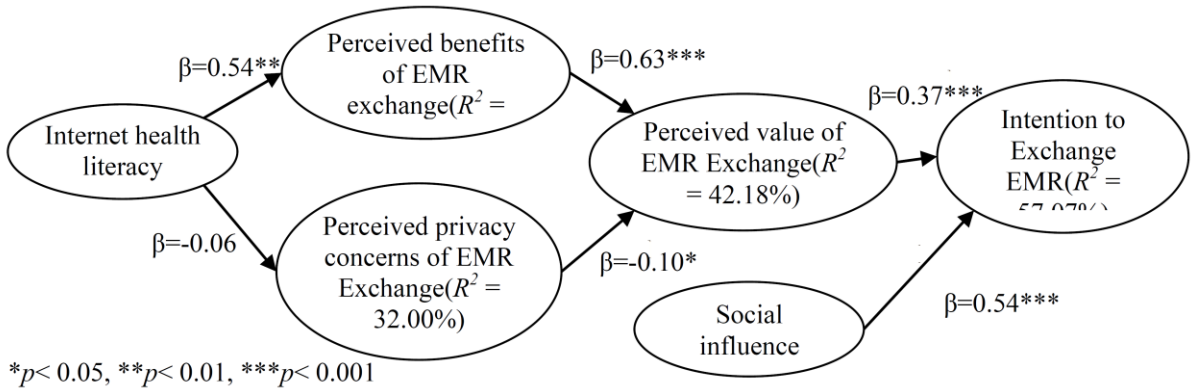

Fig.2. Structural model results

CONCLUSIONS

Based on the perceived value perspective, our study proposed a research model to investigate facilitators that can motivate individuals to agree on exchanging their EMR. The results show that perceived value of EMR exchange and social influence are two primary factors that can motivate individuals to agree on exchanging their EMR. Perceived benefits of and perceived privacy concernsrelated to EMR exchange are two factors that influence individuals' perceptions of the value of EMR exchange. Finally, internet health literacy can enforce individuals' perceptions of the overall benefits of EMR exchange.

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