

Measuring End User Satisfaction with Korean Hospital's Mobile Health System

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Abstract. Our research seeks to measure End user satisfaction and identify the contributors of satisfaction in mobile healthcare system. We gathered data from internal end users from Hallym University hospital at the level of clinicians, such as medical doctor and nurse. We employed PLS (Partial Least Square) to analyze data and our results show that all three factors- content, accuracy, and ease of use explain the contributors of satisfaction. Moreover, our results provide the evidence that Korean Mobile Healthcare System priorities are Ease of Use and Content. Our study could contribute to mobile healthcare system developer to measure user's satisfaction with mobile system. Data collected from Hallym University Medical Center year 2012 and analyzed using PLS (Partial Least Square) Out of 1668 clinical employees, only 7% response for the survey and majorities were nurses (93).

Keywords: End user satisfaction, Reflective measure, Formative measure, Ease of use, Partial least square, Mobile healthcare system

1 Introduction

Mobile Healthcare service is one of the most significant emerging trends to arise in healthcare industry in Korea. The suitability of service system is very important for the healthcare provider. I investigate mobile electronic medical record (EMR) and order communication system (OCS) in hospital. To develop mobile healthcare system I need to find what the factors are influences to end user satisfaction. Understanding important factors determine healthcare professionals mobile healthcare system satisfaction, will provide broad vision do develop strategies which make healthcare provider get more opportunity for better service.

2 Theoretical Background

Mobile healthcare system is new system support end user's job with using mobile device. The contents of mobile system are supposed to be different from immobile system, such as which level of job or group can access to the patient's test results and revise the data. Accurate information is required from healthcare employees to understand patient's condition or process next step to care. Even a system support high security and accurate information, we cannot enforce to use the system to healthcare employees if it is not easy to use. In this study we adopt Partial Least Square to analyze data and make questionnaires for both formative and reflective.

Mobile healthcare system end user – generally hospital consist with several job groups, medical doctor, nurse, technician, and administrator. In this study the end users are limited for physician, technician and nurse because they are most powerful and largest group of performers influence to the test. This could be one of the weak points of our study but at that period we conducted survey without mobile contents open to administrators. Davis and Olson (1985) pointing out to the primary and secondary users of IS. Primary users are responsible of entering data to the IS and working with software, but secondary users are those who make decision based on the reports provide by IS. Brancheau and Brown (1993) commenced their paper by defining end-user computing as the ‘adoption and use of information technology by personnel outside the information systems department to develop software applications in support of organizational tasks’. (Sandra Baker 2007)

3 Research Model

Doll and Torkzadeh (1988) proposed five quality dimensions which influence to end user satisfaction: contents, accuracy, format, ease of use and timeliness. Our research seeks to measure End user satisfaction and identify the contributors of satisfaction. We adopt Doll’s (1988) model. The original model consisted with five constructs accuracy, content, ease of use, format, timeliness, and end user satisfaction. In our study dependent variable is End user satisfaction and independent variables are content, accuracy, and perceived ease of use; we didn’t use format and timeliness. We observe both formative and reflective construct and their relationship and reflective questions are marked with capital ‘R’ and formatives are with ‘F’ our research model is as the next Figure.1.

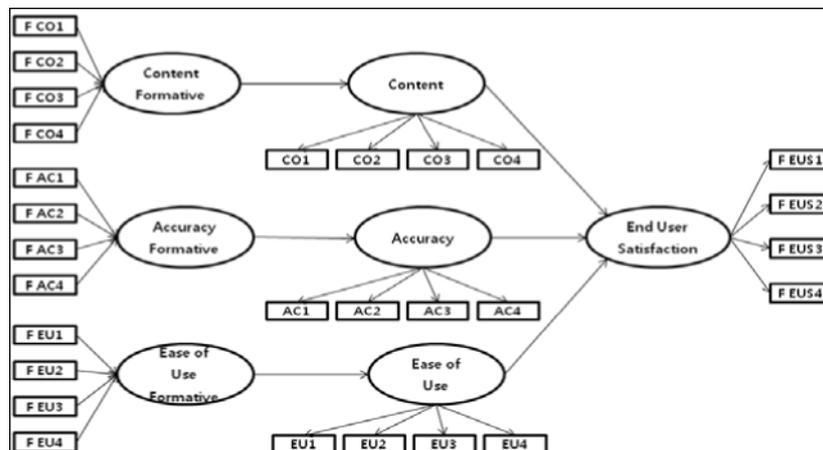


Fig. 1. Research model

4 Hypothesis

Content: In this study we define content as “The things that are inside MHS such as patient information, prescription and so on”

Hypothesis 1: The satisfaction of content will have a positive effect to end-user satisfaction.

Accuracy: We define accuracy as “The degree of closeness of measurement of quantity to that quantities actual/true value”

Hypothesis 2: The satisfaction of accuracy will have a positive effect to end-user satisfaction.

Ease of use: We define ease of use as “The degree to which a healthcare professional believes that the use of MHS would be free of physical and mental effort”

Hypothesis 3: The satisfaction of ease of use will have a positive effect to end-user satisfaction.

End-User Satisfaction: In this study we define end-user satisfaction as “The degree to which an individual has a positive emotional feeling about using Mobile Health-care System (MHS)”

5 Methodology

For better measurement, we developed 8 questionnaires for both reflective and formative. Our survey instrument is containing total 28 items, eight items for each independent variables, except dependent variable, measured by seven-point Likert scale (1=dissatisfied,4=neutral, 7=satisfied). (See Appendix Table.2)

In the original model, coefficient value of content to End User Satisfaction is 0.300, Accuracy to End User Satisfaction is 0.187, and Ease of Use to End User Satisfaction is 0.482. R-square value of Accuracy is 0.588, Ease of Use is 0.757, and End User Satisfaction is 0.746. Correlation of CO6, AC6 and EU6 shows very low. According to our cross loadings discriminant validity for the reflective constructs based on the loadings and cross loadings are good. We can observe seven dimensions are higher than 0.7 except CO6, EU6 and EU8, so the results are considered reliable (Nunnally 1978). Table 1 show that EU6 and EU8 may not measure “Ease of Use”. So, we examined the model after removed Eu6 and EU8. The correlation of latent variables is significant. We conducted the bootstrapping with 1000 times and 500 times both.

In the original model the correlation value for CO6, AC6 and EU6 were lower than other values. After bootstrapping, correlation values are increased, but CO8 and EU5 are decreased.

Paths between formative and reflective constructs are all significant. T-value for content is 14.111, accuracy is 19.837 and ease of use is 28.037.

According to the original model there were two items (EU6, EU8) which are greater than AVE. Also we removed CO6 and AC6 for negative gamma coefficient value. In the modified model, we removed four items from the original model and conducted same process. Coefficient value from content to End User Satisfaction is 0.300, Accuracy to End User Satisfaction is 0.186, and Ease of Use to End User Satisfaction is 0.482.

In the Table 1, R-square value of End User Satisfaction is 0.746, Content is 0.462, Accuracy is 0.586, and Ease of Use is 0.727. In the modified model, CO8, AC7 and EU5 are most significant contributors to form the constructs.

Table 1. Statics of the measurement model

CR	Sq AVE	Latent Variables	EUS	CO	AC	EU	COF	ACF	EU5
0.93	0.89								
8391952	0083977	EUS	1						
0.91	0.85		0.76						
6325496	6385684	CO	4088019	1					
0.94	0.89		0.72	0.80					
1589653	5145948	AC	5741532	7051595	1				
0.94	0.89		0.79	0.65	0.6171				
3572239	8441988	EU	2143277	1355385	23916	1			
0.83	0.79		0.66	0.67	0.7192	0.60			
0270003	1429716	COF	599309	9986146	84107	6551867	1		
0.91	0.88		0.73	0.69	0.7656	0.60	0.63		
508961	4450195	ACF	6713291	1351067	04913	8374505	5854466	1	
0.78	0.81		0.74	0.61	0.5839	0.85	0.59	0.54	
1580919	1049613	EU5	1255255	9931306	46923	2600825	2237718	6631012	1

CR	AVE	Latent Variables	EUS	CO	AC	EU	COF	ACFF	EU5
0.93	0.79								
8391952	2249487	EUS	1						
0.91	0.73		0.58						
6325496	339644	CO	3830501	1					
0.94	0.80		0.52	0.65					
1589653	1286268	AC	6700772	1332277	1				
0.94	0.80		0.62	0.42	0.3808				
3572239	7198006	EU	7490971	4263838	41928	1			
0.83	0.62		0.44	0.46	0.5173	0.36			
0270003	6360995	COF	3546795	2381158	69626	7905167	1		
0.91	0.78		0.54	0.47	0.5861	0.37	0.40		
508961	2252148	ACF	2746473	7966298	50883	0119539	4310902	1	
0.78	0.65		0.54	0.38	0.3409	0.72	0.35	0.29	
1580919	7801475	EU5	9459352	4314825	94009	6928167	0745515	8805463	1

We conducted the bootstrapping with 1000 times and shows the result of t-value from content to End User Satisfaction is 3.327(3.291 at 99.99%), Accuracy to End User Satisfaction is 1.480(1.645 at 90%), and Ease of Use to End User Satisfaction is 3.551 (3.291 at 99.99%). Only two paths are significant at level 0.01%

7 Conclusion

The hypotheses were tested by examining the structural model. The test of the structural model includes estimating the path coefficients, which indicate the strength of the relationships between two variables. Results of structural model are provided in Figure 2.

First, the satisfaction of content has a significant positive effect on End-User Satisfaction ($\beta=0.300$, $p<0.001$), thus H1 is supported.

Second, the satisfaction of accuracy was not found to have a significant positive effect on End-User Satisfaction ($\beta=0.187$, $p<0.001$), thus H2 is not supported.

Third, The satisfaction of ease of use has a significant positive effect on End-User Satisfaction ($\beta=0.482$, $p<0.001$), thus H3 is supported.

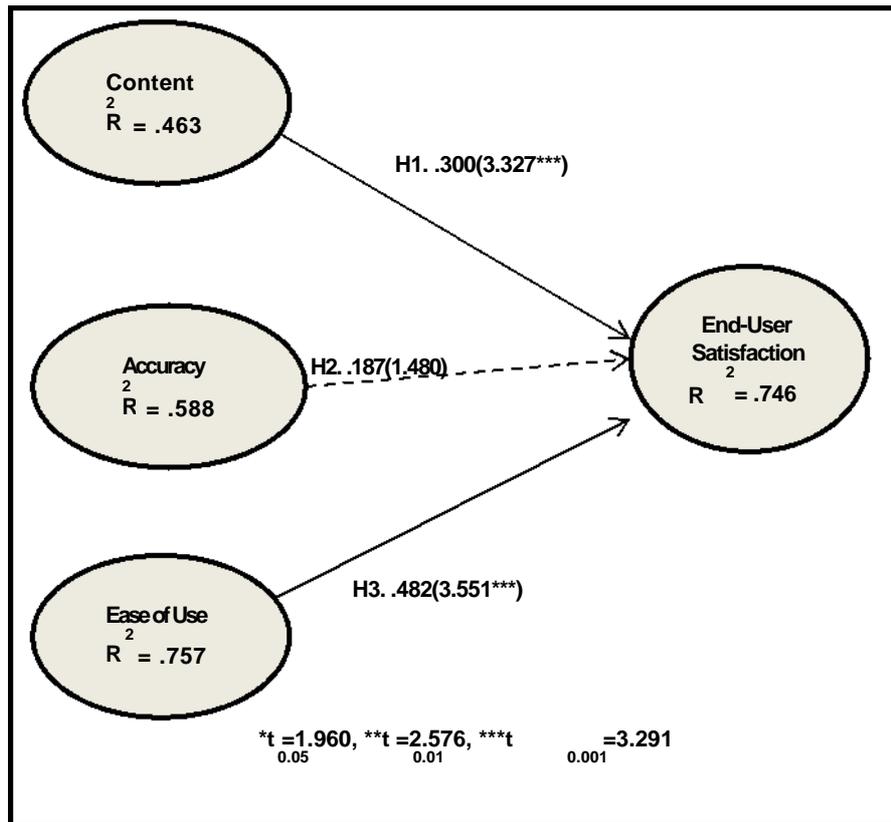


Fig. 2. Results of Structural Model

According to this study mobility is very important factor to the end users. Ease of use is important factor to the end users to adopt innovation. The result shows that ease of use is very important factor to the end users to adopt the mobile health system. Through this research, we found that there are three limitations. Firstly, the sample size was 114 out of over 1000. Secondly, the survey was conducted only for medical doctor and nurses without clinical technician and administrative. Thirdly, our study had considered only end-users from specific hospital environment.

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Appendix

Table.2 Survey questionnaire

Content	CO1 I am pleased with information MHS provide. CO2 I am satisfies with contents MHS provide. CO3 I am happy with information MHS provide. CO4 I am satisfied with report MHS provide. Here is the list of contents, MHS provide. How satisfy with each of this? I am satisfied with. CO5 Capability of patient prescription through MHS CO6 Capability of Patient data input through HMS CO7 Capability of test result confirm through MHS. CO8 Capability of patient information search through MHS.
Accuracy	AC1 Overall, I am satisfied with accuracy of Information of MHS. AC2 Overall, I am satisfied with fidelity of information of MHS. AC3 In general, I am satisfied with level of reliability of output MHS. AC4 Overall, I am satisfied with how precise the MHS is. We want you to tell us how satisfied are you in terms of the accuracy of parts of MHS AC5 I am satisfied with accurate appointment schedule of MHS. AC6 I am satisfied with MHS accurate medical image of MHS. AC7 I am satisfied with accurate test result of MHS. AC8 I am satisfied with accurate patient information of MHS.
Ease of Use	EU1 How do you satisfy with user friendliness of MHS. EU2 How do you satisfy with ease of use of MHS ? EU3 How do you satisfy with comfortableness of MHS ? EU4 How do you satisfy with ease to access ? EU5 MHS provides user-friendly interface. EU6 MHS decrease my work time. EU7 I can solve problem easily using MHS EU8 MHS is easy to learn.
End user satisfaction	EUS1 Overall, I am satisfied with MHS. EUS2 In general, I am please to use MHS. EUS3 I am positive to use MHS. EUS4 Overall, I am comfortable to use MHS.