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The Impact of User Quality and Information Quality on the IS Success in Healthcare Context

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ABSTRACT

In modern world, hospitals implement Hospital Information System (HIS) solution to achieve a range of business and competitive benefits and manage huge amount of medical information. In spite of many investigations that have been done on Information System (IS) models and framework, the user's role in IS success measurement is neglected, especially in the HIS mandatory usage. Moreover, effective theoretical model of IS success measurement is needed for managers to get better understanding of the user's role in terms of user quality and personal characteristics in IS success. In this study, in order to investigate the user's role beside of information quality in the IS success measurement model, two-phase methodology consist of explanatory and confirmatory, was followed. The first one was aimed to specify a quantitative research instrument in specification part, while the second phase was performed to test the hypothesized model. Moreover, collected data from 249 staff showed that user quality significantly influences usage quality and satisfaction quality, while the relationship between user quality and usage quality was moderated by age and experience. In addition, mandatory system usage in the hospital, toggled the impact of the usage quality on IS net benefits from significant effect in voluntary system usage to insignificant effect.

KEYWORDS: user's role, personal characteristics, and IS success measurement model.

INTRODUCTION

In modern world, due to rapid increase in the amount of medical information, and in order to achieve a range of business and competitive benefits, Hospital Information System (HIS) software solutions implement. Accordingly, hospital's managers needs to be ensure that their implemented information system are effective or "successful" (Petter et al., 2012).In spite of a lot of investigations that have been conducted on the success of information system, the user quality is not clearly focus beside of the other dimensions such as information quality, system quality, and service quality, while the user's role is a crucial element towards the success of an IS.

However, the users' roles in information technology acceptance researches were investigated by different researchers (Davis, 1989; Venkatesh & Bala, 2008; Venkatesh et al., 2003), in one hand, observation showed that organizations tend to neglect the roles of users during measuring the success of an information system(Petter et al., 2012) and in the other hand, the roles of users in terms of user quality and personal characteristics in prominent IS models and framework has been ignored. Furthermore, in contrast to voluntary system usage, investigation on mandatory system usage in IS model is quite inadequate, especially in the health information system (Monem et al., 2013).

In order to investigate the influence of user quality and information quality based on IS success measurement model, explanatory and confirmatory phases were followed in research design. The remaining parts of the paper are organized in the following manner. The paper begins with summarizing the well-validated IS models and framework, and then followed by the short definitions of HIS and relevant literatures. Then, research motivation and research methodology were presented in sequence.

Theoretical Background

During last two decades, the success of information systems has been evaluated strongly by different researchers(DeLone & McLean, 1992, 2003; Gable et al., 2008; Golafshani, 2003; Myers et al., 1997). In order to explain what makes information system successful, some IS models have been introduced by previous researchers. The Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB)(Fishbein & Ajzen 1975) were used in Technology Acceptance Theory (TAM) (Davis, 1989). Davis explained the reasons of the better acceptance of technology from individual perspectives. However, acceptance has not same mean as success, information system acceptance by users is necessary and preliminary precondition to achieve success (Petter et al., 2008). In order to

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integrate success factors in IS success, Monem et al, in 2011(Monem et al., 2011) reviewed related literatures for two decades and initially proposed a map of success factors in three dimension consist of user, resource and system application. They compare the initial model by prominent IS models and framework, they found an overlooked user's role in IS models and framework. They added a new independent variable to the Delone and McLean updated IS success model under moderation of personal characteristics (from unified theory of acceptance and use of technology (UTAUT)) and called it IS success measurement model.

Important Models and Framework of IS Success

The three most salient IS models which are discussed briefly here, are: the (1) DeLone and McLean IS success models(DeLone & McLean, 2003), (2) Enterprise System (ES) benefits framework(Shang & Seddon, 2002),and (3)the IS-impact measurement model(Sedera & Wang, 2009).The first and most important IS model which has been widely used and cited, is DeLone and McLean IS success model. In this model not only the causal relationship between the six dimensions consist of systems quality, service quality, information quality, intention to use / use, user satisfaction, and net benefits (individual and organizational impact) were provided, but also prominent observe items for each construct from previous studies were summarized (Sedera & Wang, 2009). The mentioned models (original and updated) have been criticized, applied, validated, and modified by many researchers (Gable et al., 2008; Livari, 2005; Miles & Huberman, 1994; Myers et al., 1997; Torkzadeh & Doll, 1999) since it's incepted.

The second one is ES benefit framework. This model was proposed by Shang and Seddon(2002) to measure the success of information after some years of implementation. The ES framework classified benefits of enterprise resource planning system. Five dimensions of ES consisted of operational benefits, managerial benefits, strategic benefits, IT infrastructure benefits, and organizational benefits.

The third one is IS-impact measurement model which was derived in the context of enterprise systems by Gable et al. (2008), and generalized to the IS domain. Since its inception, IS-impact was considered as an assessment tool to indicate success of an information system, thus it has been accepted and cited model among researchers. Individual Impact, Organization Impact, System Quality, and Information Quality with 37 observed measures formed the IS-Impact model. The IS-Impact model not only was accurately treated model's dimensions but also it was "the sub-constructs as a formative index rather than implying causality amongst the dimensions"(Sedera & Wang, 2009).

Monem et al. (2013) after literature analysis on the aforementioned models and framework introduced IS success measurement model based on Delone and McLean updated IS success model. The following figure (Figure I) depicts the IS success measurement model in seven latent variables in two main categories. Independent variables group (left side of figure) mentioned to independent formative variables which influence usage quality and satisfaction quality, while dependent variables group (right side of figure) converged success of implemented information system to IS net benefits by usage quality and satisfaction quality.

Due to the perceived lack of measures and dimension to adequately indicate the level of user role in terms of personal characteristics and user quality in success measurement of IS implementation. In addition, assessment of hospital information systems benefits have never been done entirely appropriate by the IS success measurement model. IS success measurement model was focused and used in order to investigate the user quality and information quality in success of an information system in hospitals.

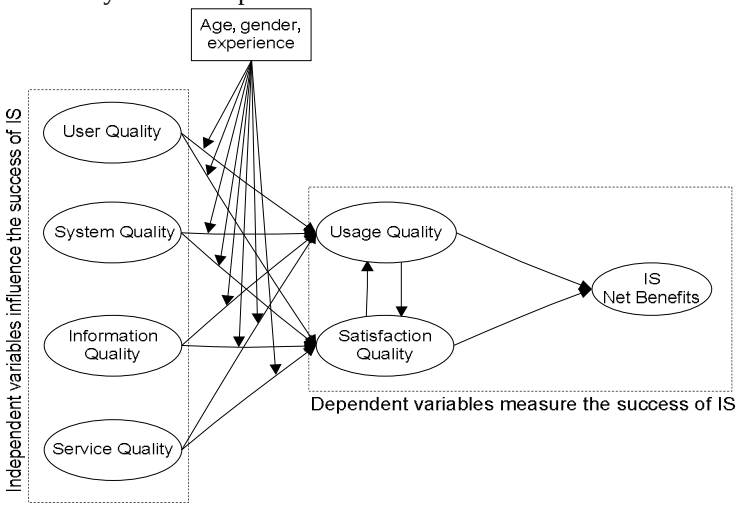

Figure I: IS success measurement model (Monem et al., 2013)

Hospital Information System

The use of Information Technology (IT) has been spreading more and more in hospitals. It is widely accepted that the use of IT in hospitals offers huge development prospects and opportunities, mainly in improvements to the quality of patient care, increased staff efficiency and effectiveness, and a significant decrease in their operational expenditure (Bates DW et al., 2001). Many other management and processing are carry out by a hospital information system application. This computerized system consists of special sub-systems which manage clinical and non-clinical information in the hospital's wards. Data processing such as patient admission, treatment, discharge, billing, financial and accounting, inventory, radiology and laboratory, etc. as well as clinical information system and decision support system are doing by HIS.

Research Motivation

Role of user is crucial issue that has been neglected to consider in IS success measurement in organizations (Monem et al., 2013; Petter et al., 2012). However, IS success measurement model cover this existing gap among IS models and framework, empirical test never done to measure the influence of user capability and moderation of personal characteristics onto success of IS. Gable et al. (2008) measured the success of information system by measuring impact of the information system on individual and organization as same as D&M IS success model. They have also measured information quality and system quality. However, Gable et al. (2008) considered the impact of various roles of the system on their proposed model, the user's role in terms of impact on the information system's success has been overlooked as well as Shang and Seddon (2002) that did not consider the influence of user characteristics and capabilities on the created benefits in enterprise system in the ES benefits framework. Finally, researchers believe that beside of information quality, user quality will affect usage quality and satisfaction quality, while UTAUT key moderators consist of gender, age, and experience will moderate the influences the aforementioned relationships (Monem et al., 2013).

Research Design

In order to test the IS success measurement model from user quality and information quality perspectives, the study employed the research cycle proposed by Gable et al. (2008) and adopted it (Figure II) for quantitative research. They suggested original research cycle for model developing in IS research. In this study, research design consists of two main phases, exploratory and confirmatory phases. Exploratory phase focused to specify related measures and items of information quality and user quality perspectives and specify research instrument, while confirmatory phase concentrated to test and confirm hypothesizes of specified model. The exploratory phase followed the two steps approach of Burton-Jones and Straub (2006), which were used for operationalizing constructs and identifying measures.

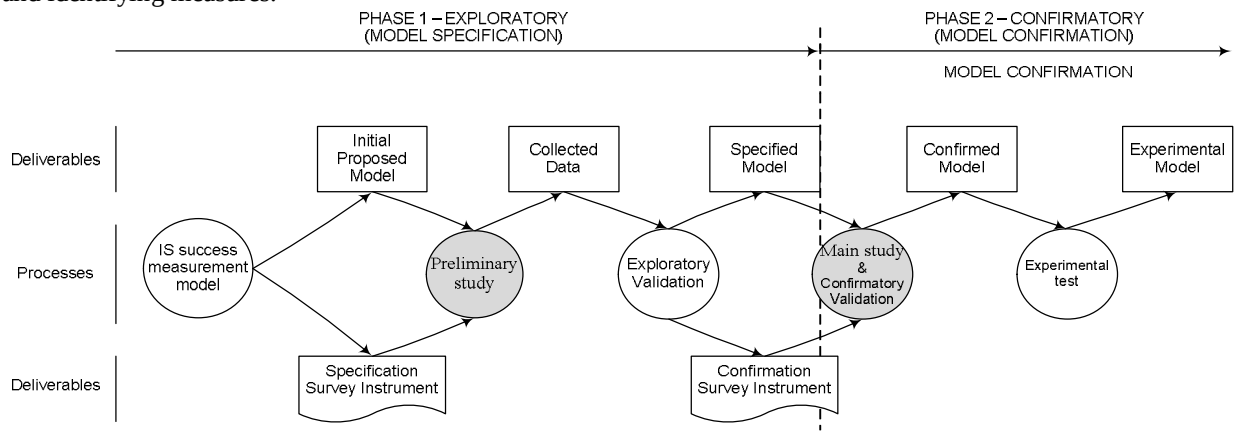

Figure II: Research design(adopted from Gable et al. (Gable et al., 2008))

The exploratory phase consists of model specification part. An initial two perspectives quality model was shaped in the first process of specification part as well as initial survey instrument. Then, pilot study was conducted to validate the instrument and the initial model. A common approach to identify a-priori measures and dimensions was to select from the existing literature, based on conceptual arguments. The measures substantiated and discovered in the literatures review and subsequently became the basis of an initial measurement model that was operationalized in the pilot study. Specified model was concluded by the results and finding of the pilot survey and

followed by main survey. The main survey and confirmatory validation employed the validated measures from the pilot survey and exploratory validation. This study conducted to validate the IS success measurement model from information quality and user quality perspectives during the exploratory-phase, while, reconfirming the measurement model and its measures by using of collected data during main survey.

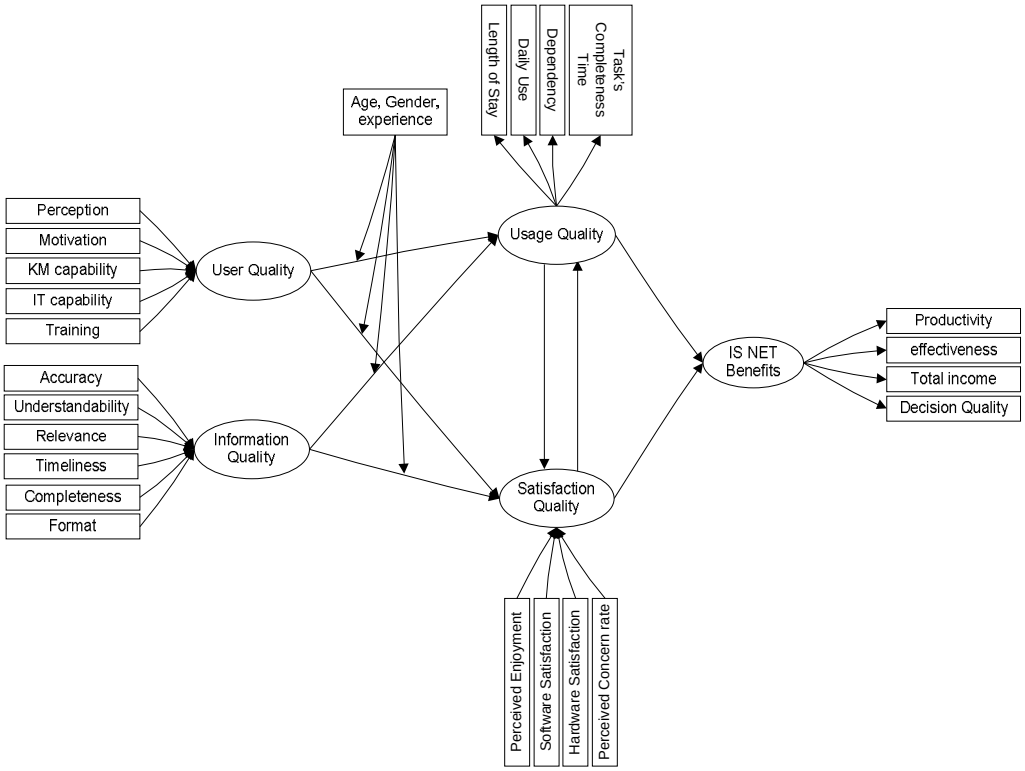

Figure III: Measurement model of initial model

Hypotheses

The hypotheses based on IS success measurement model is depicted in Figure IV. Hypothesizes H1, H2 mentioned to the influence of user quality on usage quality and satisfaction quality, while H3 and H4mentioned to the influence of information quality on usage quality and satisfaction quality. The four aforementioned relationships have been moderated by age, gender, and experience within mandatory system usage. Moreover the relationship between usage quality, satisfaction quality and net benefits in the mandatory system usage were tested in healthcare context.

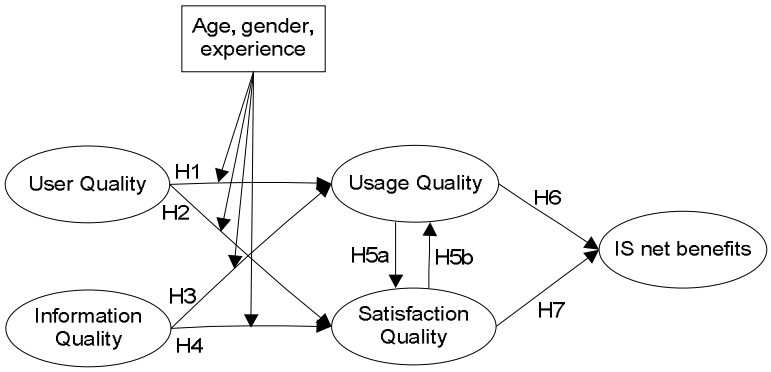

Figure IV: initial model and its hypothesis (User and Information Dimension)

Petter et al.(2008) claimed that "A final observation is that organizations tend to neglect the role of the user or individual when measuring the success of an information system. Consistently, practice focuses on specific aspects of the system or organization with little attention to how the system is used and whether the users are pleased with

the outcome". The researcher believe that as same as information quality that influence the success of IS in an organization, IS solution is under influence of level of user quality, such as IT capability(Abbott et al., 2001; Hung et al., 2010; Shiels et al., 2003), motivation (Chalmeta, 2006), training (Bidgoli, 2004; Venkatesh et al., 2003), perception (Hashim, 2007; Hung et al., 2010; Salomann et al., 2005; Wainwright et al., 2005; Wu, 2007; Xin MA, 2010), KM capability(Hung et al., 2010; King & Burgess, 2008), and will be moderated by gender, age, education, experience (Venkatesh & Bala, 2008; Venkatesh et al., 2003),

User quality refers to capability of users which is related to the better technology acceptance and usage such as KM capability, IT capability, etc. The researcher also concluded that user quality affects directly the usage quality and satisfaction quality of the IS application and accordingly increase / decrease the success of IS, while this relationships will be moderated by age, gender, and experience of user. Then, it is concluded that, there is significant relationship between user quality and usage quality and satisfaction quality. Thus, the following hypothesizes checked:

H1: The influence of ***User Quality*** on the ***Usage Quality*** is significant and will be moderated by age, gender, and experience in the mandatory system usage.

H2: The influence of ***User Quality*** on the ***Satisfaction Quality*** is significant and will be moderated by age, gender, and experience in the mandatory system usage.

Information Quality refers to captures the content issue. Information system applications should be completed (DeLone & McLean, 1992, 2003; Livari, 2005), relevant (DeLone & McLean, 1992, 2003; Gable et al., 2008; Petter et al., 2008; Yin, 1994), understandable (DeLone & McLean, 2003; Gable et al., 2008; Petter et al., 2008; Yin, 1994), formatted (Laudon & Laudon, 2009; Livari, 2005; Seddon & Kiew, 1996), accurate, and timely, if we expect prospective staff to be involved into using of IS application. The researcher believed that, mentioned features affect the usage quality and satisfaction quality, while this relationship will be moderated by age, gender and experience as well, then researcher concluded that:

H3: The influence of ***Information Quality*** on the ***Usage Quality*** is significant and will be moderated by age, gender, and experience in the mandatory system usage.

H4: The influence of ***Information Quality*** on the ***Satisfaction Quality*** is significant and will be moderated by age, gender, and experience in the mandatory system usage.

The researchers believe that in order to have any type of IS's satisfaction, at the first step, system must be used in organization. Previous researchers measured the system usage quality with frequency of use (DeLone & McLean, 1992, 2003) during a day (daily use), task's completeness time (Petter et al., 2008), minute of system usage(DeLone & McLean, 2003; Petter et al., 2008), and perceived dependency by staff. Therefore, the researcher believes that higher levels of system usage quality cause to higher levels of satisfaction quality. Then following hypothesis checked:

$H5_a$: There is a significant relationship between ***Usage Quality*** and ***Satisfaction Quality***

The researchers measured satisfaction in mandatory system usage as perceived enjoyment (Murcko, 2012; Shang & Seddon, 2002; Venkatesh & Bala, 2008), perceived software satisfaction (DeLone & McLean, 1992), perceived hardware satisfaction (DeLone & McLean, 1992), and perceived concern rate of the system. The researcher believe that higher levels of satisfaction quality cause to higher levels of usage quality of the IS application and reverse. Therefore the following hypothesis can be concluded:

$H5_b$: There is a significant relationship between ***Satisfaction Quality*** and ***Usage Quality***

DeLone & McLean (2003) expressed that "Simply saying that more use will yield more benefits, without considering the nature of this use, is clearly insufficient. Researchers must also consider the nature, extent, quality, and appropriateness of the system use". It is important to remember that in the organizational environment, it is system usage that drives requested services and requested consults. Therefore, mandatory or voluntary system usage must be happened in the effective manner in the organization. Without effective system usage, the organization cannot deliver any appropriate services in the modern environments. Therefore, the researcher believe that, the mandatory system usage of the IS application will influence the net benefits of the hospital.

H6: There is a significant relationship between ***Usage Quality*** and ***IS Net Benefits***.

Based on the DeLone and McLean updated IS success model, researcher believe that user satisfaction has significant impact on the net benefits (Guimaraes & Igbaria, 1997; Law & Ngai, 2007; Livari, 2005; McGill et al., 2003; Torkzadeh & Doll, 1999; Yoon & Guimaraes, 1995). In this study this label is changed to satisfaction quality because user satisfaction refers to the satisfaction of information quality, system quality, and service quality, while in the IS success measurement model, satisfaction quality not only cover DeLone and McLean definition, but also

refers to perceived enjoyment and perceived concern rate. If staff be satisfied by using of IS application, then, they are more likely to be wholly satisfied with his or her experience and increase more system usage, decrease task completeness time and then net benefits will be increased accordingly. In this case, productivity, effectiveness, total income, decision making quality, task's performance and profit's performance (DeLone & McLean, 1992; Petter et al., 2008) are more likely to occur and could be measured for net benefits at the organization level. Satisfaction quality measured also by perceived enjoyment, software and hardware satisfaction (Esfahani, 2011), and concern rate of the system (Pitt et al., 1995). Then, the following hypothesis checked:

H7: There is a significant relationship between ***Satisfaction Quality*** and ***IS Net Benefits.***

Data Collection and Sampling Technique

In order to test the initial model (Figure IV), based on the literatures from 1992 to 2012, observed variables for each one of the constructs were retrieved. Then by employing of Delphi technique 116 preliminary measures filtered to 23 final measures which are mentioned in the Figure III. In the survey instrument, Multi-choice questions were designed for personal characteristics (demographic) questions and five-point Likert scale questions were designed based on standard questions for items measurement. These questions, formed preliminary structured questionnaire which was presented for two medical centers' chief executive officer (CEO) and chief information officer (CIO), three clinical and surgical laboratory in charges and supervisors, and three HIS developers to clarify the wording, content validity, and general layout validity of the survey instrument. Accordingly, questionnaire revised by their recommendations and presented again, and then translated into local language. The main survey was carried out and questionnaires were distributed among 408 HIS users by simple random sampling at three clinical and surgical labs in public hospitals. 249 questionnaires Out of 408 questionnaire were validate for data processing and data analysis. IBM SPSS Statistics 20 was employed to carry out descriptive and frequency analysis.84 staff were man in contrast to 165 women. Average experience of staff was 8.59 years, while 139 staff were graduated with bachelor degree.

Tools and Techniques

In the first step, in order to identify errors of data entry and to test that data met all statistical assumptions, data screening was performed. Then, for each item which included in the questionnaire, preliminary descriptive analysis was performed to extract specific statistics. The reliability of the instrument was checked by Cronbach's Alpha (0.873), while validated questions were used in the used instrument.

Recent comparison between traditional regression, covariance-based and partial-least-square-based (two classes of structural equation modeling (SEM)) showed that covariance-based and partial-least-square are appropriate for testing DeLone and McLean model(Gefen, 2000). Accordingly, covariance-based and partial-least-square were suitable for IS success measurement model because IS success measurement model was stand on DeLone and McLean IS success model. Previous finding suggest that SEM approaches such as AMOS, LISREL and EQS are appropriate for confirmatory rather than exploratory analyses, moreover strong theory is required. Furthermore, covariance-based structural equation modeling is suitable for theory and causality relations testing rather than prediction(Chin & Newsted, 1999).Thus, in this research, developed causality model was planned to test. In addition, Seddon(1997) stated that DeLone and McLean IS success model is not very strong model. Secondly, Livari(2005) claimed that "These cases are small for covariance-based structural equation modeling methods, which also impose tighter statistical assumptions than regression analysis and partial-least-square-based methods", therefore, due to the small number of samples (less than 250 samples) in present research which were 248 samples, partial-least-square-based methods techniques with Smart-PLS software, version 2.0.M3(Falkenberg et al., 1998) were used to test the models and all paths within the models.

Moreover, Chin and Newsted(1999) expressed that PLS is appropriate for theory building. Sample size can be considered as minimum as ten time smaller than numbers of items in the most complex latent variable in the model, while parametric assumptions of multivariate normal distribution doesn't imply(Chin, 1998; Gefen, 2000).

Model Validity (Measurement and Structural Models)

Two causal model components consist of measurement model and structural model are recognized by Smart-PLS. Relationship between manifest variables (observed variables) and the latent variables (constructs) were measured by the measurement model. Moreover, Diamantopoulos stated that reliability in the internal consistency sense and construct validity in terms of convergent and discriminant validity are not meaningful for formative constructs (Diamantopoulos A. & Winklhofer HM., 2001). Jarvis et al. (2003) stated four primary decision rules for determining whether a construct is reflective or formative. Prior to data collection, researchers should use of these decision regulations conceptually as they identify the constructs within the research model. In order to distinguish the formative and reflective form of construct, Petter et al. (2007) claimed that the researchers "should consider the theoretical

direction of causality between each construct and its measures. If the direction of causality is from the construct to the items, the construct is reflective. If causality is directed from the items to the construct, the construct is formative".

Furthermore, reliability in the internal consistency sense and construct validity in terms of convergent and discriminant validity are not meaningful for formative constructs (Diamantopoulos A. & Winklhofer HM., 2001). Internal consistency (reliability testing) of indicators is difficult for formative constructs because the indicators are not reflections of the underlying latent variable. Convergent validity for formative constructs is also not relevant. This is due to the fact that formative construct indicators are not necessarily correlated. Discriminant validity however can be tested for both the reflective and formative construct by testing for "whether the constructs are less than perfectly correlated" (MacKenzie et al., 2005).

In the mentioned model (Figure IV), H5 is a mutual relationship between usage quality and satisfaction quality that could not be tested at the same time in the Smart-PLS. Therefore, we prepared two same measurement models with a difference direction in H5. In the model 1, we supposed that influence is from usage quality to satisfaction quality and labeled H5a, while in the model 2 the influence is reversed, from satisfaction quality to usage quality and called H5b.

In order to validate the measurement model (Figure III);we examined content validity. Such a test has content validity if it covers all of the test requirements. Content validity ensures that construct items and related instrument questions are representative and retrieved from a universal pool (Cronbach LJ, 1971). In this research, definitions for all the constructs came from the existing literature, where they had been shown to exhibit strong content validity. In most case content validity is evaluated in discussion with colleagues or other experts (Blunch, 2008). As mentioned earlier, content validity had been done by eight CEO, CIO, clinical lab's in charges and HIS developers.

Following the criteria set by the adopted methodology (explanatory and confirmatory factor analysis), 23 items were selected from the 116 items from various research on constructs of the IS success measurement model by Delphi technique. A construct is validated when items load are above 0.6 for each item and have low loadings on unrelated factors(Hair et al., 1998).All constructs successfully passed the construct validity test. More specifically, it is found that all factor loadings exceed the 0.6 threshold on their own constructs and, at the same time, have low loadings (<0.30) on unrelated factors (Table I).

Construct reliability was assessed using Cronbach's a-value. Nunnally and Bernstein (1994) recommend that the cronbach's alpha should be greater than 0.7 for items to be used together as a construct. Related cronbach's alpha values ranges were from 0.81 to 0.87 for formative constructs. In order to test the convergent validity of the measurement models, the methodology suggested by Fornell and Larcker(1981) was employed. Convergent validity of the model is confirmed since squared factor loadings (SFL's) exceed the 0.50 threshold for all constructs, while composite reliability (CR) and average variance extracted (AVE) for all constructs exceed the 0.70 and 0.50 threshold, respectively (Table I).

Table I: squared factor loadings (SFL's), composite reliability (CR), average variance extracted (AVE), Cronbach's a-value and p-value of model 1 and 2

Construct & AVE	Measure	SFL's	CR	Cronbach's α	p-value	
					Model1	Model2
User Quality 0.749	Motivation	0.725			0.020	0.023
	IT capability	0.678			0.013	0.022
	Training	0.813			0.041	0.035
	KM capability	0.751			0.068	0.048
	Perception	0.777			0.021	0.049
Information Quality 0.781	Accuracy	0.824			0.003	0.001
	Understandability	0.712			0.001	0.0
	relevance	0.906			0.0	0.001
	Timeliness	0.769			0.0	0.0
	Completeness	0.687			0.001	0.002
	Format	0.790			0.0	0.0
Usage Quality 0.805	length of stay	0.863	0.80	0.81	0.0	0.0
	daily use	0.765			0.0	0.0
	task's completeness time	0.806			0.009	0.007
	Dependency	0.786			0.0	0.0
Satisfaction Quality 0.835	Enjoyment	0.893			0.0	0.002
	software satisfaction	0.795			0.003	0.005
	hardware satisfaction	0.908			0.018	0.021
	concern of the system	0.744			0.0	0.0
IS net benefits 0.750	Productivity	0.692	0.86	0.87	0.051	0.049
	Effectiveness	0.732			0.048	0.047
	Income	0.806			0.035	0.032
	decision quality	0.770			0.015	0.022

Discriminant validity is also confirmed by the square root of the variance shared between a construct and its items is greater than the correlations between the construct and any other construct in the model, satisfying Fornell and Larcker's(1981) criteria for discriminant validity (Table II). The results confirmed proposed measurement models by satisfactory content, construct, convergent and discriminant validity as well as construct reliability.

Table II: Discriminant validity (diagonal elements in bold (the square root of AVE) should exceed the inter-construct correlations below and across them for adequate discriminant validity: Fornell and Larcker(1981)).

Construct	Info Quality	IS Net Benefit	Usage Quality	User Quality	Satisfaction Quality
Info Quality	**0.883**				
IS Net Benefit	0.653 0.653	**0.866**			
Usage Quality	0.719 0.713	0.554 0.544	**0.897**		
User Quality	0.679 0.677	0.698 0.697	0.712 0.722	**0.865**	
Satisfaction Quality	0.765 0.765	0.760 0.759	0.721 0.717	0.639 0.639	**0.913**

Latent variables (construct, unobserved) and theoretical relationship between them are characteristics of a structural model. Calculating p-value between two construct indicate to significant of relationships between independent variable and dependent variable. Moreover, each unobserved construct links with a set of manifest items in the measurement model.

Gender, age, and experience have played moderator role on the relationship between independent variables and dependent variables. As mentioned earlier, due to mutual effect between usage quality and satisfaction quality in the current study, Table III mentions to two data sets, upper numbers are relate to model1, while the lower numbers are belong to model2.The details of significant values between user quality and information quality to usage quality and satisfaction quality are listed in Table III.

Table III: p-values comparison between gender, ages, and experience

Relationship	p-value								
	Gender		Age		Experience			Overall	Total effect
	Male	Female	21-31	32-65	1-4	5-10	11-40	Model1 Model2	
userquality→ usagequality	0.122 0.141	0.189 0.219	0.409 0.364	0.001 0.0	0.172 0.076	0.365 0.408	0.0 0.0	0.028 0.033	0.031
userquality→ satisfaction quality	0.081 0.184	0.129 0.427	0.056 0.291	0.454 0.070	0.106 0.118	0.181 0.188	0.264 0.429	0.014 0.063	0.032
information quality→ usage quality	0.519 0.352	0.222 0.362	0.453 0.270	0.474 0.380	0.329 0.315	0.349 0.382	0.430 0.468	0.026 0.050	0.036
information quality→ satisfaction quality	0.486 0.462	0.063 0.020	0.486 0.398	0.020 0.071	0.455 0.472	0.437 0.478	0.081 0.010	0.169 0.076	0.116
usage quality→ IS net benefits	0.341 0.361	0.440 0.480	0.174 0.164	0.171 0.241	0.131 0.104	0.219 0.138	0.0 0.032	0.282 0.247	0.264
satisfaction quality → IS net benefits	0.034 0.022	0.158 0.149	0.102 0.057	0.0 0.051	0.109 0.074	0.137 0.103	0.0 0.0	0.0 0.004	0.0
usage quality(→←) satisfaction quality	0.474 0.002	0.341 0.029	0.252 0.009	0.135 0.241	0.097 0.0	0.227 0.464	0.317 0.451	0.0 0.0	0.0

The mentioned results in Table III are reflected to Figure V. In Figure V significant relationships are illustrated by normal lines, while insignificant relationships are presented by dotted lines. Data analysis show that user quality influence usage quality and satisfaction quality. Age and experience moderated the relationship between user quality and usage quality and the other relationships were note moderated by age and experience. Information quality unexpectedly did not influence satisfaction quality.

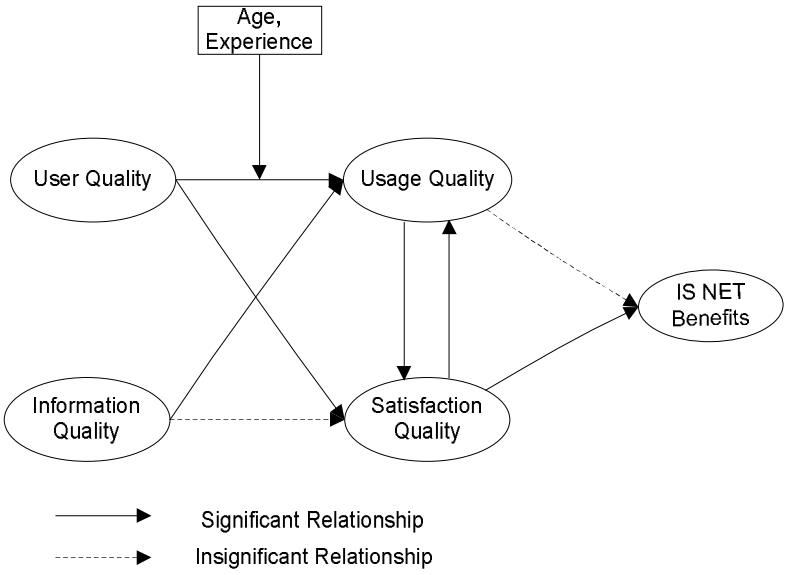

Figure V: Confirmed two perspective of IS success measurement model

DISCUSSION

Table IV summarizes derived hypotheses from two perspectives IS success measurement model under influencing of key moderators. Overall; the results support the most predicted relationships of the initial model in health context. The significant of the relationship between user quality and usage quality and satisfaction quality are 0.031 and 0.032, respectively. These numbers show strong effect of user quality to usage quality and satisfaction quality. This finding confirmed the neglected user's role in IS success measurement that have been observed by Petter et al. (2012) and claimed by Monem et al (2013).

Table IV: Summary of hypothesis

Hypothesis symbol	Independent variables	Dependent variables	Moderators	Result
HI	user quality	usage quality	age, experience	confirmed
H2	user quality	satisfaction quality	None	confirmed
H3	information quality	satisfaction quality	None	rejected
H4	information quality	usage quality	None	confirmed
$H5_a$	usage quality	satisfaction quality	Didn't test	confirmed
$H5_b$	satisfaction quality	usage quality	Didn't test	confirmed
H6	usage quality	IS net benefits	Didn't test	rejected
H7	satisfaction quality	IS net benefits	Didn't test	confirmed

Results from research also showed that information quality has strong effect on usage quality and insignificant influence on satisfaction quality. The significant effect from satisfaction quality to the IS net benefits was considerable, while the influence from usage quality to IS Net benefits was not significant. This insignificant relationship confirmed the Livari's theory (2005) in 2005. The mandatory nature of the system usage toggled relationship between usage quality to IS net benefits from significant in voluntary usage to insignificant effect. The rest of hypothesis confirmed the DeLone and McLean IS success model's prepositions.

Satisfaction quality measures compatibility between information quality and user quality from users' perspective that is influenced by personal characteristics such as age, gender and experience. Therefore a positive relationship between satisfaction quality and IS net benefits is quite understandable. Correct users' perception of required compatibilities increases satisfaction quality and as a result, positive relationship between satisfaction quality and usage quality decreases task completeness time, while increases dependency, productivity, decision quality, efficiency.

From a more practical point of view, the power of user quality and information quality as predictors of usage quality and satisfaction quality, suggests that they provide an effective diagnostic framework in which to analyze system features that may "cause" quality of satisfaction or dissatisfaction. The close and high significant association

between usage quality and satisfaction quality appeared in the mandatory usage situation and effectiveness on the IS net benefits affect via satisfaction quality.

Conclusions

This study was conducted to test the roles of users as a neglected perspective besides of information quality in IS success measurement models. In contrast to voluntary system usage which has been more investigated in the literatures, mandatory system usage investigations in healthcare context have been quite inadequate. Reliable questionnaires by random simple sampling were distributed among 408 staff of clinical and surgical laboratories, CEO, CIO, and wards' in charge in medical centers. From 408 distributed questionnaires, 249 correctly answered questionnaires were contributed in the research. Results indicated that user quality and information quality significantly influence usage quality, while information quality did not influence satisfaction quality significantly. Mandatory system usage in the selected labs toggled the influence of relationship between usage quality and IS net benefits from significant relationship (voluntary usage) to insignificant (mandatory usage). In addition, Strong significant relationship is indicated from satisfaction quality to IS net benefits.

The findings show that the proposed IS success measurement model from information quality and user quality perspectives is a valid and reliable IS model and it can be used by other researchers elsewhere. The results of this study clarified the crucial role of staff in IS success. Although, the developed model tested in the health context, it can be considered as an IS success measurement model by other mandatory system usage in public and private organizations in developing countries.

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