

Assessing User Satisfaction of using Hospital Information System (HIS) in Malaysia

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Abstract—Hospital Information System (HIS) has been successfully being implemented in Malaysia since 1998. However, there is little research being conducted to evaluate the level of satisfaction among the system's user. There is a need for more investigation and researches being conducted to investigate the quality of the system. The main objective of this empirical study is to investigate the level of user satisfaction of using HIS in Malaysia. The data was analyzed by using kruskal-wallis. Survey data of 248 respondents from two different hospital in Malaysia that uses similar HIS were used. The users include physicians, nurses, laboratory technologies, pharmacists and others. The results show that there are significant differences between different types of users for HIS in Malaysia in terms of the (i) quality of HIS interface, (ii) quality of HIS Function, (iii) quality of HIS Performance and (iv) quality of HIS (*combination of HIS interface, HIS Function and HIS Performance*). Thus, provide indication for customization and better understanding for different type of HIS users to improve the quality of HIS from end-user's perspectives.

Keywords- *System evaluation, hospital information system, human computer interaction*

I. INTRODUCTION

HIS can be defined as a massive, integrated system that support the comprehensive information requirements of hospitals, including patient, clinical, ancillary and financial management [1] [2] [3] [4]. Hospitals are extremely complex institutions with large departments and units coordinate care for patients [5]. Hospitals are becoming more reliant on the ability of hospital information system (HIS) to assist in the diagnosis, management and education for better and improved services and practices [5] [4]. As a result, there has been widespread agreement and comprehension that IT has the potential to improve the quality and reduce the cost such as scenarios which is vividly seen in the U.S [6] [7].

In health organization such as hospitals, implementation of HIS inevitable due to many mediating and dominating factors such as organization, people and technology. HIS may subsequently improve the quality of care delivery and reduce costs. However, adoption of HIS among users needs evaluations to ensure its quality, reliability, maintainability and sustainability for its existence and span of system lifecycles. The problems arise when users reluctant and having difficulties to use the system. Consequently, the HIS may be under utilized by the users. More empirical investigations are being required to identify problem and weaknesses of HIS for better understanding of the requirements for different types of HIS users.

Hospital Information System (HIS) have been successfully being implemented and used since 1998 in Malaysia [8]. However, there is little research being conducted to evaluate the level of satisfaction among system's user. For example, previous research includes evaluations being conducted at Hospital Selayang, Selangor, Malaysia in year 2001 and 2003 [8]. However, there is a need for more investigation and researches being conducted to assess the system ensuring the continuity of the quality of the system and user satisfaction. The main objective of this empirical study is to investigate the level of user satisfaction of using HIS in Malaysia. The instrument was adapted from Barley and Pearson (1983) and Ribière et al. (1999) (cited in [9]). The next section discusses the (i) literature review, (ii) research methodologies, (iii) results and analysis and (iv) conclusions.

II. LITERATURE REVIEW

A. Hospital Information System (HIS)

Hospital information systems (HIS) are just one instance of health information systems, with a hospital as health care environment [3]. A HIS is a comprehensive and integrated information system designed to store, manipulate, retrieve information of the administrative and clinical aspects [11].

B. Critical Success Factor for HIS Development

There exist some contributing factors that determine the success or failure of the completion of IT projects including the development and implementations of HIS. Analysis of literature shows some of the CSF as listed at Table I. The planning, development and implementation depends on various factors that exist from the context of hospital. Therefore, certain IT solutions are rather impossible to be implemented to different hospitals as subjected to local context, both organizationally and culturally [12].

TABLE I. CRITICAL SUCCESS FACTOR HIS DEVELOPMENT

CSF	Reference	
	[12]	[13]
People characteristics, education & training, and user involvement both at system requirements definition and project implementation	✓	✓
Outsourcing, vendor commitment, including vendor support	✓	✓
Annual IT Budget	✓	✗
System's Evaluation	✓	✗
Software and Hardware and Data accuracy (Technical issues)	✓	✓
Organizational environments,	✗	✓
Cultural impact	✓	✓

C. Studies on HIS

Table II shows summarizes studies being done on HIS and type of studies which include evaluation, development and implementation, method, concept and integration studies that related with HIS from various countries. Theses indicate that more pertinent empirical investigations are being required to evaluate the HIS towards increasing the quality level of HIS.

TABLE II. EVALUATION OF HIS

Evaluation criteria	Title	Country	Author
Satisfaction	Assessing Users Satisfaction through Perception of Usefulness and Ease Use	Italy	[14]
	Towards Responsive IT-Infrastructures - Assessment	Germany	[15]
	The Workings of a Paperless Hospital	Malaysia	[8]
Usability	Assessment of Success of Hospital Information System in a Public Sector Hospital	South Africa	[16]
	Questionnaire Based Usability Evaluation of Hospital Information Systems	Germany	[17]

Evaluation criteria	Title	Country	Author
Information quality	New Health Information Systems (HIS) Quality-in-Use Model Based on the GQM Approach and HCI Principles	Saudi Arabia	[18]
	Assess the quality of information processing in hospitals	Austria	[19]
	Correlation Between Information Quality, User Acceptance And Doctors' Attitude Of EMR System	Malaysia	[20]
Cost Impact	Measuring the cost impact of hospital information systems	U.S	[21]

D. The early stage of HIS implementation in Malaysia

HIS in Malaysia started at Putrajaya and Selayang Hospital as well as Putrajaya Clinic [22]. Early IT implementations started between 1991 and 1995, and were designed to handle administrative tasks, drug inventory management, finance and health management information reporting. Salleh (2003) believes that that IT initiative can help fulfil our government vision for health that is providing an integrated delivery system across each business unit of a hospital which will help the care providers to deliver effective and efficient care [8]. In 1998, the first paperless and filmless hospital in Malaysia was the Selayang Hospital, Selangor, Malaysia and was being considered as the best example of effective implementation of a HIS [8]. At that time, rather than develop an in-house system, the Ministry chose vendor solutions because of faster implementation [23].

III. RESEARCH METHODOLOGY

The research instrument was a questionnaire adapted from Barley and Pearson (1983) and Ribièrè et al. (1999) (cited in [9]) but has been modified by the researcher to suit the purpose of this study. The questionnaires were distributed to 400 HIS users from two different hospitals in Malaysia that uses the same HIS system. However, only 261 respondents had answered to survey questionnaire. The data with missing values were omitted resulting with only total of 248 surveys response to be analyzed for further data analysis.

IV. RESULTS AND ANALYSIS

A. Descriptive statistics

Table III shows the descriptive statistics of the sample. The sample consists of (i) physicians with 21.8 %, (ii) nurses with 32.7%, (iii) laboratory technologies with 4.8%, (iii) pharmacist with 7.3% and (iv) 'others' with 33.5%. Majority of the sample (50.8%) had been working in the hospital between one to five years. Data from Table IV shows that more than 66% of the respondents are frequent users as they have been using HIS more than ten times a day.

TABLE III. DESCRIPTIVE STATISTICS (RESPONDENTS PROFILE)

Characteristics		Frequencies	Percentage
Gender	Male	58	23.4
	Female	190	76.6
Position	Physicians	54	21.8
	Nurses	81	32.7
	Laboratory Technologies	12	4.8
	Pharmacists	18	7.3
	Others	83	33.5
Age	Under 26	29	11.7
	26-35	159	64.1
	36-45	42	16.9
	Above 45	18	7.3
Years of Working in Hospital	<1	27	10.9
	1-5	126	50.8
	6-10	55	22.2
	>10	40	16.1

TABLE IV. FREQUENCIES OF USING THE HIS IN A DAY

Number of use	Frequency	Percentage
<1	2	0.8
1-5	49	19.8
6-10	33	13.3
>10	164	66.1

The total data gathered from the administered questionnaires are 248 respondents. The next sub-section discusses the inferential statistics of the study.

B. Inferential statistics

Data gathered was not normally distributed for all type of inferential analysis. This is based on the Shapiro and Wilk analysis. As the p-value is less than 0.05, the distribution is not normal. Kruskal-Wallis test was used for the non-parametrics analysis.

i. Quality of HIS Interface

RQ1: Is there enough evidence that on the average total score quality of HIS Interface are different for positions (*between Physicians, Nurse, Lab Technologist, Pharmacist, others*)?

The Kruskal-Wallis test was used. There is statistically significant different in the total Quality of HIS interface score across five groups as the sig-value was 0.006 and less than the alpha level 0.05. An inspection of the mean ranks in Table V suggests that Nurses had the highest satisfaction on the Quality of HIS Interface, followed with 'others', pharmacists, physicians and laboratory technologies.

TABLE V. MEAN RANK OF FIVE INDEPENDENT GROUPS (QUALITY OF HIS INTERFACE)

Position	N	Mean Rank
Physicians	54	101.82
Nurses	81	144.12
Laboratory Technologies	12	93.79
Pharmacists	18	115.14
Others	83	126.57
Total	248	

ii. Quality of HIS Function

RQ2: Is there enough evidence that on the average total score quality of HIS Function are different for positions

(*between Physicians, Nurse, Lab Technologist, Pharmacist, others*)?

The Kruskal-Wallis test was used. There is statistically significant different in the total Quality of HIS function score across five groups as the sig-value was 0.000 and less than alpha level 0.05. An inspection of Table VI shows that the mean rank suggests that nurses had the highest satisfaction on the Quality of HIS Function, followed with 'others', physicians, laboratory technologies and pharmacists.

TABLE VI. MEAN RANK OF FIVE INDEPENDENT GROUPS (QUALITY OF HIS FUNCTION)

Position	N	Mean Rank
Physicians	54	111.46
Nurses	81	152.60
Laboratory Technologies	12	87.75
Pharmacists	18	70.06
Others	83	122.68
Total	248	

iii. Quality of HIS Performance

RQ3: Is there enough evidence that on the average total score quality of HIS Performance are different for positions (*between Physicians, Nurse, Lab Technologist, Pharmacist, others*)?

The Kruskal-Wallis test was used. There is statistically significant different in the total Quality of HIS performance score across five groups as the sig-value was 0.001 and less than alpha level 0.05, so we can conclude that there is statistically significant different in the total Quality of HIS performance score across five groups. An inspection of Table VII suggests that the mean ranks of Nurses had the highest satisfaction on the Quality of HIS Performance, followed with 'others', physicians, pharmacists and laboratory technologies.

TABLE VII. MEAN RANK OF FIVE INDEPENDENT GROUPS (QUALITY OF HIS PERFORMANCE)

Position	N	Mean Rank
Physicians	54	109.71
Nurses	81	145.47
Laboratory Technologies	12	79.00
Pharmacists	18	97.67
Others	83	126.05
Total	248	

iv. Quality of HIS (combination of HIS interface, HIS Function and HIS Performance)

RQ4: Is there enough evidence that on the average total score quality of HIS (combination of HIS interface, HIS Function and HIS Performance) are different for positions (*between Physicians, Nurse, Lab Technologist, Pharmacist, others*)?

The Kruskal-Wallis test was used. There is statistically significant different in the total Quality of HIS (combination of HIS interface, HIS Function and HIS Performance) score across five groups as the sig-value was 0.000 and less than alpha level 0.05. An inspection of the mean ranks of Table VIII suggests that Nurses had the highest satisfaction on the

Quality of HIS, followed with others, physicians, pharmacists and laboratory technologies.

TABLE VIII. MEAN RANK OF FIVE INDEPENDENT GROUPS (QUALITY OF HIS)

Position	N	Mean Rank
Physicians	54	103.25
Nurses	81	151.30
Laboratory Technologies	12	80.42
Pharmacists	18	99.39
Others	83	123.99
Total	248	

V. CONCLUSION

The results show that there are significant differences between different types of users for HIS in Malaysia in terms of the (i) quality of HIS interface, (ii) quality of HIS Function, (iii) quality of HIS Performance and (iv) quality of HIS (*combination of HIS interface, HIS Function and HIS Performance*). Thus, provide indication for customization and better understanding for different type of HIS users to improve the quality of HIS from end-user's perspectives. HIS managers and developers may attain benefits from this study towards better understanding of the different requirements and level of satisfactions among HIS's users. The result can be used a guidance to improve the quality of HIS and meet different expectations and demands from different types of HIS users. It is important to be able to quantify user satisfaction to justify the cost, implementation time, user involvement and testing in the development, implementation and maintenance stage of HIS. Collaboration with the users, training and support by the technical personnel may well be feasible for future HIS development methodology and implementation.

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