A Qualitative Study of Medical Staffs on Acceptance Model of Hospital Management System

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Abstract
In this current technological era, the implementation and use of information and communication technology (ICT) has infused almost all features of life due to its significant effect on productivity and organizational management. Therefore, implementing ICT in the health sector is not an exception. Studies have shown that user acceptance and system usability are precondition for successful implementation of Hospital Management System (HMS). Therefore, this study aimed to investigate the factors that affect the staff-user acceptance of HMS using the Unified Theory of Acceptance and Use of Technology (UTAUT), in a private hospital in Malaysia. A semi-structured interview was conducted to study the behavioral attitude and acceptance of doctors and nurses towards the existing system that has been used at each department that involve from front desk to clinical. Data collection was undertaken using an interview and observation and it was analyzed using ATLAS.TI. Application of the research model suggested that hospital staff acceptance of HMSs was influenced by performance expectancy, effort expectancy, social influence and facilitating conditions, with performance expectancy having the strongest effect on user intention. From here, the data will be analyzed to come up with a result for the new enhancement and further study to improve the system of the HMS. As a result, the system's availability and support play a significant role in facilitating direct data entry and retrieval, as well as the user interface's ease of understanding and quick results. Users believe that some part of the system is slowing down their processes and quality of work because it takes a lot of time to process. As HMS kept implementing and upgrading, doctors and nurses needed to adapt to the new system changes, therefore, this research is responsible for the findings that allow healthcare systems to focus on the main factors that facilitate the adaptation and acceptance processes.

Keywords:
Information Technology, Health Management System, User Acceptance, User Perceptions, System Performance, Social Influence, Facilitating Condition, Qualitative, Acceptance

Introduction

Hospital Management System (HMS) in the current era have the potential to reduce any documenting errors and improve communication between two different departments and management. It is also helps to improve the quality of health care in the sector. Due to the existence of the system, the performance has increased steadily over the past few years, which has encouraged more people to use and implement the system everywhere in the health care sector. Therefore, it plays an important role in refining the efficiency, quality and access to healthcare services. However, despite all the service and ability to improve, there is a consistent need to improve the HMS from time to time to have better quality service.

Many studies suggested that system delay and unsuccessful implementation of the HMS or medical record systems are largely due to the staff acceptance towards the system used. Therefore, it is essential to do staff training to promote a positive attitude towards HMS and increase their trust in the system's benefits.

This study is beneficial to the hospital to improve the HMS and its acceptability among users. Given that the end users' acceptance is one of the most important aspects, it is necessary for them to understand the process and navigation used, in order to apply the data recording and management system more efficiently. Assessing the required acceptance factors among different user groups can also enhance future HMS implementation. This can benefit both the end users and the company in term of cost and time saving. Studying the acceptance model also benefits the IT-experts to identify necessary potential changes which are needed in the HMS especially towards the front desk system. Therefore, this study aimed to explore the factors that affect the staff-user acceptance of HMS based on the Unified Theory of Acceptance and Use of Technology (UTAUT), in a private hospital in Malaysia.

Ever since its invention, HMS is well-known for several advantages. Firstly, it helps to reduce the volume and storage area of physical data. Data and information can be archived offsite for safe storage and this allows organizations to reduce storage space needed. Secondly, HMS is much faster and more reliable in terms of information and data retrieval, which is exceptionally important in large scale service deliveries. Additionally, it is also important to improve data security of the patients and staffs. Since data stored is secured by access-controlled system, this helps to prevent data breaches and violation.

This research mainly to investigate and contribute the factors of doctors and nurses in accepting HMS by using UTAUT method which it is considered as trustworthy model that use to seek human factors such as Perceived Usefulness (PU) and Perceive Ease of Use (PEU) to predict the adoption of HMS within the health sector. Prioritizing and identifying the elements for the factor of success implementation the HMS is crucial, therefore it is important to access the issue that could influence the acceptance of the system. The unified theory of the acceptance and use (UTAUT) model is one of the widely used and preferred tools for assessing technology acceptance.

Benefits of Hospital Management System

Each and every individual research study is uniquely executed for specific organization will produce different result beneficial for growth. This study will be beneficial to specific hospital to improve and arise a crucial question regarding improving the system and acceptance of the users. End users of any system make up the most important aspect as it is the users that have to understand the process needed to use the system efficiently. When the end users understand the process correctly and understand how to navigate through the system flows, documents management system efficient work is the result. When this happened, it will not only do the end users to see the advantage in works they perform, but also the entire company benefits in term of cost and time. This study also benefit to the IT-experts to identify necessary potential changes which needed in the HMS especially toward the front desk system.

Therefore, if result shows user acceptance the system, that's mean, the system is good and able to identify the factor for each specific user group in order to find universal solution for in future enhancement. This study also help to understand the required acceptance factors among different user group before implementing HMS.

Aside from that, Hospital Management System (HMS) also carries several advantages:-

- It is helping to reduce the volume of physical data and the data storage area. Data and information can be archived offsite for safe storage in which this indirectly will allow some organizations to reduce their storage space requirements
- Fast to retrieve of data and information in which a successful systems can beneficially retrieve information and data. This will helps to deliver a larger services.
- Improve data security level of patients and staffs data which when everything is handled by an access-controlled system where the availability of information depends on user rights, there is no possibility of error.

This research mainly to investigate and contribute the factors of doctors and nurses in accepting HMS by using UTAUT method which it is considered as trustworthy model that use to seek human factors such as Perceived Usefulness (PU) and Perceive Ease of Use (PEU) to predict the adoption of HMS within the health sector. Prioritizing and identifying the elements for the factor of success implementation the HMS is crucial, therefore it is important to access the issue that could influence the acceptance of the system. The unified theory of the acceptance and use (UTAUT) model is one of the widely used and preferred tools for assessing technology acceptance methods.

Theoretical background

This section present an overview of what Unified Theory of Acceptance and Use of Technology (UTAUT) and what main thing that lead to the acceptance of the system in the health sectors. A number of model that been used to predict factor that leading to the acceptance of Health Management System (HMS), in which by using the unified theory of acceptance and use of technology is consider the most effective to be used for the intention of the actual system. This model is interpreted for the understanding deep on behavioral intention of users toward the system which it consider convenient instrument to measure the success of the acceptance. This model suggesting four (4) predictive factors; Performance Expectancy (PE), Perceived Ease of Use (PEU), Social Influence (SI) and Facilitating Condition (FC).

The proposed model is made in this study for hypothesize that apart of the four basic constructs may have significant impact of the behavior intention and used of the system in the hospital sector. The model is made to ensure the main cause of the intention to be use by the doctors and nurses is clearly represent and acknowledge. The following sections explains the hypothesis that developed in this study for investigating the research questions.

Performance expectancy (PE)

Perceive Usefulness also known as Performance Expectancy is the level at which users anticipates that utilizing a given system will assist them in reaching achievements in their job performance. Based from Venkatesh et al (2003) mention that, performance expectancy is defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance” (The construct has five other construct roots: perceived usefulness (PU) from Technology Acceptance Model (TAM) or Technology Acceptance Model 2 (TAM2) and Theory of Planned Behavior (TPB) combined, extrinsic motivation from the motivational model, relative advantage from division improvement theory and expectation or outcome from social reasoning theory.

Perceived Ease of Use (PEU)

Perceived ease of use also known as effort expectancy is used to describe the system's usability's level of easiness. Its root constructs are the combination of TAM and TPB, complexity and ease of use. Although effort expectancy had only border line effects on adoption intentions, meta-analysis revealed that effort expectancy had the greatest impact on older individuals' intentions to participate in HMS.

Based on Venkatesh et al. in 2013, Perceive ease of use is the level of ease that is related to the application of a specific system and social influence is the level at which individuals perceive that essential people believe that they need to use the recommended different system. He also found that the effect of enabling condition on the application of a system is primarily moderated by the experience and age of an individual. He also said that facilitating condition as the level at which a user asserts that a technical and organizational infrastructure exists normally to assist the use of a given system.

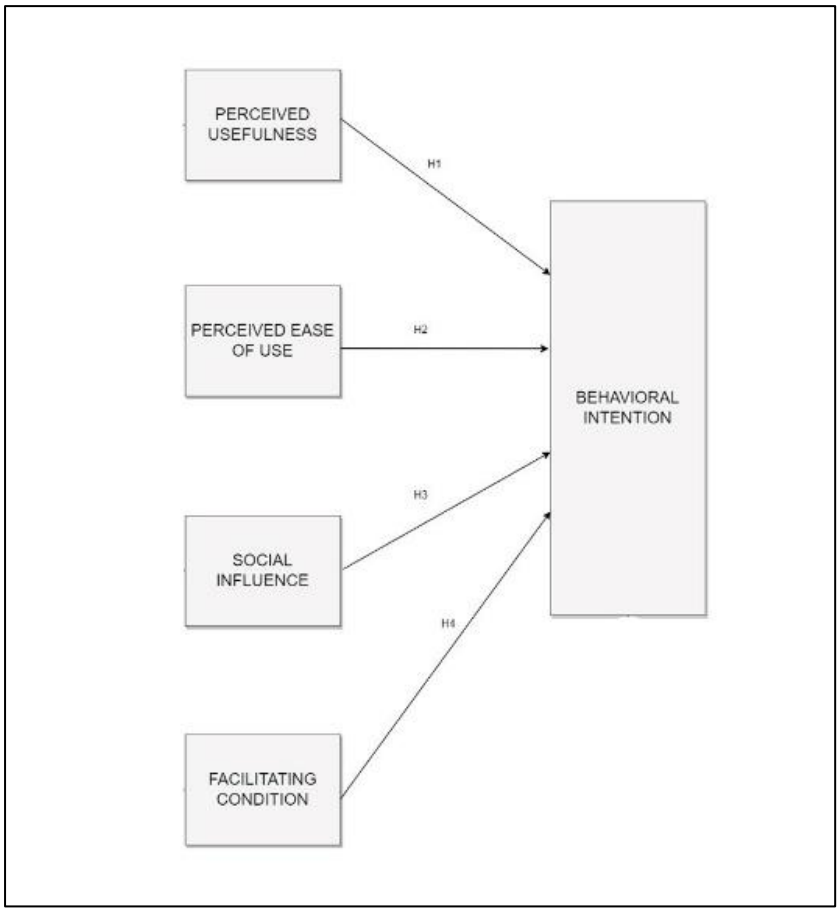
Social Influence (SI)

Social influence is the degree to which people believe that they should attempt utilizing the new system because those who are close to them or who have important roles in their lives are trying it. Its fundamental components include social variables, subjective norms derived from TRA and TAM, and image. Little impact sizes for social influence are shown by meta-analysis, which is in line with other studies that did not discover a strong relationship between social influence and intention.

Facilitating Condition (FC)

Facilitating conditions refer to the degree to which people believe that certain organizational and technological factors exist that make it easier to operate the system is referred to as the concept of "facilitating circumstances." Its root constructs are perceived behavioral control, facilitation condition and compatibility. In meta-analyses, facilitating conditions had the least impact on tablet usage intentions, which is not unexpected given Venkatesh et al (2003).

Figure 1: UTAUT model proposed in this study



Methods

Research design

Based on this research, it will be conduct according four (4) main phases:

Phase 1: Sample and Setting

Main interview questions is made for the semi-structured interview for interviewing nurses and doctors of MSUMC. After the interview question is done, making letter for the ethical approval from the authorized individuals. Once is obtained, the observation and interview will be done in MSUMC, Shah Alam later this year. The interview focus nurses and doctors of departments that involve on using the Hospital Management System. Reason of this selection because they mainly involve on the engaging with the system every day for their work, so expecting they know how well is the system.

The interview questions will be divided into three (3) sections:

- Respondent profiles, which will include information such as name, position, gender, level of education, age, and phone number.
- Users who primarily use HMS, what modules were utilized and how frequently and suggestions for improvement
- Acceptance factors for HMS users

There is a scale level available, which is separated into five parts. The scale level is computed using these values and is based on the opinion level scale (strongly agree, agree, neutral, disagree, and strongly disagree). >1.8–2.6 agree, >2.6–3.4 neutral, >3.4–4.5 disagree, >4.5 strongly disagree; 1–1.8 strongly agree; >1.8–2.6 agree; >1.8–2.6 agree; >2.6–3.4 neutral; >3.4–4.5 disagree; >3.4–4.5 disagree; >3.4–4.5 strongly disagree. This scale is use to determine the satisfaction and acceptance of them toward the existing system.

Phase 2: Data Collection

Top-level officers, leaders of departments and units such as doctors and nurses, as well as anybody else who uses the system at MSUMC, will be the primary target population. The selection of these individuals was based on the need for a clear view from top-level management who have a more in-depth understanding of the system than the bottom-level user. This target audience is critical for acquiring data that will aid in obtaining high-quality information on MSUMC's Hospital Management System. Therefore about 25 people from each departments involve.

In terms of data gathering, this study will conduct an unstructured interview with a randomly chosen respondent. This is to ensure that prejudice is eliminated and that the information acquired is clearer as a result of factors such as respondents' "feeling comfortable to tell" even if it is indirectly. Furthermore, doing this form of interview is "flexible," allowing you to adjust questions as needed. During the numerous interviews, an electronic recording device was employed to record all of the participants' spoken responses. This is also true of observation, where unstructured is widely utilized and experiencing the real world and system can help to strengthen and validate the supported outcome. By doing so, it will be easier to further examine the data and see each and every component of the system as well as each individual's performance. The interviews took place in the doctor's office or the management office and lasted between 5 and 15 minutes. The interviewer will read the questions and ask the doctor and management which aspects they believe are the most crucial for HMS user approval.

The main reason for choosing this strategy is to avoid organized data collection due to bias, as the bulk of the participants or respondents will be “the best” from the business, affecting the research results.

As for the sampling size, to cover and answer the objective result, it will be calculated using an adjusted single population proportion formula with an additional 20% of non-response rate, giving rise to a final sample size, n = 158. Infinite single population proportion formula (Cochran’s Formula).

Therefore, interview will involve for the research study to 158 people. This method provides user-oriented, summative as well as formative approach for the evaluation on the technology. Each statement for each element in the interview questions, is assessed on five (5) point of rating scales which start with disagree to agree which also include further category which is no opinion which help to reduce random answers.

Phase 3: Analysis

During this phase, utilizing the inductive and deductive method using the constant comparative analytic approach, semi structure interview during the pre-observation. Also, a lot of data collections via journal, conference paper and documentations been gather for conducting this study. Atlas.ti qualitative data analysis software is used for supporting analysis.

Atlas-ti will be utilized to locate keywords from prior studies in order to analyses the challenges that have been encountered in earlier studies as well as certain methods that have been used by numerous researchers. Primary data covers the interview and observation questions and points needed to obtain data for the project's goal. Books, reports, newspapers, articles, journals, and historical documents are examples of secondary data. This is a review of current materials or literature relating to the topic from previous studies. It also aids in the development of knowledge on the subject of study. They collect the data from respondents, analyse it and then process it. The information is supplied in the form of demographics.

By using Unified Theory of Acceptance and Use of Technology Model (UTAUT), each interview question will be represent for each PEU, PU, Social Influence and Facilitation of conditions of nurse and doctor, in which a cross sectional interview will be conduct to answer each hypothesis that been set which are:-

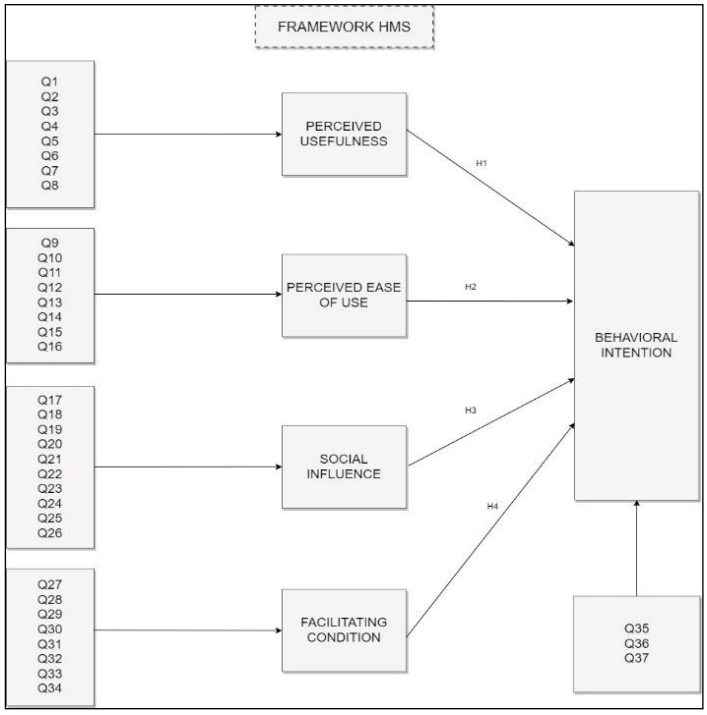
Hypothesis 1: Perceive Usefulness has a significant effect on the staff behavioural intentions to adopt hospital management systems.

Hypothesis 2: Perceived ease of use has a significant effect on the staff behavioural intentions to adopt hospital information systems.

Hypothesis 3: Social influence has a significant effect on the staff behavioural intentions to adopt hospital management systems.

Hypothesis 4: Facilitation of conditions has a significant effect on the staff behavioural intentions to adopt hospital information systems.

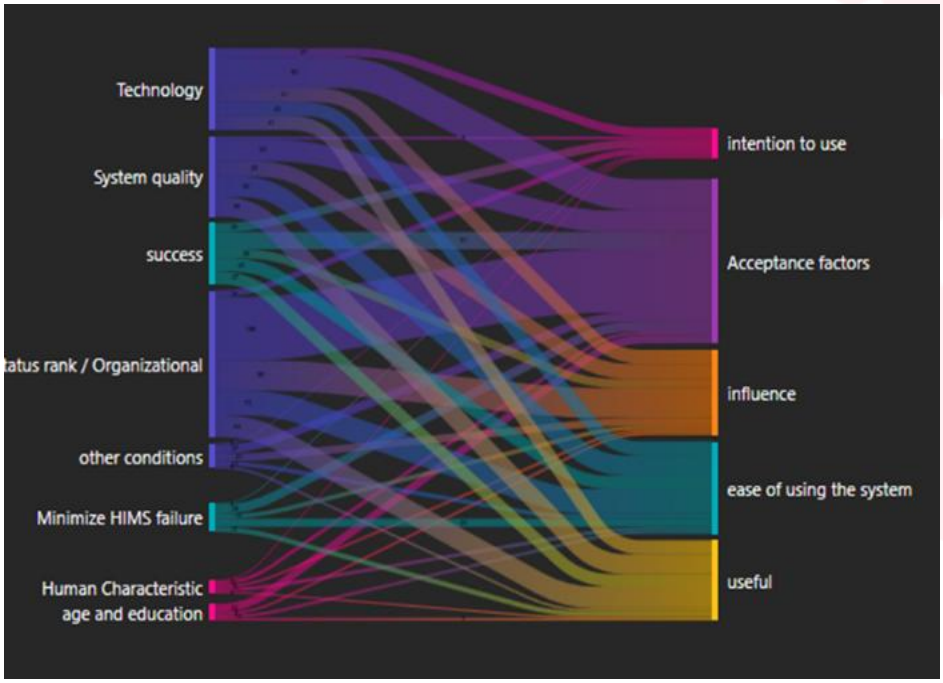
Figure 2: UTAUT model use in this study



Phase 4: Result

A total of 158 respondent over 200 that involve during the pilot tested which involve their age, education and position. Based interview, observation and study from previous journals and articles by using Atlas.ti for qualitative data, manage to simplify and visualize what the main thing that involve for the acceptance towards HMS.

Figure 3: Element that lead to the factor the acceptance



The main acceptance factors toward the system is link to technology, system quality, organizational factors, other condition, way of minimize the HMS failure, human characteristic and person background such as age and education. The organizational factor giving huge impact in the acceptance factors which follow up by the technology and system quality.

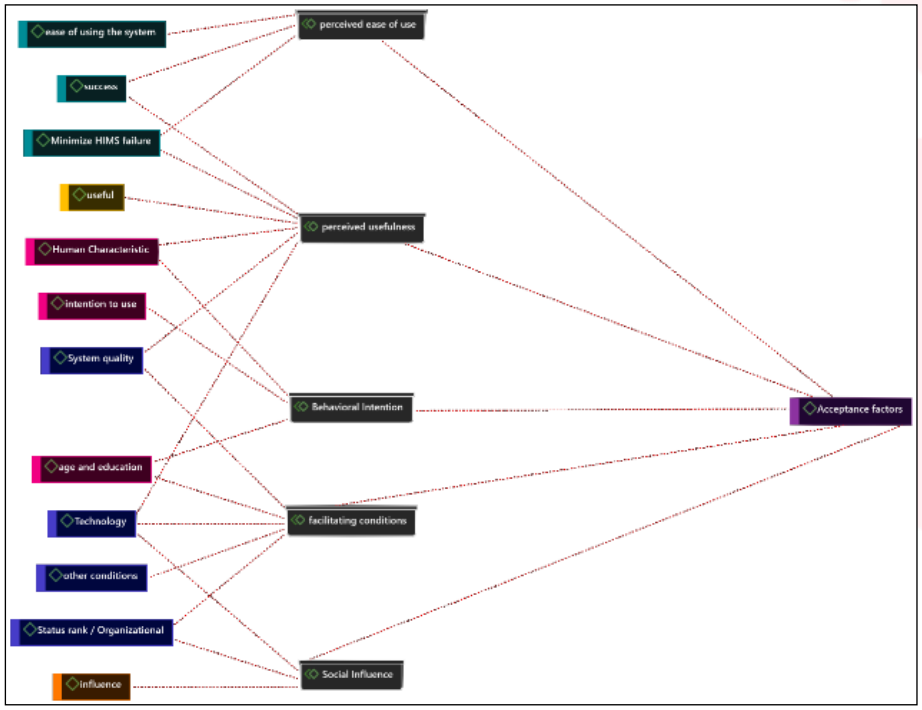
Useful (Perceive usefulness) link to technology, system quality, success of the system, organizational factor, other conditions, factor that minimize HMS failure, human characteristic and person background. However the one play huge role for this factor is the organizational factors where they need to follow up with the higher rank of the organizational status.

Ease of using the system (Perceived ease of use) play role for the factors of technology, system quality, success of the system, organizational factors, other factors and condition that minimize the factors of failure. Success on developing the system is playing huge role for the impact to make staffs use the system itself.

Social influence link to the factor of technology, system quality, the success of the system, organizational factors, other conditions, minimize the factors failure, human characteristic and the person background. Technology and organizational factor playing huge role for the staff to use and accept the system as they are.

Behavioral intention to use is link to few factors such as technology, system quality, success of the system, other conditions, minimizing the HMS failure and human characteristics. Technology playing huge factor for the staffs to develop or interested to use the system in this current era.

Figure 4: framework that link to acceptance factors



Acceptance factors depend on the 5 main factors that can be categories: (1) perceive ease of use, (2) perceive usefulness, (3) social influence, (4) facilitating factor and (5) behavioral intention. Each of the categories is linking to one and another as shown because they share same impact and element to each factor

Discussion

By using Unified Theory of Acceptance And Use of Technology Model (UTAUT), doing the qualitative data gathering method at MSUMC, as it been agreed by the staff and people who involve, that the main factor of the acceptance toward the system are the facilitating condition which include the management support and human character which also known as perceive usefulness and perceived ease of use have the largest influence on HMS user acceptance. However the hospital management been focus on the development and technology characteristic without considering what the user needs. The user interface is been focus for "IT people level" of understanding. It is important to understand what the user needs and want for each and every departments in order to increase the success of HMS implementation. These results also shown there is still a lack of supporting infrastructure in the hospital and user still cannot make optimal use of HMS.

Perceived usefulness is second key factor that increase HMS user acceptance where it is the important element of intention to use the system and improving the quality of the system in order to suit the need for the HMS user. Hospital management should give training and socialize with certain people for increase the sense of responsibility to manage HMS. This indirectly highlighted as one of the important factor on increasing the user acceptance and success rate on using the system. It is because training campaign will improve the user to develop and enhance the knowledge for using the HMS.

Another important factor for the acceptance HMS is the quality that can generate information and the system easy to use. According few studies, a well design HMS cannot succeed due to lack of system use or user failure to change or adapt HMS and it has been explain that system and information quality have a simultaneous interplay and it giving impact on user satisfaction and performance. Good system is characterized by minimal errors, user-friendly interface, quality of HMS documentation management and system being safe and quick to use.

The staffs stated that the most important factor of the user acceptance toward the system are facilitating condition, training, participation of end user in the implementation process, information quality, system quality and perceived usefulness. This factor are important for the stuffs who affected by facilitated

condition and infrastructure to support the use of HMS. However most staffs such as nurses and doctor refuse to use HMS due to lack of integration, double their work due to recording both digitally and traditionally, system not user friendly and lack of support. This is also because of facilitating condition due to their age and lack of IT knowledge.

Contribution of the study

To conclude for this study, there are three (3) area that will benefit with this research for future development of the system:

User

The impact of attitude on an individual respond to change can be significant for the research. A semi-positive accepting attitude toward change has been shown to result in engagement with changes required and more positive work behaviors toward handling and using the system. For this study majority department with young age intend to adept the system easily compare to the older staffs which they require training and explanation deeper on handling the system. Many noted that they been experience frustration with the HMS which they do recognize the benefit but the usage is time consuming and confusing which it delay and slow down their work even more than usual. With this study, it can show that which area is mainly highlighted on improving for the next update on the system on what they required. Organizational rank in the hospital is play big role for them to adept and accept the system entirely with supervisions.

Area of study

This study focus from the area of front desk up to the clinical system. There are few area is still using manual system such as appointment system, queue system, warding recording and lab recording. Some of the digitalize system still require manual work which it double the workload and slowing down staff. Miscommunication between staffs frequently occur due to the manual recording. Majority of the staff denied the system due to few factors such as the system is not user friendly, they confuse over the workflow and still prefer manual due to easy access on what they need. With this study, it help on producing a better upgrade system for the next enhancement. However being push by the organization to use the system itself is not enough, there for training and supervision to get feedback to improve the user interface of the system and understanding the workflow is important to them.

Private Hospital

Impact on using HMS in the hospital for the patient care is still concerning. The study show that patient care was simply desire to make work done easily and cause them to “just adapt” on following the current era. Majority of the staff just “use the system because told so” which giving bad impression and impact especially not knowing on proper recording and workflows. Based on this study, nurses and doctors should not only adapt with fact of “just adapting”, they should know the clear view of the workflow, proper communication, proper 24/7 tech support and important is familiar with whatever they do. This study also show some area that in the hospital need to be digitalize and link to one and other for making the work easier and faster. The main area of this selected hospital that needed to be digitalize is the appointment system, lab system and warded system, other system need to be improve in term of the workflows and ease of use for staffs.

Limitation

Sample is only taken from MSUMC staffs for this study. The sample is not representative of entire private hospital that available in Malaysia. Thus, the result of this study might not generalize to the whole hospital. This study also limited to participants who have access on some parts on the modules in the hospital which it is hard to generalize the whole HMS system usage for the individual. They majority have limited access such as front desk only can access the front desk access, the nurse only can access based on what clinical and lab stuffs they do. Individual interview for face to face is limited due to MCO, to do online also limit due to the time limit and cooperation of the staffs. Success interview can be bias towards all the data collected due to majority it only gathers from the heads of the department and groups. Thus the sample is unlikely to be representative of the total staffs of MSUMC.

Implication of the study recommendation

This result of study is limited because it's only focus on a private hospital, MSUMC. Therefore a further study should be conducted for analyze other hospital including government hospital. This is just to generalize the most important of HMS user acceptance factors in addition, research and analyze patient perspective on HMS or HIS or HIMS in order to more identify the requirements that needed to be present such as managing booking and payment. This also could be developed in order to get clearer view and better understanding toward the relationship between the acceptance factor and successful implementation of HMS.

Currently the private hospital that used as case study has only implemented HMS partially without integration between HMS module and other related application that used in the hospital with lack features to meet user demands and requirements such as appointment system. In which this lessen the potential user that use the HMS and it lowering the level of HMS user satisfaction and acceptance. The result only showing based on qualitative data by using UTAUT, therefore, the future recommended to enhance the current framework that been made with quantitative research. User acceptance is needed to be ranked based on what the most important to the least important for strong visualized. Currently, ranking the most important to least important: (1) facilitating condition, (2) social influence. Thus, recommends that other studies, both quantitative and qualitative approach to be carried for strengthen the outcome of the study.

Conclusion

With this study, it provides major understanding of the factors that lead to the acceptance of Hospital Management System. Social influence and attitude toward the system holds the strongest for the intention to use the system. Facilitation condition also playing huge role in order for nurses and doctor to adapt and learn how the system is. Finding this study support the hypothesis of the models, it shown that what the most clear factors that lead to the acceptance on HMS.

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