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A Conceptual Study of User Adoption for Military Lifetime Health Record Systems

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Abstract— The Ministry of Defence in Malaysia has realized a lot of information technology venturing into the world of healthcare for armed forces. From time to time, the majority of these successful healthcare systems are increasingly aware of the extent and success of its operations. Along with IT growth, there is a need for excellent technical capability as well as integrated, centralized, comprehensive and intensive health information systems for armed forces in Malaysia. However, given the success rate in the application of transverse health information system is very high, it is significant to identify the user adoption factor to increase the success rate. Thus, this paper attempt to identify user adoption factors among the medical and clinical personnel's which Malaysian Armed Forces Hospital and Clinics should keep in mind, to ensure the success of health record systems' implementation. In this article, we propose our proposition for the clinician and medical personnel's adoption model to answer our research problem.

Keywords— Technology Adoption Model, UTAUT, Electronic Health Record, Health Information System, Malaysia Armed Forces, healthcare personnel

I. INTRODUCTION

Under the authority of the Malaysian Armed Forces (MAF), Ministry of Defence, Division of Health Services also known as Royal Medical Corps (KKD) has established to improve the quality of services, especially in terms of preparedness of medical personnel of MAF. KKD is responsible for carrying out more comprehensive health checks on armed forces personnel and collecting information with more systematic way that can be used for the purpose of analysis as well as an aid in making any decisions relating to the health of armies. With the growth in the MAF personnel, the need for up-to-date technology as well as enterprise decision making tools is required and total health information management system to cater these requirements.

Military Lifetime Health Record (MLHR) system is a health information management system (HIS) that helps MAF to effectively manage its armed forces personnel health information by providing and integrated health information for its deployment, training and medical needs. However, the achievement of these valuable benefits depends on the success of MLHR usage. While HIS system can bring advantage, a high rate of failure in applying HIS is a major cause of concern in the health sector [1], [2].

This paper purposes at clarifying the accepting of HIS system particularly MLHR assimilation by using a survey based statistical study analysis among the clinicians and medical personals in MAF. Primarily, we tried to solve the following questions: What are the user (clinicians and medical personnel) intention factors for MLHR adoption in the Malaysian Armed Forces?

II. BACKGROUND

Health information management system (HIS) in Malaysia is categorized by several failure issues and is still at early stage [3]. Even in some of the hospital and medical center under the Ministry of Health, Malaysia which previously implements HIS systems, healthcare personnel do not know the HIS because of the lack of proper design and implementation of the health information system [4]. This suggests that investing in IT particularly in the HIS system of these hospital does not recognize the potential benefits [5]. Thus, this requires a better method of measuring the success factor of the HIS system to estimate and ensure sustainable use especially armed forces.

An additional, notable HIS initiative in Malaysian health sector and particularly armed forces is the MLHR system. The MLHR system is a primarily working on armed forces community, focused on its personnel health information by

providing centralized and integrated health information. This information is a mandatory requirement for its deployment, training, task appointment and medical needs. Though, this HIS is relatively fresh, there are problems, specifically the practicability of usage and its related clinicians' satisfaction are not well understood. The system has also not yet assimilated with many of the HIS components as well as many other such as army human resource system, in which resulted in low satisfaction level and failure of the system.

Therefore, it is crucial for MAF to comprehend the significant factors to enhance the usage of MLHR systems among armed forces medical personnel in their medical practices. Accordingly, the major objective of the study is to explore several of the available theoretical models in HIS assimilation and simplify the main reasons and factors of HIS success in the Malaysian armed forces context. This study will therefore try to bridge the gap in the literature between the Information System (IS) implementation and its success factors (HIS success factors) for its use in an armed forces environment such as Malaysia.

III. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

A. Technology Acceptance Model (TAM)

According to [6], technology acceptance model (TAM) is one of the most powerful models used to describe the acceptance of information technology (IT). [7] developed TAM by considering two independent variables which consist of two major determining factor of IT usage, namely perceived usefulness (PU) and perceived ease of use (PEU). PU is conceptualized as the extent to a person believes that the system will improve their performance. Next, PEU is conceptualized as the extent to a person think that there will be easy and no effort to use this system. TAM posits that PU and PEU determine the intent of the individual to use the system with the intention of using the service as a mediator for actual use of the system. PU are also considered to be directly affected by Perceived Ease of Use [7].

The fundamental theory of TAM is to use it voluntarily to succeed. Therefore, TAM's practice must be compulsory in order to successfully implement MLHR system all over the hospital. This is necessary because the system integrates data and generates comprehensive military health reports which are valuable for MAF and this report is not useful if the system is only used by a few departments and not to other departments.

B. Unified Theory of Acceptance and Use of Technology (UTAUT)

The unified theory of acceptance and use of technology (UTAUT) was proposed by [8] as an alternative to TAM. UTAUT was formulated, with four core determinants of intention and usage of information technology namely performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC). PE measuring the extent of an individual's think that the system could advantages in increase their performance and this configuration is similar to the usefulness concept in the TAM model. EE measuring the extent to which individuals believe that the system is easy to use and this configuration is similar to the ease of use construct in the TAM model. SI

measuring the extent to some individuals believe that others who care about themselves should use the system. FC measures the extent to which individuals believes that organizational support is available to simplify the practice of the system. UTAUT also theorizes the moderating effect of four other influences such as gender, age, experience and voluntariness of use [8].

In practice, UTAUT has been found to be useful in identifying the adoption rate of information technology in very large populations [9]. The model is expandable and can be transformed into detailed research instrument that incorporates. Thus, as an extension to TAM and UTAUT, this study takes into attention the factor of Computer Self-Efficacy of computer usage behavior which plays an important factor in MLHR system adoption by clinicians and medical personnel of MAF.

C. Performance Expectancy (PE)

According to [8], performance expectancy is conceptualized as the extent to which an individual believes that using the system will help him or her to attain gains in a job. This factor was derived from the perceived usefulness construct as proposed in TAM. The most valuable system is a system that users think they will reduce their diversity and improve their performance [6]–[8]. As evidenced by a research of possible future directions for TAM research based later in year 2015, usefulness was still found to be a solid and extremely significant factor of technology usage [6]. Decomposing perceived usefulness as [10]–[13], did explicitly provides more specific lenses into understanding user perception of IT's (particularly e-Health) usefulness. It can be argued that the greater the perceived usefulness in using the MLHR system, the more likely it is that MLHR system would be adopted. Therefore, the following proposition is formulated below:

Proposition 1: Performance expectancy will have a positive effect on intention to use of the MLHR system.

D. Effort Expectancy (EE)

Effort expectancy is posited as the extent of ease related with the usage of the system. According to Venkatesh et al. (2003), this element was initiated from the perceived ease of use element as proposed in TAM. [7] found that IT system perceived by people which is easier to use is can be acceptable. In additional, finding by past studies suggest that effort expectancy has a strong influence on the users' intention to health information system adoption and acceptance [1], [10]–[12]. For instance, effort expectancy has been identified as an important factor directly influencing users' intention to use mobile health (m-health) systems [1] and online based hospitals report cards (HRC) that provide patients with quality-related information on hospitals and enable hospital comparisons [14]. It can be argued that the greater the effort expectancy or easy to use of MLHR system, the more likely it is that MLHR system would be adopted. Hence, it was propositioned that:

Proposition 2: Effort expectancy will have a positive effect on intention to use of the MLHR system.

E. Social Influence (SI)

According to [8], social influence is defined this construct as the extent to which an individual people to believe that other important people should use a new system. SI as a direct factor of attitude towards use of the system and behavioral intentions is represented as a subjective norm and image that is similar to the factor "subjective norm" as defined in TAM2, an extension of TAM [15]. In TAM2, subjective norm is conceptualized as the individual's perception from people he or she considers as important, that think he or she should or should not perform the behavior in question, in the case of this study, to use the MLHR system. A common explanation is that an innovation such as MLHR system creates uncertainty about its expected consequences for potential users like MAF medical personnel that are usually uncomfortable with ambiguity. Therefore, they tend to interact with the social network among their peers to consult on their adoption decisions by informational and normative social influences. In a similar finding by previous studies suggest that social influence has a strong influence on the users' intention to HIS adoption and acceptance [1], [10], [12]. Therefore, the following proposition is formulated below:

Proposition 3: Social influence will have a positive effect on intention to use the MLHR system.

F. Facilitating Condition (FC)

Facilitating condition is conceptualized as the extent to which an individual believes that organizational and technical infrastructure (resources) exists to support use of the system. [8] Facilitating condition is operationalized to include aspects of resources availability that are designed to remove barriers to use technology. Resource availability refers to the degree to which resources necessary to adopt IT are available, and lack of resource availability often results in insufficient technology support. According to [16], lack of organizational readiness in resources (infrastructure, human resources, funding) comprise the challenges faced by government agencies in adopting IT. Facilitating condition has been hypothesized to influence the construct of behavioral intention in HIS studies [1], [10], [12] and turned out to be statistically significant. The impact of facilitating conditions in the terms of use MLHR system by an end user is influenced by factors which have the same objective of advancing the compatibility between the individual's working style and the use of the hospital's system. Therefore, the following proposition is formulated below:

Proposition 4: Facilitating conditions will have a positive effect on intention to use the MLHR system.

G. Computer Self-Efficacy (CSE)

The Computer Self-Efficacy Theory established the utility of self-efficacy to comprehend individual computing behavior [17]. CSE refers to individuals' judgment of their capabilities to use computers in diverse situations. Individuals with weak approaches in CSE will be more easily disappointed with the barriers to their performance and respond by reducing their awareness of their ability to use computers and information technology.

Conversely, individuals with strong CSE awareness will not be easily blocked through difficult problems and will continue their efforts. As a result, they are more likely to overcome the obstacles they face [17]. CSE is an effective indicator of behavioral intention and has been shown to be an important indicator of personal's attitude about IT usage behaviors/satisfaction [18]. Prior IT acceptance study, the important role of CSE in understanding individual responses to IT has been verified [19]. It can be argued that the greater the sense of CSE of MLHR system, the more possible it is that MLHR system would be accepted. Hence, it was propositioned that:

Proposition 5: Computer Self-Efficacy have a positive effect on intention to use the MLHR system.

H. Behavioural Intention (BI) and Actual Use Behaviour

The main objective of this research was to examine what factors influence the Behavioral Intention of clinician and medical personnel in MAF to remain using the MLHR system as a medium of HIS in the future. According to [20], intention is an intent or indicator that is used to fill factors that affect the usage behavior. [20] states that Behavioral Intention is the cognitive expression of willingness to perform a given behavior, and is considered a precedent of behavior. [1] considered that behavioral intention is the intent of the end user to use of mobile Health (mHealth). This means end users who have high PU, EE, Social Influence, Facilitating condition, and sense of CSE will use MLHR system thus creating a strong correlation between behavioral intention and actual behavior. The relationship between the behavioral intention and actual use behavior is well documented in many research fields and that indicates behavioral intention is a valid predictor of actual use behavior. For instance, [1] and [12] found that behavioral intention is a predictor of actual UB of health information technology. Based on the above literature, this study posited the following proposition:

Proposition 6: Behavioral intention has a significantly positive and direct effect on actual use behavior of the MLHR system.

IV. PROPOSED RESEARCH MODEL

In the above literature review and the operational variable, the proposed research model, which is grounded from UTAUT as proposed by [8] with few adjustment shown in Figure 1. The behavioral intention and user behavior influence factors have been pooled and substituted by intention to use MLHR system. In additional, the "intention to use MLHR system" explained the behavioral intention and subsequently the actual MLHR system usage. This is consistent with many previous research settings to determine the intent to use by end users in HIS environment [1], [10], [12]. This study will be carried out in the cross-sectional setting, therefore, the moderating factor of age, gender experience and voluntariness of use as from original UTAUT model was excluded from the proposed research model.
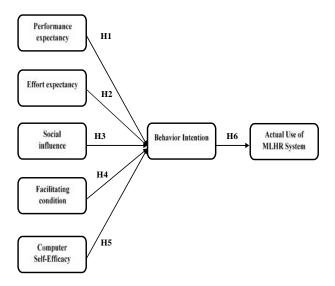
Fig. 1 Proposed Research Model

V. CONCLUSION

The findings from the literature review indicates that in the past 20 years, many information technology and technology acceptance theory have been introduced. However, there are new research models that lack of empirical study. In the proposed research model above, further research should be conducted to measure whether this model is able to explain the end user intentions to use the HIS particularly MLHR system. Five factor variables have been identified for further research on the impact of military medical personnel's intention to use MLHR system. From the literature review, all five independent variables, namely performance expectancy, social influence, effort expectancy, , computer self-efficacy proposed to contribute positively to the military clinicians and medical personnel's intention to use the MLHR system.

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