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# Organizational decision to adopt hospital information system: An empirical investigation in the case of Malaysian public hospitals

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## ABSTRACT

**Objectives:** This study mainly integrates the mature Technology-Organization-Environment (TOE) framework and recently developed Human-Organization-Technology (HOT) fit model to identify factors that affect the hospital decision in adopting Hospital Information System (HIS).

**Methods:** Accordingly, a hybrid Multi-Criteria-Decision-Making (MCDM) model is used to address the dependence relationships of factors with the aid of Analytic Network Processes (ANP) and Decision Making Trial and Evaluation Laboratory (DEMATEL) approaches. The initial model of the study is designed by considering four main dimensions with 13 variables as organizational innovation adoption factors with respect to HIS. By using DEMATEL, the interdependencies strength among the dimensions and variables are tested. The ANP method is then adopted in order to determine the relative importance of the adoption factors, and is used to identify how these factors are weighted and prioritized by the public hospital professionals, who are wholly familiar with the HIS and have years of experience in decision making in hospitals' Information System (IS) department.

**Results:** The results of this study indicate that from the experts' viewpoint "Perceived Technical Competence" is the most important factor in the Human dimension. In the Technology dimension, the experts agree that the "Relative Advantage" is more important in relation to the other factors. In the Organization dimension, "Hospital Size" is considered more important rather than others. And, in the Environment dimension, according to the experts judgment, "Government Policy" is the most important factor. The results of ANP survey from experts also reveal that the experts in the HIS field believed that these factors should not be overlooked by managers of hospitals and the adoption of HIS is more related to more consideration of these factors. In addition, from the results, it is found that the experts are more concerned about Environment and Technology for the adoption HIS.

**Conclusions:** The findings of this study make a novel contribution in the context of healthcare industry that is to improve the decision process of innovation in adoption stage and to help enhance more the diffusion of IS in the hospital setting, which by doing so, can provide plenty of profits to the patient community and the hospitals.

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## 1. Background

Physicians and patients today are encountering great pressures from the healthcare setting. In the perspective of physicians, their irritation is originating from heavy patient loads, administrative tasks, and losing patient care decision control [1]. While patients are complaining that during the medical interaction, more consideration should be provided to them [2,4]. Obviously, medical service all the days of a week are required to be given from the public hospitals, especially effective appointment's scheduling system and individual electronic access to personal medical health records [1]. Therefore, there are more demands on electronic services from patients that have to be given by hospitals. But, the healthcare community is moving slowly in response to these demands [3]. Even in United States hospitals, only 17% will have the equipment of Computerized Physician Order Entry (CPOE) by 2009 [3].

The proper and correct adoption of Information Technology (IT) can significantly affect the quality and performance of the medical services provided by a hospital [1,19,128,135]. Hospital Information System (HIS) is a comprehensive, integrated Information System (IS) designed to manage the administrative, financial, and clinical aspects of a hospital. HIS influences the decrease in medical errors, growing the efficiency, cost effectiveness, timely decision making, and improving the quality of healthcare services [5,11,33]. In addition, the main aim is to eliminate manual processes that are now seen as a major hindrance to increasing organizational performance in terms of providing fast and efficient health services [17]. Nevertheless, these innovations have not escaped from various challenges and issues both from internal and external factors [7,15,40].

In Malaysia, the healthcare system consists of both a public and a private sector. Also the rural areas are mostly served by government health clinics and hospitals [6,17]. The people are acquiring a broad range of healthcare services for a low price. But, for some reason such as, population structure, increased life expectancy, healthcare service expectation from the people and so forth, the status quo has been distorted [1]. Besides, there is an increasing rate of Malaysian healthcare expense which has been occurring every year [17,118]. Hence, to enhance the quality of healthcare and decrease the cost, there is a big pressure on Malaysian government.

To overcome these issues, there are several projects that have been developed by the Malaysian government with the aim of promoting and maintaining the wellness of Malaysians and to provide more and easy access to every citizen regarding healthcare information systems [1,5,8,127]. Such projects include the National Telehealth Policy (NTP) that comprises of four exciting initiatives for IS such as Telemedicine, Mass Customised/Personalised Health Information and Education (MCPHIE), Lifetime Health Plan (LHP), and Continuing Medical Education (CME) [8,9]. One of the areas that is focused for intensive development is telemedicine [1]. Telemedicine flagship has been intended to provide the healthcare services to individuals [10]. Furthermore, HIS was introduced under LHP project to launch the process of digitalization of the healthcare sector [1,8,9].

Despite all of these, according to [1,5,12,13,127], only 15.2% of the Malaysian public hospitals are referral hospitals equipped with either fully integrated or partially integrated HIS since the Telehealth project was launched more than a decade ago and almost 85% of public hospitals are delaying adoption of the HIS technology. Hence, this shows a very slow progress among Malaysian public hospitals in the trend of HIS innovation adoption.

## 2. The problem statement and our contributions

This paper describes an empirical study that we conducted investigating possible factors influencing organizational decision to adopt HIS in public hospitals of Malaysia. The questions that have been raised for this study are: (a) What are the current practices of IS in healthcare industry? (b) What are the significant factors that affect the decision to adopt HIS based on Human Technology Organization Environment (HTOE) framework? (c) What theoretical model is suitable to be applied to facilitate the adoption of HIS? and (d) What Multi-Criteria Decision-Making (MCDM) model is suitable to weigh and prioritize the factors for HIS adoption in a public hospital?

The contributions of the study at hand are two-folded. First, according to [14,95], there is a lack of theories being developed for a specific type of innovation and for a particular adoption context such as healthcare organizations due to the lack of generic theory of technology innovation [14]. This is emphasized more by Grover [98] on advocating the need to study more than one innovation characteristic which will lead to increase the relative predictive power of characteristics in evaluating the organizational adoption process. Hence, the current study makes an effort to incorporate these statements as was suggested.

Second, this paper presents a study which evaluates the important level of interdependency among critical factors for adoption decision of HIS. In addition, this study proposes MCDM model, which consists of the Decision Making Trial and Evaluation Laboratory (DEMATEL) and Analytic Network Processes (ANP) to evaluate and find the importance level of the determined factors for HIS adoption in Malaysia. In this regard, DEMATEL is applied to construct interrelations among adoption factors in the integrated model. By using this approach the interdependencies strength among the adoption factors are tested. The ANP method is then adopted in order to determine the relative importance of the adoption factors, and used to identify how the critical factors are weighed and prioritized by the public hospital professionals, who have plenty of experience and are wholly familiar with HIS innovation in different areas of hospital.

## 3. Literature review

### 3.1. The current state of IS in healthcare

Continuous efforts have been carried out in order to improve the current technological scenario in the healthcare industry [16]. Many countries produce strategic IS plans for their large scale health systems which are aimed at providing benefits

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