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# **Re-examining the Technology Acceptance Model from stakeholders' management perspective in health sector**

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## Abstract

Limited implementation and low acceptance of health technologies are the common issues in the National Health Service (NHS), which impacts on the efficiency of organization and quality of the service. Previous research focused on the development and evaluation of models that could help predict the technology adoption and improve the usage of the technology in NHS. Technology Acceptance Models (TAMs) are intensively researched in the last 30 years to solve the above issues. However, there is still a need for exploring the additional and overlooked factors that impact on the acceptance of health technologies in NHS. This paper explores the literature and compares the limitations and impracticality of the existing TAM in the Healthcare sector. As a result, the paper contributes TAM literature by developing an enhanced TAM that integrates TAM and stakeholder management approach, which provides a more comprehensive approach to predict the actual use of health technologies in the NHS.

## 1.0 Introduction

Recently, demographic changes are placing an increasing burden on health care globally. An aging population with an increasing chronic disease means that there is a growing demand for health care services. Based on the demand, the UK government states that the health care system needs to devote more resources substantially to ensure high-quality services that meet public expectations (McPhail, 2016). The European Commission announced that “new health care delivery model can only be achieved through the proper use of information and communication technologies, in combination with appropriate organizational changes and skills (Commission of the European Community, 2009). According to recent reports (Mostashari 2014; Rippen et al. 2013; Bélanger et al. 2012), technology and information technology systems including electronic health records, electronic patient records, technical infrastructure and telemedicine, and telecare can meet the challenges placed on the health care system (Taherdoost, 2018). The National Health Service (NHS) has its own IT system with standardized interconnecting systems. However, it was experienced huge issues with implementation, interoperability, costs, and timescales. Moreover, NHS now tends to enhance the development of more consumer-facing technologies, such as telemedicine and telecare which process slowly and disparately. The healthcare industries described the NHS as “a late and slow adopter of technology” (Glenn, 2019). As the importance of technology in the NHS and the role that technology can improve health outcomes, NHS is keen to improve the management approach in order to assess different technologies and increase the technology acceptance. TAM model has been adopted to analyze what factors impact on the actual use of health technology.

### 1.1 Why Technology Acceptance model?

Health technology such as Health information technology (HIT) or mobile presents ongoing opportunities to improve the quality of emergency care, promote patient safety, reduce medical errors, and enhance the efficiency of emergency departments (EDs). The increasing demand for health technology forces managers to build a comprehensive framework to increase the acceptance rate of technologies. In order to achieve the demand, the TAM model has been developed to analyse different factors that influence technology acceptance and actual use. In the 1980s, researchers used the model for testing the attitude of users. In the following years, researchers started to think about the intention of the user and which impact factors can influence the user’s intention. The original purpose of the model is to examine the impact variables and contribute further to technology adoption. Besides, the TAM model can help the organization to maximize the expected profit and minimize the potential risk. To be specific, if the impact variables have been justified, an organization can deliver better design and adoption process, which can benefit from reduced cost and improved efficiency. A framework is an effective way to present a clear, parsimonious, but comprehensive understanding of the impact factors and their inter-relationships.

Four major variables are being considered to represent the users’ attitude and intention, which are Behavioral Intention, Attitude, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Base on a different timeline, the external variables will be added. The following paragraph will explain the TAM original model and its development. Furthermore, the implementation of this model specifically in the health sector will be explored.

## 2.0 TAM Background

### 2.1 original TAM and its development

Recognizing the needs and acceptance of users would be helpful to find the way for future development of technologies, thus academicians are interested in investigating the factors that drive users' acceptance or rejection of technologies. A number of models have been developed to explain user adoption of new technologies and these models introduce influenced factors that can affect user acceptance. (Aherdoost, 2018) The original Technology Acceptance Model was developed by Davis (1989), in which the user's subject norms are not considered. This model characterizes users' motivation by three factors: perceived usefulness, perceived ease of use and attitude toward use. Past research found that perceived usefulness and ease of use have a considerable impact on the attitude of the user. Generally, researchers also regard other impact factors, which can impact the essential beliefs as external variables such as user training, system characteristics, user participation in design and the implementation process nature and which are included in TAM model. In addition, the original TAM was designed for increasing the Information Technology (IT) acceptance. The model only includes the attitude, as it assesses by asking the individual user about their personal attitude regarding IT. Venkatesh and David. (2000) proposed to explore users' intention to utilize technologies specifically in the future. Knowing the factors that shaped one's intentions would allow organizations to manipulate those factors to promote acceptance and thus increase IT use. However, before 2003, the vital challenge of this model is that TAM ignored the social influence on the adoption of technology, which limited this model to be applied on organizational environment. Besides, some external variables still needed to be added in order to provide a more consistent prediction of system use. Venkatesh et al (2003) added more factors into the TAM model aiming to improve explanatory power and specificity of TAM, which regards as the extended model TAM2. TAM2 was proposed by adding two groups of constructs; social influence (i.e. image, subject norms and voluntariness), and cognitive (i.e. result demonstrability, job relevance, and output quality) to TAM, to improve the predictive power of perceived usefulness. Therefore, for both voluntary and mandatory environments, TAM2 is outperformed. The only exception is related to the subjective norm, which has influence in mandatory settings but not involuntary settings. The second study identified constructs that influence on perceived ease of use (Aherdoost, 2018).

### 2.2 Implementation of TAM in the health care sector

Several recent studies aim at improving the original TAM in the context of the health care sector. Aggelidis and Chatzoglu (2009), as opposed to one level approach pursued in the original model, take a 3-level approach to their model, i.e. technology, individual and implementation levels. In terms of factors that influence user acceptance of the proposed technology, in addition to main factors identified in the original model as usefulness of technology, ease of use and intention to use, they integrate additional variable into the model capturing user attributes such as self-efficacy and anxiety at individual level and social influence and training of users in the implementation level. This study is only concerned about subjective-norm and social influence. How can these variables impact the attitude and intention?

In a recent contribution to existing literature, with the aim of improving the service quality in healthcare area in Jordan, Jaradat et al. (2013) explore an enhanced technology acceptance model to decide whether mobile health system can be accepted. The authors proposed the following factors: Trust, security, and privacy, social influence, compatibility. This model added trust and security factors to the impact factors of technology. Technology trust can be regarded as the supplier factors, which means the quality and reliability of a certain technology, provided by the supplier.

### 2.4 Research Gap

One tool for assessing and predicting user acceptance of technologies, which has gained popularity in recent years, is TAM (Davis, 1986; Davis, 1989; Davis, Bagozzi & Warshaw, 1989; Davis, 1993). TAM has demonstrated, as a key theoretical model, supporting the understanding of users' behaviour and attitude in technology adoption. Different external variables need to be used for different applications to influence perceived usefulness and perceived ease of use, it is rare to apply external variables with organizational context in health care area. The relevant stakeholder has not been considered. This can be an essential impact factors on users' behavior and attitude.

In 2009, Aggelidis has been implemented TAM to adopt technologies in the healthcare industry. Researchers start to explore how the colleagues/employees will impact on the behaviour intention. The additional variables were continuously added in TAM due to different perspectives, influences of nurse participants is significant. If nurses did not do the diffusion and introduction part, it will impact on the patients' intention and attitude of use. In addition, the impact of suppliers on attitude to use has been investigated. While relevant single stakeholders' impact has not been taken into consideration in TAM, those models have not considered the importance and influences of all the stakeholders as a whole. In order to fulfil the research gap, the following conceptual model will include more comprehensive stakeholder elements, and explore how the stakeholder influence on the user's attitude and attention of technology adoption. The conceptual model is able to directly increase the health technology acceptance in NHS.

### 3.0 Conceptual model of TAM involving stakeholder management perspective

Basic on the research gap, this paper aims to develop an integrated framework to predict the actual use of health technologies in NHS. The stakeholder theory has been advanced and justified in the management literature on the basis of this descriptive accuracy, instrumental power, and normative validity. This stakeholder theory initiate used in healthcare sector was 1999 (Preble , J 2005 . The attributes of healthcare experienced as facilitating continuity could be grouped under two dimensions of care: managing care and direct service provision which required the relevant stakeholder’s engagement. The trusting relationship is important between service provider(one of stakeholders) and client. Therefore, the stakeholder can be the essential impact factors in NHS, which can influence the user’s intention, and attitude to accept the health technology. As each health technology acceptance process will involve multiple stakeholders, good stakeholder management can benefit for technology acceptance in NHS. Each stakeholder potentially has the ability to speed up; slow down or completely obstruct the health technology acceptance progress. Stakeholders may not be in the driving seat, however, they still can be extremely useful advocates, sponsors, and agents of change. In addition, the single stakeholder is very important, in the meantime, all the stakeholder should be also considered together. In addition, the conceptual model developed based on the stakeholder assessment method to determine the influence factors from different NHS stakeholder perspective.

The conceptual model considers five major NHS stakeholders including the organization, the patient, government, NHS digital department and the supplier (Figure 1). Basic on the original TAM model. These five contexts will directly influence on intention to use and attitude to use and consequently impact on the actual use. Each stakeholder has its own interests, behavior, influence, and power over the technology adoption process. Thus, different factors have been identified in each stakeholder context. For instance in the supplier context, technology reliability and quality of technology have been considered.

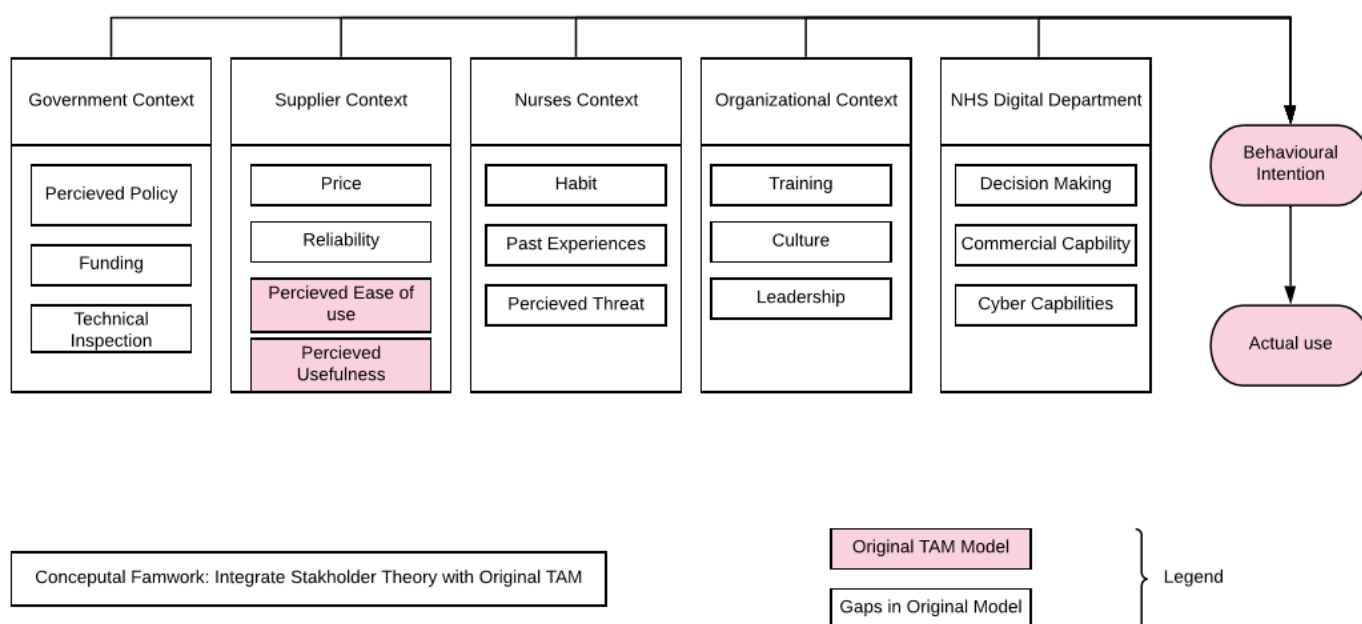


Figure 1: Conceptual model of technology acceptance from stakeholder management perspective

## 4.0 Conclusion

According to extant research, the implementation of health technology is difficult and complex. As the availability of these technologies increases, increasing the acceptance of technology by the users become more critical question for the NHS. The conceptual model developed in this paper integrates TAM with stakeholder management approach and ensures a more consistent and comprehensive understanding of user attitudes, intention and explanations towards actual use of health technology.

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