



# A Conceptual Model for Telemedicine Adoption: An Examination of Technology Acceptance Model

Manoranjan Dash, Preeti Y Shadangi, Sunil Kar, Rita Prusty

**Abstract:** India is attaining a high rate of adoption of telemedicine services and which is contributing towards the growth of Indian economy. Healthcare industry in India is going through a massive transformational change. Low cost driven channel for delivering health care services to the patient at their convenience and where distance is matter of concern. Government and private hospitals had started to render their health care service to the urban as well as rural community's. Digital OPD is thus leading towards a digital culture for providing health care services. However lot of issues and challenges arise regarding adoption of telemedicine services by the physicians working in different private and government hospitals. This study was made in Odisha with a sample size of 134. Technology acceptance Model (TAM) model was extended in the study with other external factors and SEM modeling was used to predict the significant factors leading to the prediction of the adoption of telemedicine services by Physician's. The TAM model is a good predictive model for the adoption of telemedicine services by the Physician's.

**Keywords:** TAM Model, Digital Healthcare, Telemedicine, Digital OPD

## I. INTRODUCTION

Healthcare organizations around the globe are interested in acquiring and implementing the telemedicine technology. Recent advancement in Information Communication Technology (ICT) and biomedical technology has improved technical efficiency and economic feasibility of adopting telemedicine for delivering health care services. Telemedicine is the use of ICT for providing health care services remotely. The distance barriers are eliminated and access to health care services is improved. The technology also helps in helping the critical care services and emergency

situations. Telemedicine communicate between patients and health care professionals with confidence and fidelity. Easily the data about the patient is transmitted from one site to another. Telemedicine is being categorized into store-and-forward and real time telemedicine. Tele-health care services have a strong potential to improve the health care services and to provide the health care services to rural patients where distance and cost of delivery is a barrier. The doctors can provide their expertise with greater convenience and contributing to the health community at a large scale. Telemedicine market is growing in India and is having an impact on international economy in terms of revenue sale, market size and share. The telemedicine services save travel time and patients can take services from doctors at their convenience and remaining at home. In India Ayushman Bharat scheme where ICT has a leading role in the development of health care sector and it introduces tele-health for long distance medical care to make safe, effective, timely and efficient health care services to patients. Despite rapid implementation of telemedicine services in hospital still the acceptance by the physicians in its infancy stage.

## II. LITERATURE REVIEW

Hu .P.J. et al (1999) studied rapid adoption of information technology in organizations has different issues i.e. regarding user acceptance and management. The TAM model has been used in explaining physician's decision to adopt telemedicine technology in the health care context. Perceive usefulness was the significant determinant of attitude and intention whereas perceived ease of use was not significant. Croteau (2002) in their study used a revised model based on the TAM model to study the intentions of physician's to adopt telemedicine technology. It focused on two groups of physician's from Urban and rural area and it found perception of usefulness is related to their intention to adopt the technology. Gagnon M .P. (2011) study on physician's intention to use tele dermatology found the main determinants are perceived usefulness and perceived ease of use and they are significant. Chau P Y (2002) integrated the TAM and TPB model in explaining physician's technology acceptance, TAM model was a good fit model than the TPB. The integrated model fully explained the physician's acceptance of the technology. Kowitlawakul Y (2011) studied to find out the factors that influence nurses intention to use the EICU technology and it used the TAM model. Perceived usefulness and perceived ease of use was the significant determinant of adoption of the EICU technology.

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## A Conceptual Model for Telemedicine Adoption: An Examination of Technology Acceptance Model

Shadangi P Y , Dash M , Kar S (2018) studied on Physician's attitude and their intention to use telemedicine technology and had taken into consideration the TAM model and extended the model with factors like risk and technology infrastructure support. Risk and technology infrastructure are the important factors which affects physician's attitude towards using telemedicine services. Kamal et al (2018), study on Doctor's intention to use Telemedicine used TAM model and found perceived usefulness and perceived ease of use are the determinants of adoption of telemedicine in addition to this cost and legal concerns were found to have negative effects on usage intention to use telemedicine. Adenuga et al (2017) , used UTAUT model and found effort expectancy, performance expectancy , facilitating condition have significant effect on clinician's intention to use telemedicine system Karia N et al (2015) studied on human factors on acceptance of telemedicine and found its has positive impact on user to use telemedicine service. Saigi et al (2016), used the extended TAM model to find the determinants in intention to use the telemedicine .Physicians found cost, usefulness, security and confidentiality were factors in intention to use the telemedicine . Ladan et al (2018) study combined the two model TAM and UTAUT in understanding healthcare professionals adoption and use for technology .They studied the factors that affect the attitude towards the adoption of technology. Marris A et al (2017) , found the critical factors in adoption of telemedicine application are security, cross platform and user friendliness .Ward R (2013) studied various technology acceptance model in context of healthcare Human factors are the important factors than the technological factors in health informatics. Lee et al (2012) considered the human, technology and organization perspectives are the factors affecting the HIS adoption. Holden et al (2010) the TAM model parameters were significant in acceptance of health IT. Venkatesh V et al (2011) used UTAUT model for the adoption of e-medical record and found age as a significant predictor whereas experience and gender do not play mediating role .M Dash , Shadangi P Y , Kar S (2019) used neural network and regression model in explaining the physician's adoption of telemedicine .TPB model was used in the study.

### III. PROBLEM STATEMENT

Despite lot of benefits of telemedicine services still rapidly it has not been widely accepted by health care professionals. In developed countries it has been successfully implemented and different factors have been identified which leads to the successful implementation and acceptance of telemedicine. In different research TAM, UTAUT model has been used to throw the light on the usage of telemedicine service. The PU and PEOU variables are the important in adoption of telemedicine services. The TAM model used in the study as a basis and further it extends with other variables taken into consideration It is important to know the significant variables affecting the adoption of telemedicine by health care professionals.

### IV. RESEARCH OBJECTIVES

To identify the significant factors affecting the adoption of telemedicine by the Physician's.

Hypothesis Formulated

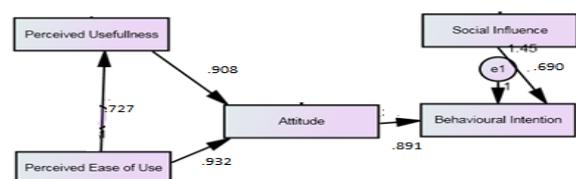
- H1: Perceived social influence have a significant effect on behavioral intention to use telemedicine services
- H2: Physician's perceived ease of use has significant effect on perceived usefulness to use telemedicine services
- H3: Physician's perceived usefulness has a significant impact on attitude towards using telemedicine services.
- H4: Physician's Perceived ease of use has a significant impact on attitude towards using telemedicine services.
- H5: Physician's attitude towards using telemedicine has a significant impact on his or her behavioral intention to use telemedicine services.

## V. RESEARCH METHODOLOGY AND ANALYSIS

A survey was conducted among physician's working in different private and government hospitals. The questionnaire was designed using the constructs from the TAM model and additional construct added i.e. social influence. The data was collected from physician's working in different departments. the questionnaire was validated using face validity by taking the opinion from different experts having technical expertise in the area of telemedicine. Five point likert scale was used ranging from 1 Strongly disagree to 5 strongly Agree to get response regarding agreement and disagreement regarding the objects. Cronbach reliability was used to check internal consistency of the scale where it was .879. Random sampling design was used and 134 sample have been received. SEM Modeling was used to asses the research model. For the convergent validity the AVE value was greater than .7. the model was a good fit on the parameters NFI,GFI,AFI which was found to be greater .9..The GFI , AGFI value is greater than .9 which represents it is a good fit. The CFI and NFI value is greater than .9 RMSEA value is less than .05 which is perfect fit. The model is good fit for data analysis .The GFI value is .981, AGFI is .966,CFI is .961 and RMSEA is .065

**Table-1 Regression Weights: Path Analysis Model**

			Estimate	S.E	C.R	P
Social Influence	<---	Behavioural intention	.690	.012	.687	.000
Perceived Ease of use	<---	Perceived Usefulness	.727	.006	.729	.000
Perceived Usefulness	<---	Attitude	.908	.005	.704	.000
Perceived Ease of Use	<---	Attitude	.932	.090	.963	.000
Attitude	<---	Behavioural Intention	.819	.060	.985	.000



**Fig-1 Path Analysis Model**

It is found to be calculate p value is 0.073 which is greater than 0.05 which indicates perfect fit .The GFI , AGFI value is greater than .9 which represents it is a good fit. The CFI and NFI value is greater than .9 RMSEA value is less than .08 which is perfect fit. The model is good fit for data analysis .

**Table -2 Model fit**

Indices	Value
Chi Square value	14.714
P-Value	0.063
Good Ness of Fit Index(GFI)	0.978
AGFI(Adjusted Goodness of Fit Index)	0.975
NFI(Normated fit Index)	0.957
CFI(Comprataibv fit index)	0.876
RMSEA(root Mean square error of approximation)	0.052

All hypotheses were supported .Perceived social influences have a significant impact on behavioral intention to use telemedicine services. The results indicated that TAM model was good model in predicting the behavioral intention of physician’s regarding their acceptance of the technology. The influential variable were found to be perceived ease of use , perceived usefulness, social influence and attitude. The results are being consistent with other previous research result conducted in different country. In order to be widely acceptance of this technology physician’s adequate awareness and training has to be given to ensure that the technology provides lot of benefits and by the adoption of this technology the efficiency of the physician’s can be increased.

**VI. CONCLUSION**

Telemedicine is now being used as a cost effective and efficient tool in delivering healthcare services remotely for improving the clinical outcomes and increasing patient involvement in the care. Healthcare professional’s acceptance of this system represents the successful implementation of the technology. The study identified the factors that affects the physician’s regarding the acceptance. Physician’s behavioral intention to use telemedicine services is affected by technology, user and social characteristics. Social influence is an important factor which is positively affecting the behavioral intention to use telemedicine. Because physicians are being influence by their peers who use telemedicine services’ taxonomy of factors affect which include social, technology and user characteristics in intention to use telemedicine .Besides this factors Physician’s are reluctant to adopt regarding their financial benefit and work pressure.

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