International Journal of Scientific Research in Science and Technology
Print ISSN: 2395-6011 | Online ISSN: 2395-602X (www.ijsrst.com)
doi : https://doi.org/10.32628/IJSRST207554

An Empirical Study of Intrinsic Determinants Influencing Telemedicine Services Adoption by Healthcare Professionals

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Article Info
Volume 7, Issue 6
Page Number: 90-103
Publication Issue :
November-December-2020

Article History
Accepted : 05 Nov 2020
Published : 14 Nov 2020

ABSTRACT

Background: Telemedicine services have been confronted with several determinants that hinders their successful implementations. Identifying such determinants for acceptance and use of telemedicine services is a growing concern for healthcare professionals as people nowadays perpetually live their lives through telemedicine services. This current study seeks to investigate the internal determinants that influence health professionals' intention to utilize telemedicine services in selected hospitals in Ghana.

Method: An integrated theory was derived by combining healthcare technology acceptance theories to examine this quandary. Purposive and convenience sampling methods were used in the selection of healthcare professionals from different medical fields whilst using questionnaires for the data collection in four government health institutions. Structural equation modeling (SEM) approach was utilized in the data analysis.

Results: Selected constructs: perceived usefulness, management strategies, health institution's financial sustainability, perceived ease of use, and communication channels had significant influence on health professionals' behavioral intention to use telemedicine services. Surprisingly, user characteristics of healthcare professionals was not significant as divulge by the results of the integrated theory.

Conclusion: Findings portray that healthcare professionals were pragmatic when making choices for technology applications and were interested in using telemedicine services. Effective utilization of telemedicine services will aid as a strategy to eradicate hardships in healthcare services delivery in Ghana. The study contributes to empirical knowledge by identifying the vital internal predictive factors affecting telemedicine services among healthcare professionals.

Keywords: Telemedicine, perceived usefulness, perceived ease of use, communication channel, management strategies

I. INTRODUCTION

Telemedicine service is a paradigm that blends the delivery of medicine with information and telecommunication technologies. The concept is achieved by assisting healthcare professionals in routine tasks and service deliveries i.e. consultations, treatment, diagnosis, and recommendations [1,2]. The interconnection of health professionals and patients with diverse technologies in healthcare was first introduced as a result of a study by Russell [3]. The results of his study revealed medical technologies for distant care deliveries, which spread extensively into US hospitals after the year 1950. Since then, tremendous developments and studies have been carried out on different technologies in healthcare. This has led to the use of a wide array of telecommunication technologies for providing medical and clinical services when distances separate both the health professional and patient [4].

The acceptance and use of these telemedicine services are mostly determined by Physicians because they are the front-line users. These services are championed by modern information and communication technologies (ICTs) because they form the pivotal part of the clinical workflow activities in today's global healthcare operations [1,2]. Telemedicine services have increased the investments in telecommunications and health professionals technology acceptance by healthcare organizations all over the world, creating several managerial and implementations issues [1,5,6]. Nevertheless, in spite of the high potential superiority and promised benefit of telemedicine services, an underutilized technology will not be successful in the healthcare domain [7,8]. The studies of Davis [9] disclose that 'as technical barriers in organizations disappear, the enthusiasm to create services that people are ready to use becomes a critical factor in harnessing the growing power of computer technology.' At present, the modern popularisation and introduction of the internet have increased the pace of telecommunication technologies progression in healthcare, thereby intensifying the span of telemedicine services to cover web-based applications (i.e., emailing, video conferencing, teleconsultations), and multimedia approaches (video and digital imagery) [10]. Despite the great promises of these services, its applications have accomplished different levels of success, although its introduction has fundamentally changed how, when, and where healthcare professionals make medical decisions [11].

Healthcare professionals may exhibit fascinating or diverse differences in using telemedicine services due to their professional ethics and training in using technology [1,5].

Notwithstanding, some health professionals are compelled to apply these telemedicine services in their clinical workflow due to the large population growth they serve, and the high physician to patient ratio's[12]. Some health professionals may also need proficient knowledge or expert advice under certain conditions during clinical consultations like maternal, chronic and accidental services. Where the absence of expert knowledge can subsequently lead to the death of the patient [12,13]. There are also challenges with staffing in rural facilities, which results in high staff turnovers resulting from service inaccessibility etc. [14]. In solving some of these predicaments, healthcare administrators have implemented telemedicine services in their routine activities. This, surprisingly, has been a blessing to solve most of the healthcare challenges in some developing countries [15,16]. Telemedicine services have not been fully deployed into typical clinical workflows except in places where special telemedicine centers have been built due to several reasons which may include internal factors influencing health professionals' acceptance to use the service, which this study sort to redress. Currently,

health institutions partly or partially use the service to augment their clinical workflows in or during critical conditions. This has helped to bridge the hurdles for rural dwellers who, at times, receive the same medical services as compared to the citizens in the urban centers.

Several studies reviewed have shown that previous telemedicine studies have predominantly concentrated on the clinical applications and technology development necessary for its success [2,5,17]. However, there have been inadequate or fewer discussions on the internal and managerial factors supporting its use, which is likewise important for its sustainability in healthcare [18]. This has made its full utilizations being undermined by most Healthcare Administrators because it becomes arduous to identify the factors that helps to influence its adoption for service continuity. Researchers suggest that the success of telemedicine services demands that an adopting healthcare organization tackles not only external or technological issues but also managerial and internal challenges [2,19]. This, therefore, propels our current study to investigate the internal factors in the healthcare facilities that enhances the acceptance and use of telemedicine services among health professionals. This current study will add to knowledge and practice the identifiable determinants which influence telemedicine services for effective utilization and easy understanding of the service by healthcare administrators and healthcare professionals. The study explored these factors by selecting constructs from the technology acceptance model and the diffusion of innovation model. The selected constructs from these theories will be integrated to form a single hybridized model. This model will provide a parsimonious understanding and accurate information to investigate the internal factors enhancing telemedicine services in healthcare settings.

1.1 Healthcare professionals' telemedicine services adoption

It is ambiguous to define the term telemedicine. A study conducted by Sood, et al.,[20] disclosed 104 peer-reviewed definitions of telemedicine which has enthused the World Health Organization (WHO) to adopt an extensive description as: "the delivery of health services, (diagnosis, consultation, patient monitoring, treatment of illnesses, recommendation) by health care providers via telecommunication tools where distance separate healthcare providers and patients"[21]. The approach is normally practiced when complicated case beyond the knowledge of the healthcare personnel at the remote healthcare facility appears and needs expert knowledge to treat the patient. The expert is consulted remotely using telecommunication tools to render services to the patient online irrespective of location with the view of promoting the health of the patient in their communities.

The health professionals' telemedicine service acceptance is his emotional state concerning his intended use of a specific telemedicine service for treatment or management of a health condition [2]. Studies have divulged that the individual's willingness to patronize a telemedicine service can significantly influence his real use. Health professionals' behavioral intention is known to predict his real state of mind, such as accepting or rejecting the service. The analytical locus, then, is how the health professional can recognize the vital intention determinants that may result in actions. These determinants may include attributes of the telemedicine services (perceived ease of use and perceived usefulness), communication channels for the spread of the telemedicine service, user's influences in the social system, and other promoting factors such as health facilities financial strength and health facilities management strategies towards the telemedicine services [7]. Some of these determinants can be found in the theories of diffusion

of innovation and technology acceptance models, which are well established intention-based theories for studying user adoptions in health information technologies [1,8]. According to the models, beliefs control attitude, which gradually shapes behavioral intentions that subsequently, dictates an individual behavior to accept or reject the telemedicine service. Several researchers have explored health professionals' receipts of telemedicine technology; nevertheless, a large number of the studies were narrow in scope, and some tested hypotheses require adequate empirical bases [6,17,22,23].

II. Theoretical Backgrounds and Investigated Theories

Our current study is based on an integrated theory by selecting constructs from the Technology Acceptance Model (TAM), Diffusion of Innovation model (DOI), and Researchers' constructs. This theory's foundation is grounded on their common belief–intention–behavior in studying user acceptance of various information technologies in healthcare settings [7,9,18]. The choice of an individual's behavior towards a definite technology is programmatically strong when combining these theories. TAM and DOI are among the best empirical theories that have accrued strong experimental support comprising of various end-users and have emerged as principal models upon which a combined model can be formed and use for this study [7,9,18].

2.1 Technology Acceptance Model(TAM)

TAM is among the accepted theories to study the perceptions and factors that promote the adoption and use of telemedicine services in the medical environment [9]. To know the factors that affect technology acceptance and use, the user's perception on the use of the technology is examined. The selected constructs of TAM for this study include perceived ease of use, perceived usefulness, individual behavioral intentions, and actual system use.

In this study, TAM advocates that a health professionals' perception on the attributes of the telemedicine service is the extent to which the telemedicine service is simple and helpful. The health professionals' intention to use the services can be explained by its perceived usefulness, ease of use, and attitude, which is being influenced by its behavioral intentions [9,24]. The actual system usage is influenced by individual behavioral intent, perceived ease of use and perceived usefulness. Additional constructs were deployed to the TAM model by the researchers based on the characteristics of the study. Management strategies; the procedures introduced by the healthcare management to promote and maintain the telemedicine services among healthcare professionals. These strategies are used to increase and motivate behavioral intentions toward the use of telemedicine services. The financial sustainability depicts how strong the hospital is in terms of monetary values to provide for all expenditures and reimbursement pertaining to the telemedicine service.

2.2 Diffusion of Innovation Theory (DOI)

Innovation diffusion theory is one of the widespread theories for studying the adoption of telemedicine services. The concept is extensively used in various fields of research, such as public health, politics, communication, and economics, etc [24,25]. Our current study adopted the constructs of 'communication channels' and 'characteristics of users' in a social system from this theory. This theory proposes that innovation is perceived as an idea, process, or technology that is novel or unfamiliar to individuals within a specified catchment area [25]. The theory provides a framework to model the dynamic adoption process by recognizing that acceptance of telemedicine services is a gradual process over some time. DOI is used to explain how innovations spread within and between communities of peoples of common interest (social system) [26]. The behavior of individual health professionals in receiving

telemedicine services is affected by the communication channel. The medium through which the information about the telemedicine service spreads within the social system. The characteristics of users help to distinguish between the various types of health professionals in the health facilities based on their telemedicine acceptance levels [27].

An integrated theory comprising of chosen constructs from TAM and DOI was then examined by the Researcher's purposely for this study. The rationale is that both TAM and DOI are common technology acceptance models that make their combination hypothetically well-matched and uncomplicated to use but with different foci. The cognitive impact specified by TAM may be vital precedents for attitudinal beliefs in DOI. This integration enhances the explanatory powers of TAM by increasing the possibility of accepting and adopting the indispensable dimensions of individual telemedicine services acceptance. A similar theory integrations research has been conducted to investigate the role of experiences in individual IT usage[28].

2.3 Hypotheses development

The integrated theory proposed by the researchers leads to the following hypothesis:

Management strategies in telemedicine services play a very vital role due to numerous restrictions, regulations, legalizations, funding, and motivations that ought to be considered when implementing telemedicine services [29]. Stakeholders of healthcare must ensure effective and efficient prudent administration because all items associated with telemedicine utilization brings huge expenditures to the facilities. Again, several sustainability models are being created and must be seen in both the initiating and receiving facilities. This may include telecommunication infrastructures and reimbursement procedures, which are all being regulated by management strategies [30]. Based on these the researchers hypothesized that;

H1a: Management strategies will significantly influence the financial sustainability of telemedicine services.

H1c: Management strategies will motivate health professionals' behavioral intention to utilize telemedicine services.

Several studies[30-32] have disclosed that, in the healthcare ecosystem, payment, or reimbursement to the care providers for their services are made either by individuals, private or government insurance companies. Some Providers and Administrators are unwilling to adopt telemedicine services because of unclear guidelines on reimbursement policies after using the telemedicine service in certain instances. Based on this, the researchers hypothesized that:

H1d: Financial sustainability has a significant impact on the actual utilization of telemedicine services.

Studies[33,34] suggests that communication channels utilized by Management for the introduction of new systems have direct instantaneous and reciprocal effects on a health professionals' willingness to utilize the telemedicine service. These communication channels spread the knowledge about the telemedicine to large numbers of potential adopters rapidly[12,27]. Based on this, the researchers hypothesized that:

H1b: Management strategies will significantly impact on the communication channels to spread the telemedicine services.

H1e: Communication channels will significantly impact health professionals' behavioral intentions to accept telemedicine services.

Scores of researchers[1,9,10,22] stress on the attributes of the new telemedicine services as a relative advantage over the existing service in place. The new telemedicine services should be easily compatible with the existing clinical workflow activities and as powerful assessors of individual behavioral intention. This made the researchers hypothesize as follows:

H2a: Perceived usefulness will have significant influence on health professionals' behavioral intentions to accept telemedicine services.

H2b: Perceived ease of use will have significant relationship on health professionals' behavioral intentions to accept telemedicine services.

Studies[10,35] discloses the influences that users in a social system have on potential adopters towards using technological services. This influence can also arise from colleagues and supervisors and helps the researchers to hypothesize that:

H2c: Characteristics of Users will have significant influence on health professionals' behavioral intentions to accept telemedicine services.

The research works[34-36] divulges that TAM is a scientifically adequate model to predict an individual's future behavioral intention on management practices of telemedicine services actual utilizations. We therefore hypothesize that;

H3a: Health professionals' behavioral intentions will have significant influence on the actual utilization of telemedicine services.

III.Method

3.1 Settings

The Republic of Ghana is situated in sub-Sharan Africa and currently has sixteen regions. Eastern region is the sixth largest with a land size of about 19,323km2 and the third most populated region. Its large population growth inspires the emergence of technological innovations in its healthcare facilities. The region lacks healthcare infrastructural resources with fewer healthcare professionals. Also, there is a high doctor to patient ratios and higher demands for 24-hour service delivery from the populace [3-16]. This economic quandary pushes health professionals in the region to apply telemedicine services in their clinical activities massively. The researchers were heartened by these health indicators and subsequently asked for permission from the Eastern Regional Health Directorate Ethical Review Committee to research on the internal factors influencing telemedicine services among health professionals in the region. The Health Administrators in the hospitals where the research was conducted were officially informed about the study. To meet the research standards and fulfill the objectives of the study, we applied a purposive and convenience sampling technique for the selection of participants from four health facilities (Kwahu Government Hospital, Eastern Regional Hospital, Holy Family Hospital) and Eastern Regional Health Management Directorate. These facilities were selected based on the availability, use, and management of telemedicine services. The telemedicine service used was; teleconsultation services (for diabetes education, and surgery services). Direct video conferencing, store and forward video services, mobile health monitoring, telephone, and e-mails were the methods used in these telemedicine service. The selected hospitals serve as the referral points for telemedicine services in the region. Health Professionals who were engaged in telemedicine services were occasionally trained and rewarded by their health administrators. The survey was conducted for September 2018 to April 2019.

3.2 Study design, participants and sampling

The researchers developed questionnaires based on extant literature[1,9,37,38] with necessary validation and wording changes tailored to telemedicine services and the target profession. The questionnaire encompasses the appropriate telemedicine areas. Nurses, Physician Assistants, Physicians, Healthcare Administrators, and Telemedicine Service Providers were purposively selected based on their experience, job knowledge, roles, and schedules in telemedicine services to respond to various questions asked. The study took place at the emergency care, in-patient, out-patient, maternity, surgical, and pediatrics departments.

A questionnaire comprising of the constructs management strategies (4 items), communication channels (3 items), financial sustainability (3 items), perceived ease of use (4 items), perceived usefulness (4 items), characteristics of users (3 items), individual behavioral intentions (4 items) and actual telemedicine use (4 items), with a five-point Likert scale to measure the responses from (1- strongly disagree to 5- strongly agree) were distributed to the appropriate staff both in hardcopy and an online soft copy forms. The questionnaire was administered face-to-face to staff who were readily available to respond to the questions. Staff that could not avail themselves instantly due to their job schedules were given the questionnaires to fill at their convenience. Participants were regularly contacted forth nights using e-mails and short messages systems as a follow-up method because it was difficult to reach each participant. A total of 612 questionnaires were retrieved from participants, and 69 were excluded due to deficiencies in responses; 543 responses were finally used for the data analysis giving a response rate of 78.6% participation.

IV. Analysis and Results

Structural Equation Modeling (SEM) statistical approach was utilized in this study using AMOS and SPSS (v.23) to determine whether the structural and measurement models confirms to the criteria for evidence-based research. The variables in the model were based on the questionnaires used for data collection. Such variables are identified from Table 1 to Table 4.

4.1 Demographics of respondents

The final sample size of respondents consisted of 27.8% Physician Assistants, 7.9% Physicians, 43.6% Nurses, 12.2% Telemedicine Service Providers and 8.5% Healthcare Administrators. The majority age groups of the respondents were between the ages of 31-40 years, representing 45.5%. On education, university degree holders representing 82.9% were the majority, and the minimum qualification was professional certificate holders representing 7.2%.

4.2 Measurement of Confirmatory Factor Analysis

Measurement constructs were evaluated according to their validity and reliability, and items with loading exceeding the recommended thresholds were used. As suggested by several researchers, we operationalized the internal factors for telemedicine services among health professionals as the reflective construct. The measurement models were appraise based on construct reliability, which indicates the consistency of the measurement items; convergent validity, which signifies that items are related statistically with the proper constructs and discriminate validity, signifying that the determinants were independent of each other [39-41]. Based on the appropriateness and theoretical foundations of all protocols, all constructs were significantly and critically analyzed. The individual constructs Cranach's alpha values ranged from 0.903 to 0.805, which were above the benchmark of 0.70. The convergent validity was calculated, and the average variance extracted (AVE) for all reflective constructs was above the proposed level of 0.5, ranging from 0.904 to 0.603. This is presented in Table 1.

Table 1.0: Measurement and Confirmatory Factory Analysis

Construct	Items	unstandardized estimate	standard error	critical ratio	standardized factor loadings	p-value	Average variance extracted	construct reliability	Cronbach's alpha
MGST	MGST1	1.000			0.970				
	MGST2	0.970	0.028	34.359	0.933	***	0.750	0.897	0.885
	MGST3	0.706	0.037	18.850	0.663	***			
COMCH	COMCH1	1.000	_	_	0.808				
	COMCH2	1.253	0.071	25.460	0.994	***	0.636	0.831	0.805
	COMCH3	0.645	0.050	25.560	0.517	***			
FINST	FINST1	1.000	_	_	0.955				
	FINST2	1.043	0.026	21.342	0.973	***	0.773	0.907	0.890
	FINST3	0.813	0.041	19.839	0.673	***			
CUSERS	CUSER1	1.000	_	_	0.875				
	CUSER2	1.093	0.046	25.450	0.868	***	0.904	0.760	0.903
	CUSER3	1.020	0.040	24.210	0.871	***			
PU	PU1	1.000	_	_	0.947				
	PU2	0.889	0.033	26.841	0.834	***			
	PU3	0.734	0.041	17.919	0.654	***	0.665	0.887	0.881
	PU4	0.876	0.035	24.881	0.800	***			
PEOU	PEOU1	1.000	_	_	0.943				
	PEOU2	1.010	0.029	34.419	0.935	***			
	PEOU3	0.660	0.041	16.260	0.603	***	0.640	0.873	0.859
	PEOU4	0.807	0.043	18.560	0.660	***			
IBI	BI1	1.000	_	_	0.651				
	BI2	1.230	0.074	16.544	0.839	***			
	BI3	1.336	0.076	17.479	0.934	***	0.653	0.881	0.874
	BI4	1.108	0.071	15.685	0.783	***			
ATU	ATU1	1.000	_	_	0.928				
	ATU2	0.878	0.041	21.247	0.782	***			
	ATU3	0.794	0.044	18.155	0.694	***	0.603	0.856	0.845
	ATU4	0.902	0.052	17.450	0.674	***			

MGST: Management Strategies, COMCH: Communication Channels, FINST: Financial Sustainability, CUSERS: Characteristics of Users, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, IBI: Individual Behavioural Intention; ATU: Actual Telemedicine Users, *** p<0.001.

A confirmatory factor analysis (CFA) was used to evaluate the measurement models for the validity and reliability constructs. This study used eight measures to evaluate the goodness of fit of the CFA. The results were confirmed with past studies [40,41]. All measures met their threshold values implying that the model was fit for estimation. This is presented in Table 2.

Table 2: Overall fit of the research model

Model-fit index	Recommended valve	Score
chi-square/degree of freedom (X2/df)	≤3.00	2.102
goodness-of-fit index (GFI)	≥0.90	0.920
adjusted goodness-of-fit index (AGFI)	≥0.90	0.902
non-normed fit index (NNFI)	≥0.90	0.934
comparative fit index (CFI)	≥0.90	0.964
root mean square residual (RMR)	≤0.08	0.041
Tucker-Lewis index (TLI)	≥0.90	0.958
Root mean square error of approximation (RMSEA)	≤0.08	0.045

The discriminate validity was calculated using the square root of AVE to replace the correlation coefficient matrix diagonals, with larger values that link correlation coefficients. This confirms that reflective constructs differ from each other. The measures in this study established a satisfactory confirmation of discriminate, uni-dimensionality, and convergent validity for the structural model [40]. This is presented in Table 3.

Table 3 : Discriminant Validity

	MGST	FINST	COMCH	CUSER	PEOU	PU	IBI	ATU
MGST	**0.866**							
FINST	0.531*	**0.797**						
COMCH	0.402	0.535*	**0.879**					
CUSER	0.401	0.406	0.411	**0.950**				
PEOU	0.552*	0.523*	0.652*	0.412	**0.800**			
PU	0.512*	0.542*	0.659*	0.481**	0.691**	**0.815**		
IBI	0.542*	0.481	0.582**	0.421	0.611**	0.610**	**0.808**	
ATU	0.492	0.681*	0.460	0.428	0.525**	0.521**	0.715**	**0.776**

**** ≈ P-value significant at 0.1% (0.001)*
*** ≈ P-value significant at 1% (0.01)*
** ≈ P-value significant at 5% (0.05)*
√AVE are bold and underlined

4.3 Hypothesis Testing

As summarized in Table 2, the structural model fit was evaluated using goodness-of-fit measures. The overall values were within acceptable thresholds. Eight out of the nine hypotheses stated were positively supported, and one hypothesis was rejected. The structural path diagram in Figure 1 showed significant relationships for all the hypotheses stated but at different significant levels. All constructs in the model have empirical foundations based on the results of the study.

In hypotheses (H1a, H1b, and H1c), our findings confirm, the stated hypotheses as statistically positive, ($\beta = 0.151$ and p-value < 0.001, $\beta = 0.461$ and p-value < 0.05, $\beta = 0.301$ and p-value < 0.05 respectively) see Table 4. This means that management strategies, communication channels, and management motivation packages to health professionals influence the adoption of telemedicine services and are a good prerequisite to its widespread adoption. The result of the study is consistent with other studies [41,42,43].

In hypothesis (H1d), our findings confirm that the stated hypothesis has a significant positive relationship with the use of the telemedicine service ($\beta = 0.495$ and p-value <0.01). This means that management teams will consider the financial indicators of the healthcare institutions as a paramount factor during the implementation stages of telemedicine services. This finding is parallel with the studies [32, 42,43].

In hypothesis (H1e), our finding is positive and significant ($\beta = 0.238$ and p-value < 0.001). This means communication channels used to broadcast the information about the telemedicine service is very important. The result is consistent with similar studies [22,33,42].

In hypothesis (H2a, H2b), our finding endorses the stated hypothesis as statistically positive with individual behavioral intention ($\beta = 0.093$ and p-value < 0.05 and $\beta = 0.109$ and p-value < 0.01). This means health professionals will decide on using telemedicine services if they clearly understand the attributes of the service. This result is parallel with similar studies [10,45,46].

The result of our study for hypothesis (H2c) was surprising rejected. Several authors [15,47-49] in their studies have shown the influence of users in a social system on individual behavioral intentions; this is contrary to our study results. In healthcare ecosystems, Health professionals have a high level of authority on the type of service to use and are very pragmatic when

making decisions in technology acceptance. Our current result is similar to the study[6] that showed the non-significant effect of the user's in the social system influence.

Finally, about hypothesis (H3a), our study showed a significant positive impact with the actual utilization of the telemedicine services (β=0.089 and p-value <0.05). This means health professionals will patronize telemedicine services if they have a good understanding of assisting in clinical judgments and management in patient care. This result is similar to studies[10,45,47] conducted in the field of telemedicine.

The empirical findings supporting the entire stated hypotheses are presented in Table 4.

Table 4: Hypothesis testing

Hypothesis	Path	Unstandard estimate	standard error	critical ratio(C.R.,t)	standard estimate	p-value	Findings
H1a	MGST -> FINST	0.166	0.049	3.609	0.151	***	Supported
H1b	MGST -> COMCH	0.109	0.179	2.532	0.461	*	Supported
H1c	MGST -> ATU	0.141	0.143	2.212	0.301	*	Supported
H1d	INST -> ATU	0.119	0.186	2.696	0.495	**	Supported
H1e	COMCH -> IBI	0.235	0.045	5.263	0.238	***	Supported
H2a	PU ->IBI	0.089	0.041	2.268	0.093	*	Supported
H2b	PEOUS ->IBI	0.147	0.034	3.155	0.109	**	Supported
H2c	CUSER -> IBI	0.072	0.311	0.532	0.401	1.289	Not Supported
H3a	IBI -> ATU	0.093	0.045	2.079	0.089	*	Supported

* p < 0.05
** p < 0.01
*** p < 0.001

Figure 1; shows the causal path diagram showing the relationship between each of the constructs.

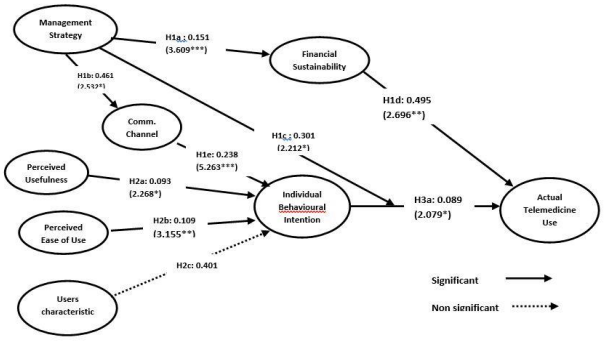

Fig. 1. Results of integrated structural theory analysis. t0.05= 1.960, **0.01 =2.576 ***t0.001 = 3.291.

V. Discussions and implication

The motivation of this research is to identify the most prominent internal factors promoting the acceptance and utilization of telemedicine services by health professionals in the selected hospitals in Ghana. This was to be achieved with combined theories of technology acceptance model (TAM) and diffusion of innovation model (DOI). The outcome of this study indicates that the construct of TAM that were selected was significant for explaining health professionals' behavior technology acceptance decisions. Notwithstanding, additional constructs were also selected from the DOI model to expand the integrated model. At present, most studies disclose that very few types of research have being conducted on telemedicine services in Ghanaian hospitals on health professionals' intentions to exploit telemedicine services. However, following the low ratio of health professionals to patients in report deliveries by the health ministry, it is, therefore, important to know the factors that intimidate the full utilization of telemedicine services. From the study conducted, Hospital Management roles are very important for the adoption and utilization of telemedicine services (see Table 4). The inability of the management team to adjoin the services into their daily operations of the hospital administration will be a flaw to health professionals who wants to use the service but lacks the support and directives. Management teams should also not consider these services as a mandatory service to be used by all health professionals, especially in situations where health professionals don't understand the service or see it as very burdensome by adding extra duties to the already existing workload.

The imperative role of perceived usefulness observed in the expression of individual attitudes may be rooted in the health professionals' tool-oriented view of technology and is only acceptable if they demonstrate proven or expected utility in their practice. Since health professionals have great autonomy in deciding whether to use the service or not lie in their onus. Another caveat to this study is that the fundamental factor for the acceptance of telemedicine services is whether the service technology meets the health professionals' requirements. Health professionals tend

to be pragmatic in selecting services base on its usefulness. The service usefulness is more paramount than how ease the service can be operated. In the healthcare technology environment, the genesis of new systems are scrutinized very well before putting it to use. This is because its failure or adherent effects can lead to permanent incapacitation, several complications, or death of an individual. Because of this, telemedicine services are systematically tested very well during the developing stages before its implementation, and this forms part of a culture of introducing healthcare technologies. This makes health professionals place less value on its difficulties as ease of use as compared to its perceived usefulness (see Table 4).

The influence of users in the social system places no significance in our current study (see Table 4). This is because, in the healthcare ecosystem, health professionals may conduct independent assessments and therefore value their assessments more than other's opinions and recommendations.

VI. Limitation

Although the findings of this study are quite valuable, there are some restrictions to its generalization. First, the research did not emphasize a specific telemedicine service but emphasized a specific professional cluster of people in specified hospitals. This participant's mindset can be influenced by specific public health system and regional characteristics. The data collection period was short, which resulted in less participation and was subjected to questionnaire administration where both the researchers and the respondents can be biased. To generalize these findings, several types of research with different data collection techniques should be carried out. Further research should gather information from a larger study area whiles limiting the study to specific telemedicine services.

VII. Conclusion

Ghana's healthcare industry is working hard to ensure that telemedicine services are adopted and used in many government and private hospitals. This will help close the barrier between health professionals and patients, most particularly in clinical care management that demands specialized medical intervention. This current study is needed because the health ministry is on the urge to commercialize several telemedicine centers and these internal factors affecting the successful implementation of telemedicine services must be known. This current study provides insights into appropriate strategies for hospital Management to accept and encourage telemedicine services. The findings expose the receipt and use of telemedicine services by Health professionals as a very imperative area worth exploring. Physicians were the primary users of the telemedicine services, and because of the trust relationship between their patients, their acceptance is of great interest to its sustainability.

Health professionals are relatively independent when making technical decisions, and the results analyzed indicate that they are eager to use telemedicine services in their clinical activities. Management teams should add such technologies services to their routine operations.

Our study recommends that an appropriate reimbursement plan should be established by the hospital management teams and the health insurance authorities. This will condense the burden of who reimburses for the services provided after a telemedicine service has been rendered. Hospital management should communicate the usefulness of the telemedicine services to the individual tasks of health professionals, after deciding to patronize a particular telemedicine service. Persistent clinical workshops, education symposia, and conferences should be organized and participated by health professionals to boost their knowledge and awareness in telemedicine services. Lastly, our current study did

not consider the external determinants that may influence telemedicine services adoption, and we recommend further research in this direction.

VIII. Acknowledgement

We wish to express our profound gratitude to the National Nature Science Foundation of China (Grant No 71774069), and 2014 "Six Talent Peaks" Project of Jiangsu Province (Grant No. 2014-JY-004) for their financial support for this research work. We also wish to render our sincere gratitude to the Management of the selected health institutions for making their facilities available for the periods of the research. We again wish to thank all Ph.D scholars under the supervision of Prof. Dai Baozhen for their immerse contributions and suggestion for this manuscript.

IX. Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research work was funded by the National Nature Science Foundation of China (71774069) and Social Science Foundation of Jiangsu Province (19SHB001).

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Cite this article as :

Jonathan Kissi, Baozhen Dai, OU Wen-hui, Fortune Agbi, Edward Obeng, "An Empirical Study of Intrinsic Determinants Influencing Telemedicine Services Adoption by Healthcare Professionals", International Journal of Scientific Research in Science and Technology (IJSRST), Online ISSN : 2395-602X, Print ISSN : 2395-6011, Volume 7 Issue 6, pp. 90-103, November-December 2020. Available at doi : https://doi.org/10.32628/IJSRST207554
Journal URL : http://ijsrst.com/IJSRST207554