Faculty of Economics and Business

Assessment of Healthcare Providers' Acceptance of Telemedicine Consultation in Sarawak

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DECLARATION

I declare that the work on this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. It is original and is the result of my work, unless otherwise indicated or acknowledged as referenced work. The thesis has not been accepted for any degree and is not concurrently submitted in candidate of any other degree.

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ABSTRACT

In order to provide information, education, medical consultation, diagnosis, treatment, support, and governance, Malaysia formed the Telemedicine Blueprint in 1997. The COVID-19 epidemic enhanced consumer knowledge of telemedicine, but patients and healthcare providers still have low levels of adoption, according to the Malaysian Medical Council in year 2020. Despite the advantages of using such technology, healthcare personnel under utilize it due to several factors. Based on the background and problems of acceptability towards telemedicine, no market data for Sarawak is available, and has not yet been established. Besides, there are no user perspectives from healthcare providers that are found to match with telemedicine adoption based on the Sarawak context, and there are no guidelines based on data-riven (current-status in Sarawak) decisions. The telemedicine might able to leverage the issues of delayed diagnostic and the needs of medical consultations, yet the alarming still persist in Sarawak due to lack of medical officers in primary centers. As a result, the experiment aims to estimate the acceptability. The initial goal of this study is to identify the demographics and consumer attitudes towards telemedicine in Sarawak among healthcare providers. Next, determine consumers' perceivance of telemedicine in Sarawak. Finally, to demonstrate the broad correlations between consumer attitude and intention. Cross sectional study is embarked, 164 sample are collected from healthcare providers. Healthcare professionals of Sarawak's four largest cities, Kuching, Sibu, Bintulu and Miri, are the targeted. Questionnaires based on the TAM models are constructed to evaluate and forecast the acceptability of telemedicine. The association was examined using PLS-SEM. Throughout the study, four variables were shown to have a significant link in the TAM (6 hypothesis accepted out of 11). Researchers reviewed the significant variables related to the intention to use telemedicine systems to

assist healthcare business stakeholders in understanding how potential users embrace and adopt such a system. The significant of the study, might act as initial data platform to both the government and privates for the better understanding (knowledge and research) of how consumers can use an efficient telemedicine system in healthcare business settings from the perspectives of healthcare providers.

Keywords: Telemedicine, Acceptance, Healtcare provider, Perception and TAM.

Penilaian Penerimaan Sistem Teleperubatan di dalam Kalangan Penyedia Perkhidmatan Kesihatan di Sarawak

ABSTRAK

Akta Teleperubatan 1997 yang digubal di Malaysia, telah menyediakan kemudahan seperti maklumat, pendidikan, rundingan perubatan, diagnosis, rawatan dan sokongan urus tadbir. Sejak pandemik COVID-19, kesedaran penggunaan khidmat teleperubatan semakin meluas, walaubagaimanapun penerimaan masih rendah di Malaysia seperti yang dilaporkan pada tahun 2020 oleh Majlis Perubatan Malaysia. Walaupun sistem tersebut membawa kebaikan dan kemudahan, tetapi sambutan pengunaan masih rendah dikalangan penyedia perkhidmatan kesihatan. Berdasarkan latar belakang dan masalah penerimaan terhadap teleperubatan, setakat ini tiada maklumat tentang pengaruh penerimaan sistem teleperubatan di Sarawak. Tambahan pula, tiada data perspektif daripada penyedia perkhidmatan kesihatan, tiada rujukan asas data semasa di dalam konteks populasi di Sarawak. Teleperubatan mungkin dapat memanfaatkan isu diagnostik yang tertangguh dan keperluan perundingan perubatan, namun yang membimbangkan masih berterusan di Sarawak kerana kekurangan pegawai perubatan di pusat-pusat primer. Dengan ini, aspek kajian dimulakan dari segi pengaruh penerimaan. Objektif kajian ini adalah untuk mengenalpasti demografi pengaruh penerimaan, faktor-faktor pengaruh penerimaan di kalangan penyedia perkhidmatan kesihatan. Seterusnya, tentukan persepsi pengguna terhadap teleperubatan di Sarawak. Objectif akhir adalah, untuk meninjau hubungan keseluruhan antara faktor-faktor perspektif pengguna. Kajian keratan rentas dimulakan dengan 164 saiz sampel daripada penyedia perkhidmatan kesihatan. Empat kawasan bandar utama di Sarawak *akan diutamakan untuk mendapatkan responden dari penyedia perkhidmatan kesihatan iaitu di* Kuching, Sibu, Bintulu *dan* Miri. *Alat kajian soal selidik*

berdasarkan model Technology Acceptance Model (TAM)*, untuk mentafsir pengaruh penerimaan. Data analisis menggunakan* PLS-SEM *untuk pengujian model pengukuran statistik T. empat indikator menunjukkan signifikan dalam hubungan TAM modal* (6 *hipothesis diterima daripada jumlah* 11 *hipothesis*). *Faktor-faktor yang menggalakan pengunaan teleperubatan telah ditonjolkan, dan ini dapat membantu memberi pemahaman kepada pihak-pihak berkenaan khususnya dalam bidang perubatan. Signifikan dalam kajian kuantitatif ini berkemungkinan mampu bertindak sebagai platfom data asas bagi rujukan pihak kerajaan dan swasta dalam memahami (pengetahuan dan penyelidikan) pengguna yang mengunakan sistem pekhidmatan teleperubatan secara berkesan dalam pengurusan penjagaan kesihatan, ataupun dari perspektif penyedia perkhidmatan kesihatan.*

Katakunci: *Teleperubatan, Penerimaan, penyedia perkhidmatan kesihatan, perspektif dan* TAM

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LIST OF ABBREVIATIONS

%	Percentage
AI	Artificial intelligence
ATT	Attitude Toward Use
AVE	Average Variance Extracted
B2B	Business-to-business
B2C	Business-to-customer
BI	Behaviour Intention to use
BI	Behavior Intention
CA	Cronbachs Alpha
COVID-19	Coronavirus disease
CR	Composite Reliability
DV	Discriminant Validity
ICT	Information and communications technology
IoT	Internet of things
M2M	Machine to machine
PEU	Perceived Ease of Use
PLS-SEM	Partial least squares structural equation modeling
PU	Perceived Usefulness
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
VIF	Variance Inflation Factor
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.0 Overview

This section provides an overview on introduction of concept of research areas, research background in the context of Malaysia's market, a problem statement based on the gaps spotted in Malaysia, research questions development, objective of the research towards contributions, followed by the statement of research significant aspects, and the scope of research dimensions. In addition, the limitation of this study are stated.

1.1 Introduction

The provision of healthcare by adopting and integrating the healthcare system with information and communication technology (ICT) to improve the services has emerged as a call for virtual healthcare consultation (Jamieson et al., 2015 & Al-Shorbaji, 2022). This improves communication between patients, caregivers, and health care teams without requiring a physical visit. The patients receive healthcare through so-called e-visit, tele-consultation or virtual visits (Jung & Padman 2014; Mehrotra et al., 2013) to enable smooth continuation of medical care.

From the healthcare business dimensions, the implementation of telemedicine will increase the hospital performance and cost-effectiveness (Zhao et al., 2020), and this might help the health organization's business strategy as a competitive advantage (Chen et al., 2019). The positive demand and well-adopted progress of telemedicine into the business model due to

the increase return on investment (Sterling & LeRouge, 2019). With telemedicine as the upcoming wave of trend in medical business, it would help to boom in medical businesses. As healthcare providers are currently lacking in manpower (World Health Organization, 2013 & Džakula et al., 2022) in hospital, clinics would be given chances to assign patients to help out the governments in medical business. Nonetheless, pharmacies would also receive benefits. Health care stations can be set up at pharmacies for patients to do normal health check-up such as blood pressure monitoring, blood glucose monitoring, temperature monitoring, and body fat monitoring. Patients' results would be saved into the cloud system as healthcare providers would have assessed through the cloud, enabling them to increase their accuracy in diagnosing the patient (Webster, 2019).

The cost and safety aspects were improved by reducing the cost for both patients (Bynum et al., 2003) and healthcare, as well as enhancing the safety of self-centred management (Snoswell et al., 2020). In addition, Wade et al, (2010) systematically reviewed based on the economic aspect of telehealth services was shown cost-effective. This causes the new progress phenomena demands of telemedicine among the patients due to the factors of cost and logistic issues, such as at: China (Wang et al., 2019) and OCED countries (Eze et al., 2020).

Along with the rising awareness of telemedicine, yet omnipresence due to the several factors was identified (worldwide) such as: technical, resistance to change, age factor, education level, and reimbursement (Scott et al., 2018); geographic factor (Zhang and Zaman, 2020); However, there are still some limitations due to geography or education, whereby some remote areas do not have internet access (Drake et al., 2019). Patients

would not be able to practice telemedicine, as this requires both health care providers and patient cooperation to make it happen. Nonetheless, some patients with low education levels on devices such as smartphones, laptops, or tablets do not know how to have a meeting online during their appointment with their appointed healthcare provider (Scott et al., 2018). The factors that facilitate and resist telemedicine are different (from systematic reviews) and collectively grouped for better observations and improvement (Almathami et al., 2020). Besides, the health policy of telemedicine also contributes to the barrier factor towards implementation based on the systematic reviews (Kruse et al., 2021).

During the COVID-19 pandemic and unprecedented situation, the trend of telemedicine adoption increased. Several countries are starting to introduce and improve access to telemedicine services, especially in the Southeast Asia region (Gudi et al., 2021). Patients and healthcare providers are able to practice social distancing and reduce the risk of cross infections. Some patients who have difficulty with transportation or whose residential area is too remote and far from the nearby clinic would sometimes miss their appointment time, causing a huge issue.

Despite the non-monetray factors, the monetary valuation towards the telemedicine also part of the dimension in terms of marketing in the context of understanding patient preferences. As a result of the overview from this perspective, a systematic review of the 11 studies (7 countries) indicates: significant correlation between age and distance towards the WTP for telemedicine; with a broad range of percentage and amount of WTP with 19%-70% and US$0.89-US$821.25, respectively (Chua et al., 2022). From the healthy

patient perspective, the WTP for a healthy lifestyle programme through the telemedicine platform show positive feedback based on the distance journey (Rauch et al., 2020).

From the fact of the various unique indications and factors of telemedicine adoption, it is paramount and vital to understand potential user behaviour in order to maximise the telemedicine health system for patient well-being. As the COVID-19 pandemic raged and entered post-pandemic, the telemedicine healthcare concept continued to innovate to increase utilisation (Sigh et al., 2022) and overwhelming demand (Jercich, 2022). Patient preferences may not be the same after the Covid-19 pandemic in terms of cost-related factors, where patients are sensitive to out-of-pocket costs for video visits (Predmore et al., 2021).

Hence, this study was initiated to reviews the patterns of telemedicine in Malaysia especially in Sarawak state. The following sub-section reviews the background of the study to develop the desired research paradigms.

1.2 Background of the Study

Health concerns and resources in society are considered part of the socio-economic system worldwide, including Malaysia. Malaysia is among the countries to start virtual healthcare after establishing Malaysia's Telemedicine Blueprint in 1997 (Ministry of Health, 1997). Under this blueprint, the aim of service ranges from providing: information, education, medical consultation, medical diagnosis, medical treatment, medical support, and governance (Ministry of Health Malaysia, MOHM). In this context of the research, the element of consultation in the healthcare setting has been focused on. Under the

Telemedicine Act 1997, 'telemedicine' is defined in a practical way: the practice of medicine using the audio mode, visual mode and data communications. The existence of telemedicine approaches in the healthcare system has brought benefits to both providers and patients (Maroop et al., 2011a). Overall, the proliferation of telemedicine adoption is slow and still needs to improve the system (Som et al., 2010; Zailani et al., 2009).

The acceptance of telemedicine among healthcare providers is based on a positive response and willingness to adopt from the 4 hospitals (Selayang Hospital, Kuala Lumpur Hospital, Sungei Buloh Hospital, and Putrajaya Hospital) (Zailani et al., 2014) and 17 main hospitals plus 62 district hospitals (Ibrahim et al., 2010), respectively. In contrast, a cross-section study in a single hospital (Hospital of Conselor Tuanku Muhriz) shows moderate acceptance among the doctors (Abushaar & Ismail, 2018). While from the public (Selangor) perspective, a recent study from Lee et al. (2020) shows mobile health (m-health) is well perceptive.

In the last decades, the Malaysian Medical Council (2020) found that consumers have been boosted to consider their demand for health monitoring. Their consciousness of telemedicine increased even more drastically during the COVID-19 pandemic. Therefore, the healthcare industry continues to provide services, especially primary care, by starting to adopt the telemedicine approach (Malaysian Medical Council, 2020). This contrasts with a recent cross-sectional study and a short survey during the pandemic in Malaysia, which indicate the status of telemedicine among healthcare providers' perspectives is not well reflected, such as the benefits and real practices of telemedicine being low (Thong et al., 2021). The healthcare providers in Malaysia outlooks the benefits of telemedicine with the

concern factors of: digital literacy, disability, language, location, or internet connection, and these will lead to weak patient-outcomes (Salleh, 2021).

From the above reviews, despite evidence of effectiveness for telemedicine, there is still a low rate of practice among healthcare providers and patients. Therefore, recognising the factors from the consumers' perspective regarding telemedicine can assist healthcare systems, either from the government or private sector, to improve acceptance levels. This is in line with the positive findings of evidence-based research that properly identify the factors able to increase the acceptance level among patients (Woo & Dowding, 2018). In addition, it is important to evaluate telemedicine attitudes as a foundation for successful implementation (Waschkau et al., 2020). Hence, recently the first study to look at views towards telemedicine in East Malaysia was done in Sabah, and it revealed (attitude foundation data) a high level of acceptability among respondents from rural areas (Manzoor et al., 2022).

1.3 Problem Statement

Although the Malaysian government developed and revised the version of telemedicine with the aim of ensuring to restructure the healthcare communication from doctor-centred to patient-centred care by incorporating Information and communications technology (ICT) (Som et al., 2010). In the past two decades, the system should have matured enough to be part of the healthcare system for the public. Based on the studies over the past two decades have provided important information on factors by using several theories to estimate the influence of the adoption of telemedicine in Malaysia. For instance, phenomenology mixed method design and a one-phase approach (Maroop et al., 2011a); theory-driven and

prior-research approach (Maroop et al., 2011b); and mixed method convergent design and a one-phase approach (Maroop et al., 2014); Technology Acceptance Model (Abushaar & Ismail, 2018). Even with all these studies, the acceptance among the users are still not dominant enough, as portray from a cross-sectional study revealed that pharmacists and allied health care providers accessed teleconsultation less frequently (Ng et al., 2022). The majority of studies are conducted from the perspective of healthcare providers rather than the public/patient or two perspectives in a single research approach. This lead, the acceptance of certain factors is not always clear visualized in Malaysia. In addition, these previous studies of findings are based on peninsular Malaysia and would perhaps not be applicable in the Sarawak context as there are no solid indications of similar factors.

Moreover, the following questions highlight the problem: "The healthcare sector is subject to strict regulation. Are we ready to abide by our rules. Are there any telemedicine services available right now?", in regard to the issues mentioned by the Ministry of Health delegate during the Selangor International Healthcare Conference 2022 (Moreira, 2022). Which means the situation is still unclear. According to the most recent news, the utilisation of technology in the field is still minimal, according to a statement from Health Digital Technologies (DoctorOnCall) co-founder Hazwan Najib (Ignatius, 2023). While in Sarawak, the planning and research are undertaken in Sarawak to improve all digital infrastructure, particularly to improve telemedicine connectivity in 2020 (Jee & Yih Boon, 2020). Although telemedicine as a concept has been developed and supported by the Sarawak government since 2011 (Sarawak Government, 2011) and was introduced in year 1997 (blueprint telemedicine under Ministry of Health Malaysia). With this scenario, informed the delayed of unknown causes in Sarawak. This might due to lack of perspective

determinants from consumers. In which, the new mode of medical services feedback are part of the important factors towards the telemedicine business developing framework (Velayati et al., 2021).

The implementation continues to face challenges in Sarawak. As the demographic structure in Sarawak was different compared to Peninsular Malaysia. The demographic also acts as a factor of acceptance towards the desired study (Maroop et al., 2014). There is no telemedicine market data available in Sarawak based on the context of acceptance towards telemedicine, which has yet to be determined due to the previous studies focusing on Peninsular Malaysia. Furthermore, there are no guidelines based on data-driven (current status in Sarawak) decisions available, and no comprehensive user perspective factors are identified to align with telemedicine adoption based on the Sarawak context. Therefore, the current study was designed to investigate the telemedicine market in Sarawak. As the discrepancies in healthcare between rural and urban areas have been evident, and it has been argued that patient and provider satisfaction are two important determinants of whether telemedicine services can be established (Falcon, 2019). Hence, this study to initiate investigate the perspective of health-care providers acceptance of telemedicine. The healthcare-dimensional perspective is a crucial step in fostering public engagement and involvement in their healthcare system through the use of telemedicine.

Telemedicine is an important technique for increasing access to medical treatment in remote places. It serves to bridge the gap between healthcare providers and patients in distant areas, particularly in Sarawak. The scarcity of medical officers in rural areas, such as Sarawak, is a pressing issue. According to reports, more than half of Sarawak's remote

community health centres lack medical professionals (Ling & Vethasalam, 2023; Jamie, 2020). On top of the shortage of medical officers, rural communities in Sarawak also face challenges in accessing important health information (Panting et al., 2023). This lack of access to health information further delays the diagnostic process and hinders effective healthcare delivery (Wan et al., 2020; Mohamad et al., 2022).

Overall, despite the increasing availability of telemedicine services, their acceptance level still remains low in the Malaysia market. This is despite research that suggests it could improve patient outcomes and reduce healthcare costs. In order to better understand why telemedicine is not being adopted as widely as it should be, we need to identify the specific factors that are preventing its acceptance in this market. Through an analysis of existing research and data, this study seeks to identify these factors and provide recommendations on how they can be addressed.

1.4 Research Questions

Based on the reviewed background of study, there is a gap of undefined telemedicine in Sarawak. Thus, this study to proceed with the research questions:

i. What are the demographic characteristic patterns of telemedicine in Sarawak among the healthcare providers?
ii. What are the healthcare providers' attitudes towards the telemedicine in healthcare system in Sarawak?
iii. What are the healthcare providers' perceptions towards the telemedicine in healthcare system in Sarawak?