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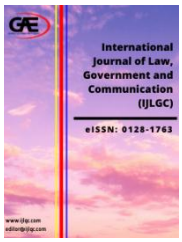

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BRIDGING THE GREY DIVIDE: A CONCEPTUAL FRAMEWORK OF DIGITAL HEALTHCARE ADOPTION AMONG SENIOR CITIZENS IN MALAYSIA

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Abstract:

Digital healthcare has transformed the conventional access to health and assisted living services. This practice was once considered as taboo or abnormal. However, it has since become a normal practice for Malaysia's society. The normalisation of digital healthcare has not benefited senior citizens equally. Some senior citizens experience challenges in adopting digital healthcare services. This paper aims to address such challenges by proposing a framework of digital healthcare adoption among senior citizens in Malaysia. Senior citizens, referred in this paper, are the Malaysians aged 60 years old and beyond. Its conceptual framework consists of four components: availability, affordability, acceptability and usability. Examining availability enables the paper to determine the readiness of capacity of infrastructure related to digital healthcare, capabilities of medical practitioners, digital infrastructure, and digital health devices for senior citizens to use in Malaysia. An examination of affordability analyses financial accessibility of senior citizens when adopting digital healthcare services. Usability is meant to assess the interface quality of digital healthcare devices and experience of senior citizens as users. Lastly, an examination of acceptability determines whether digital healthcare service is trusted enough as to be willingly adopted and sustained by senior citizens and medical practitioners. The paper also examines five moderating factors: age groups of senior citizens, socio-economic status, educational level, residential areas, and living lifestyle of senior citizens. The framework contributes to a better understanding of digital healthcare adoption among senior citizens in Malaysia.

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Keywords:

Grey Digital Divide, Digital Healthcare, Senior Citizens, Digital Transformation, Malaysia

Introduction

Digital healthcare has transformed the conventional access to health and assisted living services. Instead of being physically present at hospital or clinic when receiving medical consultation, a patient could opt for an online medical consultation with his or her doctor. This practice was considered as taboo or abnormal, however, has become a normal practice for Malaysia's society. The public has become accustomed to digital healthcare since covid-19 pandemic notably the periods of restricted movement. For instance, MySejahtera, a mobile health app which enables users to conduct medical assessment of covid-19 without being at any medical institution, was introduced by the government of Malaysia in April 2020. Due to its features on covid-19 tracing and vaccination scheduling, more Malaysians have downloaded MySejahtera. This resulted to MySejahtera ranked at number three in the list of top mobile app with active users in Malaysia in 2022 (Simon Kemp 2022). The popularity of MySejahtera is an evidence of Malaysians accepting mobile health app, a form of digital healthcare. Other forms of digital healthcare include "electronic health records, electronic medical records, wearable devices, telehealth and telemedicine, as well as personalized medicine" (Berstein 2021). These digital healthcare devices are gradually accepted by some Malaysians due to their respective medical needs and healthy life style. This situates the interest of this paper to examine the digital healthcare adoption. Adoption of digital healthcare, defined in this paper, is consistent use of healthcare devices.

Nevertheless, not all groups of age in Malaysia could adopt digital healthcare. In particular, senior citizens do have difficulties to adopt digital healthcare. One indicator that denotes the struggles of senior citizens using digital technology is internet usage. Department Statistics Malaysia (2022) reported that Malaysians aged 60 years and beyond was the age group that recorded lowest internet usage as compared to other age groups in 2021. This has become worrisome because Malaysia with "7.3% of national population" of senior citizens in 2022 has become an ageing nation (Azuar 2022). Drawn from this basis, the paper seeks to bridge this digital divide by proposing a framework of digital healthcare adoption among senior citizens, aged 60 years and beyond, in Malaysia.

Literature Review

Digital Healthcare Adoption in Malaysia

Digital healthcare refers to digital transformation of healthcare in Malaysia provided by both public and private health institutions. It is supported by government blueprints such as Malaysia Digital Economy Blueprint, National 4IR Policy, and Pelan Jalinan Digital Negara (JENDELA). Legality of providing digital healthcare is stated in the Medical Device Act 2012, Act 737. The legislation categorises digital healthcare products as medical device (Medical Device Act 2012, p. 9), which includes all forms of digital product or service used in healthcare. Accenture (2021, p.7) further lists down product or service of digital healthcare: mobile phone applications, tablet applications, electronic health records, wearable technology, social media and online support communities, online support resources, virtual consultation with a medical

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provider, remote patient monitoring to track symptoms or a condition that is shared with a medical professional, chatbots/voice-enabled technology, and digital therapeutics.

Barriers of Digital Healthcare Adoption in Malaysia

Although 98% of Malaysians have internet access in 2024 (Department of Statistics Malaysia 2025), its digital healthcare adoption is limited. Due to movement restriction during covid19 pandemic, most people opted for online consultation in the form of telemedicine. However, medical practitioners, who provided telemedicine service during the pandemic, were discouraged due to some barriers namely "medico-legal aspect and consent (80.6%), billing and charges for such services (66.7%), insurance reimbursement/payment for such services (62.5%), technical difficulties including the setup and availability of technology (62.5%), patients willingness to adopt telemedicine (55.6%), time consumption and reduction in productivity (38.9%) and prescription of a medical certificate (40.3%)" (Thong et al. 2021, p. 471). In addition to this, Khor et al. (2024) argued difficulty to attain stable internet access and low level of digital literacy also contribute to low adoption of digital health. Similarly, GSMA (2022) also concerned about connectivity issues in Malaysia with reference to ownership of device with adequate broadband coverage and unstable internet coverage. This situates the importance of having digital infrastructure to supports digital healthcare adoption.

A study conducted by Mat Surin et. al (2018, p.53) on acceptance of technology among senior citizens in Beranang, Selangor found that the level of technology use was low with 64.4% owned smartphones and mobile phones, 28.9% owned laptop, 17.8% owned desktop computer, and 11.1% owned tablet. For consecutive years between 2018 and 2021, Malaysians aged 60 years and beyond has been the the age group that recorded lowest internet usage as compared to other age groups (Department Statistics Malaysia 2019; 2022). Nevertheless, covid-19 pandemic was seen as a wake call to some senior citizens to be connected digitally notably during the periods of restricted movement. This was reported Ayamany (2021) on the struggles of two senior citizens to cope with digitalization. This infers that these senior citizens have difficulties to be digital inclusive because of technological distrust and low quality of technological device. Many literatures point that the digital divide affecting senior citizens to their respective internal attributes namely lower levels of computer literacy, technophobia, lack of perceived usefulness and physical and cognitive deficits (McDonough, 2016). Moreover, technology is not generally customized for seniors and their different needs. Examples include difficulties to use touch screen, remembering passwords and usernames can be challenging to remember and confusing, and menus and user interfaces can be overwhelming. In addition to this, Vellasamy explained that "education and support for the elderly is sorely lacking in terms of helping them learn the required skills to fully use digital technology and meet their daily needs" (Ayamany 2021). In addition, Ahmad et. al (2022, p.184) argued that digital health technologies issues among older adults are "lack of confidence to use technology, limited technological literacy, less interest in using technology, facing impairments due to ageing, and low expectation of telemedicine session". Due to age factor, senior citizens, not limiting to the Malaysians, tend to have negative attitudes to new technology, anxiety when using new technology and difficulty to trust such new technology (Frishammar et al. 2023). Drawn from this basis, the paper seeks to develop a conceptual framework of digital healthcare adoption among senior citizens in Malaysia.

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Conceptual Framework

Some studies examining digital healthcare adoption employed model of Unified Theory of Acceptance and Use of Technology (UTAUT) to examine user behaviour and their respective intentions. Technology Acceptable Model (TAM) is also preferred by scholars to how users accept new technologies. The paper, however, argues that a framework of digital healthcare adoption should not solely focus on senior citizens as the users. Rather, A framework should involve other key stakeholders of digital healthcare industry as well. These stakeholders include government agencies as regulators and policy makers, healthcare practitioners as the supplier of digital health service, industrial providers as the ones who provide service of the digital health platforms and smart health devices as well as telecommunication and logistics. These stakeholders are the ones who contribute significantly to facilitating conditions argued by Malarvizhi et al. (2024, p. 5): "These supportive conditions encompass resource accessibility, technical assistance, and training opportunities, which not only shape users' intentions, but also facilitate the effective utilization of e-healthcare services". In this respect, the paper argues a sustainable framework of digital healthcare adoption should be based on four components: availability, affordability, acceptability and usability.

Availability

An examination on availability enables the paper to determine the readiness of capacity of infrastructure related to digital healthcare, capabilities of medical practitioners, digital infrastructure, and digital health devices for senior citizens to use in Malaysia. It questions: What is the current state of readiness across capacity of infrastructure related to digital healthcare, medical capabilities of medical practitioners, and digital infrastructure required that enable senior citizens to use digital healthcare service? By doing this, it analyses the inter-agency collaboration between the three Ministries, Ministry of Health, Ministry of Communication, and Ministry of Digital in providing digital healthcare service to senior citizens. It is important to note that existing hospitals were mostly designed for traditional medical service. These hospitals were built without any consideration of providing digital healthcare, "They lack devices as well as physical infrastructure to accommodate healthcare digitalisation" (Khor et al. 2024, p. 24). Medical practitioners should also possess certain skills when using digital medical devices. In addition to that, digital infrastructure should be examined in terms of stable internet connectivity at the hospitals and residential areas of senior citizens. This examined scope addresses the concern of Khazanah Research Institute (2004, p.10): **"**Infrastructure within different states in Malaysia differs and there is significant variation in proportions of individuals using the internet to seek health information and make medical appointments online by state". (Khazanah 2024, p. 10). Similarly, Omar et al. (2025) argued stable internet connectivity matter most as to ensure sustainable adoption of digital healthcare.

Affordability

Affordability shown in the framework is referred as financial accessibility of senior citizens to adopt digital healthcare services. By examining affordability, the framework addresses the financial barriers faced by senior citizens when adopting digital healthcare. For instance, financial barriers in the form of shouldering costing for internet connectivity and devices of digital healthcare disproportionately impact senior citizens in low-income groups (B40) (Omar et al. 2025). This refrains these groups to gain continuous access to digital healthcare service. Furthermore, offering digital healthcare at affordable cost is very costly for government. An

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examination of public-private partnership is crucial as to ensure such delivery of digital healthcare service is affordable by all senior citizens irrespective socio-economic status.

Usability

An examination of usability enables the framework to assess the interface quality of digital healthcare devices and experience of senior citizens as users. It questions: What is the current state of usability in digital healthcare services that is necessary to ensure functional and non-frustrating interactions for senior citizens in Malaysia? It also ponders on the potential standard quality assurance label of geriatric friendly.

Acceptability

An examination of acceptability enables the framework to examine whether digital healthcare service is trusted enough as to be willingly adopted and sustained by senior citizens and medical practitioners. It questions: What is the acceptability level of digital healthcare service in Malaysia from the perspectives of senior citizens and medical practitioners? Trust can be examined from legal aspect. It will be examined by analysing existing legal measures that protect senior citizens as users of digital healthcare citizens.

Conceptual Model Diagram

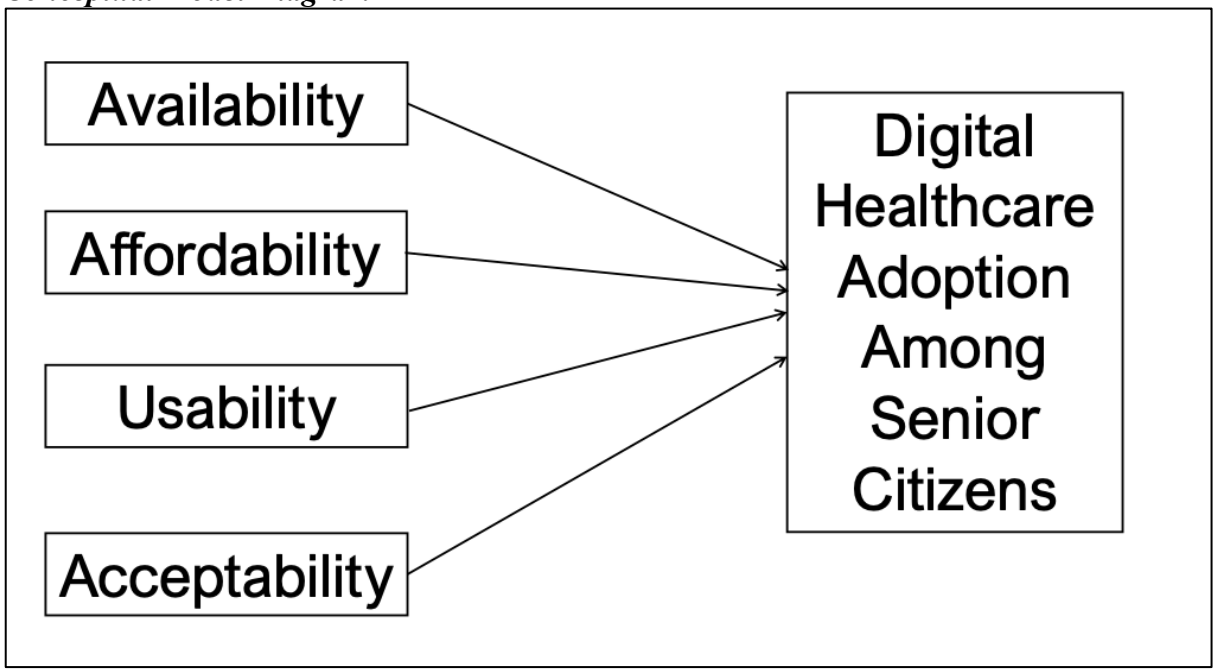

Figure 1: Conceptual Model Diagram

Diagram shown in Figure 1 depicts the relations of availability, affordability, usability, and acceptability and digital healthcare adoption among senior citizens. These components are developed based on selected literature on barriers of adopting digital healthcare, not limiting to the Malaysian senior citizens. To gain a holistic perspective, the paper also considers moderating factors namely age groups of senior citizens, socio-economic status, educational level, residential areas, and living lifestyle of senior citizens.

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Conclusion

In conclusion, the paper has presented a conceptual framework of digital healthcare adoption among senior citizens in Malaysia. The novelty of this framework is shown in its emphasis on stakeholders of digital healthcare industry, not limiting to senior citizens as users. In particular, it has argued that a sustainable framework of digital healthcare adoption should be based on four components of availability, affordability, acceptability and usability with moderating factors of age groups of senior citizens, socio-economic status, educational level, residential areas, and living lifestyle. This framework also contributes to a better understanding of digital healthcare adoption among senior citizens in Malaysia.

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