The Planned Requirements for a Distributed, Systematic Citizen-Centred Design, Intelligent Health Management System Post COVID-19 Pandemic for a Developing Country

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Abstract: The article study discussed the challenges of having an efficient database to address COVID-19 in the Malaysian context as a developing country. Likewise, the challenges include the management of the database system, which can share patient confidential information. It also implies good governance and strategy to enable an intelligent citizen-centred design that focuses on the usability and plan to benefit during post-COVID-19 with an efficient health information system in IR 4.0 era. The approach of this study is from content analysis of current literature, particularly during post-pandemic COVID-19. The listed factors are Shareable; Accessible Distributed Database; Data Protection; Backup Data Software Application Design and Development; Security and False News; and Systematic Integrated Monitoring System.Therefore, this article proposed criteria for a better health management system during the post-COVID-19 pandemic.

Keywords: Health Information System, COVID-19, Database, citizen-centred design, usability, IR 4.0

1. Introduction

A distributed, systematic and efficient database for information sharing is essential for governments, hospitals and citizens, especially when managing COVID-19 pandemics (Girija, Reddy, & Sarla, 2021). Most of the management of patients' medical records database systems in government hospitals are not in sync to access patients' information in different hospitals in Malaysia as a developing country. There is a lack of a citizen-centred design approach to consider needs and requirements from the users, particularly highlighting usability challenges. The pandemic of COVID-19 has changed new normal behaviour amongst human being (Attipoe-Dorcoo et al., 2020, Baumgart, 2020, Alam, 2021, Demaerschalk et al., 2021). The pandemic also demonstrates the potential of industrial revolution 4,0 integrated with AI technology (Khubrani, 2021; Gulhane, Ravikumar, 2021, & Sajana, 2021). However, the vital need of the citizens in having a distributed database need to be addressed to manage the health system efficiently (Hasell et al., 2021).

2. Methodology

The term "content analysis" refers to the process of determining the existence of specific words, themes, or ideas within a body of qualitative data such as the text (Hsieh, & Shannon, 2005). Likewise, Content Analysis techniques determined the current challenges for creating a distributed, systematic and efficient database with an intelligent citizen-centred design approach. By making sense from the cases, the researcher derived the themes (Elo et al., 2014) related to the current debatable topics or issues.

3. Proposed Requirements Strategy

Based on current requirements, the strategy is to create a distributed, systematic and efficient database with an intelligent citizen-centred design approach (Ariffin, 2018), especially in terms of monitoring the health and safety of people at all time, including during the pandemic period of the MCO. During the MCO, the database of patients enrolled in hospitals has to be accommodated (Myers et al., 2021) to the hospital located in Malaysia during the COVID-19 pandemic. The MCO's control also restricts the movement of patients outside the zone of

location. It includes patient information and medical records (Mann, 2020; Kitphati, 2021). This approach ensures that if patients are out of their zone, they are also given the same medication without registering the same information in different hospitals. Importantly the management information system database must include usability in mind to increase user satisfaction using the system (Al-Gayar, 2021, Ariffin, Yatim, & Daud, 2019, Ariffin et al., 2018, Ariffin & Dyson, 2015). Con

3.1. Shareable Information System

If this distributed, systematic and efficient database information system existed in Malaysian hospitals, patients can also book appointments with the respective hospital for health consultations through mobile applications. Whereas in the case of COVID-19, the records of the hospital databases must record the latest patients' information (Singh et al., 2020). To date, however, most COVID-19 patients' status of information has been conveyed to the hospitals by using applications such as Excel and emails from public health clinics to hospitals without the availability of a distributed database system that works to automate the transmission of such information.

3.2. Accessible Distributed Database

The plan proposal includes a distributed, systematic and efficient database. This strategy will make it easy to access and share the information with the network of hospitals and health clinics involved, both private and government (Tarmidi, 2021). The up-to-date patient database can facilitate monitoring the patient's status and medication until they recovered, regardless of whether a patient is a COVID-19 patient or a typical patient.

3.3 Data Protection Plan

In Malaysia, the information and data of a patient are also protected under the Data Protection Act 2010. In western countries, data information such as the EEU is very tight compared to China, where the government controls information. Meanwhile, all confidential information is not shareable in some countries except with the patient's consent. MOH, MKN, MCMC, MOSTI and cybersecurity, can look into the data privacy of Malaysian citizens and how it can be maintained even when such confidential information is shared.

3.4 Backup Data Plan

A patient's database should have a specific lifespan in the activation system and phase out afterwards. After the MCO, such information can be used as 'backup data' to be archived or otherwise disposed of when the data life cycle expires. The Immigration Department can inform MKN and MOH regarding citizens' data arrival in the country during MCO. For example, the quarantine of citizen or non-citizen must as soon as they arrive in Malaysia. Monitoring information such as visitors, tourists, and foreign workers' records can facilitate the strategy of preventing the spread of COVID-19, including the entry control process.

3.5 Software Application Design and Development

To date, the government has initiated the development of the MySejahtera application through the cooperation of MKN, MOH, MAMPU and MCMC, which is to monitor the COVID-19. This health application developed according to the Prevention and Control of Infectious Diseases Act 1988 (Act 342). This application needs to be registered by the user first, on the https://mysejahtera.malaysia.gov.my page, before downloading it for free via mobile devices. This app can help individuals to identify their health status, get health care services and pieces of advice on health in case an individual has an infection. The app can also help users identify nearby hospitals and clinics for further examination and treatment. Another effort by the Malaysian government is to develop the 'Malaysian Movement Application' online to facilitate the citizens' movement permits.

3.6 Security Enforcement

Meanwhile, this application uses QR code technology can reduce the risk of outbreaks by allowing users to download applications. Examples in 'application stores' such as 'Google Play Store', 'Apple App Store' and 'Huawei App Gallery' without coming to the police station in huge groups. At the same time, MOSTI, MCMC, and cybersecurity should also look into the needs and security of the patients' data to prevent intrusion and corruption of the data and information from cyber hackers (Mohsin et al., 2018).

3.7 False News Monitoring and Alert Automation

Likewise, citizens can assist governments by becoming responsible citizens, working together to break the COVID-19 chain by staying at home, social distancing, staying calm and maintaining good health hygiene, avoiding believing in false news (Desai, 2021). This responsibility also includes being mentally, physically and spiritually alert during the COVID- 19. By creating a distributed, systematic and efficient citizen database, governments and security forces such as the PDRM, ATMs, and immigration can also distinguish and alert the patients' data either they are Malaysian citizens or not, including their current status of entry permission into Malaysia.

3.8 Systematic Integrated Monitoring and Reporting System

The systematic and efficient database is also essential for national security, especially for monitoring and reporting management matters analytically, especially for citizens and non-citizens. The government will then monitor the status of patients and the ongoing treatment of hospitals, especially in cases of COVID-19, more efficiently (Ting et al., 2020). The possibility of using Mathematical and Statistical computation, AI, Big Data and Data Science with Machine Learning during the IR 4.0 era is vast due to the authority's making sense of the information strategy and decision-making. It includes the prediction and prescription based on the computation of the data analysis.

4. Conclusion

A distributed, systematic and efficient intelligent citizen-centred design database system with usability such as accessibility in mind is crucial in Malaysia as a developing country. Integration of data between government department such as MOH, MKN, and Immigration is vital to ease accessibility of the information. Only relevant and essential information can be shared through a distributed database for a more integrated, effective and efficient COVID-19 pandemic management as it also adapts the concept of IR 4.0.

The proposed distributed, systematic, and efficient system monitors national well-being for future health monitoring system management, and security matters focus on the system's usability of its citizen. The future study shall include investigating other factors contributing to an efficient distributed health management system in the developing country. This prospective study also implies developing a model requirement on a 'Distributed Citizen Centred-Design Intelligent Health Management System'.

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