Digital Community Support and Management Application and Dashboard Features for Pandemic Outbreak Management in Malaysia Setting

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Abstract

Disaster management is the process of organizing and managing resources and responsibilities for dealing with the humanitarian elements of disasters, including preparedness, response, and recovery. Disaster management's objective is to mitigate the impact of disasters on communities. Numerous infectious diseases can offer a significant threat on a local regional, and global scale, and in certain cases can result in epidemics or pandemics. Due to the massive volume of information and data generated every minute, data visualization is a necessary strategy for conveying information accurately and ensuring that people grasp it immediately upon first glance. This scope of the inquiry was based on the phenomenon of the covid-19 outbreak, and all the data were gathered within Malaysia. The analysis's parameters were chosen after thorough investigation and consultation with professionals. This study acquired data through telephone interviews with residents of the affected communities. Eight digital community features were proposed in this study to help the management of pandemic outbreak. With comprehensive features and the capacity to be accessed by the general public, all afflicted communities can be certain that they will receive all available aid from the government or non-governmental organization, and the extent of assistance covered is visible on the dashboard.

Keywords: *Dashboard Features, Disaster Management, Pandemic Management*

1. Introduction

A pandemic is defined as an epidemic that crosses international borders and affects a large number of people nationwide. According to Qiu et al. [1], the pandemic is a situation where the virus vigorously spread throughout the world as a result of the spread of human-to-human infection. Many major diseases and pandemics were recorded, such as Spanish flu, Hong Kong influenza, SARs, H7N9, Ebola, Zika, and Novel Coronavirus or Covid-19 [2].

Crises related to the pandemic can be caused an overwhelmingly negative impact on the economy, society, and country safety. As stated by [3], the Covid-19 outbreak

has affected the community greatly by the closing of colleges, research centers, and labs. In addition, there are also widespread job losses and the livelihoods of millions of businesses struggling to cope with the lockdown to control the virus. This situation of pandemics affected the community tremendously.

In Malaysia, the first Covid-19 case was reported on 25 January 2020 after eight people staying in Johor were identified as close contact with the person infected in Singapore. After that, the numbers keep increasing until more than 100 cases were reported each day [4]. In this situation, Malaysian National Security Council (NSC) or Majlis Keselamatan Negara (MKN) is given full authority to take action and make necessary preventions to curb the disease. Therefore, on 18 March 2020, as stated by [5]. Malaysian has implemented a Movement Control Order (MCO) to enhance the Ministry of Health (MoH) efforts in keeping the spread and mortality under control.

The implementation of MCO is the first-time experience faced by all Malaysians, and the impact has tremendously affected all edges, such as lifestyle, job, social activities, interstate travel, and many more. According to Bank Negara Malaysia, the implementation of MCO will have an impact on national incomes, with Malaysia's estimated economic growth in 2020. The MCO implementation affects the macro level and at the micro-level, particularly those groups of households with the lowest income of 40% or termed as B40. A B40 income group is a group of families that are expected to face high economic risk and directly affect their consumption patterns during the implementation of the MCO. Realizing this situation, the government had prepared a stimulus package aiming to help all Malaysian people go through this hard time. According to [5], a special fund announced by the government known as PRIHATIN and PENJANA are packages that focusing to help Malaysian people to survive in this worst time and bring back the economy into a stable track. Not only the government but NGOs also actively helping those who are affected by the Covid-19 pandemic by providing food, shelter for the homeless and have even given out money to help those in need [5]. Some NGOs have helped by providing protective masks, disinfection chambers, etc. According to [6] on March 28, 2020, Defense Minister Ismail Sabri Yaakob declared that NGOs would no longer be allowed to distribute food and other goods, and they need to send their assistance and goods to the Welfare Department for centralized distribution. Further, several other suggestions for community leaders are to keep an eye on the mental health of families and the community as a whole and help people with mental problems like depression and anxiety get help [7]. They should also be aware of anyone in the community who needs basic needs like food packs or medical help and be able to meet those needs [7]. Besides, according to the Ministry of Women, Family and Community Development in 2020 anyone who is in need, especially those who lost their daily income, must fill the form to get the food distribution.

Along with the pandemic phenomenon, technology can be used as a medium to solve pandemic-related issues. There are so many ways that this technology can be used, such as fighting misinformation about the number of fatalities, diagnosis and treatment options, vaccines, medicines, government policies, and all fake news adds to the public's fear and anxiety [8]. A transparent scenario can be created, and people can be informed about the right steps by making accurate information available to

everyone. Other than that technology can improve traceability and transparency by sharing data [9]. With the right platform and information, the aid can be distributed equally, either in rural or urban areas. Hence, this study focuses on exploring and proposing a digital community dashboard feature for pandemic outbreak management to overcome this issue.

2. Background

2.1. Disaster Management

Disaster is considered as a sudden adverse or occurrence that causes a great damage to human beings and surroundings. According to [10] a disaster is an event of natural or man-made causes that leads to a calamitous event that physically damages society and economic disruption. Some of the examples of disasters are the attacks of terrorists in France in January 2015, Hurricane Katrina in 2005 and the Ebola epidemic on the Africa continent in 2014. All these disasters happen unexpectedly, and no one can predict how big the impact is. Because of that, a disaster management plan is needed to analyze how big the impact is and what are action should be taken. Disaster management can be referred to as the ability to handle the emergency task that can injure or kill people, damage the property and environment, and disrupt a community's normal condition [11]. There are four phases of disaster management plan: Comprehensive Emergency Management (CEM), as shown in Figure 1. It consists of mitigation, preparedness, response, and recovery. The detail explanation is shown in Table 1. It is crucial to identify how dangerous the disease is and the planning to handle it. With this plan, the process of handling will be more effective and accurate.
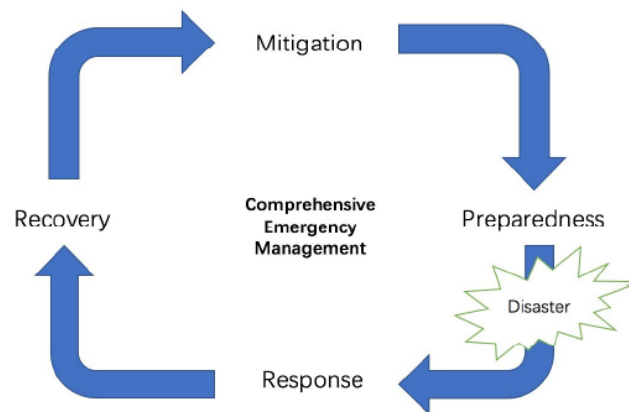
Figure 1. Comprehensive Emergency Management by [12]

As a result of the widespread transmission of COVID-19 on a global scale, nations throughout the world have undertaken stringent measures in order to curtail the rapid spread of the virus. The measures used encompass travel limitations, adherence to social distancing guidelines, and the deferral of any scheduled gatherings for a minimum duration of 14 days [13]. The first case of COVID-19 was officially recorded in Malaysia on January 24, 2020. Subsequently, the number

of cases remained relatively low until March 2020, mostly attributed to travelers originating from China. However, the situation underwent a significant transformation when Malaysia saw its initial substantial surge on March 15th, registering 190 instances, the most of which were linked to a sizable religious gathering in Kuala Lumpur.

Table 1. Emergency Management Phase [12]

Phase	Details
Mitigation (Preventing future emergencies or minimizing their effects)	• Includes any activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies. • Buying flood and fire insurance for your home is a mitigation activity. • Mitigation activities take place before and after emergencies.
Preparedness (Preparing to handle an emergency)	• Plans or preparations made to save lives and aid response and rescue operations are included. • Preparedness includes things like making evacuation plans and stocking up on food and water. • Event preparedness actions take place before the occurrence of an emergency.
Response (Responding safely to an emergency)	• In an emergency, steps taken to save lives and avoid further property damage are included. The term "response" refers to the act of putting your preparedness measures into action. • Response activities occur during an emergency, such as seeking shelter from a tornado or turning off gas valves during an earthquake.
Recovery (Recovering from an emergency)	• Actions performed to return to a regular or even safer situation after an emergency are included. • Financial support to help pay for repairs is part of the recovery process. • Following an emergency, recovery activities are carried out.

The Malaysian government enforced the Movement Control Order (MCO) in all states on March 18, 2020, due to the rapid increase in positive cases and difficulty identifying the contacts [7]. Following the MCO as announced by the government, all Malaysians were advised to remain at home. All places of worship and business were closed temporarily except those related to essential sectors such as health and

safety, telecommunications, retail, finance, and transportation. This stringent action had significantly altered people's lifestyles and social interactions between them. It had presumably developed a high level of anxiety with fear of interacting with others [14].

2.2. Application and Dashboard Features

Nowadays, data visualization can be found everywhere. The term data visualization can be defined in several ways [15] primarily focuses on the connection between data and computer technology to converting a large amount of data into a visual format, such as a map, graph, chart, or other standard visualization types to make data easier to understand for the human brain [16]. Big data and data visualization has proven impactful and played an important role in the world. Based on the study result by [17] data visualization is growing, and it is assisting in the successful management of the COVID-19 epidemic. It is not possible to visualize many people throughout the world. Visualization is allowing for the recording of a large number of patients in a minute. Visualizing and covering the Covid-19 to the entire world has been incredibly successful and effective up to this point. Researchers from various countries have employed various methodologies, tools, and dashboards. It is not just about visualizing the patients in COVID-19, but also about covering the symptoms of COVID-19 using various ways. Dashboard refers to a visualization technique important in information analytic and decision-making [18]. In general, dashboard is a graphical and visual representation of information. The design and implementation dashboard features are significant for a DSS's effectiveness, especially at the operational level [19]. However, different types of dashboards will allow the users to communicate a more compelling message to the audience, organize data more efficiently, and improve business processes in general. The following are the three types of common dashboards and each type has its purpose and differences between the area of use [20]:

a) Strategic dashboard - are typically known as reporting tools for monitoring the long-term company strategy. It is usually complex in its creation. It provides a vast impact on a business and mainly used by senior-level management.

b) Analytical dashboard - is a type of dashboard that comprises many data designed and used by analysts to assist executives. They provide a whole perspective of data to a business, with middle management being a critical component of their use.

c) Operational dashboard - is one of the types of dashboards used to monitor and manage operations in a shorter time. The junior level of management usually administrates this dashboard. This dashboard helps the department to stay proactive and ahead of problems.

Therefore, this study discusses more on the operational structures entailing the functional features, interactive analytic features, and the standard type of dashboard used in advance analytical purposes on situation awareness and task performance.

3. Methodology

A qualitative research approach was utilized in this study, specifically employing descriptive interviews conducted via telephone calls. The sample consisted of sixty-

four (n=64) people, primarily belonging to the B40 group residing in Kuala Lumpur. The contact numbers of the participants were acquired using two methods: firstly, by obtaining them from community leaders, and secondly, by employing a snowball sampling technique among the participants. The majority of respondents, accounting for 57.3%, belong to the B40 category, characterized by a monthly income below RM4849. The subsequent subset, denoted as the M40 cohort, comprises 42.7% of the surveyed individuals whose income falls within the range of RM4850 to RM10,959. In relation to gender, the female population constitutes a majority of the participants, accounting for 64.1 percent of the whole sample size of 41 respondents. The male participants constituted 36.9% of the whole sample, which equated to a total of 23 responses.

Table 2 presents a brief overview of the total number of children reported by the respondents. Table 3 provides a comprehensive overview of the interview questions' format. The questionnaire is categorized into two sections: the first portion pertains to demographic information, while the second section focuses on gathering data regarding the essential aspects of the dashboard and application.

Table 2. Respondents with number of children

Number of children	Total of respondents	Total of respondents (%)
0	20	31.25
1	15	23.44
2	6	9.38
3	6	9.38
4	5	7.81
5	8	12.50
6	3	4.69
7	1	1.56

Table 3: Interview Questions

| Section	Category	Description	Questions
1	Community Demographics	Identifies the type of profiles or demographics of participants.	Getting information about Name, Age, Gender, Marital Status, Address, Phone Number, Number of households, Employment status, Household income per month.
2	Digital Community Requirement	Identifies the community issues regarding Covid-19.	Current situation or issues are facing during the pandemic
		Identify additional features	Recommendation aspects for dashboard features

4. Result

Based on preliminary inquiry and the data compiled in the primary source, it has come to light that certain excluded populations exhibited a lack of awareness, accessibility, or knowledge pertaining to the government's various initiatives, notwithstanding their implementation. This scenario typically occurs among those who have difficulties in accessing community leaders.

Following the declaration of the Movement Control Order (MCO), many non-governmental organizations (NGOs), social workers, and civil society groups have commenced their efforts to address the situation. Throughout the nation, non-governmental organizations (NGOs) promptly organized and coordinated monetary assistance as well as donations in the form of goods to prepare food parcels for the individuals under their care. The majority of the financial assistance was provided through the sponsorship of local companies, charities, and expatriate groups. An exemplary case was the collaboration of Gerai OA and the Centre for Orang Asli Concerns (COAC), which utilized the MyKasih cashless food aid program. This initiative allows eligible folks to select critical food products from a variety of participating retail establishments. Furthermore, this initiative has provided communities with the capacity to exercise autonomy in determining their requirements, taking into account their unique circumstances and availability of alternative food resources. The Malaysian government has implemented a restricted movement order (RMO) in response to the outbreak of the SARS-CoV-2 virus, which was first identified as 2019-nCoV. The implementation of the restricted mobility order has had a detrimental impact on certain vulnerable segments of society. The repercussions encompass not just financial implications but also physical and psychological aspects. Specifically, those diagnosed with anxiety disorders, mental illnesses, and chronic diseases are encountering heightened risks and repercussions. This may encompass those who are single moms, those who live alone, and the elderly population, who may require additional help compared to other demographic groups. Certain individuals may require allocation to non-governmental organizations (NGOs), healthcare aid, and e-community support groups in order to address the psychological effects experienced by certain segments of society during that period.

Hence, we captured the desired features requirements and present the requirements in the following sections. In general, the systems proposed to cover 8 main features as shown in Figure 2. The main features include:

o   News and Latest Update

o   Interactive & Search

o   Registration and List

o   Support & Coordination

o   Online Services

o   Chat and Feedback

o   Counseling Services

o   MyTimeBank
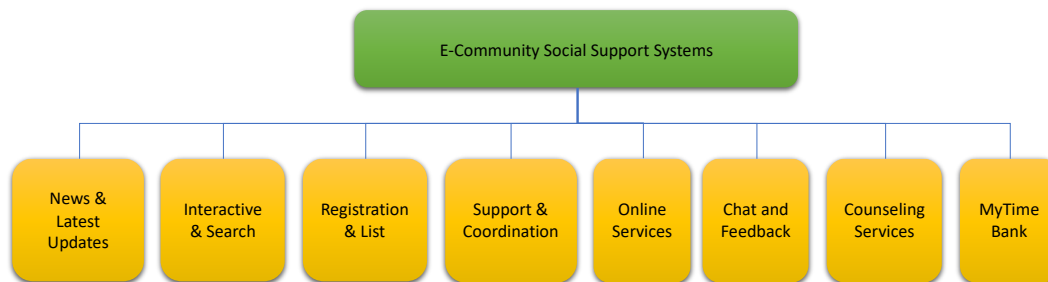
Figure 1. Dashboard and Application Features for Pandemic Management

In particular, the core features that digital community for pandemic management shall provide are proposed as the followings:

- **Feature 1: News & Latest Update**
  - o Able to provide news, information and circular issued by authorized body
  - o Able to provide link and download facilities to existing applications such as *MyTrace* and *MySejahtera*
  - o Able to provide link to government agency that provide help
  - o Able to provide latest news and live streaming of government media
  - o Able to provide latest COVID status and information
  - o Able to provide sections for showing latest gallery

- **Feature 2: Interactive & Search**
  - o Able to provide real-time dashboard showing the support distributions and location of people in need
  - o Able to search for person-in-charge in a specific location
  - o Able to provide type of supports provided based on location
  - o Able to capture information related to support needed
  - o Able to track handicapped and senior citizens that need help

- **Feature 3: Registration & List**
  - o Able to register requester
  - o Able to lodge for support
  - o Able to check eligibility on the spot
  - o Able to register funder/NGO
  - o Able to register counselor
  - o Able to register volunteers
  - o Able to register runner
  - o Able to register local support services
  - o Able to list all above categories

- **Feature 4: Support & Coordination**
  - Able to match requester and available supports/funds
  - Able to coordinate funder, runner and local support
  - Able to produce reports and tracking ticket based on organized supports
  - Able to schedule and estimates coordination
  - Able to notify requester regarding the fund/support to be distributed

- **Feature 5: Online Services**
  - Able to display section for online services that provide local goods
  - Able to display local community activities

- **Feature 6: Chat & Feedback**
  - Able to provide chat section
  - Able to provide feedback section
  - Able to provide complaints section

- **Feature 7: Counseling Services**
  - Able to provide link to counselor services
  - Able to register for counseling services
  - Able to coordinate counselor-requester

- **Feature 8: MyTime Bank**
  - Able to register myTime account
  - Able to keep track hours of involvement

8. Conclusion

At the time Malaysian government announced restricted movement order due to SARS-CoV-2 virus (initially known as 2019-nCoV) outbreak in 2020 several unfortunate groups of society are being affected badly. This is due to the restricted movement order thus effects are not just in terms of financial but also physically & psychology. In particular, people with anxiety disorder, mental illness and people with chronic disease are facing additional risk and consequences. This may be inclusive of single mothers, single people who live by themselves and elderly group who may need support more than another social group. Some of them may need to be assigned to the assistance of NGO, healthcare support as well as e-community support group to help combat psychological impact that some society groups were facing at that time. This study was conducted to identify the core features for digital community dashboard during pandemic outbreak to cater various support for the impacting community. The study was aimed at finding the core feature requirements gathered through the series of interviews of 64 respondents. Thus, further requirements elicitation still needs to be done if the proposed features to be developed in the future. This study provides a total of eight digital community features that can aid in the management of a pandemic epidemic. With a wide range

of inclusive functionalities and the potential for public accessibility, it can be assured that all affected communities will get the full amount of available support from either governmental or non-governmental entities. The application provides an easily understood representation of the range of aid coverage.

Acknowledgments

References

[1]   Qiu, W., Rutherford, S., Mao, A., & Chu, C. (2017). The pandemic and its impacts. Health, culture and society, 9, 1-11.

[2]   Cucinotta, D., & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. Acta bio medica: Atenei parmensis, 91(1), 157.

[3]   Darke, N. (2020). How the Coronavirus Is Hampering Science - Scientific American [Online]. Available at: https://www.scientificamerican.com/article/how-the-coronavirus-is-hampering-science/ [Accessed: 10 February 2021].

[4]   Elengoe, A. (2020). COVID-19 outbreak in Malaysia. Osong public health and research perspectives, 11(3), 93.

[5]   Shah, A. U. M., Safri, S. N. A., Thevadas, R., Noordin, N. K., Abd Rahman, A., Sekawi, Z., ... & Sultan, M. T. H. (2020). COVID-19 outbreak in Malaysia: Actions taken by the Malaysian government. International Journal of Infectious Diseases, 97, 108-116.

[6]   Rahman, S. (2020). Overcoming the odds and filling the gaps: Malaysian civil society responses to COVID-19. Perspective Issue 2020 (44).

[7]   Aziz, N. A., Othman, J., Lugova, H., & Suleiman, A. (2020). Malaysia's approach in handling COVID-19 onslaught: Report on the Movement Control Order (MCO) and targeted screening to reduce community infection rate and impact on public health and economy. Journal of infection and public health, 13(12), 1823-1829.

[8]   Pavithra, S. (2020). Technology and Pandemic Management. Journal Of Interdisciplinary Cycle Research, 12, 510-517.

[9]   Hasan, M. R., Deng, S., Sultana, N., & Hossain, M. Z. (2021). The applicability of blockchain technology in healthcare contexts to contain COVID-19 challenges. Library Hi Tech, 39(3), 814-833.

[10] Sena, L., & Woldemichael, M. K. (2006). Disaster prevention and preparedness.

[11] Dusse, F., Júnior, P. S., Alves, A. T., Novais, R., Vieira, V., & Mendonça, M. (2016). Information visualization for emergency management: A systematic mapping study. Expert Systems with Applications, 45, 424-437.

[12] Wang, D., Guo, D., & Zhang, H. (2017, November). Spatial temporal data visualization in emergency management: a view from data-driven decision. In Proceedings of the 3rd ACM SIGSPATIAL Workshop on Emergency Management using (pp. 1-7).

[13] Fabeil, N. F., Pazim, K. H., & Langgat, J. (2020). The impact of Covid-19 pandemic crisis on micro-enterprises: Entrepreneurs' perspective on business continuity and recovery strategy. Journal of Economics and Business, 3(2).

[14] Salim, N., Chan, W. H., Mansor, S., Nazira Bazin, N. E., Amaran, S., Mohd Faudzi, A. A., ... & Shithil, S. M. (2020). COVID-19 epidemic in Malaysia: Impact of lockdown on infection dynamics. medrxiv, 2020-04.

[15] Li, Q., & Li, Q. (2020). Overview of data visualization. Embodying Data: Chinese Aesthetics, Interactive Visualization and Gaming Technologies, 17-47.

[16] Meloncon, L., & Warner, E. (2017, July). Data visualizations: A literature review and opportunities for technical and professional communication. In 2017 IEEE International Professional Communication Conference (ProComm) (pp. 1-9). IEEE.

[17] Gaikwad, S., & Patil, J. (2020). Analysis of Data Visualisation in Pandemic situation. International Journal of Engineering Applied Sciences and Technology, 251-254.

[18] Rocha, S., Bernardino, J., Pedrosa, I., & Ferreira, I. (2017). Dashboards and indicators for a BI healthcare system. In Recent Advances in Information Systems and Technologies: Volume 1 5 (pp. 81-90). Springer International Publishing.

[19] Nadj, M., Maedche, A., & Schieder, C. (2020). The effect of interactive analytical dashboard features on situation awareness and task performance. Decision support systems, 135, 113322.

[20] Durcevic, S., 2020, Types of Dashboards: Strategic, Operational & Analytical [Online]. Available at: https://www.datapine.com/blog/strategic-operational-analytical-tactical-dashboards/ [Accessed: 7 June 2021].