Veterinary Movement Control: An Online System During Covid-19 Pandemic

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Abstract: The Malaysian government led by Tan Sri Muhyiddin Yasin had announce the implementation the Movement Control Order (MCO) on 18th March 2020 due to the novel coronavirus (COVID-19) pandemic that has spread and killed thousands of people. This restriction was implemented to prevent the spread of the virus in this country. At the same time, the government needs to make sure that the food chain supply is available and delivered to people all over the country. To do that, some methods of approval and monitoring of the essential service provider are required. Besides the standard operating procedures, a clear workflow for this service needs to be provided to register and obtain approval prior to operation, which typically begins with manual forms. This paper will cover the transition from manual forms to an online automation system. This system has been used to replace the manual forms until the end of MCO restrictions.

Keywords: Movement control order, online application, QR code technology, Covid-19

1. Introduction

In the early March 2020, several countries started to declare a stringent lockdown to practice social distancing and prevent the spread of novel coronavirus (COVID-19) infections [1]. In Malaysia, the government has enforced the Movement Control Order (MCO) due to this pandemic, which began on 18th March 2020. The implementation of the MCO was a restrictive activity order under the Prevention and Control of Infectious Diseases Act 1988, the Police Act 1967, and the Prevention and Control of Infectious Diseases (Measures Within Infected Local Areas) (National Recovery Plan) Regulations 2021. To date, the Malaysian government has implemented three levels of the Movement Control Order (MCO), consisting of the Movement Control Order (MCO), the Conditional Movement Control Order (CMCO), the Recovery Movement Control Order (RMCO), and the Enhanced Movement Control Order (EMCO) before changing to the National Recovery Plan [2]. During the MCO, the government controlled the people by prohibiting mass movements and gatherings across the country, as well as the closure of most government and private premises, except those involved in essential services (The Malaysian National Security Council). Following the implementation of the MCO, all Malaysians were instructed primarily to stay indoors. Other restrictions imposed included the prohibition of mass gatherings, compulsory health screening and quarantine for Malaysians coming from abroad, restrictions on foreigners entering the country, and the closure of all facilities except primary and essential services such as health services, water, electricity, telecommunication, and food supply companies [3].

The movement restriction was also implemented by other countries globally as a precautionary step to stop the spread of the COVID-19 virus starting in March 2020. Most countries struggled initially to manage the pandemic with fast responses to mitigate the effects of COVID-19. The use of digital technology and its applications has helped governments to manage health care facilities during pandemic, health care surveillance, rapid testing to symptomatic

patients, contact tracing, quarantine facilities and procedure, and managing the pandemic planning. South Korea, for instance, managed to flatten their incidence curve with the help of digital technologies [4]. South Korea gathered all the important information before crafting their policies on pandemic planning using security camera footage, facial recognition technology, bank card records, and global positioning system (GPS) data from vehicles and mobile phones to provide real-time data and detailed timelines of people's travels [5]. On the other hand, Singapore employed the Bluetooth technology by launching a mobile phone application that exchanges short-distance Bluetooth signals when individuals are in proximity to each other. This application captured all the data and stored in respective individual's mobile phone for 21 days. If an individual is diagnosed with COVID-19, Singapore's Ministry of Health would access the data to identify contacts of the infected person [6]. Similarly, Malaysia also came up with the mobile application viz MySejahtera to gather all the information for contact tracing and surveillance. Taiwan initiated health checks for airline travellers from Wuhan, integrating data from immigration records with its centralised, real-time national health insurance database as soon as they received information about the outbreak that occurred in Wuhan province, China [7]. South Korea, Singapore, and Taiwan are examples of successful countries that have adopted and integrated digital technologies for pandemic planning, surveillance, testing, contact tracing, quarantine, and health care.

As a local authority in Malaysia that provides services to the livestock industry and the welfare and well-being of all animals, the Department of Veterinary Services (DVS) planned a protocol and method to accommodate our stakeholders, such as farmers, the food industry, pet clinics, and others, to obtain an exception in the MCO. It involved manually inserting document forms and obtaining approval at the local office before transitioning to a simpler and more user-friendly online system. Figure 1 shows the workflow of the manual process to obtain an approval letter from the DVS. From the previous approval processes, some problems arose; thus, alternative ways were sought to make the process more efficient and effective. Some weaknesses or issues have arisen from the manual system, such as application crashes or data loss, distance limitations, limited time for submission (depending on the premises' operation hours), real-time data lags, and reporting issues. In designing a solution to these issues, a new system should consider important criteria such as easy access for all users, real-time or up-to-date information, rapid adaptability, and easy maintenance or simple alteration, which could provide a standard report data for the entire country. To date, there has been no system for the entire country to monitor and provide approval to farmers or the livestock industry to move or access their premises throughout the MCO period. Thus, there was a mounting need to design a simple and user-friendly application that could enhance the approval process. Hence, this study aims to improvise the traceability system by adopting QR code technologies to expedite the validation and authentication process.
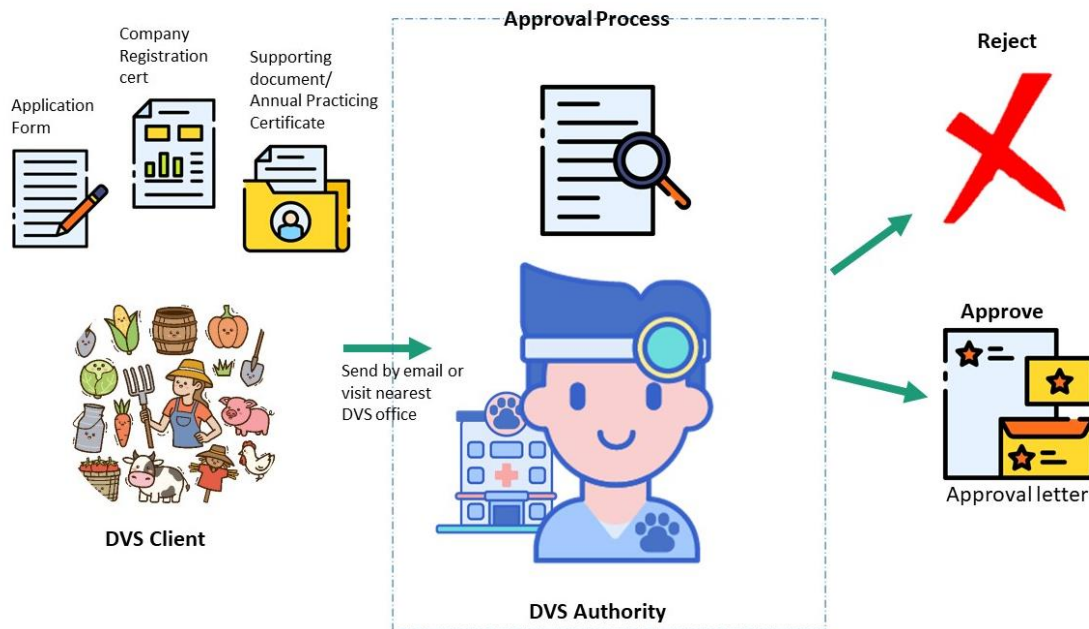

Fig. 1 - Manual application process

2. Illustrations

For system development, agile approaches were used because stakeholders' involvement was emphasised. This helped teams execute work more efficiently while delivering the highest quality product within budget constraints [8], and a QR code was added to the system for each approval letter's traceability and security. The QR code technology allows an easier way to retrieve farmers' information through checking and verifying it in this system. Previous studies

have shown that QR technologies are able to retrieve real-time data easily [9,10]. An online system was developed by DVS through in-house development. This system is divided into three main parts: registration from farm users; verification from local subdistrict or regional veterinary authorities for verifying the information; and approval by the Veterinary District Headquarters. Each part has a user restriction level to access the system. Moreover, two more types of user level are in place, which involve the Department of Veterinary Services Malaysia Putrajaya (Main Headquarters) to check daily and total approval records for the entire country and the Enforcement user level to check approval letters at checkpoints or roadblocks.

This real-time centralised database was created using a basic programming language such as HTML, PHP, CSS, and SQL. The database is collected on a server with the UNIX operating system and the MySQL database installed. The system uses a simple interface and a simple guide to help all users. A simple world-wide web (WWW) user interface was developed using common gateway interface (CGI) scripts written in the PHP language. The rationale for this approach was to simplify what users needed to do to access the data. The system was made to be user-friendly for the interface and mobile-view friendly so that it can be accessed across devices. This online application involves a combination of computer languages used for the front-end and back-end systems. The front-end uses an interactive and easy-to-understand GUI. At the same time, the system process that takes place in the back-end involves some scripting for the data migration from and to the database. This application uses a database that is simple to maintain and can store, process, and retrieve data to satisfy the users' needs. Besides that, this integrated system receives information about the farmer's industry from the DVS epermit2 system that contains details such as premises, owners, and animal registrations [11].

2.1 Architecture of System
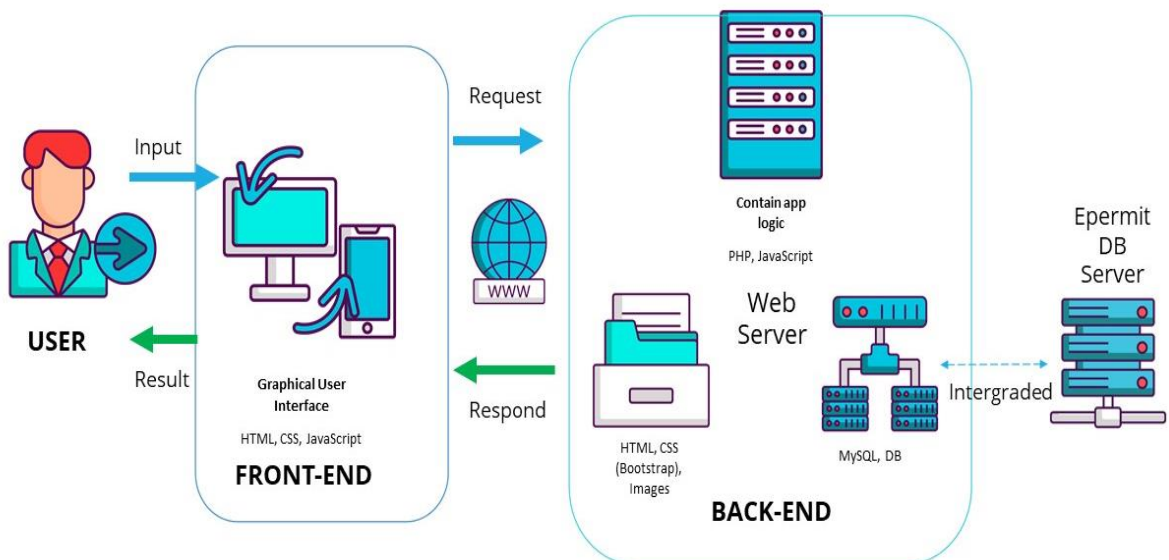
Fig. 2 - Web Application Architecture

Fig. 2 shows the architecture of the system. It consists of 2 tiers (front-end and back-end). The front-end focuses on the look and feel of the website utilised by web users. Users will make a request through a web-based graphical user interface (GUI) developed using HTML, CSS, and JavaScript. The front-end will retrieve the data from the back-end and submit it to the users in the front-end. In the development of this system, bootstrap was used to design a responsive, interactive, and user-friendly GUI. Bootstrap is the most popular open-source front-end framework for interactive web design, mobile-first web, and application development. It mainly works on a grid structure with the use of rows and columns to create page designs and supports all browsers on multiple platforms. By using bootstrap, it delivers the appropriate user experience to the correct device. The back-end focuses on the file system and database used to make the front-end possible. It consists of a server, a file system, and a database. PHP and MySQL are used to make the server, the file system, and the database communicate with each other. The combination "PHP and MySQL" has more coverage in a web search, providing more than 4 million results on a Google search, which means more tutorials, forums, assistance, and problem solving. [12].

2.2 Application development

The application was developed on a computer using Windows 10 installed with the XAMMP version 7.1.29 software. XAMPP is an open-source software programme developed by Apache Friends. The XAMPP 7.1.29 software package contains Apache distributions for Apache Server, Maria DB, PHP, and Perl, which is basically a local host or a local server. The use of XAMPP is to test the clients or websites before uploading data to the remote web server. The XAMPP server software provides a suitable environment for testing MySQL, PHP, Apache, and Perl projects on a local computer. The application would be developed using the web and database locally before being uploaded to the web server for online access [13]. For the server side, CentOS Linux release 7.9.2009 was used, which is also installed with PHP 7.2.34, Apache/2.4.6, and MySQL Ver 15.1 with 5.5.68-MariaDB.

3. Results and Discussions

The system's concept was presented and approved at a DVS top management meeting on 26 July 2021. Selangor state was chosen as the pioneer to use this system. A one-month period was allocated for implementing the system, so that improvements could be made before it could be widely implemented across the country. For all processes, all users, including the general public and staff, were directed to the URL http://eternak.dvs.gov.my/. The front page of the system is shown in Figure 3, which consists of some details of the system such as status check (*Semakan*), manual for the user (*Panduan*), registration page (*Pendaftaran*), and Frequently Ask Questions (FAQ). The interface was created clearly for the users. There was also a quick response WhatsApp button link to allow users to interact with staff for all inquiries or assistance. All information was transferred to farmers and the industry in all Malaysian states through blast platforms such as emails, WhatsApp groups, and the official website.
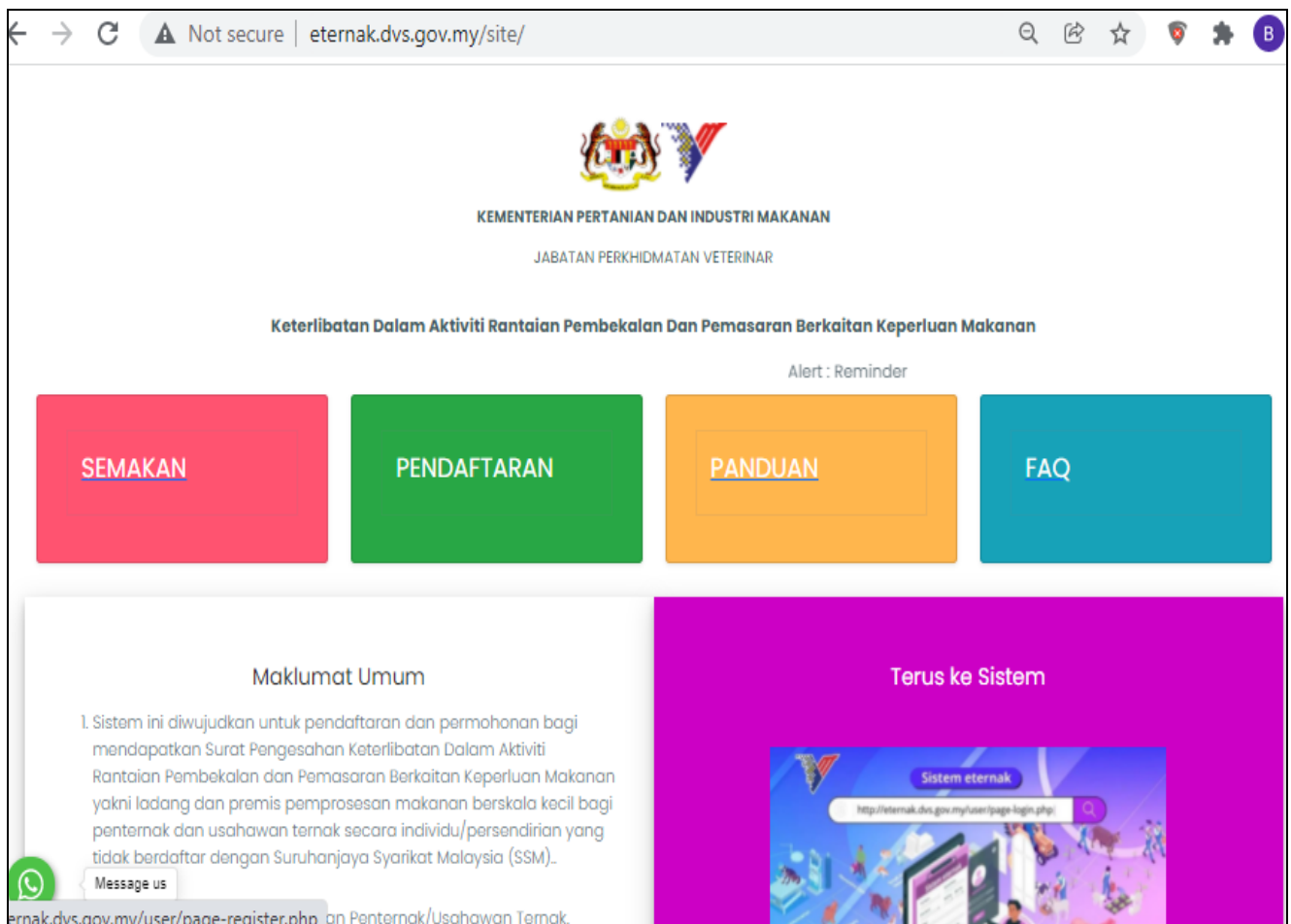
Fig. 3 - Font page of the system

This system is divided into three main categories as shown in Fig. 4: client registration; verification or approval from the local state or district veterinary authority; and the DVS Headquarters that checks daily and total approval records for the entire country, as well as the Enforcement level, which will check approval letters at checkpoints or roadblocks. This system would generate an approval letter automatically after obtaining approval from the state DVS. The letter was available in pdf format and could be downloaded or printed as proof to be used as a permit during the MCO restriction.

Furthermore, the letters contained a QR code that could be verified for authenticity and traceability. The QR technology also helped enforcement officers validate the letters in an easier and faster manner. The generated letters are shown in Figures 5 and 6 below:
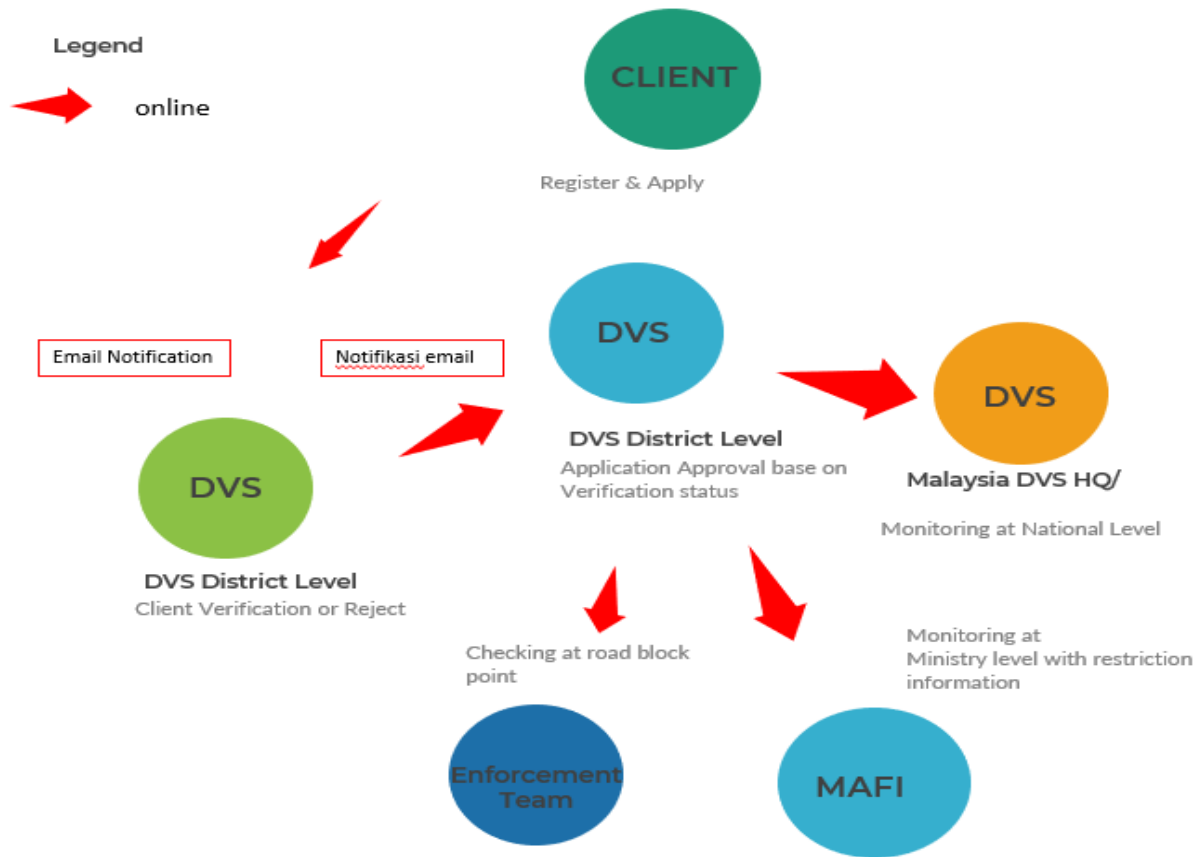
Fig. 4 - System workflow

KEPADA SESIAPA YANG BERKENAAN

TUAN,

PENGESAHAN PENDAFTARAN SYARIKAT DI DALAM SISTEM eTERNAK - DVS.
Dengan ini, berdasarkan maklumat yang dikemukakan oleh Syarikat SHAM SDN BHD
Dimana ia telah berdaftar melalui Sistem eTERNAK - DVS dengan maklumat seperti yang berikut:

Nama Syarikat : SHAM SDN BHD
ID Premis : T00252
Kluster : Penternakan dan Perkhidmatan Veterinar
Sektor : KILANG MAKANAN HAIWAN
Status : DILULUSKAN pada 2021-06-28
Alamat : NO. 7, JALAN TP 7, UEP INDUSTRIAL PARK, SHAH ALAM, 40400,
SELANGOR

Fig. 5 - Approval letter to the livestock industry

KEPADA SESIAPA YANG BERKENAAN

YBhg. Datuk/Dato'/Dr./Tuan/Puan,

PENGESAHAN KETERLIBATAN DALAM AKTIVITI RANTAIAN PEMBEKALAN DAN PEMASARANN BERKAITAN KEPERLUAN PERTANIAN DAN MAKANAN MELALUI SISTEM eTERNAK-DVS

Dengan segala hormatnya saya merujuk kepada perkara di atas.

2.   Selaras dengan pelaksanaan Pelan Pemulihan Negara (PPN) di seluruh negara bermula 5 Julai 2021, sektor Agromakanan (Pertanian, Perikanan, Penternakan dan rantaiannya) adalah disenaraikan sebagai Perkhidmatan Perlu (essential services) tertakluk kepada Negeri – Negeri yang berada dalam Fasa PPN serta senarai Perkhidmatan Perlu di kawasan Perintah Kawalan Diperketatkan (PKPD).

3.   Dengan ini, Kementerian Pertanian dan Industri Makanan (MAFI) ingin mengesahkan bahawa PEMOHON terlibat secara langsung dengan Perkhidmaan Perlu (essential services) Agromakanan dan dibenarkan untuk melaksanakan aktiviti yang telah diumumkan oleh Kerajaan. Maklumat Pemohon adalah seperti berikut:

Nama   :Mohamad Hanafi
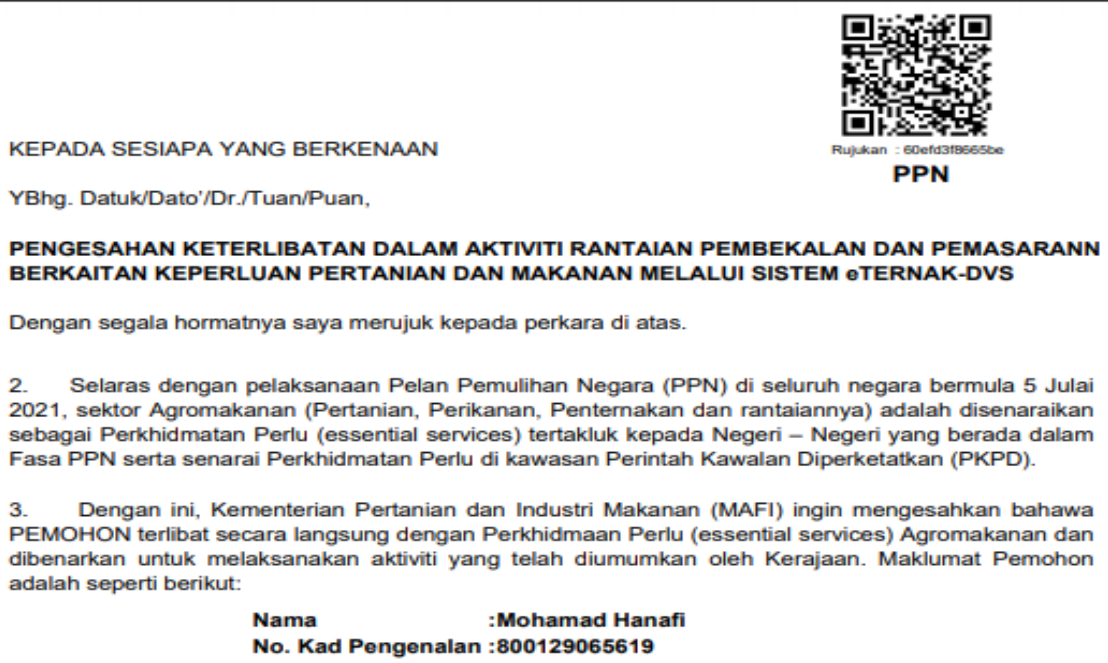No. Kad Pengenalan :800129065619

Fig. 6 - Approval letter to the farmer or worker

3.1 Evaluation and Approval

DVS Selangor created seven users for its district officers (Fig. 7) to check all applications received based on locality to verify farm information. Moreover, DVS Selangor also created two state admins who could monitor and approve the supporting letters. Since the system was linked to epermit2, the process of verification and approval was made easier. All new applications would be notified to the district officers by email and would appear on their desktop (Fig. 8). Through this integration, the system would receive all of the essential information for verification. The continuous information would assist state officers in obtaining the necessary information for approval at the appropriate level (Fig. 9).
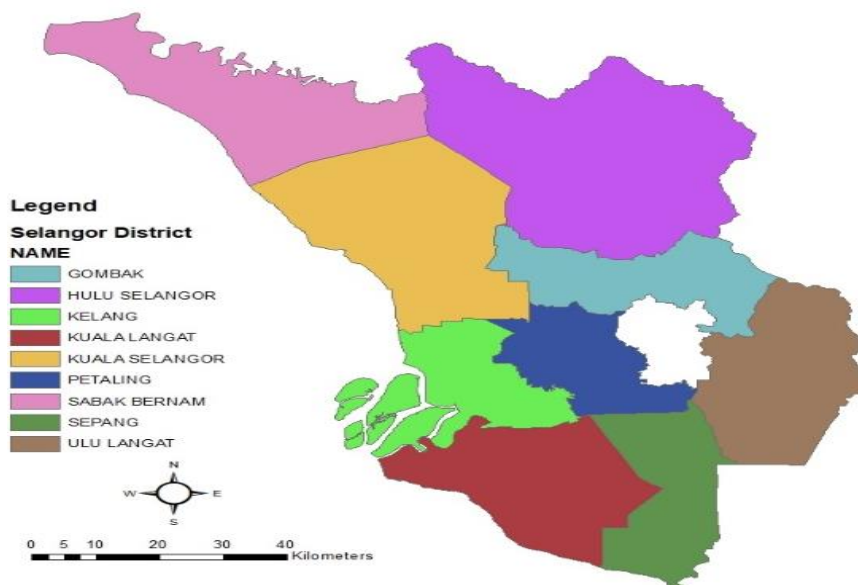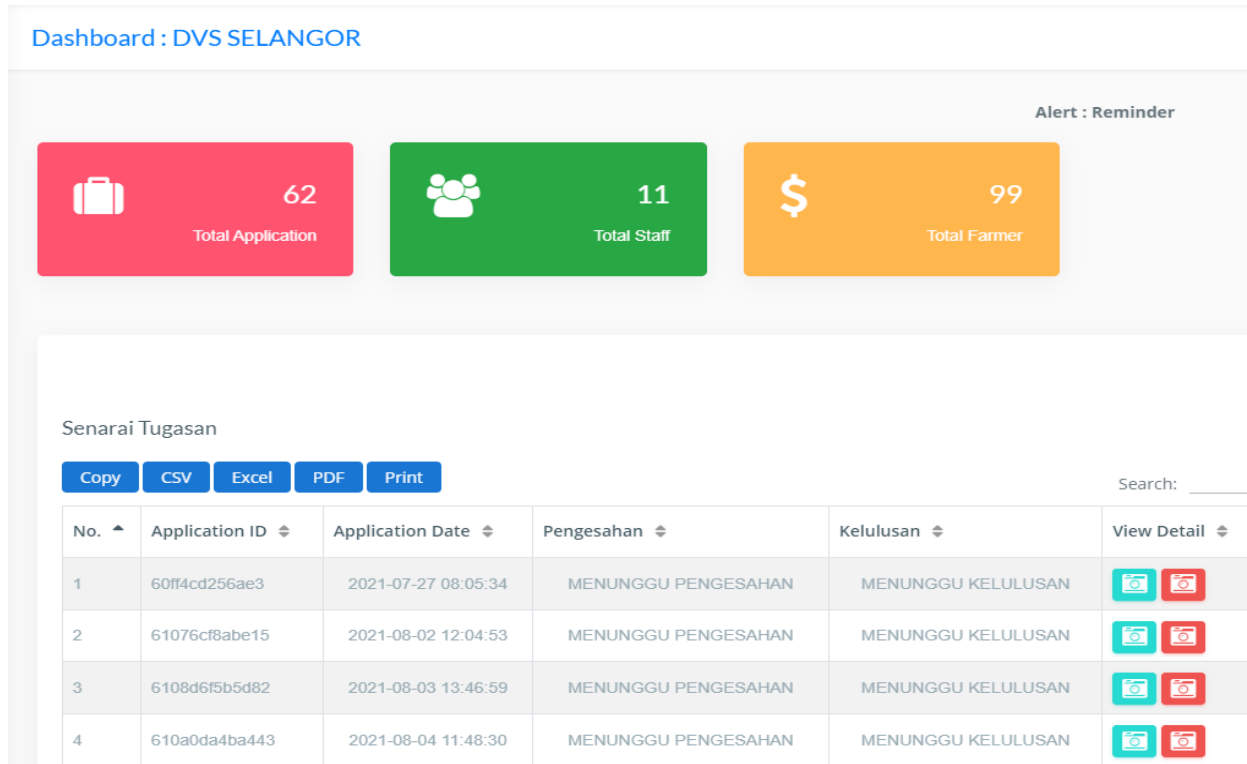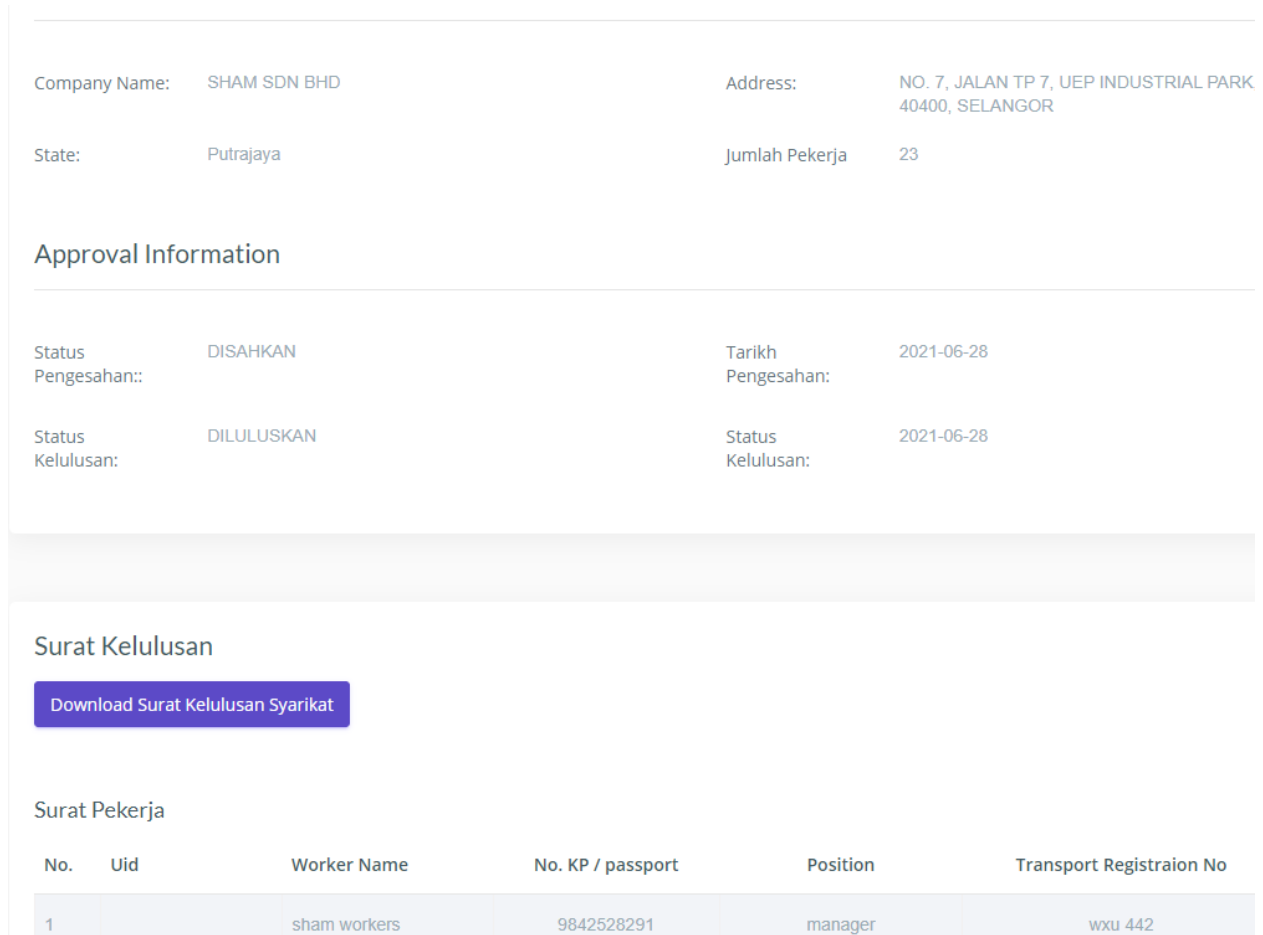

Fig. 7 - Nine districts at Selangor State

Dashboard : DVS SELANGOR

Alert : Reminder

	62		11		99
	Total Application		Total Staff		Total Farmer

Senarai Tugasan

Copy | CSV | Excel | PDF | Print

Search: _____

No. ▲	Application ID ⇕	Application Date ⇕	Pengesahan ⇕	Kelulusan ⇕	View Detail ⇕
1	60ff4cd256ae3	2021-07-27 08:05:34	MENUNGGU PENGESAHAN	MENUNGGU KELULUSAN	
2	61076cf8abe15	2021-08-02 12:04:53	MENUNGGU PENGESAHAN	MENUNGGU KELULUSAN	
3	6108d6f5b5d82	2021-08-03 13:46:59	MENUNGGU PENGESAHAN	MENUNGGU KELULUSAN	
4	610a0da4ba443	2021-08-04 11:48:30	MENUNGGU PENGESAHAN	MENUNGGU KELULUSAN	

Fig. 8 - DVS User Dashboard

Company Name:	SHAM SDN BHD	Address:	NO. 7, JALAN TP 7, UEP INDUSTRIAL PARK 40400, SELANGOR
State:	Putrajaya	Jumlah Pekerja	23

Approval Information

Status Pengesahan::	DISAHKAN	Tarikh Pengesahan:	2021-06-28
Status Kelulusan:	DILULUSKAN	Status Kelulusan:	2021-06-28

Surat Kelulusan

Download Surat Kelulusan Syarikat

Surat Pekerja

No.	Uid	Worker Name	No. KP / passport	Position	Transport Registraion No
1		sham workers	9842528291	manager	wxu 442

Fig. 9 - Approval by Authority (DVS)

3.2 Reporting

Process status reporting would be generated as soon as the process is completed. In the beginning, the report could be exported to an Excel sheet for further processing, such as generating charts and tables according to evaluation categories. The reason was to ascertain the end format for reporting purposes so that it could be standardised and developed into the system. An example is shown in Figure 10. In the first month of the testing period, 70 applications were received by Selangor state officers. From the total, 56 applications were approved while others were rejected (9 applications) or pending approval (5 applications).
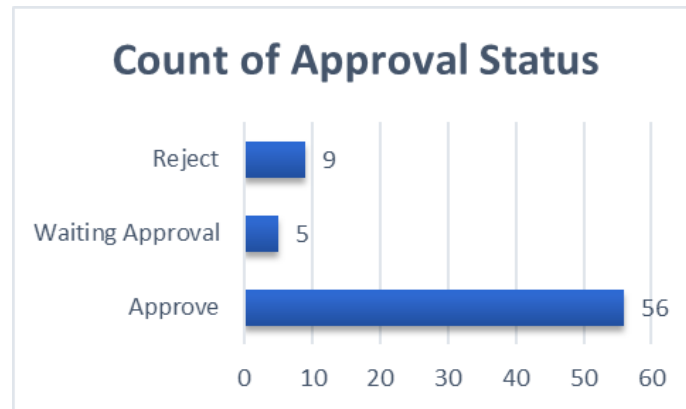
Fig. 10 - Approval status by Authority (DVS)

According to the approval record, the process only took three days from application submission to completion, which was significantly faster than the previous manual process. Nonetheless, instances were unsuccessful due to insufficient data or a lack of information at the district level.

4. Conclusion

In conclusion, this application is expected to replace the old manual application that had been used in Malaysian states, as it is much easier and more effective compared to the manual form. Indeed, it also contributed to more efficient response time to serve all stakeholders within reasonable time frame. Using this application, the flow and format for applying the exclusion to movement during the pandemic period can be standardised. By doing this, DVS clients will receive the same information and obtain standard approval letters. The full online procedure helps clients and DVS users throughout the process, regardless of location and time. The notification system will help officers be more alert with updates. The centralised database ensures data availability and traceability, as well as collects all the information for reporting purposes. All collected information is stored and can be used for monitoring or further analysis, enabling the DVS to conduct monitoring more efficiently. Presently, this system is on hold due to the termination of the MCO, but it may be used again if needed.

Acknowledgement

References

[1]   S. Ghosal, R. Bhattacharyya, and M. Majumder, "Impact of complete lockdown on total   infection and death rates: A hierarchical cluster analysis," *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, vol. 14, no. 4, pp. 707–711, Jul. 2020, doi: 10.1016/J.DSX.2020.05.026.

[2]   The Malaysian National Security Council. http://www.mkn.gov.my, 2020.

[3]   N. A. Aziz, J. Othman, H. Lugova, and A. Suleiman, "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*, vol. 13, no. 12, pp. 1823–1829, Dec. 2020, doi: 10.1016/J.JIPH.2020.08.007.

[4]   S. Whitelaw, M. A. Mamas, E. Topol, and H. G. C. Van Spall, "Viewpoint Applications of digital technology in COVID-19 pandemic planning and response," Lancet Digit. Heal., vol. 2, no. 8, pp. e435–e440, 2020, doi: 10.1016/S2589-7500(20)30142-4.

[5] The New York Times. How South Korea flattened the curve. March 23, 2020. https://www.nytimes.com/2020/03/23/world/ asia/coronavirus-south-korea-flatten-curve.html (accessed April 13, 2020).

[6] News National. Singapore's coronavirus temperature screening and tracking are leading the way. https://thenewdaily.com.au/news/ national/2020/03/19/singapore-coronavirus-temperature-scans/ (accessed April 12, 2020).

[7] Wang J, Ng CY, Brook RH. Response to COVID-19 in Taiwan: big data analytics, new technology, and proactive testing. JAMA 2020; published online March 3. DOI:10.1001/jama.2020.3151.

[8] S. Rajagopalan, M. K. Saji Mathew, S. Rajagopalan, S. K. Mathew, and S. K. Rajagopalan Saji Mathew, "Choice of Agile Methodologies in Software Development: A Vendor Perspective," 2016. [Online]. Available: https://scholarworks.lib.csusb.edu/jitimAvailableat:https://scholarworks.lib.csusb.edu/jitim/vol25/iss1/3

[9] J. J. Baugh, R. Oran, T. Roberts, M. Hankin, K. Moore, and B. A. White, "The QR code: A treatment for COVID-19 information overload," *The American Journal of Emergency Medicine*, vol. 45, pp. 613–614, Jul. 2021, doi: 10.1016/J.AJEM.2020.11.065.

[10] L. Tarjan, I. Šenk, S. Tegeltija, S. Stankovski, and G. Ostojic, "A readability analysis for QR code application in a traceability system," *Computers and Electronics in Agriculture*, vol. 109, pp. 1–11, Nov. 2014, doi: 10.1016/J.COMPAG.2014.08.015.

[11] Salina and A. B. Azmie, "Development, Establishment and Current Achievement of Animal Traceability System in Malaysia," 2013.

[12] M. Heiderich, E. A. V. Nava, G. Heyes, and D. Lindsay, "PHP," *Web Application Obfuscation*, pp. 151–175, Jan. 2011, doi: 10.1016/B978-1-59749-604-9.00006-6.

[13] V. Nayak, P. R Nayak N, Sampoorna, Aishwarya, and N. H. Sowmya, "Agroxpert - Farmer assistant," *Global Transitions Proceedings*, vol. 2, no. 2, pp. 506–512, Nov. 2021, doi: 10.1016/J.GLTP.2021.08.016.