

3rd INTERNATIONAL HALAL MANAGEMENT CONFERENCE (3rd IHMC 2021)

Developing and Sustaining a National Halal COVID-19 Vaccine Initiative: Exploring the Strategic Ecosystem
– Malaysian Armed Forces Perspective

Brigadier General Dato' Dr A Halim Haji Basari

Health Services Division, Malaysia Armed Forces Headquarters, Ministry of Defence, Malaysia
Tel: +6012 399 6037 E-mail: halimbasari@yahoo.com

Second Lieutenant Gan Ee How

Tuanku Mizan Armed Forces Hospital, Ministry of Defence, Malaysia
Tel: +6011 1177 1195 E-mail: eehow96@hotmail.com

Abstract

The COVID-19 pandemic spurred countries worldwide writhing for vaccines and vaccine development. In Malaysia, the need for vaccine self-sufficiency became pronounced. However, technological capacity, financial resource and qualified personnel are the barriers. Religious concern on vaccination and antivaxxers affected the government's effort to achieve mass vaccine voluntary utilisation. This study aims to propose the Malaysia's framework of Halal Vaccine Ecosystem and identifies all stakeholders from the Malaysian Armed Forces' (MAF) strategic perspective. This framework serves Malaysia to amalgamate its ecosystem players to become an organised halal vaccine producer, as literature is scarce and players worked in isolation. This study is done using qualitative approach based upon content analysis design. Based on the study, supply chain actors, government/private agencies/stakeholders, processes and activities are identified. Strong support from the government in vaccine and clinical development does exist. Malaysia has relevant legislations and regulatory authority (National Pharmaceutical Regulatory Agency) to provide command, control and enforcement. The MS2424:2019 Halal Pharmaceuticals Guideline developed by Standards Malaysia and manuals by the Department of Islamic Development Malaysia (JAKIM) guide halal certification implementation. The MAF brought the actors and stakeholders together creating conducive and collaborative environment for halal vaccine development, thus promoting national security, economy, wellness and sustainability. Malaysia aims to lead the world as the halal vaccine champion.

Keywords: halal pharmaceutical; vaccine; ecosystem; COVID-19; sustainability; security

1. Introduction

Malaysia is the world halal economy leader according to the Global Islamic Economic Indicator (GIEI) ranking for 6 years now (DinarStandard, 2020). Among the 6 parameters rated by the GIEI report, Malaysia is in the pole position for halal food, islamic finance, muslim-friendly travel and halal pharmaceuticals/cosmetics. As such Malaysia aspires to venture into halal vaccines and take a lead on it too. An ecosystem for halal vaccines is imperative to be set up before any country can strategise to sustain its biopharmaceutical development. Moreover, Malaysia has issued its Sectoral Development Roadmap for Halal Pharmaceuticals (SDRHP) through Ministry of International Trade and Industry (MITI) to be acted upon and implemented. Concurrently, Malaysia is also finalising its National Vaccine Development Roadmap (NVDR) through Ministry of Science, Technology and Innovation (MOSTI) to guide the nation. Thus, a strategic framework for the Malaysian Halal Vaccine Ecosystem (MHVE) that identifies all its actors, stakeholders, processes and activities was created by the Malaysian Armed Forces (MAF) to be used by the Sectoral Working Group for Halal Pharmaceuticals (SWG HP) to monitor and implement the SDRHP. This framework will serve as a reference to enable Malaysia consolidates its players and

resources in becoming a halal vaccine producer. Many actors and stakeholders were working in isolation prior to this MHVE initiative.

Vaccines contain antigen as its active component. It acts as an immunogen, the administration of which is intended to stimulate the immune system, resulting in the prevention, amelioration or therapy of any disease or infection (Centers for Disease Control and Prevention, 2012). Vaccines for human use in Malaysia are registered by the Drug Control Authority (DCA), Ministry of Health (MOH). The practice of vaccination had initially begun in England during 1800s to combat smallpox. Since then, the field of vaccinology had advanced with the introduction of several successful vaccines against polio, measles, mumps, etc (Plotkin et al., 2012). The design of modern vaccine is based on the concept of inducing active acquired immunity against a particular infectious disease by mimicking the naturally occurring immune response but without causing the disease (Zepp, 2010).

1.1 The emergence of Coronavirus Disease 2019 (COVID-19) pandemic

The outbreak of COVID-19 was first reported in the city of Wuhan, China. Due to its unexpected high speed and large magnitude of transmission, COVID-19 was declared as pandemic by World Health Organisation (WHO) in 11 March 2020, hoping to bring the effort from every nation member to strategise ways to stop this pandemic (World Health Organisation, 2020).

The emergence of COVID-19 pandemic in Malaysia has led to the establishment of The Special Committee for Ensuring Access to COVID-19 Vaccine Supply (JKJAV) and COVID-19 Immunisation Action Body (CITF) to govern the National COVID-19 Immunisation Programme in Malaysia. JKJAV was established to ensure access of the COVID-19 vaccine to be timely, safe, and effective for the country while CITF acts as the coordinating committee, monitoring framework and overall strategy to support the implementation of the National COVID-19 Immunisation Programme. This pandemic has caused a surge of interest in vaccine development. The need for vaccine self-sufficiency for the country became more relevant and recognised by the government, healthcare professional, industrial experts and public in general (Kamal, 2021; Singh, 2021). This is to ensure the pharmaceutical readiness of our nation in order to face any outbreak of infectious disease that poses a threat to our national security, economy and wellness.

The Malaysian Armed Forces (MAF) promote the strategy of national biosecurity, bioeconomy and wellness to push for a local halal vaccines development. The MAF are actively involved at all levels of federal and state in managing pandemic public health policy-making and implementation, Movement Control Orders (MCO), patient care delivery/governance, medical/general logistics, testing and quarantining through various special task forces (including CITF). The MAF provide strategic, technical and tactical advices to the government and lead many initiatives to assist the federal, state and local authorities. The Greater Klang Valley Special Task Force (GKVSTF) demonstrates the full extent of military involvement from end to end (New Straits Times, 2021). In addition, never before in history, the MAF have deployed 7 field hospitals all over Malaysia and expanded its Tuanku Mizan Armed Forces Hospital with additional 150 beds and converted its Disaster Management Zone (DMZ) into becoming a full-fledged COVID-19 Category 4 wards (The Sun Daily, 2021a). In short, the MAF utilise its full capabilities in order to manage the current national pandemic emergency/disaster with newer roles being created as the situations worsen. Thus, it is in the interest of the MAF to ensure the nation takes holistic measures to be pharmaceutically ready and sustain itself during any emergency situation.

1.2 Current capability of Malaysia in vaccine development

The most important capability for Malaysia to have at the moment is vaccine development. Although the government manifested much willingness to drive the nation towards a vaccine producing country, the current situation in Malaysia does not permit it to become a reality right now. Currently, Malaysia does not yet have the technological capacity to produce new innovative human medicines or vaccines (Malaysia Competition Commission, 2017). Thus, Malaysia fully relies on the importation of vaccines from other country to fulfil the

usage demand. As running a vaccine industry involves complex Research and Development, and Commercialisation (R&D&C) process, it also requires many qualified personnel to be involved and this adds another barrier for Malaysia to produce its own vaccine.

1.3 Religious concern on vaccination

Halal is defined as religiously acceptable/permissible according to the Muslim law (Islamic Shariah & Fatwa). In Malaysia, halal certification is led and managed by the JAKIM. Aside from factors such as safety and effectiveness of vaccines that cause vaccine hesitancy which may lead to refusal, another factor not to be neglected is the religious belief. In fact, this is a major issue in Malaysia which is made up of 61.3% Muslim. People is questioning the status of halal of the vaccine as they afraid it is made up of ingredients which are not permissible (haram) for the consumption by Muslim such as porcine deoxyribonucleic acid (DNA) (Khoo et al., 2020). Such factor could hamper the effort to achieve mass vaccine utilisation in Malaysia. In the case of COVID-19 vaccine, although the Fatwa Committee of the National Council for Islamic Religious Affairs (MKI) has decided that the use of the COVID-19 vaccine is permissible and obligatory for groups which have been identified by the government, misconception and the doubt on halal status of vaccine among people still exist today and they use it as an excuse to refuse the vaccination (The Sun Daily, 2021b). The overall vaccine acceptance rate is reported to be 83.3%. Among the vaccine hesitancy, religious factor consists of 20.8% (Syed Alwi et al., 2021). Thus, vaccine which is certified as halal is highly demanded in Malaysia.

1.4 Possibility of halal vaccine development in Malaysia

Considering Malaysia's current capability in producing vaccine and the religious concern on vaccination, development of halal vaccine requires the setup of the halal vaccine ecosystem in Malaysia. This proposed ecosystem enables the government to identify various actors and stakeholders involved and the relationship between them. The idea is mooted by the author who is the Chairman for the SWG HP who is responsible to monitor and facilitate the implementation of the SDRHP under the HDC, MITI. Therefore, the ecosystem was developed from the perspective of the MAF. The research questions of this study are: who are the players in the halal vaccine ecosystem, what roles do they play and how can the MAF facilitate all players to collaborate. This study can then map out the overall framework on MHVE in order to accelerate the national aspiration in achieving the status of a halal vaccine producing country, making vaccine self-sufficiency a national reality.

2. Objectives

This work aims to propose the overall framework on MHVE which includes every actor and stakeholder from the perspective of MAF as to enable Malaysia becoming a halal vaccine producer.

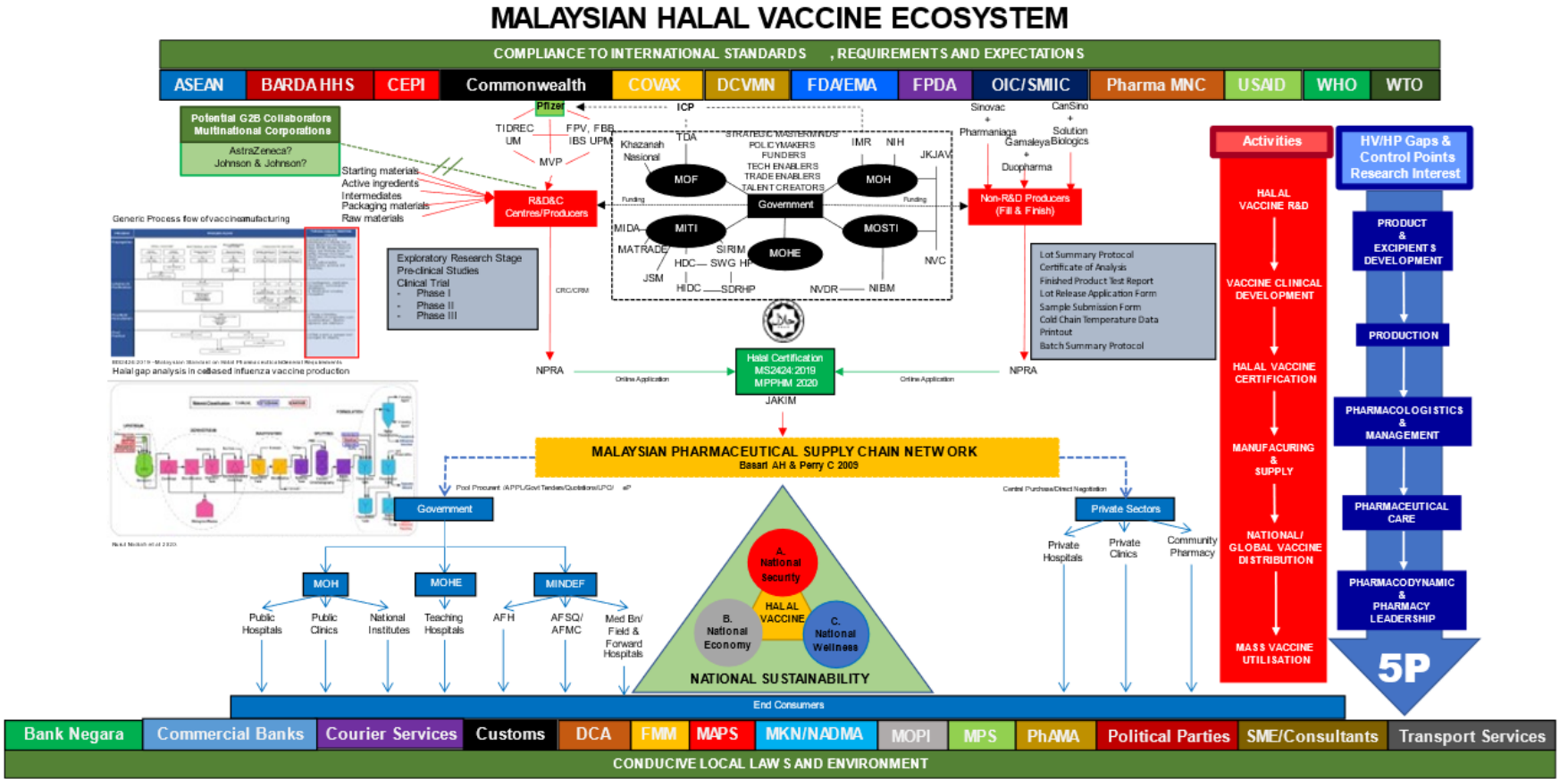
3. Methodology

The study of this paper has been conducted through a qualitative approach based on content analysis design by using literature review approach. Data analysis is based on deductive methods. The overall framework on the MHVE was summarised based upon inputs gathered from discussions with Subject Matter Experts (SME) as follows: Director General of Health Services and Director of Pharmacy at the Malaysian Armed Forces Headquarters (MAF HQ); Director General of Institute for Medical Research (IMR); CEO of Technology Depository Agency (TDA); Senior Assistant Director Strategic Planning of National Pharmaceutical Regulatory Agency (NPRA); Executive Director of Malaysian Vaccines and Pharmaceuticals (MVP); Chief Industry Development Officer of Halal Development Corporation (HDC); Group CEO and Vice President of Institute of Standards and Industrial Research Malaysia (SIRIM); Chairman of TIDREC at the Universiti Malaya (UM);

Professor of Biotech and Biomolecular Science Faculty, Director of Putra Science Park and Head of UPM-MAKNA Cancer Research Laboratory Institute of Bioscience of Universiti Putra Malaysia (UPM); VC of PICOMS International University College; Senior Manager Strategic Planning of Pharmaniaga Sdn Bhd; Manager Halal Department & Government Relation of Duopharma Biotech Bhd and Director, Emerging Market Policy and Public Affairs, Malaysia/Brunei/Pakistan of Pfizer Malaysian Sdn Bhd.

4. Results and Discussion

This study successfully created the MHVE which depicts all the actors, stakeholders, processes and activities involved in the halal vaccines development (Figure 1). The literature is scarce on such ecosystem, thus the MHVE adds significant contribution for future research in this area. There is a strong support from the government in the national vaccine development. Malaysia has the standards, regulations, guidelines, infrastructures and authorities to provide oversight and regulatory checks for halal vaccine development to occur in Malaysia. Apart from the SOP by the NPRA, the MS2424:2019 Halal Pharmaceuticals Guidelines by Standards Malaysia and Malaysian Halal Certification Procedure Manual (MPPHM) 2020 by JAKIM can be used by any local/international vaccine developer in obtaining halal certification. Various local and international players are further identified and the MAF can now strategise an initiative to bring all these actors and stakeholders together through the SWG HP to lead and promote the national halal vaccine development agenda. The MNVE will ease the SWG HP in bridging all the gaps (structural/academic/environment) by promoting multisectoral and multilateral collaboration among the appropriate players throughout all the processes and activities. More importantly, now the collaboration can be done holistically.



Basari AH & Gan EH 2021 (UPDATED 4 AUGUST 2021)

Figure 1. Malaysian Halal Vaccine Ecosystem.

Table 1. List of abbreviations used in Fig. 1

International Biopharmaceutical Stakeholders					
ASEAN	-	Association of Southeast Asian Nations	FPDA	-	Five Power Defence Arrangement
BARDA HHS	-	Biomedical Advanced Research and Development Authority under U.S. Department of Health and Human Services	ICP	-	Industrial Collaboration Programme
CEPI	-	Coalition for Epidemic Preparedness Innovations	OIC/SMIIC	-	Organisation of Islamic Cooperation/Standards and Metrology Institute for Islamic Countries
COVAX	-	COVID-19 Vaccines Global Access	Pharma MNC	-	Pharmaceutical Multinational Company
DCVMA	-	Developing Countries Vaccine Manufacturers Network	USAID	-	United States Agency for International Development
EMA	-	European Medicines Agency	WHO	-	World Health Organisation
FDA	-	Food and Drug Administration	WTO	-	World Trade Organisation
Local Biopharmaceutical Stakeholders					
AFH	-	Armed Forces Hospital	MKN	-	<i>Majlis Keselamatan Negara</i>
AFMC	-	Armed Forces Medical Centre	MOF	-	Ministry of Finance
AFSQ	-	Armed Forces Sick Quarter	MOH	-	Ministry of Health
CRC	-	Clinical Research Centres	MOHE	-	Ministry of Higher Education
CRM	-	Clinical Research Malaysia	MOPI	-	Malaysian Organisation of Pharmaceutical Industries
DCA	-	Drug Control Authority	MOSTI	-	Ministry of Science, Technology and Innovation
FBB	-	<i>Fakulti Bioteknologi & Biomolekular</i>	MPS	-	Malaysian Pharmacists Society
FMM	-	Federation of Malaysian Manufacturers	MVP	-	Malaysian Vaccines and Pharmaceuticals
FPV	-	Fakulti Perubatan Veterinar	NADMA	-	National Disaster Management Agency
HDC	-	Halal Development Corporation	NIBM	-	National Institutes of Biotechnology Malaysia
HIDC	-	Halal Industrial Development Corporation	NIH	-	National Institutes of Health
IBS	-	Institute of Bioscience	NPRA	-	National Pharmaceutical Regulatory Agency
IMR	-	Institute for Medical Research	NVC	-	National Vaccine Centre
JAKIM	-	<i>Jabatan Kemajuan Islam Malaysia</i>	NVDR	-	National Vaccine Development Roadmap
JKJAV	-	<i>Jawatankuasa Khas Jaminan Akses Bekalan Vaksin COVID-19</i>	PhAMA	-	Pharmaceutical Association of Malaysia
JSM	-	<i>Jabatan Standard Malaysia</i>	SDRHP	-	Sectoral Development Roadmap for Halal Pharmaceuticals
MATRADE	-	Malaysia External Trade Development Corporation	SWG HP	-	Sectoral Working Group in Halal Pharmaceutical
MAPS	-	Malaysian Association of Pharmaceutical Suppliers	SME	-	Subject Matter Expert
Med Bn	-	Medical Battalion	SIRIM	-	Institute of Standards and Industrial Research Malaysia
MIDA	-	Malaysian Investment Development Authority	TDA	-	Technology Depository Agency
MINDEF	-	Ministry of Defence	TIDREC	-	Tropical Infectious Diseases Research & Education Centre
MITI	-	Ministry of International Trade and Industry			

Table 1. List of abbreviations used in Fig. 1 (Continue)

Others					
APPL	-	Approved Product Purchase List	MPPHM	-	<i>Manual Prosedur Pensijilan Halal Malaysia</i>
eP	-	<i>ePerolehan</i>	MS2424:2019	-	Malaysian Standard on Halal Pharmaceuticals – General Requirements
HP	-	Halal Pharmaceuticals	R&D	-	Research and Development
HV	-	Halal Vaccines	R&D&C	-	Research, Development and Commercialisation
LPO	-	Local Purchase Order			

4.1 Roles of the government

As shown in Figure 1, the government plays indispensable roles in supporting the development of halal vaccine in Malaysia. Various ministries under the government such as Ministry of Finance (MOF), Ministry of Higher Education (MOHE), MOH, MITI, and MOSTI, armed with various agencies within each ministry, enabling the government to act as strategic masterminds, policymaker, funders, technology/economic trade enablers and talent creators. The Government can now decide what fundamental framework and policy for the halal vaccine development to be implemented in Malaysia under which stages.

Any initiative and decision made by government will directly affect the two key players in vaccine manufacturing – Vaccine R&D&C Centres/Producers who are producing the vaccine products from scratch and Vaccine Non-R&D Producers who are solely involved in “fill and finish” of the products. The government will need to make a bold decision soon on how to fund/invest and/or own a stake into suitable local manufacturers for the halal vaccine development to be enabled and sustained. For example, the government may involve the Khazanah Nasional, Bank Negara, Development Bank and other commercial banks.

4.2 Vaccine manufacturers

As mentioned previously, Vaccine R&D&C Centres/Producers and Vaccine Non-R&D Producers can be the part of the ecosystem to commercialise the products and enable Malaysia as a vaccine manufacturing country. Thus, these two types of producers form the skeletal backbones of the ecosystem to ensure that the nation’s vaccine self-sufficiency can be achieved.

4.2.1 Vaccine R&D&C Centres

Vaccine R&D&C Centres/Producers involve in full vaccine development process starting from the identification of antigen during its initial exploratory stage. Then the candidate vaccine will be subjected to pre-clinical and clinical stages. In Malaysia, the clinical trial is conducted through Clinical Research Centres (CRC) established in various government hospitals. Once the vaccine passed phase III clinical trial, only then it can be submitted to NPRA for registration.

Although Malaysia currently does not have the capability to produce human vaccine, but Malaysian Vaccines and Pharmaceuticals Sdn Bhd (MVP) has a history of over 25 years in successfully developing veterinary vaccines (Malaysian Vaccines and Pharmaceuticals, 2017). It is proposed that MVP should collaborate with research partners such as the Tropical Infectious Diseases Research & Education Centre (TIDREC) under Universiti Malaya or research faculties and institutes under UPM, IMR, SIRIM, CRC and Clinical Research Malaysia (CRM) for local content. The MVP should also collaborate with a multinational company such as Pfizer to acquire technical/technological support and knowledge from established vaccine developer. Pfizer for example can expand the role of MVP to become a human vaccine developer like it did before for the MVP to produce animal vaccines in year 2009 to 2011. Currently, IMR and UPM are at exploratory stage in their human vaccine development projects, but still looking for an industrial partner for their product commercialisation (The Edge Markets, 2021). Again, MVP is the most logical local player/industrial partner to commercialise the products of IMR and UPM whom all converge in the SWG HP.

4.2.2 Vaccine Non-R&D Producers

Vaccine Non-R&D Producers are not involved in full vaccine development and focus solely on “fill and finish” concept. The local manufacturers will import the unpacked bulk finished products and pack them locally before they submit to the NPRA to be marketed in Malaysia. This type of industry is easier to operate in term of complexity of vaccine development as compared with Vaccine R&D&C Centres, described previously. It is suggested that Malaysia should establish this type of industry which is simpler to be developed, concurrently with investing into the Vaccine R&D&C Centres to reap short term economic gains.

Currently Pharmaniaga Lifescience Sdn Bhd is the first Vaccine Non-R&D Producer in Malaysia that has been approved to produce “fill and finish” version of the Sinovac vaccine to be distributed for the use of Malaysian as a part of National COVID-19 Immunisation Programme. Duopharma Biotech Bhd and Solution Biologics Sdn Bhd are the other two producers currently working on “fill and finish” concept with Gamaleya and CanSino vaccines respectively.

4.3 Pharmaceutical regulatory aspects

Malaysia has comprehensive and systematic regulation on pharmaceutical products. The DCA which was established under the Control of Drugs and Cosmetic Regulation 1984 (CDCR) is the executive body charged with regulating pharmaceutical products in Malaysia. Approval from the DCA is compulsory from all pharmaceutical products before marketed in Malaysia to ensure that only safe, efficacious, and high-quality pharmaceuticals are marketed for public use (National Pharmaceutical Regulatory Agency, 2021a).

NPRA acts as secretariat of DCA in the regulation of pharmaceutical products in Malaysia. They will implement drug registration through evaluating the technical aspects of the product before it is then submitted to DCA for the approval (National Pharmaceutical Regulatory Agency, 2021c). NPRA requirements for registration of biologics/ biopharmaceuticals products are aligned with the scientific guidelines and recommendations for quality, clinical efficacy and safety and non-clinical of the WHO, EMA and International Conference of Harmonization (ICH) (National Pharmaceutical Regulatory Agency, 2021b).

For the registration of vaccines, NPRA requires documents from vaccine manufacturer such as Lot Summary Protocol, Certificate of Analysis, Finished Product Test Report, Lot Release Application Form, Sample Submission Form, Cold Chain Temperature Data Printout, Batch Summary Protocol and other relevant documents. In comparison, for Vaccine R&D&C Centres, additional documents on clinical trials will be required. Vaccine manufacturers also need to comply with Good Manufacturing Practice (GMP) as a pre-requisite for product registration (National Pharmaceutical Regulatory Agency, 2021b).

4.4 Roles of JAKIM

JAKIM is the only agency that is authorised to issue halal certificate in Malaysia. After the vaccine had been registered with DCA and allowed to be marketed in Malaysia, only then the manufacturers can submit an online application to JAKIM for the halal certification. The vaccine is then evaluated based on MS 2424:2019 standard and with the input from NPRA on its manufacturing process and formulation. Once the vaccine has been found to be in compliance to the standards, halal certification can be approved (Department of Islamic Development Malaysia (JAKIM), 2020).

4.5 Malaysian Pharmaceutical Supply Chain Network

Upon successfully obtaining the halal certificate, the vaccine can be distributed for public use through the government or private sectors via the supply chain network. As shown in Fig. 2, the pharmaceutical supply chain network in Malaysia consists of nine players, making the network to be quite complex (Basari, AH & Perry, C 2009). The nine players are:

1. Government, employers, individuals and employer coalitions.
2. Insurers and health maintenance organisations.
3. Hospitals, physicians, pharmacies, clinic and panel providers.
4. Tender agents, wholesalers and stockists.
5. Distributors.
6. Importers and license holders.
7. Drug manufacturers, information system manufacturers and contract manufacturers.
8. Raw material importers.
9. Raw material manufacturers, chemical manufacturers, artwork designers and packaging manufacturers.

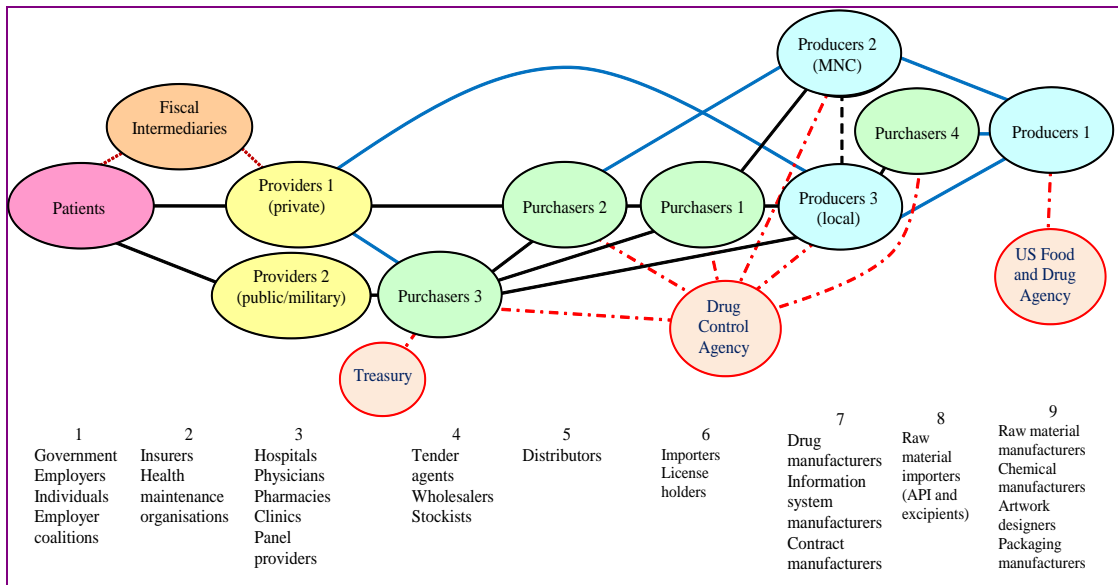


Figure. 2. Picture of the healthcare supply chain in Malaysia showing nine actors

4.5.1 Vaccine supplies to the government sectors

The MOH, MOHE and Ministry of Defence (MINDEF) are the 3 ministries that are involved in managing public healthcare in Malaysia. Government procurement system for vaccines is typically done via pool procurement, Approved Product Purchase List (APPL), government tender, quotations or eProcurement (eP).

The vaccines procured by the MOH will be used in public hospitals, clinics and national institutes such as National Heart Institute (NHI) and National Cancer Institute (NCI). For MOHE, the vaccines will be used in teaching hospitals that are affiliated with public universities. For MINDEF, the vaccines will be used in the Armed Forces Hospitals (AFH), Armed Forces Medical Centres (AFMC), Armed Forces Sick Quarters (AFSC), Medical Battalions (Med Bn), field and forward hospitals. Health care professionals at such facilities will then administer vaccines to the end consumers.

4.5.2 Vaccine supplies to the private sector

Under the private sector are the private hospitals, private clinics and community pharmacy. In private sector, the procurement is done via central purchase or direct negotiation with the marketing team of pharmaceutical companies. Currently, pharmacists are not yet allowed to vaccinate the public although the community pharmacies are part of the vaccination centres in other countries. The Malaysian Pharmacists Society (MPS) has urged the government to consider legalising pharmacist as the vaccinator (CodeBlue, 2021). The involvement of community pharmacies in the supply chain network will only happen if due recognition is given to the community pharmacists to vaccinate the public.

4.6 Other stakeholders

As shown in Fig. 1, various local and international stakeholders can have impact on the ecosystem. Locally, there are the *Bank Negara*, commercial banks, courier services, customs, DCA, Federation of Malaysian Manufacturers (FMM), Malaysian Association of Pharmaceutical Suppliers (MAPS), National Security Council (MKN), Malaysian Organisation of Pharmaceutical Industries (MOPI), Malaysian Pharmacists Society (MPS), Pharmaceutical Association of Malaysia (PhAMA), political parties, SME/consultants and transport services to provide conducive local laws and/or environment for the halal vaccine development to occur. Internationally, there are organisation such as the Association of Southeast Asian Nations (ASEAN), Biomedical Advanced Research and Development Authority under U.S. Department of Health and Human Services (BARDA HHS), Coalition for Epidemic Preparedness Innovations (CEPI), Commonwealth, COVID-19 Vaccines Global Access (COVAX), Developing Countries Vaccine Manufactures Network (DCVMN), European Medicines Agency (EMA), Food and Drug Administration (FDA), Five Power Defence Arrangements (FPDA), Organisation of Islamic Cooperation/Standards and Metrology Institute for Islamic Countries (OIC/SMIIC), multinational pharmaceutical companies, United States Agency for International Development (USAID), WHO and World Trade Organisation (WTO) to further strengthen the ecosystem so the development of halal vaccines is ready and sustainable to comply with the international standards, requirements, and expectations.

4.7 Roles of the MAF

The MAF provides the thought leadership for the SWG HP and act as the mediator and facilitator to bring all the local and international actors and stakeholders together, forming a comprehensive multisectoral and multilateral collaborative network to provide the conducive environment for halal vaccine development to take place. The MAF is fully committed to complement the MHVE by implementing and developing Shariah Compliant Pharmacy Practice (SCPP) and ethnocentric medicines further (Haji Basari, 2019). The MAF has an obligation to assist the country to build this halal vaccine national capacity to improve in part, its military pharmacy readiness as its future direction. This SCPP concept is in accordance with the “Malaysian Blue Ocean Strategy” (MBOS) to explore and expand into new global market opportunities. The MAF promote halal vaccine agenda by collaborating externally with the all the players not limited to the MPS, HDC, JAKIM, TDA, MVP, Duopharma, Pharmaniaga Berhad, IMR, UPM, UM, Khazanah Nasional and Department for Standard Malaysia (JSM). The halal vaccine initiative transforms the healthcare value chain, upskills the workforce and uplifts the image of Malaysia.

5. Conclusion

From the finding of this study, Malaysia has the potential to develop halal vaccine on its own due to the strong support from the government through these landmark roadmaps, namely the SDRHP and NVDR. The NPRA ensures

the safety, effectiveness, and availability of vaccines to public through its stringent regulatory review mechanisms. With the talent, technical and technological supports from various research agencies and established pharmaceutical industry players, Malaysia can venture into local halal vaccine development. JAKIM plays an important role in increasing vaccine acceptance among Muslim by issuing halal certification to those vaccines that comply to MS2424:2019 and other relevant guidelines.

Moving forward for the government is to realise the self-sufficiency first vaccine policy, to clarify the goal and direction and to commit towards the development of halal vaccines through the monitoring and facilitation of the SWG HP. Various multisectoral and multilateral collaboration among the players be it the government, industry, academia and regulators can be formalised through the MHVE framework. Malaysia will then need to establish and develop human capital that is well verse in the halal vaccine industry. With the thought leadership provided by the MAF through the SWG HP, Malaysia can merge its MHVE players to become a strategic halal vaccine producer for the world, while ensuring the national sustainability by preserving our national security, national economy and national wellness.

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