

# DUNMAN HIGH MODEL ASEAN PLUS SUMMIT

6 - 8 June 2019



## Study Guide

### ASEAN MINISTERIAL MEETING ON SCIENCE AND TECHNOLOGY

1. The Question of the Transition towards Smart Cities
2. The Question of the Advancement of Biotechnology





# INTRODUCTION

## THE TRANSITION TOWARDS SMART CITIES

Upon globalisation, the Association of Southeast Asian Nations (ASEAN) now faces a megatrend, namely urbanisation. With 90 million more people expected to urbanise within ASEAN by 2030, ASEAN is likely to enjoy increased productivity and economic growth. Yet in the midst of this transitions, a new set of challenges has surfaced due to the strain caused by urbanisation on countries. Denser population density, increasing energy demand, congestion, poorer air quality and deforestation are only some of these challenges. In ASEAN countries, urban infrastructure and resources including transport, transportation systems, housing and information technology (IT) networks are already experiencing the strain of the large-scale migration into cities. Beyond this, rapid urbanisation also contributes to global warming, impeding sustainable development.

ASEAN thus welcomes a transition towards smart cities to better handle the various complications brought about by urbanisation through the use of digitalisation. Smart cities can potentially step up the efficiency of processes and solve the aforementioned challenges through digitalisation<sup>1</sup>. Such a move may bring ASEAN closer to its goal of sustainable development and also enhance its economic growth. Moreover, with 60 per cent of the ASEAN population being below the age of 35, suggesting that most of them are likely to be technologically-savvy, ASEAN can seize this opportunity to pioneer the development of new digital jobs and services; and to equip both the young and elderly within society with the necessary digital skills<sup>2</sup>. This is so that ASEAN can remain competitive in the global market. Regionally, the networking of Smart Cities across ASEAN states would also contribute to the enhancement of better mutual understanding across cultures.

However, the transition towards smart cities comes with obstacles. These obstacles include digital protectionism, lack of awareness and support for smart cities as well as lack of research bases, of which would be discussed further in the later part of the study guide. In that vein, new innovations in modern technology as well as extensive scientific research will be needed to support this movement, though these may come accompanied with challenges for ASEAN.

To conclude, AMMST will play a key role in facilitating the smooth transition towards smart cities in ASEAN through the advancement of the science and technology industry and consideration of other areas. This study guide aims to provide a clearer view of the transition towards smart cities and the current issues hindering such progress. Delegates should work towards a cohesive solution that not only addresses the challenges that ASEAN may face in this process, but should also be one that ASEAN can collectively undertake. Delegates should also keep in mind the goals of a smart city which is to mitigate the problems caused by urbanisation throughout this process.

1. Bloomberg, J. (2018, May 17). Digitization, Digitalization, And Digital Transformation: Confuse Them At Your Peril. Retrieved February 15, 2019, from <https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/#4f5a9812f2c7>

2. Balakrishnan, V. (2018, November 13). Towards smart cities in ASEAN. Retrieved April 28, 2019, from <https://www.businesstimes.com.sg/hub/asean-singapore-2018/towards-smart-cities-in-asean>



# DEFINITIONS

## Smart Cities

A smart city in ASEAN is envisioned to be one that strives to balance three interdependent strategic outcomes: a high quality of life, a competitive economy, and a sustainable environment<sup>3</sup>. It harnesses technological and digital solutions as well as innovative non-technological means to address urban challenges, so as to continuously improve people's lives and create new opportunities. It should also be sustainable, promoting economic and social development alongside environmental protection through effective mechanisms to meet the current and future challenges of its people. As a city's nature remains an important factor in its economic development, smart city development should also be designed in accordance with the city's natural characteristics and potential<sup>4</sup>.

3. Centre for Liveable Cities. (2018). Retrieved January 8, 2019, from <https://www.clc.gov.sg/docs/default-source/books/book-asean-smart-cities-network.pdf>

4. S. Rajaratnam School of International Studies. (2018). ADDRESSING DIGITAL PROTECTIONISM IN ASEAN: TOWARDS BETTER REGIONAL GOVERNANCE IN THE DIGITAL AGE. Retrieved April 26, 2019, from: [https://www.rsis.edu.sg/wp-content/uploads/2018/03/PR180321\\_Addressing-Digital-Protectionism-in-ASEAN.pdf](https://www.rsis.edu.sg/wp-content/uploads/2018/03/PR180321_Addressing-Digital-Protectionism-in-ASEAN.pdf)

# HISTORICAL PROGRESS

October 2016	<p><b>The 9th Informal ASEAN Ministerial Meeting on Science and Technology (IAMMST-9)<sup>5</sup></b></p> <p>During the meeting, the ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025 was established. APASTI is a comprehensive ten-year implementation plan that outlines the key strategic actions as well as priorities ASEAN would undertake and pursue. The plan looks towards improving programmes and initiatives, and enhancing cooperation between Dialogue partners. It also lays the foundation for the development of the science and technology sector for the future generations, and involves borrowing the help of the ASEAN Committee on Science and Technology (COST), a committee under AMMST, to facilitate progress in science and technology within ASEAN and improve innovation.</p>
March 2018	<p><b>The ASEAN-Australia Special Summit: The Sydney Declaration<sup>6</sup></b></p> <p>In this summit, it was discussed that Australia would work with ASEAN to create cities that are smart and sustainable, with Australia investing AUD30 million to achieve this purpose. This culminated in the establishment of the ASEAN-Australia Smart Cities Initiative. Over the next five years, the Initiative will provide education, training, technical assistance and support for innovation. This summit emphasises the benefits of ASEAN could reap from tapping into foreign expertise.</p>
April 2018	<p><b>Establishment of the ASEAN Smart Cities Network (ASCN) at the 32nd ASEAN Summit<sup>7</sup></b></p> <p><i>The ASEAN Smart Cities Network (ASCN) comprising 26 diverse cities (showcased in Figure 1) was officially introduced</i></p>

5.Asean.org, (2016). Retrieved February 16, 2019, from  
<https://asean.org/wp-content/uploads/2017/10/02-APASTI-2016-2025-Implementation-Plan-FINAL.pdf>

6.Singapore.embassy.gov.au. (2018). Retrieved February 9, 2019, from  
<https://singapore.embassy.gov.au/files/sing/20181411%20-%201.%20ASEAN%20Smart%20Cities%20-%20Fact%20sheet.pdf>

7.Centre for Liveable Cities. (2018). Retrieved January 8, 2019, from  
<https://www.clc.gov.sg/docs/default-source/books/book-asean-smart-cities-network.pdf>

# HISTORICAL PROGRESS



Figure 1: ASEAN Smart Cities Network (Cities involved)

The ASCN is envisioned as a collaborative platform where cities from the ten ASEAN Member States will work towards the common goal of smart and sustainable urban development. It aims to improve the lives of ASEAN citizens through the use of science and technology. This involves promoting cooperation among ASEAN, working with the private sector, and facilitating collaboration with ASEAN's external partners. The ASEAN Smart Cities Framework, a guide to facilitate the transition towards smart cities, was also established. It highlights the key areas and aspects to note with regards to smart cities. This was a significant event to kick-start ASEAN's transition towards smart cities.

May 2018	<p><b>The ASEAN Smart Cities Governance Workshop<sup>8</sup></b></p> <p>The ASEAN Smart Cities Governance Workshop functions as a platform for chosen cities of the ASCN to meet. During the workshop, respective leaders were able to exchange ideas and gain insights from expert consultants. This workshop exposed the leaders to a wide array of innovations used internationally. Each city was also to present their Smart City Action Plan for better planning of the ASCN framework. This workshop emphasises the benefits public-private partnerships can bring to ASEAN.</p>
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<sup>8</sup>. Information Paper on the ASEAN Smart Cities Governance Workshop. (2018). Retrieved May 6, 2019 from <https://www.asean2018.sg/Newsroom/Press-Releases/Press-Release-Details/-/media/39E1CE1AD6494FE6B6B193B1033A39EC.ashx>

# HISTORICAL PROGRESS

July 2018	<p><b>6th Meeting of Governors/Mayors of ASEAN Capitals (MGMAC) 2018<sup>9</sup></b></p> <p>The meeting served as a platform to discuss the creation of a sustainable environment in ASEAN<sup>10</sup>. The top three main areas of focus were water resource management, community resilience and smart technologies. Here, environmental sustainability was recognised as an important key to the transition towards smart cities. This meeting was hence crucial as a checkpoint for improving environmental infrastructure and emphasising the need to save the environment in order to embrace smart cities.</p>
July 2018	<p><b>World Cities Summit<sup>10</sup></b></p> <p>The World Cities Summit (WCS), a biennial event organised by Centre for Liveability Cities (CLC), is an event where representatives globally gather to share their technical expertise and discuss methods to enhance the liveability and sustainability of cities through innovation. During the meeting, future action plans for each country are discussed. The plans mainly focus on the civil and social, health and well-being, safety, environment, infrastructure and innovation aspects of a country. The meeting officially endorsed the ASEAN Smart Cities Framework as well as the Smart City Action Plans of 26 cities. Delegates will find taking note of the Action Plans that were shared in the meeting helpful.</p>
September 2018	<p><b>1st ASEAN-ROK Infrastructure Ministers Meeting<sup>11</sup></b></p> <p>ASEAN and the Republic of Korea (ROK) had their first meeting under the purpose of strengthening cooperation on sustainable infrastructure and regional connectivity. The ministers discussed the priorities and development plans of each ASEAN Member State on sustainable infrastructure and smart cities. Of which, the importance of developing smart infrastructure technologies related to transport and water resources was highlighted as the main focus of the meeting.</p>

1. Lim, A. (2018, July 07). Asean capitals sign declaration pledging commitment to environmental sustainability. Retrieved March 6, 2019, from <https://www.straitstimes.com/singapore/environment/asean-capitals-sign-declaration-pledging-commitment-to-environmental>

2. World Cities Summit. (2018). Retrieved March 6, 2019, from [https://www.worldcitiesummit.com.sg/sites/default/files/wcsmf\\_lowyenling.pdf](https://www.worldcitiesummit.com.sg/sites/default/files/wcsmf_lowyenling.pdf)

3. World Cities Summit 2020. (2018). Retrieved February 9, 2019, from <http://www.worldcitiesummit.com.sg/>

ASEAN, ROK forge closer cooperation on sustainable infrastructure. (2018, October 29). Retrieved March 6, 2019, from <https://asean.org/asean-rok-forge-closer-cooperation-sustainable-infrastructure/?highlight=smartcities>



# KEY STAKEHOLDERS

## **Republic of Singapore**

Singapore is a leader in innovation and infrastructure support within the science and technology sector. Since 2014, the Singapore government has been actively promoting its "Smart Nation Initiative" and has been working towards the goal of becoming a smart city. In the Global Smart City Performance Index 2017, Singapore is ranked as the top performer of global smart cities in these four areas: Health, Productivity, Mobility and Safety<sup>13</sup>. In addition, during Singapore's ASEAN Chairmanship in 2018, Singapore was the first country to initiate the ASCN<sup>14</sup>. Mentioned by Prime Minister Lee Hsien Loong, Singapore also has a focus on environmental sustainability to keep the country a clean, green and sustainable home for the decades to come. Singapore's green building journey has since developed 17 green buildings, making Singapore one of the leading cities in sustainability. Singapore's high accessibility to science and technology resources and broad focus on both the environment and technological progress enables it to play an important role in ASEAN through the sharing of such initiatives, technological knowledge and potential frameworks with its counterparts.

## **Kingdom of Thailand**

While other countries focussing on incorporating digital services in the daily lives of citizens, Thailand aims to build a smart and sustainable Bangkok that is liveable and environmental friendly for all citizens. In the Thailand 4.0 Smart City Initiative, one of the main aspects include the construction of energy-efficient buildings<sup>15</sup>. For example, Park Ventures Ecoplex was the first building in the city to be accorded the Leadership in Energy and Environmental Design (LEED) platinum rating. Its achievement has become the yardstick for other energy-efficient buildings in the city . Thailand's goal is to make a liveable smart city in which technologies implemented are not only sustainable but also practical. Thailand's 4.0 Initiative also has a clear framework which may be viable to facilitate the transition towards smart cities. Although Thailand still has much to improve on in terms of its infrastructure and integration of smart city technologies into the fabric of the city's development.

13. Singapore best performing 'smart city' globally: Study. (2018, March 13). Retrieved February 2, 2019, from <https://www.channelnewsasia.com/news/singapore/singapore-best-performing-smart-city-globally-study-10038722>

14. ASEAN. (2019). Retrieved January 18, 2019, from <https://asean.org/storage/2018/04/Concept-Note-of-the-ASEAN-Smart-Cities-Network.pdf>

15. Smart City Spotlight: Bangkok. (2018, May 22). Retrieved March 8, 2019, from <https://theaseanpost.com/article/smart-city-spotlight-bangkok>



# KEY STAKEHOLDERS

## **Kingdom of Cambodia, Lao People's Democratic Republic, Republic of the Union of Myanmar and Socialist Republic of Vietnam (CLMV Countries)**

The CLMV Countries have embraced the transition towards smart cities. Myanmar was the first of the four countries to introduce its smart city plans. For example, Myanmar started utilising internet-connected sensors to manage traffic at junctions by installing CCTV cameras at traffic lights to monitor and record activity from a control room and setting up GPS systems in rubbish trucks to monitor their routes<sup>16</sup>. The Laos government has also initiated its smart city plans in 2019 for the building of a smart and eco-city<sup>17</sup>. However, being less developed than the other countries, Laos faces difficulties in its transition towards smart cities. According to The World Academy of Sciences, in 2017, Laos, Myanmar and Cambodia were identified as developing countries that capacities in science and technology were significantly lagging<sup>18</sup>. Considering that more cities will urbanise in these countries, with 21 million Vietnamese and five million Burmans expected to move up into the middle classes<sup>19</sup>, more help is needed in bridging the development gaps, as was discussed in the 33rd ASEAN Summit<sup>20</sup>. Such help may include infrastructure support and the sharing of science and technology expertise by the more developed countries.

## **People's Republic of Japan**

Japan, being a developed country, hopes to develop more smart cities both abroad and domestically, and sees artificial intelligence (AI) and networked devices as the technologies to help it achieve this goal<sup>21</sup>. In November 2018, at the 21st ASEAN-Japan Summit commemorating the 45th Anniversary of ASEAN-Japanese friendship and cooperation, Japanese Prime Minister Shinzo Abe pledged support for the ASCN programme. Currently, Japan is working with the Philippines to develop Davao into a smart city. Japan has been working on smart city innovation for almost a decade and has an edge in using technology to build infrastructure that meets the needs and expectations of both residents and businesses. Japan is also well-established in its electronics industry. Therefore, Japan would definitely be a credible partner to ASEAN as well as for the ASCN.

16.Mandalay's challenging road to becoming a smart city. (2018, November 19). Retrieved February 2, 2019, from <https://www.mmtimes.com/news/mandalays-challenging-road-becoming-smart-city.html>

17.Maierbrugger, A., & Maierbrugger, A. (2019, January 14). Laos to get its first smart city. Retrieved February 2, 2019, from <http://investvine.com/laos-to-get-its-first-smart-city/>

18.The 66 S&T-lagging countries. (2017). Retrieved March 6, 2019, from <https://twas.org/66-countries>

19.Bangkok Post Public Company Limited. (2016, June 22). All that glitters in CLMV markets is not gold. Retrieved April 3, 2019, from <https://www.bangkokpost.com/opinion/opinion/1016629/all-that-glitters-in-clmv-markets-is-not-gold>

20.Future directions of Asean. (2018, November 18). Retrieved March 6, 2019, from <https://www.khmertimeskh.com/551725/future-directions-of-asean/>

21.Tech Wire Asia | 30 October, 2., Tech Wire Asia | 15 June, 2., Tech Wire Asia | 28 March, 2., 7 February, 2., 5 February, 2., 6 February, 2., & 4 February, 2. (2019, January 03). Should ASEAN partner with Japan to build its smart cities? Retrieved February 15, 2019, from <https://techwireasia.com/2019/01/should-the-asean-partner-with-japan-to-build-its-smart-cities/>



# PROBLEMS/SCOPE OF DEBATE

## Inadequate planning

Development plans of many countries still face the issue of inadequate planning and inefficiency. This obstacle is particularly salient for the less developed countries. For example, Mandalay in Myanmar is setting up GPS systems in rubbish trucks to monitor their routes. However, despite the GPS system having been installed into the rubbish trucks, the system fails to cover suburban areas; hence limiting outreach. Traffic lights are also often located in places where they are not needed<sup>22</sup>. Besides Myanmar, Cambodia's proposed master plan for Phnom Penh city also lacks detailed planning as only a general layout has been covered in the plan with few to no details for smaller areas. The plan has also proposed to fill the lakes and rivers which store rain water during wet seasons. With a growing urban population that may put more pressure on flooding<sup>23</sup>systems, such a move will leave the city more susceptible to flooding . Delegates should be warned how poor planning may render smart city plans ineffective, and consider solutions to facilitate this process.

## Digital protectionism

Digitalisation is needed for smart cities to be developed and built. However, in ASEAN, there are still some regulatory elements that restrict the digital economy within the region. With countries each possessing their own set of laws, digital development in ASEAN is limited. For example, Malaysia's Personal Data Protection Act 2010, which was enforced in 2013, compels data users to seek approval from authorities before moving personal data out of Malaysian territory to potentially within the ASEAN region and further<sup>24</sup> Vietnam, Philippines and Indonesia too practise digital protectionism, making it difficult for ASEAN countries to coordinate and develop smart city plans. The presence of intellectual property rights and inefficiencies in their enforcement may also be impeding innovation in the region. For instance, Thailand's Patent Act provides the framework for patent filing, cancellation, protection, and related matters. However, its patent registration system tends to encounter the issue of backlogs. Illustratively, as of May 2016, the Department of Intellectual Property possessed more than 38,000 pending applications. As a result, foreign stakeholders may have to wait for several years to get their patents registered, disrupting their plans to develop new products for the markets. Moreover, Thailand's and Vietnam's "takedown authorities" which have power to remove infringed content from online portals upon the rights holders' notification were reported to be inadequate<sup>25</sup>. These elements could discourage the development of Southeast-

22.Mandalay's challenging road to becoming a smart city. (n.d.). Retrieved March 7, 2019, from <https://www.mmtimes.com/news/mandalays-challenging-road-becoming-smart-city.html>

23.Vin, V. (2018, May 18). Long way to go before Cambodia gets a 'smart city'. Post Property, Phnom Penh Post. Retrieved April 4, 2019, from <https://www.phnompenhpost.com/post-property/long-way-go-cambodia-gets-smart-city>

24.S. Rajaratnam School of International Studies. (2018). Realising Smart Cities in ASEAN. Retrieved April 26, 2019, from <https://www.rsis.edu.sg/wp-content/uploads/2018/12/CO18211.pdf>

25.S. Rajaratnam School of International Studies. (2018). ADDRESSING DIGITAL PROTECTIONISM IN ASEAN: TOWARDS BETTER REGIONAL GOVERNANCE IN THE DIGITAL AGE. Retrieved April 26, 2019, from



# PROBLEMS/SCOPE OF DEBATE

Asian innovation firms as well development of new technologies, undermining future growth of the region's economy and thus the transition towards smart cities. The lack of a common set of laws in ASEAN makes it difficult countries to help one another and may discourage partnerships with foreign firms. Delegates should, however, remain astute in their choice of solutions and note the feasibility of their proposals in consideration of the reasons and stances of the various countries in even engaging in digital protectionism in the first place.

## **Lack of research infrastructure**

Research bases and centres play an important part in developing new technologies to build a sustainable smart city. Yet, due to the lack of resources and funds, there has been a lack of research bases in ASEAN. For example, due to a lack of funds previously, Laos only managed to open its first science and technology training centre in 2018 to build the capacity of scientists to contribute to the nation's development. However, this is still insufficient in supporting the growth of the industry as the economy continues to be relatively slow<sup>26</sup>. In modern Vietnam, the usage of old technologies also drags down on its economic growth<sup>27</sup>. Such lacking government spending and soft infrastructure skills is also increasing the disparity within ASEAN where there is a large digital divide beside the different ASEAN Member States. This digital divide refers to the economic and social inequality with regard to the accessibility of modern technologies and facilities, and may potentially slow down the transition towards smart cities in ASEAN by stunting innovation and technological progress.

## **Lack of public support**

Smart city technology is novel, and the public may not be familiar with the new technologies implemented. Additionally, in rural areas such as the CLMV countries, science and technology education is low. Citizens may thus experience difficulty in adapting and be averse towards the change. One such example is the usage of digital transactions such as payWave where physical cash is not needed during financial transactions. While the primary purpose of this innovation is to increase work efficiency, many elderly members of society struggle with the complex nature of these technologies that involve a significant learning gap. Therefore, measures are needed to increase the awareness on smart cities as well as learn to use these smart technologies.

There also exists a deficit of public trust in digitalisation. With cyber breaches happening worldwide on a regular basis, people are increasingly exposed to the vulnerability that is a concomitant of digitalisation. For example, a total of 1.5 million SingHealth patients' non-medical personal data was stolen, fuelling scepticism toward digitalisation. Another example includes the leakage of the personal details of around 220,000 Malaysian organ donors and their next-of-kin online since September 2016. Such incidents could prove disruptive in the transition towards smart cities as the public becomes wary of the government decisions on digitalisation. Therefore, on the issue of lack of public support for digitalisation, delegates should consider solutions to improve cybersecurity.

26.Laos opens 1st science, technology training center. (2018, February 06). Retrieved March 8, 2019, from [http://www.xinhuanet.com/english/2018-02/06/c\\_136953082.htm](http://www.xinhuanet.com/english/2018-02/06/c_136953082.htm)

27.VnExpress. (2016, October 6). In modern Vietnam, a high-tech economy is a future far away - VnExpress International. Retrieved March 8, 2019, from <https://e.vnexpress.net/news/business/in-modern-vietnam-a-high-tech-economy-is-a-future-far-away-3479103.html>



# PROBLEMS/SCOPE OF DEBATE

## **Collaborative framework for a clearer direction**

In order to prepare ASEAN for the transition towards smart cities, a cohesive and collaborative framework is needed to ease the carrying out of action plans in the future. The framework should include a clear direction of the transition towards smart cities as well as the various strategies and plans to be carried out. Despite the establishment of the ASCN, the platform may still be insufficient. While Singapore has laid the groundwork for ASEAN Member States to build their own city-specific ASCN plans, only a few member states have put forward specific locally-tailored initiatives<sup>28</sup>. Having a revised framework may be able to aid countries in their preparation and serve as a guideline for countries to refer to when planning their individual smart city action plans. The framework should emphasise the support of better living with technology as well as plans to improve the science and technology sector in terms of innovation.

## **Create more opportunities for less developed countries to develop the science and technology sector**

There exists a disparity between the developed and less developed countries in the science and technology sector. Having the less developed countries receive help in building up their science and technology industry may prove beneficial to ASEAN in the long run. More science education opportunities and government spending on honing soft infrastructure skills are thus needed to increase access to new technology, particularly in the case of the less developed countries. Delegates should consider the needs of less developed countries so that all ASEAN countries can all reach their goal of becoming a smart city instead of widening inequality.

## **Increase awareness and support for smart cities**

As mentioned previously, there is a lack of awareness on smart cities as well as support for digitalisation among the ASEAN citizens. There is thus a need for national education on the concept of smart cities. There should be more institutions and campaigns to promote the use of smart technology and educate citizens, especially those in rural areas. There should also better understanding on the problems posed by urbanisation and the need for smart cities. This could improve the attitudes and perceptions of consumers regarding smart cities as well as reduce current barriers to adopting smart city technologies such as cashless payments. The government should also strengthen the digital safety and security of the country. This could mean strengthening the IT sector of the country and learning from other countries. The government can also conduct national education to increase the public's knowledge on protecting their own personal particulars.

28.The ASEAN Smart Cities Network: Singapore's legacy as ASEAN chair. (n.d.). Retrieved February 11, 2019, from <https://www.aseantoday.com/2019/01/the-asean-smart-cities-network-singapores-legacy-as-asean-chair/>



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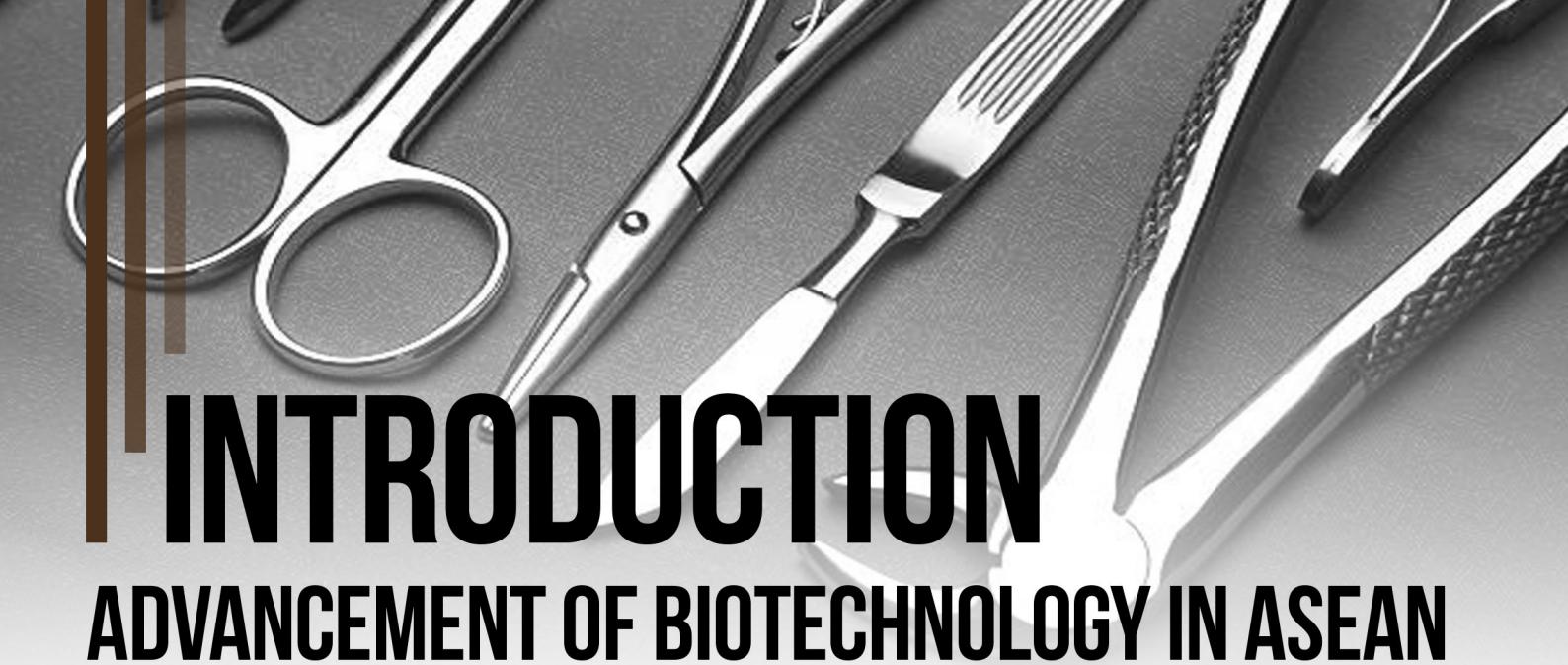


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# **INTRODUCTION**

## **ADVANCEMENT OF BIOTECHNOLOGY IN ASEAN**

Advancements in biotechnology is a key factor driving the socio-economic growth of some of Southeast Asia's countries. A strategic industry for some countries part of the Association of Southeast Asian Nations (ASEAN), ASEAN Member States mostly thrive in the following areas of biotechnology: agriculture in countries such as Cambodia, the Philippines and Thailand, biomedical and pharmaceutical sciences for Singapore and industrial manufacturing for Malaysia.

However, though ASEAN has potential in this field, its progress is currently stunted by its limitations in areas including research capacity, professional expertise as well as policies which emphasise the need to look into developing this field, so as to push for biotechnological advancements. Moreover, in Singapore<sup>1</sup>, Malaysia<sup>2</sup> and Thailand<sup>3</sup>, while these ASEAN Member States continue to lag behind global science and technology powerhouses such as Japan<sup>4</sup>, the United States of America as well as China<sup>5</sup>. Debates on bioethical issues are also a problem as controversial events have sparked debates as to whether certain scientific research should continue.

The advancement of science and technology is crucial to further the growth of ASEAN Member States in the field of biotechnology. The ASEAN Ministerial Meeting of Science and Technology (AMMST) presents a prime platform to initiate collaborative projects between Southeast Asian Countries. It can also be used to devise concrete solutions to help broaden countries' technological means and infrastructure that include the facilities and resources needed to boost the progress in biotechnology, and the policies that should be implemented with regard to biotechnology-related projects such as Genetically-Modified Organisms (GMOs) to ensure a smooth-sailing development in biotechnology in ASEAN countries.



# DEFINITIONS

## **Biotechnology**

Biotechnology<sup>6</sup> refers to the exploitation of biological processes for industrial and various other purposes, especially the genetic manipulation of microorganisms.

## **Genetically Modified Organisms**

Genetically modified organisms (GMOs) can be defined as organisms (i.e. plants, animals or microorganisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination.



# HISTORICAL PROGRESS

<b>1980</b>	<b>Establishment of ASEAN Ministerial Meeting on Science and Technology (AMMST)</b>  The ASEAN Ministerial Meeting on Science and Technology (AMMST) was established in 1980 and is held annually by the ASEAN Ministers of Science and Technology (S&T) to discuss the issues regarding the development of technology, issues regarding S&T and how to solve these issues. These meetings are held annually, alternating between formal and informal meetings.
<b>2004</b>	<b>Thailand's National Biotechnology Policy Framework 2004-2009<sup>7</sup></b>  This framework takes on the role of a catalyst, which is targeted at boosting industrial productivity and sustainability. This is part of the Board of Investment of Thailand (BOI)'s effort to maximise benefits for biotechnology investments. Besides BOI, other relevant local stakeholders including the Ministry of Industry, also devote resources to strengthening Thailand's biotechnology competitiveness. With this policy in place, many existing businesses have been rallied to incorporate biotechnology research and development into their work, providing an impetus for Thailand's biotechnology sector to grow and progress. The policy facilitates collaboration between the public and private sector, creating a business environment prompting investments to fund research, an increase in research personnel and personnel training, infrastructure and many more. This has pushed Thailand to become a strong and recognised advocate for the promotion of biotechnology alliances <sup>8</sup> .



# HISTORICAL PROGRESS

2005	<b>Launch of Malaysia's National Biotechnology Policy<sup>9</sup></b>
	<p>This policy is split into three phases, namely Capacity Building (2005-2010), Science to Business (2011-2015) and Global Business Development (2016-2020). The launch of this policy also marks the declaration of Malaysia's intentions to become a forerunner in biotechnology. The first two phases of the policy have been successfully completed, resulting in Malaysia becoming one of the leading biotech hubs in ASEAN. Since the establishment of the policy, the emphasis placed on Malaysia's biotechnology has led to tremendous economic growth and also presented itself with globalisation opportunities. This policy also highlights the agency of corporations such as BiotechCorp, a government agency that is now renamed Malaysian Bioeconomy Development Corporation<sup>10</sup>, in steering the country's biotechnology industry in the right direction. Today, Malaysia is gearing up for the final phase of this policy with its focus set on agriculture, healthcare and industrial manufacturing<sup>11</sup>.</p>
2014	<b>67th Meeting of the ASEAN Committee on Science and Technology (COST-67)<sup>12</sup></b> <p>The emphasis of this meeting was on the review of the ASEAN Plan of Action for Science, Technology and Innovation (APASTI) 2015-2020, which serves as the blueprint and implementation framework for the subsequent phase of ASEAN's science and technology efforts. The subcommittees under the ASEAN Committee on Science and Technology (COST) also discussed and presented updated reports on biotechnology. All these areas are of importance to the ASEAN region. Since the establishment of COST in 1978, it has provided a common ground for ASEAN representatives to gather and pinpoint any shared challenges faced by one another. This allows for the forging of collaboration in Research and Development.</p>



# HISTORICAL PROGRESS

**2014**

**11th Policy Roundtable on Building Capacities for Agricultural Competitiveness in Transition Southeast Asia<sup>13</sup>**

Policy makers and media practitioners from Cambodia, Laos, Myanmar, Vietnam (CLMV) as well as the Philippines, came together to discuss and receive updates regarding crop biotechnology. Emphasis of the discussion revolved around the theme of "Modern Biotechnology for Food Security in a climate change scenario and ASEAN integration". The discussion is relevant especially to CLMV countries whose biotechnology sector is reliant on agriculture<sup>14</sup>. This roundtable discussion hence provides a common platform for representatives to share and initiate collaborative projects that would assist these CLMV countries in improving their various limitations and alleviate some of the challenges faced, such as low crop yield, in the pursuit of biotechnology.

**2015**

**The Action Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025 (AMMST-16)<sup>15</sup>**

The conference was held in Vientiane, Lao PDR. This action plan was endorsed by the ASEAN Ministers for S&T in order to achieve better coordination and cooperation to strengthen the capabilities of Science, Technology and Innovation (STI) in ASEAN. The plan provides the possible measures to take, from the transformation from past APASTI 2007-2015 to APASTI 2016-2025. It also outlined the direction of COST when it comes to implementing programmes and activities focusing on public-private collaboration, talent mobility , support for companies and industries in the S&T sector, and public awareness of the importance of S&T Research and Development (R&D). The increase of talent mobility<sup>16</sup> allows the relevant biotechnology R&D stakeholders to alleviate the impacts of manpower shortage by maximizing the professionals at hand. Furthermore, this action plan also included a concise work plan<sup>17</sup> for biotechnology, which breaks down into the various aspects of biotechnology that requires focusing on, so as to guide the relevant stakeholders on the future course of actions.



# HISTORICAL PROGRESS

**2017**

## **17th ASEAN Ministerial Meeting on Science and Technology (AMMST-17)<sup>18</sup>**

Ministers who attended this meeting have highlighted the importance of supporting local ministries of micro, small and medium enterprises (MSMEs) through initiatives that facilitate technology transfer, diffusion, adoption and adaption. These initiatives are targeted at ensuring inclusive and equitable growth, which is one step forward towards realising the potential of S&T in ASEAN. In addition, they came to a consensus to further look into the development of policies targeted at assisting technology start-up, which is fundamental in progressing towards a S&T power hub. Ministers in this meeting also agreed to look further into realistic themes of research to enhance social development, with a USD 1 million pledge from Indonesia, Singapore and Malaysia respectively.

**2019**

## **Cancer immunotherapy biotech Tessa Therapeutics (Singapore) reaches significant milestone<sup>19</sup>**

The company's key cancer therapy tests drugs on patients to review the therapy's efficacy, effectiveness and safety. Their currently most advanced product is the TT10. While none of their programmes are currently offered for sale just yet, this is a huge milestone in the biomedical sector in ASEAN as the research on finding a way to combat tumours is finally showing results.



# KEY STAKEHOLDERS

## Republic of Singapore<sup>20</sup>

The biotechnology sector in Singapore is widely regarded as one of the most advanced among ASEAN Member States. Singapore is currently looking at developing a biotech hub focused on pharmaceuticals<sup>21</sup>. Singapore's flourishing research ecosystem has played an instrumental role in attracting pharmaceutical and biotechnology firms to Singapore. These firms serve patients across Asia. Singapore's biotechnology industry is backed by strong government financial support, the presence of multinational companies such as ASLAN Pharmaceuticals<sup>22</sup>, world-class infrastructure, firm regulatory policies and free-trade areas (FTAs) which are regions where two or more countries have signed a free trade agreement, and invoke little or no price control in the form of tariffs or quotas between each other<sup>23</sup>.

## Republic of Malaysia<sup>24</sup>

Malaysia is one of the ASEAN countries deemed to contribute relatively highly to the world's Science and Technology, after Singapore. Internationally, Malaysia is ranked fourth for Biotechnology Support Enterprise in the Scientific American Report and second in ASEAN for intellectual property collection and protection in the IMD World Competitiveness Index Yearbook. The leading biotechnological company in Malaysia, the Biotechnology Corporation (BiotechCorp), celebrates the opening of its first office in San Francisco in June of 2015. This is to provide assistance to American companies that are keen on establishing a regional hub in Southeast Asia. The connection with BiotechCorp is hence crucial as it bridges Malaysia and possibly the rest of neighbouring ASEAN countries to western corporations which adopt even more technologically advanced equipment and methods. In addition, as the Corporation takes on its new reformed identity, its role in Malaysian's biotechnology field is significantly larger. The exercise was launched by Malaysian Minister of Science, Innovation and Technology. The agency is now fully responsible for uplifting and upholding Malaysia's bio-economy agenda. As such, it is possible to see a collaboration between individual companies and their respective governments work together to enhance progress in biotechnology. The magnitude of the impact of individual companies is not to be underestimated.



# KEY STAKEHOLDERS

## Kingdom of Thailand<sup>25</sup>

Alongside Malaysia, Thailand is also one of the ASEAN countries deemed to be contribute relatively highly to the world's Science and Technology. The creation of the National Centre for Genetic Engineering and Biotechnology (BIOTEC) in 1983 laid the basis for the flourishing Biotechnology industry in Thailand. Today, there are an estimated 200 biotechnology firms in Thailand with a total market value of US \$2 billion. The existence of collaboration between universities and the industry, as well as robust and supportive governmental policies, allowed for the success of biotechnological companies. Thailand has also associated science with business<sup>26</sup>; and is thus able to deliver biotechnological research and innovation, applicable to the industrial sector. After the identification of biotechnology being crucial to the growth of Thailand's economy, this has shaped their national policy to one that aims to foster collaboration between public and private sectors, so as to create a conducive business environment that stimulates the inflow of investments. Over 80 businesses have incorporated biotechnology research and development in their work processes, which highlights the corporation support of biotechnology in Thailand. As such, countries who are looking forward to developing their biotechnological sector can design a similar structure which would enhance the effectiveness of research and developments.



# KEY STAKEHOLDERS

## **Kingdom of Cambodia, Lao People's Democratic Republic, Republic of the Union of Myanmar and Socialist Republic of Vietnam (CLMV Countries)**

Foreign direct investments (FDI) rose to an all-time high of \$137 billion USD in 2017. In particular, the combined FDI flow to CLMV countries reached a record level with a 21 percent increase; hence accounting for 17 percent of total FDI flow<sup>27</sup> to ASEAN countries. Vietnam became the third largest recipient, receiving over 60 percent of CLMV FDI flow. Chinese companies are the largest investors in Laos whereas ASEAN countries are the largest investors in Myanmar. As for Vietnam, Vietnamese main investors include ASEAN countries, Japan as well as the Republic of Korea. Evidently, CLMV countries are reliant on foreign investments to sustain their economy.

CLMV countries face economic and technical limitations, hindering their productivity in agriculture, which is one of the key industries crucial to CLMV's economic progress. For instance, in the last 15 years, Cambodia's agricultural sector<sup>28</sup> has seen commendable growth as a result of new policies and programmes in place. However, Cambodia today still suffers significantly from underinvestment in irrigation, economic services and many more. In addition, farming areas in CLMV countries are relatively small in general, preventing a larger crop yield that limits their ability to maximise profits and cost-saving means. Access to technology, including biotechnology, which is crucial to developing new crop variety, is also limited in CLMV countries.



# KEY STAKEHOLDERS

## Kingdom of Japan

Japan has been cooperating with many of the ASEAN countries to improve on the research of Science and Technology. Japanese companies have not only expanded their businesses in ASEAN countries such as Thailand, Vietnam, and Indonesia – countries which have had a close relationship with Japan – but also in Myanmar, Cambodia and Laos. This has helped increase the economic growth in the countries mentioned. In addition, the establishment of Japan-ASEAN Science, Technology and Innovation Platform (JASTIP)<sup>29</sup> expects to promote research and capacity building, initiate dialogues of relevant stakeholders and create a platform for collaboration regarding science, technology and innovation. The Japan Science and Technology Agency (JST) operates the Japan-Asia Youth Exchange Program in Science (nicknamed the SAKURA Exchange Program in Science, or SAKURA Science Plan<sup>30</sup> ), which invites outstanding young students and professionals from Asian countries on a short trip to Japan. The trip is filled with activities to allow these participants to experience the advanced scientific technology of Japan. The exchanges between universities and research institutions also connect Japan and its partner countries for personnel and research exchanges.

## People's Republic of China<sup>31</sup>

The Chinese biotechnology industry is heavily centred on agriculture, pharmaceuticals and natural products. China is open to opportunities for foreign investment, strategic partnerships and relationships in medical devices, functional foods, agricultural biotechnology, food and food manufacturing, veterinary and farming, and environmental protection. Today, there exists already 15 years of ASEAN-China strategic partnership which have contributed significantly to regional peace, stability and prosperity, and expanded the broad cooperation agenda. Continuing so, both ASEAN and China are expected to seize opportunities to deepen collaborative efforts on this front.



# KEY STAKEHOLDERS

## The United States of America

The implementation of ASEAN-US Science and Technology Fellows Program, a fellowship program catered to ASEAN scientists to further enhance their knowledge<sup>32</sup>, was discussed in AMMST. As one of the leading countries in biotechnology, a partnership between the USA and ASEAN may be the key to developing this industry in ASEAN countries further. The establishment of the fellowship program is supported by ASEAN, the United States Agency for International Development and the US Government, offering exclusive career opportunities to selected fellows. This program is also modelled after the successful American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellowship® Program, allowing early-mid career scientists to contribute their knowledge and analytical abilities to their governments. Having qualified personnel to undergo specialised training, they would be the rightful leaders in their respective countries to bring their countries to yet another higher level, in the fields of science and technology. This would be crucial to counter the problem on the lack of research capacity due to limited biotechnology professionals.

# PROBLEMS/SCOPE OF DEBATE

## Lack of Research Capacity

There is a paucity of governmental support for the development of the private sector in some countries, especially the CLMV countries. Funding allocated to the sector in these countries is generally low compared to that in leading biotech hubs in the region, such as Japan and South Korea. This is a significant hurdle to the advancement of biotechnology due to the costly nature of scientific research. In addition, funding is directed primarily at public research institutes. This may slow down the pace of growth as public research usually moves at a slower pace than private research<sup>33</sup>. This is attributed to a host of factors, including tight competition among private firms which spurs innovation.

This problem is illustrated by the case study of Vietnam, where research and development expenditure as a percentage of GDP was relatively low at 0.21% in 2011<sup>34</sup>. In addition, the bulk of this funding (60%) was channelled to government research institutes, leaving only 40% for the private sector<sup>35</sup>. The relative lack of support for private research efforts is mirrored in Indonesia, where gross expenditure on research and development as a percentage of GDP was 0.085% in 2013<sup>36</sup>. 70-80% of government funding for research and development is channelled to the public sector<sup>37</sup>, indicating that participation from private companies might be limited. Private companies conduct little to no research. Instead, firms usually purchase completed research outcomes. In contrast, in Japan, only 16.4% of government expenditure is spent on scientific research and development<sup>38</sup>. Delegates should thus consider implementing programmes to provide more support for firms and deepen public-private cooperation. This would go a long way in heightening the dynamism of the industry.



# PROBLEMS/SCOPE OF DEBATE

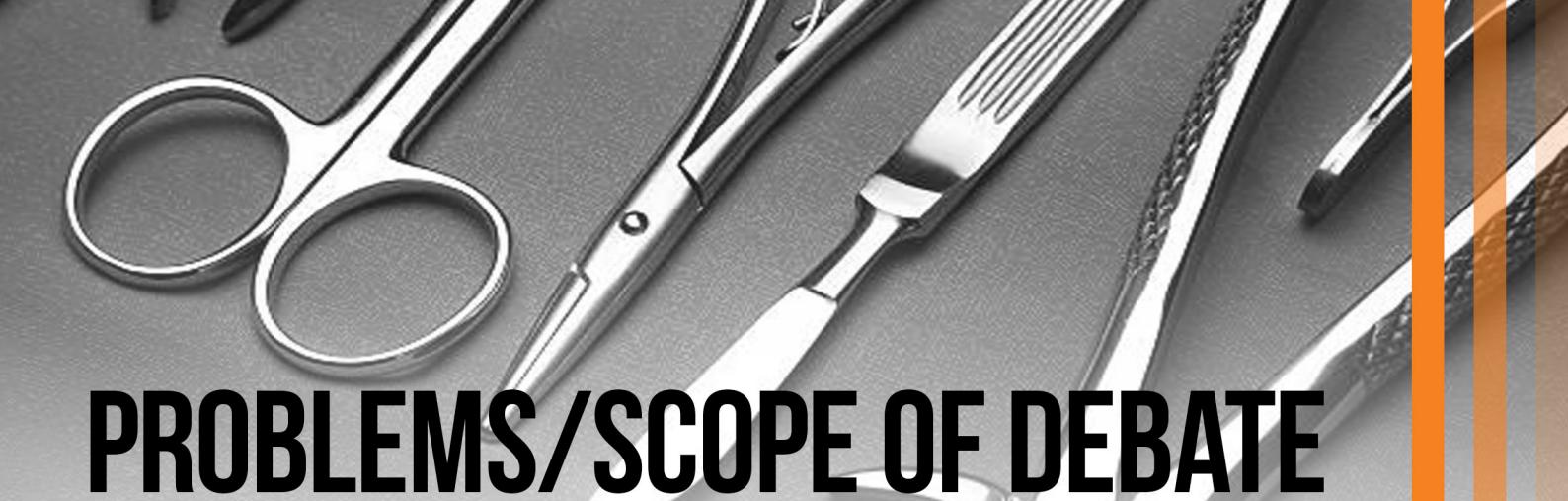
## **Insufficient development of human resources**

Human resource development is absolutely critical for biotechnological research. However, current efforts to attract citizens to pursue a career in this industry are proving to be insufficient. This is exemplified by Malaysia, where the Ministry of Education aims to achieve a 60% enrolment in the science and technology stream in upper secondary school. Nevertheless, as of 2017, enrolment in this stream remains at 46%<sup>39</sup>. Furthermore, there is a significant disparity between countries' performances in international education assessments. For instance, in the Trends in International Mathematics and Science Study (TIMSS), Indonesia scored 397 in Science at Fourth Grade, while Singapore scored 590<sup>40</sup>. Therefore, education systems may need revamping in some countries so as to develop the human capital necessary for a strong biotechnological sector.

## **Lack of Legislative Framework towards Genome Editing**

Genome editing, which is also known as gene editing, is a type of technology that allows scientists to change an organism's DNA. The technology allows genetic material to be added, removed or altered at particular locations in the genome<sup>41</sup>. It can also be applied to a wide range of fields such as the improvement of breeds, and treatment for incurable or genetic diseases.

While genome-editing is considered a fairly new technology in ASEAN and is not a hot topic in Southeast Asia, it could still potentially pose problems in the future without any regulation. This is especially if ASEAN is able to overcome the lack of research capacity in the future. One example would be the highly controversial case in China, in which a scientist named He Jiankui claimed that he had edited the genes of twin baby girls in order to make them HIV-resistant. This resulted in him receiving global backlash, sparking debate as to where the scientific community and governments have to draw the line when it comes to pushing the boundaries of the genetic sciences<sup>42</sup>.



# PROBLEMS/SCOPE OF DEBATE

Other possible dangers of insufficient and weak regulations towards genome editing include the consequences of consuming genetically-modified (GM) products. For example, in Malaysia, the Department of Biosafety in the Ministry of Natural Resources and Environment has approved eight GM maize/corn products and six GM soybean products for food, feed and processing purposes. Approval has also been given to test GM technology on mosquitoes, papayas and fertilisers. These products have different traits such as insect resistance and herbicide tolerance. However, despite the concerns raised by civil society groups which have cited supporting scientific evidence on the risks of consuming GM products, the authorities have not addressed them. The Consumer's Association of Penang (CAP), along with Sahabat Alam Malaysia (SAM, Friends of the Earth Malaysia), have consistently challenged the basis of the approval of GM Organisms (GMOs) and have also highlighted related health, environmental, social, ethical and cultural risks<sup>43</sup>.

The development of biotechnology has also raised many societal concerns regarding the environment and the natural ecosystem, for there has been research suggesting that the application of biotechnology could lead to a change in the ecosystem; and hence the destruction of natural habitats<sup>44</sup>. It is recognised that crops with genetic information from other organisms transferred into their DNA could have harmful, unique risks to the environment. These include toxicity and gene transfer, which is the insertion of unrelated genetic information into other organisms in the form of DNA, over and above those posed by conventionally bred plants. This, combined with man's current ability to design crops with specific traits to suit the needs of human beings, could catalyse land-use changes that could have negative impacts on biodiversity<sup>45</sup>.



# PROBLEMS/SCOPE OF DEBATE

Studies have shown that genetic-modification techniques used widely to make crops herbicide-resistant can be transferred to weeds, and the findings have shown that the effects of such modifications have the potential to extend beyond farms and into the wild<sup>46</sup>. This is highly important because many countries in ASEAN still depend on farming and agriculture for revenue, and some of these countries, especially the countries which highly rely on agriculture such as the CLMV countries and the Philippines, have implemented genetically-modification on their crops. These countries include the Philippines which has 800,000 hectares of GM corn under cultivation, and Myanmar which has 300,000 hectares of GM cotton<sup>47</sup>. Hence, there is a possibility of the genetic diversity of wildlife plants being threatened as the genotype with the herbicide-resistant gene could outcompete the original normal species, putting floral wildlife in these countries under threat.

While this may not a pressing issue just yet, the lack of regulation towards genome editing means that there are still unclear boundaries that should be set up and made clear such that the applications of gene editing can be restricted to only certain cases, and ensure that the issues of GMOs listed above will have lower chances of happening.



# POTENTIAL SOLUTIONS

## **Encourage and facilitate the collaboration of ASEAN countries to share technological discoveries and research information**

Collective information can help reduce the time spent on experiments and research, by giving countries a head-start. However, this solution would only be feasible under conditions such as fair information trade. This is so as to protect the works done by various professionals from different countries. This is also in line with several identified aims<sup>48</sup> of the establishment of ASEAN, one of which includes the provision of assistance to one another through means of advocating training and research facilities in the educational, professional, technical and administrative spheres. Also set out in the ASEAN Declaration would be the desire for effective collaboration between ASEAN countries for greater utilisation of their agriculture and industries, the expansion of trade and the improved transportation and communication facilities.

## **Allocating funding for research and developmental purposes more efficiently**

When resources are limited and the budget allocation to researching and improving on the current biotechnology for each ASEAN country is currently unknown, a method is needed in order to allocate budgets to the projects in the most effective way possible. It should be noted that the funds collected by the different governments for the Science and Technology industries will have to be split up to different companies and organisations in order to develop the current stage of biotechnology. The main problem is that usually, these private companies and organisations only consider the benefits to their companies when they decide on how much to invest. Hence, a way to allocate a fixed budget among several activities to maximise the expected benefits obtained from the projects may be necessary. Delegates will need to decide which types of biotechnology projects should be researched on, and which types are more necessary to ASEAN countries as compared to others. For example, in Malaysia, funding for biotechnology has been split into the following sections: ScienceFund, TechnoFund and InnoFund<sup>49</sup>. Identification of the different smaller areas which require funding can better scope the allocation of funds to different research and development sectors.



# POTENTIAL SOLUTIONS

## **Cost-sharing**

Cost-sharing is a process in which two or more parties work together in order to secure savings that otherwise one would not be able to obtain alone. Partnerships as such are usually pursued in order to achieve any number of business objectives such as access and development of technology, and cost-saving is usually a central component of these arrangements. Cost-sharing helps to reduce expenses in purchasing cost; hence allowing parties who will not be able to pay for the resources needed on their own to be able to afford them now.

It is difficult for individual countries of ASEAN to afford the funds needed to develop the technology needed to boost research on biotechnology; hence funds would have to be borrowed. However, funds from external parties will be more difficult to obtain. Hence, the member countries of ASEAN can consider sharing the costs as one of the main modalities in order to support the cooperation of biotechnology in the future.

## **Investment from private businesses and organisations**

Indonesia relies heavily on the participation of private businesses to be able to achieve its success in biotechnology today<sup>50</sup>. Considering that biotechnology is a new emerging technology, investing in this field comes with high-risks and is only made possible under the supervision of experienced private entrepreneurs and managers. This can be a possible solution which other countries can adopt, in order to further their progress in biotechnology. Countries can consider getting private businesses increasingly involved in the field to channel private funding towards biotechnological research and development. This is such that the industry is not limited by governmental funding, a major issue concerning Laos<sup>51</sup>. However, delegates should consider the willingness and likelihood of private companies investing in a relatively newer field, with not much a guarantee of success, and the implications of such a strategy.



# KEY GUIDING QUESTIONS

1. Which industries in ASEAN will benefit from the development of biotechnology? In what order should relevant issues be tackled?
2. What are the roles that international science and technological powerhouses can play with regards to the topic? What are some ways they can help resolve the issue and what are the pros and cons of the suggested solution(s)?



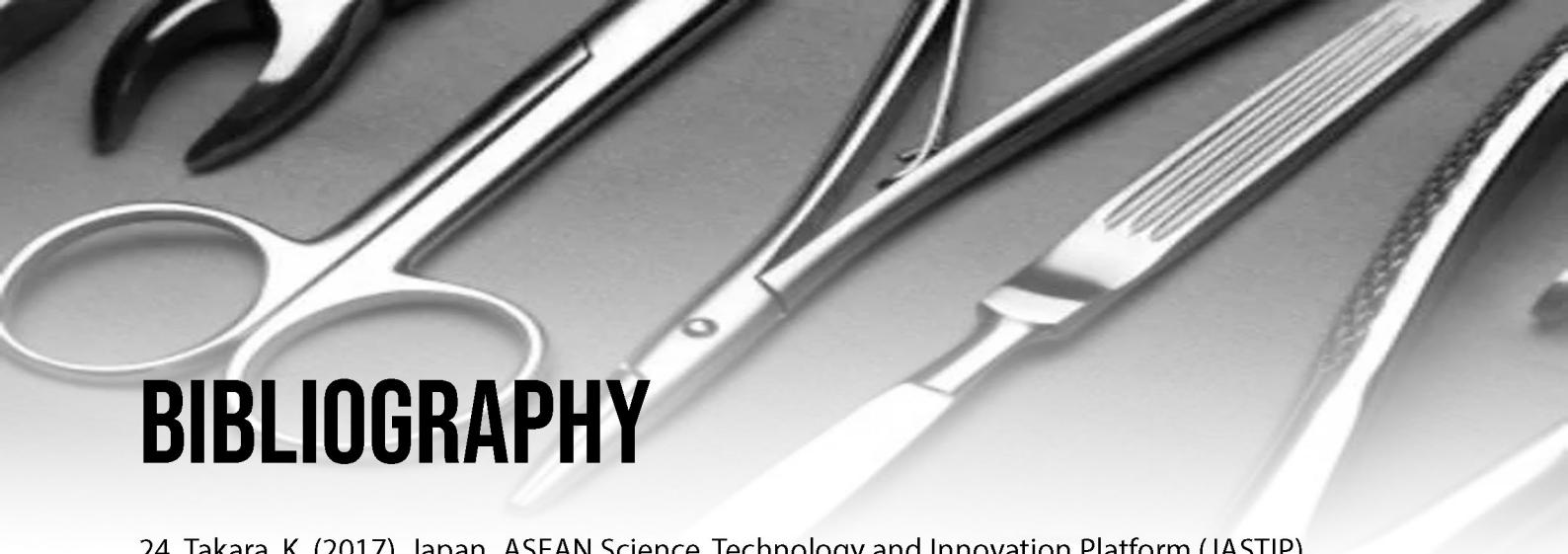
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