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ABSTRACT

This paper explores the impact of the Fourth Industrial Revolution (4IR) on the Association of Southeast Asian Nations (ASEAN). It argues that technologies of the 4IR can bring huge benefits such as empowerment for small and medium sized enterprises and opportunities for countries to leapfrog traditional pathways of development. It will also bring tremendous challenges, such as deep disruption to labor markets and the potential of rising inequality. To address the challenges and seize the opportunities of the 4IR, ASEAN will need a new way of formulating policy and regulation that will require: (i) evolution of the ASEAN Secretariat to become a "platform organization"; (ii) greater delegation of key activities to affiliated functional bodies; (iii) a shift from long-term blueprints to three year rolling plans; (iv) democratize and decentralize; and (v)establish multi-country test beds.

Keywords: Fourth Industrial Revolution, ASEAN; Digital economy; Regional economic integration.

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The Fourth Industrial Revolution and its Implications for Regional Economic Integration in ASEAN

1. INTRODUCTION

Over the past 50 years, ASEAN has notched up many notable successes (see, for instance, Koh *et al.,* 2017; Mahbubani and Sg, 2017*).* At the core of this community lies a unique approach to regional governance and cooperation. The so-called "ASEAN Way" is a commitment to the protection of national sovereignty, to non-interference in the domestic matters of fellow countries and to making decisions based on consensus-building. Alongside the ASEAN Way, member nations have also pursued a policy of "open regionalism" that has served as a catalyst for wider cohesion across the Asia Pacific.

The ASEAN peace dividend, combined with trade and other reforms within the bloc, has stimulated strong economic growth. In the past decade, regional GDP has doubled from US$1.3 trillion (2007) to US$2.6 trillion (2016). The incidence of poverty has fallen dramatically, and prosperity looks set to keep rising: the population with an income of more than US$5,000 is estimated to grow from 300 million in 2015 to 400 million in 2020, making ASEAN one of the world's most important emerging consumer markets (Kobayashi et al., 2017).

The success of ASEAN has allowed the organization to evolve and expand its mandate beyond regional security. In 2015 ASEAN established the ASEAN Economic Community (AEC) which ushered in a bold agenda for enhanced economic integration.

But alongside its many successes, ASEAN faces considerable challenges, from rising inequality, to rapid urbanization and the effects of climate change. One of the most momentous challenges will come from the spread of the Fourth Industrial Revolution (4IR).

The 4IR is the fusion of technologies across physical, digital and biological realms, which is transforming our way of life. "Disruptive technologies" such as artificial intelligence, robotics, blockchain and 3D printing are transforming social, economic and political systems, often in unpredictable ways. The changes are revolutionary not only due to the breadth of the sectors

impacted, but also due to the speed. New technologies are emerging faster and being adopted more quickly. Fixed line telephones took 75 years to reach 100 million users.

The transformative impact of the 4IR will demand that countries think deeply about their policies and priorities at a national scale. Many ASEAN governments are aware of this need and have launched national responses such as Thailand 4.0 and Singapore's Smart Nation initiative.

Importantly, however, some of the greatest impacts of the 4IR will play out not at a national scale, but at the regional scale. The nature of cross-border relations and economic interaction will be revolutionized. It will not be enough to think only about a national response. In the years ahead, regional organizations like ASEAN will be called upon ever more heavily to help steer and shape these historic transformations. And yet, given the accelerating speed and breadth of technological change, shaping regional policy is growing ever harder. It means that ASEAN and organizations like it will need to re-imagine and re-design the way they manage regional governance.

While acknowledging the huge success of ASEAN over the past 50 years, this paper looks to the future. It considers what impact that the 4IR will have on the region and how ASEAN can continue to thrive. Some of the key questions include: What opportunities and challenges does the 4IR present for the nations of ASEAN? What role should regional cooperation play in capturing the opportunities and addressing the challenges? How should regional organizations, such as the ASEAN Secretariat, respond to the changing landscape that the 4IR brings? What suggestions should the leaders of ASEAN consider for reforming their regional organization to be as effective as possible in this new era?

The paper is organized in 7 sections. Section 2 and 3 take a broad look at the opportunities and challenges that the 4IR poses for ASEAN's member countries. In Section 4, the role that regional cooperation can play in addressing these opportunities and challenges is considered. Section 5 argues that, in addition to deeper regional cooperation, ASEAN leaders must also adopt a new approach to organizing their regional cooperation and governance. Section 6 sets out key ideas for ASEAN leaders to consider on how the ASEAN organization could evolve to address the 4IR. A final section concludes.

2. WHAT ARE THE KEY OPPORTUNITIES?

The countries of ASEAN are politically, economically and socially diverse. However, the 4IR will bring many common opportunities and challenges.

The 4IR has the potential to significantly increase the wealth of ASEAN countries. Increased productivity from "disruptive technologies" could unleash an additional US$220 billion to US$625 billion in annual economic impact in ASEAN by 2030 (ASEAN Secretariat, 2016). It will also provide huge value for individuals not captured by traditional measures. One hundred years ago, not even the richest person in the world could buy a TV, an air ticket, contact lenses, or antibiotics. Today, these things are within the reach of ever more people. The 4IR will massively expand consumer choice, lower costs and raise quality, all of which will be equally hard to value.

It can also be a powerful force for economic inclusion. 4IR technologies will create new ways for citizens to connect to each other, to trade with each other, and to access services that are currently not available. In Viet Nam, the Philippines and Myanmar, a third or less of the population have a bank account.[i] Under the 4IR, citizens will gain access to new sources of information, such as high-frequency news and market prices, that can materially affect incomes and welfare (see, for instance, the case study of fishermen using mobile phone in South India by Jensen, 2007). It can also enable new forms of education (such as online courses and virtual classrooms), new healthcare (for example telemedicine powered by smartphones linked to diagnostic pills), and new financial services. The result could be much more inclusive forms of economic growth.

As the 4IR promotes greater automation and digitization of customs and other public administration processes and procedures, the opportunities for corruption and rent-seeking activities will be reduced. While it cannot eliminate corruption, it can reduce the extent to which there is direct contact between public officials and private business operators, making rent-seeking activities more difficult to pursue. The most efficient and fair way of recruiting personnel, whether public or private, would be to advertise the vacancies online, enabling full transparency, and reducing, if not removing, the potential for bribery and other means of distorting the selection process. Not only will public accountability be enhanced, deadweight losses associated with corruption and other distortions induced by it will be reduced. The

collection of government taxes and other revenues should increase as a result, improving public finances.

The 4IR could also empower small and medium enterprises (SMEs). SMEs are the backbone of ASEAN economies. Between 89% and 99% of enterprises within ASEAN are SMEs and they provide between 52% to 97% of employment in member states. They can also be an important source of innovation. But many SMEs are limited in their ability to grow because of lack of access to finance, business services and information, and constrained access to markets beyond their immediate neighborhood. However, the rise of digital marketplaces and online services can empower SMEs to trade in ways unimaginable even a few years ago, connecting them to giant regional markets rather than just local customers. Technologies such as blockchain will revolutionize payments and logistics, enabling small firms to interact on a trusted basis despite never having met each other. The 4IR thus promises to unleash a world of micro-transactions.

Technologies of the 4IR will create the opportunity for developing countries to leapfrog, bypassing traditional phases of industrial development. Mobile phones, for example, have already reduced the need for countries to lay expensive fixed landlines. Online and mobile banking is reducing the need to build networks of physical bank branches. While the infrastructure needs of ASEAN going forward will remain formidable, new technologies will impact country priorities for infrastructure investments. Localized renewable energy production, such as solar power coupled with new battery storage technology, could reduce the need for investing in expensive power distribution networks. Drones could help to deliver light-weight high-value goods such as medical supplies to remote regions with poor transport infrastructure. While drones will not remove the need to build roads for the transport of heavy goods and people, they do offer the opportunity to design transport infrastructure in new ways and to reduce the need for “last-mile” road connectivity.

It can also help with connecting the unconnected. Some ASEAN nations, notably Indonesia, the Philippines and Malaysia, are archipelagic, and physical connectivity has long been a concern for economic development. Equally, some ASEAN countries have large rural populations in remote areas that have yet to benefit from the technologies of the first and second industrial revolutions. In Cambodia and Myanmar, only around half of the population has access

to electricity.[ii] The 4IR offers new possibilities for developing distributed structures for services that can overcome geographical limitations. For example, new renewable energy technologies that are generated locally rather than in centralized power plants, can link people to electricity. 3D printing will enable people to manufacture products at small scale as required, subject to the availability of raw materials, right next to where they are needed, and so overcome resistance by distributors to serve remote regions. Drone delivery also offers an opportunity to provide improved access to vital supplies, such as vaccines, for remote areas. Given the high cost of moving goods around archipelagic nations, automated aerial logistics may be particularly advantageous in the ASEAN context.

It can also be used to fight congestion on roads and reduce traffic related fatalities. In Southeast Asia, 316,000 people die every year from traffic accidents. The Japanese International Cooperation Agency (2014) estimates that the Philippines will lose P6 billion every day by 2030 if worsening traffic congestion is not resolved and this is a familiar story across the region. The 4IR offers a number of solutions. At a simple level, crowdsourcing of traffic conditions, whereby road users provide updates, are already providing solutions to ease congested roads. More significantly, self-driving vehicles offer the potential to increase safety and security on the roads, subject to proper testing and regulations. “Smart” urban transport systems that combine multiple technologies and integrate them into a connected system, will provide more efficient options for getting around cities, and for reducing road deaths, congestion and pollution.

It can also be employed to improve the way we manage the environment. Recent calculations suggest that 40% of the land in six ASEAN countries is suffering from “severe or very severe” human-induced degradation (Anbumozhi and Intal, 2015). With economic growth projected to grow at 8% a year for the next six years (IMF dollar terms projections), pressure on the environment will increase substantially. Artificial intelligence, drones and remote sensing offer opportunities to monitor fisheries and forestry activities much more effectively. Irrigation systems can be automated and blockchain can be used to manage water allocations.

The 4IR also has the potential to transform agriculture. Many ASEAN countries have large agricultural sectors, and the 4IR could impact farming positively. In the short term, the impact of connecting farmers to the internet has already brought well-documented improvements to farmer productivity, profitability and sustainability. Smartphones give farmers better access to market

prices, weather information, and knowledge about soil, seeds and fertiliser. Smartphones may also enable a "sharing economy" to take hold, whereby farmers who can't afford to buy mechanical equipment can rent it by the hour from other farmers by accessing online sharing sites. In India, Mahindra & Mahindra, an equipment maker, has set up a platform of this type called *Trringo*.

The 4IR could improve the traceability of products, reduce logistics costs and overcome constraints of agricultural finance by enabling suppliers to use new credit scoring technologies. In the longer term, as farming is primarily a biological process, new technology will enable the easier creation of elite genetic material (seeds, plants, and livestock) and the increasing usage of microbiology in farming systems.

Even healthcare is likely to benefit from the 4IR. It will enable new business models for delivering health services (such as telemedicine) but, more fundamentally, the 4IR will also enable doctors to collect and understand genetic, environmental and behavioral data on their patients. This will enable the identification of preventative actions, treatments or cures that are increasingly tailored to a specific individual or community (rather than using medicines that are "one size fits all"). Sometimes referred to as "precision medicine", this will not only improve medical treatment, but also potentially reduce the costs of providing health services by reducing money spent on inappropriate medicines.

Finally, the 4IR will facilitate upgrading of disaster preparedness. Southeast Asia is particularly vulnerable to the impact of climate change given the continued reliance on agriculture by much of the population, heavily populated coastlines, and continued incidence of poverty. However, the region has huge potential to contribute to climate change mitigation. Blockchain technologies allow for cost-effective and transparent carbon emissions tracking and the establishment of carbon markets such as the one being established in People's Republic of China (PRC).[iii] Equally, 4IR technologies can provide new ways of preparing for disasters and delivering aid to the worst affected regions.

3. WHAT ARE THE KEY CHALLENGES?

It is clear that 4IR will be disruptive to labor markets. Artificial intelligence and robotics are rapidly increasing the jobs that machines can perform better and faster than people. While this may reduce costs and raise productivity, it will also threaten jobs, at least in the short-term as workers are reskilled. Workers in low-skilled repetitive jobs such as assembly line workers are most at risk, but it will increasingly impact middle-skilled jobs (i.e. back office, data processing). The International Labor Organization estimates that 56% of jobs in five ASEAN countries (Cambodia, Indonesia, Viet Nam, Thailand, and the Philippines are at high risk of automation in the next few decades (Chang and Huynh, 2016). This scale of job losses may well not occur. Research by OECD (2016) shows that when the individual tasks in jobs are considered, only 9% of jobs in OECD countries are at risk of displacement. The logic applies in ASEAN too. Nevertheless, industries will be impacted differently leading to huge labor market churning and requiring rapid re-skilling of workers to move into new industries. At the same time workforce in ASEAN is forecast to grow by 11,000 new workers every day for the next 15 years.[iv] Retraining and skills development may cushion the impact of automation, but they will not prevent deep disruption.

The 4IR is likely to add to inequality, both between and within countries. Economic convergence between ASEAN's developed and less-developed economies has shown promising trends in the past two decades. In 1997, Singapore's GDP was 57 times that of Lao PDR. In 2016 this had been reduced to less than 19 times.[v] However, this promising trend has been accompanied by growing inequality within countries. The impact of the 4IR has the potential to accelerate returns to talent and knowledge. This could slow down – or even reverse – convergence between countries and would widen inequality within countries. Non-inclusive growth has the potential to increase social and political instability within countries and undermine popular support – and indeed trust – in greater regional integration.

Could the 4IR mark the end of 'Factory Asia'? Industrialization within many Asian countries has been based on the supply of relatively low-cost and low-skilled labor attracting foreign investment. But artificial intelligence and robotics will decrease the competitiveness of low-cost and low-skilled labor. Equally, 3D printing will transform the nature of manufacturing. Today, many goods are made at centralized locations operating at scale and producing

standardized products. In future, 3D printing may mean that products are produced locally, next to demand, on a highly customized basis. For example, Caterpillar and John Deere, two American producers of construction and agricultural equipment, are already effectively moving their warehouses to an online cloud. Digital designs are downloaded to different locations and printed to order. This could lead to the reshoring of production in many industries back to high labor-cost countries, and reduce the attractiveness of foreign investment in ASEAN's manufacturing industries. Rapid movement towards knowledge-based economies will be required for ASEAN to remain competitive.

There is also concern that the 4IR could lead to further concentration of market power by large global firms. While the 4IR has the potential to be empowering for ASEAN's SMEs, it may create difficulties for larger ASEAN businesses. This is especially true for "platform businesses" – the types of company that require scale to be competitive, such as banks, and online marketplaces. Under the 4IR, the spread of digital networks means that the economics of platform businesses no longer experience diminishing returns to scale. Adding an additional customer (or user) has almost zero marginal cost and instead delivers ever greater value through the impact of network effects. This phenomenon is already well documented. For example, globally, Google currently controls 90% of search advertising, Facebook controls 77% of mobile social traffic and Amazon has 75% of the e-book market. While platform businesses are empowering for their users, they make the emergence of ASEAN home-grown platform businesses deeply challenging because they lack the scale to compete with non-ASEAN competitors.

Vulnerability to cyber-attacks is likely to increase over time. As ever more devices, sensors and machines are connected to the internet, the potential for damage and disruption from cyber-attacks is rising significantly. And yet, governments in ASEAN have not invested the time to develop proper cybersecurity measures, policy and law, neither at the national, nor at the regional level. The Center for Strategic and International Studies estimates that the likely annual cost to the global economy from cybercrime is between US$375 billion and US$575 billion (Center for Strategic & International Studies, 2014).

4. WHAT ROLE CAN REGIONAL COOPERATION PLAY WITH RESPECT TO THE 4IR?

The benefits of regional cooperation are well understood by ASEAN nations. Deeper integration allows businesses to access larger markets and thereby become more efficient. It lets employers source workers and skills from a larger pool. It creates opportunities for cross-fertilization of ideas, transfer of knowledge, and for new forms of collaboration that connect different resources in complementary ways. It can also help manage or mitigate cross-boundary issues such as pollution and trans-national crime.

But under the 4IR, the need for regional cooperation, and the benefits that flow from deeper regional collaboration, is significantly heightened. Indeed, it is well documented that the 4IR does not recognize national borders. The following examples show how a regional approach to addressing the 4IR will help ASEAN both capture the opportunities and manage the risks.

First, consider data sharing. Data is the foundation of the 4IR – all of the technologies of the 4IR are built on it. Of particular importance is the ability to transfer and access data across borders. Individuals, companies and governments will increasingly rely on the ability to move, process, and store data throughout ASEAN in order to provide the services and reap the benefits of the 4IR.

But as well as bringing giant benefits, the cross-border flow of data may also bring challenges, particularly related to personal and sensitive information, such as health records or financial transactions. Issues of security, privacy, and intellectual property rights are of paramount concern. However, the security and privacy of data do not depend on the physical location of servers. Rather, they depend on the protocols and rules that exist in the places where the data is accessed, used, and stored. As such, ASEAN nations need to work collaboratively on crafting rules and regulations that govern how data can flow across borders, and under what conditions. Countries that block cross-border data flows in the name of issues such as security and privacy could end up stifling their economies.

Second, changes in technology that affect manufacturing and trade will have implications that require a regional response. The character of trade is shifting away from physical goods towards virtual goods. Media products such as books, music and movies have already made this transition. But even products such as engines and spare parts are becoming more virtual in

character. Rather than importing and exporting finished goods, companies may instead sell blueprints and designs, with customers using 3D printers to manufacture the goods at their own locations. Today, ships and offshore oilrigs already use 3D printers to manufacture spare parts on board. These trends, if they gather momentum, will have profound implications for industrial policy in ASEAN. Important questions will emerge around who sets industrial standards and safety regulations, and how they are enforced. If a customer in one ASEAN country sources a virtual product from another country, prints it locally, and then suffers an injury, who is liable? And how can they seek legal redress?

Third, changes in technology that affect services and its delivery may also require regional standard setting. Cross-border trade is shifting in other important ways too, notably with the rise of trade in services relative to goods. Take healthcare. Citizens in Cambodia could access their healthcare from centers of medical excellence in the Philippines using smartphones (coupled with technologies such as diagnostic pills that send medical information via Bluetooth to the user's smartphone). These cloud services promise giant opportunities to bring much needed services to ASEAN citizens, especially in remote areas, at much more affordable prices. But for the economics to work, the services must be provided at scale across the region, and not at just a national level. This means not only allowing sensitive data (for example health data) to flow across borders, but also to have regional standards governing healthcare services. There is also the need to harmonies rules around market access and to make the rules as transparent as possible.

Fourth, the 4IR may also hasten the need for a harmonized regional business environment. To succeed in the era of the 4IR, ASEAN's platform and infrastructure businesses (such as banks, payment firms, online marketplaces, logistics providers) will need to operate at regional scale. Currently, many ASEAN firms operate in relatively small domestic markets. This prevents them from achieving economies of scale and the benefits of network affects. Harmonizing laws and regulations between countries, and promoting open access to ASEAN businesses, will be essential to addressing this. Without harmonizing business regulations, home-grown ASEAN companies risk losing out to larger rivals from outside the region. These larger rivals have grown up in naturally large domestic markets such as the US or PRC and have used their home-grown scale to invest in innovation that potentially enables them to out-compete ASEAN rivals.

Fifth, regional governments may have to work more closely to collect taxes on cross-border transactions. As products become virtual, and as services move online and are delivered remotely, it changes the ability of government to levy and collect taxes. Given the rise of cross-border commerce linked to digital platforms, governments will need to work with each other on defining what tax rules will govern regional commercial interaction.

Sixth, they may also be a need to connect innovation incubators across the region. Innovative SMEs and start-ups will be critical to capturing the opportunities of the 4IR. Many ASEAN countries already have innovation hubs and incubators at a national level. But new businesses will need to operate at scale, and to reach scale rapidly, in order to be competitive. ASEAN leaders should think about how to connect national incubators into regional networks, and to provide regional business and financial support services to help SMEs operate across ASEAN. These regional networks would open doors to new opportunities, nurture the cross-fertilization of ideas between different cultures and communities, and support the exploration of complementarities between different countries.

Seventh, the need for regional education networks will increase with the 4IR. Countering job disruption from the 4IR will require a transformation of education. The skills needed to thrive under the 4IR will centre not only on technical capabilities, but also on creativity and innovative problem-solving. What's more, given the accelerating pace of change in the job market, workers must expect to have several "careers" rather than just one, which calls for a deep commitment to adult training and life-long learning, not just early-life education. Much of the response from policy-makers will play out at the national level, but there is an important regional dimension too. Online education will give students access to education opportunities beyond their borders. Equally, the expansion of existing credit transfer systems between ASEAN universities would help build cross-border personal and professional networks which will be crucial for the worker of tomorrow.

Finally, the need to reduce barriers to labor mobility will become more pressing with the onset of the 4IR. To grasp the opportunities presented by the 4IR, countries will need access to pools of human capital with new skills, such as data scientists, IT systems managers, and software coders. Reducing barriers to the mobility of skilled workers in the region would help to meet this demand (Batalova, Shymonyak and Sugiyarto, 2017). This may call for an expansion

of existing mutual recognition agreements (MRAs) for professional qualifications to cover new occupations. Existing commitments on harmonizing and streamlining employment visas will be critical and consideration could be given to programmes that help workers overcome language and cultural barriers to movement. If labor is prevented from moving across the region, then the benefits of the 4IR may not be evenly shared, and regional inequality may rise.

All of the issues listed here will demand a regional approach to governance, policy and regulation. But underlying these challenges sit broader questions that ASEAN leaders must consider. These questions centre on the importance of "values". All new technologies have human values baked into them to some degree. For example, what does privacy mean in a world full of drones? Should artificial intelligence be able to make life-and-death decisions? How much inequality is acceptable?

Answering these questions will require regional leaders to assess the common values shared by a highly diverse group of cultures, and to craft protocols that ensure these shared values are universally applied in an ASEAN context.

5. A NEW APPROACH TO REGIONAL GOVERNANCE

The 4IR will not only affect the priorities and issues for regional integration within ASEAN. It will also require a new approach to how these policies are created and implemented.

Given the significance of the 4IR, and the speed at which it is unfolding, it will be critical for ASEAN leaders to think creatively about how they can upgrade the process of crafting policy, setting standards, and writing regulation at a regional scale. If they do not, then the region may well find itself on the wrong side of this moment of global transformation. Rather than thriving, the region may find itself being left behind.

The traditional models of crafting policy, regulation, and standards have often been relatively linear, time-consuming and top-down in their approach. Today, the imperatives of regional governance must instead adopt a different set of guiding principles:

- **Fast:** Speed is not everything, but it is important. With the pace of change accelerating, policymakers must recognize that the process of making rules and setting standards must keep up with technological shifts.

- **Agile:** Governance bodies and committees, regulators and policy-makers must have the flexibility to respond rapidly to changing circumstances without losing sight of the overarching goals and values the legislation is designed to support. As technologies evolve, regulators must have the ability to correct their course in real-time.
- **Experimental and iterative:** Part of adopting a more agile and flexible approach to policymaking is the need to be both more experimental and more iterative. Rather than running long, time-consuming processes for setting rules and standards, policymakers will need to develop ideas quickly, implement these ideas in experimental settings, learn lessons quickly, and steer this feedback into the rule-making process. Building institutions that can link experiments in different countries could provide a faster way of designing regional regulations. In some cases, this suggests a bottom-up approach to the design of regional regulation.
- **Inclusive and multi-stakeholder:** Truly effective policymaking must consider the views and input of all stakeholders. For example, formulating policy on self-driving cars will require inputs not only from governments and automobile companies, but also from insurers, urban planners, consumer groups, ethics advisors, technology firms and environmental experts.
- **Open:** The 4IR is a global phenomenon and regional-level approaches should not close doors to wider collaboration. ASEAN's historical approach to open regionalism makes it an ideal platform for enabling the development of supranational regulations and legislation which can open doors to the global market while maintaining the values and principles of the region.

6. RECOMMENDATIONS FOR A WAY FORWARD

Having set out the urgency for ASEAN leaders to consider a new approach to regional integration under the 4IR, this paper identifies a set of propositions that might offer a way forward.

These suggestions do not focus on specific 4IR policies themselves (such as how to deepen internet access or how to address data protection). Rather they focus on the process by which policies are designed and developed. They focus on the over-arching system of

governance, and how to ensure that the ASEAN organization, as the body driving regional governance, can be agile, fast, iterative, experimental, inclusive and open.

Importantly, any suggestions for reforming the ASEAN organization must not lose sight of the strengths of the ASEAN Way. As mentioned earlier, this approach to regional governance has served South-east Asia well for the past 50 years.

Yet, at the same time, the ASEAN Way may need an upgrade in the era of the 4IR. Already it is apparent that the region is struggling to achieve the goals set out under the vision of the ASEAN Economic Community. And navigating the 4IR will place much heavier demands on the region. So, while respecting the strengths of the ASEAN Way, what can the region do to upgrade its approach to regional governance?

a. **ASEAN Secretariat to become a "platform organization":** This means creating an ecosystem upon which multi-stakeholder groups of experts do the heavy lifting of integration, with the Secretariat acting as the convener and governor of their activities. An analogy is the Apple iOS or Android operating systems. In both cases, Apple and Google create the ecosystems upon which third-parties- app developers- are the main actors. Neither Apple nor Google are directly involved in developing new apps. Instead, their role is to govern the ecosystem and to make sure that it runs smoothly, with all actors adhering to the rules of the platform.

   In the context of ASEAN, multi-stakeholder groups of experts would do the work of designing and formulating new standards, policies and regulations for integration. The role of the Secretariat would be to ensure that all the various integration projects running on its "operating system" are well governed and are conducted in the right manner (e.g. overseeing the composition of working groups and the processes by which they develop policy proposals).

   In many senses the ASEAN Secretariat already functions as a platform organization, but this role could be formalized and upgraded to help the "app developers" (multistakeholder groups) function more effectively.

   This model would not undermine the sovereignty of ASEAN nations. Any proposals for new regulations or standards would still need to be ratified at a

national level before becoming law. Ideas for developing new "apps" or integration projects would need to be endorsed by ASEAN member states prior to forming the working groups. For example, a proposal might be submitted to the Secretariat to develop a set of rules governing data privacy. Once approved by the ASEAN leaders, a working group would be convened of national regulators, technology companies, academics and civil society leaders. The working group would follow the procedures set out by the Secretariat to produce a mutually agreed set of rules to be implemented at a regional scale.

For the ASEAN Secretariat to play this role effectively it would need to hire staff capable of running a platform model effectively and who are well versed in managing new tools such as new systems of communication, new mechanisms for virtual collaboration and new tools for gathering feedback and ideas.

To make this shift, consideration could be given to phasing out the idea of "appointed positions" and appointing a permanent "CEO" type of leader, hired for his or her experience of crafting regulation and policy, and with a strong record of execution.

Finally, to recruit the right staff in the right number, the ASEAN Secretariat would need more funding. Mahbubani and Sng (2017) argue that if contributions by ASEAN member states were calculated according to capacity to pay (e.g. in line with the United Nations formula), ASEAN would be well funded. The principle of differentiated contributions is already being practiced in the ASEAN Infrastructure Fund albeit in the form of capital contributions rather than recurrent expenditures. Given the role that ASEAN plays in ensuring long-term security and prosperity, additional funding would be money well spent.

b. **Delegate key activities to affiliated functional bodies:** Extending the idea of ASEAN as a platform organization, the Secretariat could also consider delegating more functions to affiliated third-party groups. These groups or institutions would operate on the platform in a more independent fashion. This would allow ASEAN to maintain oversight while also benefiting from a larger ecosystem of institutions which will be critical in managing the sheer scale of engagement and

implementation that will be required. To date, ASEAN has been reluctant to delegate many of its functions, but there are examples that have worked well.

One notable example is the ASEAN Macroeconomic Research Office (AMRO) which is responsible for managing the region's financial safety net under the Chang Mai Initiative Multilateralization. Another good example comes from the ASEAN Infrastructure Fund, which provides a platform for public-private partnerships (PPPs) in investments required under the ASEAN Connectivity Masterplan. Again, ASEAN has delegated responsibility for this fund to other experts – in this case, the management and administration of the fund is carried out by the Asian Development Bank on behalf of the ASEAN organization.

c. **Shift from long-term blueprints to rolling three years plans:** At present, ASEAN invests considerable effort in developing a strong long-term vision for regional integration with documents such as the ASEAN Economic Community Blueprint 2025. Arguably, however, because the 4IR is characterized by rapid, non-linear change, plans such as these quickly become outdated. Under the 4IR it is advisable not to attempt to forecast the future, because most forecasts are likely to be wrong. Rather it is important to be agile and allow for course correction. ASEAN could therefore consider supporting its overarching goals with rolling three-year strategies that are revisited and revised frequently.

d. **Ask the people:** Democratize and decentralize: If ASEAN is truly to benefit from the widespread expertise in its societies, it should consider increasing its openness to their direct engagement in policy creation. As internet and smartphone penetration deepens across ASEAN, there is substantial opportunity to make ASEAN policy formulation more inclusive. Dedicated portals could be established to gain direct feedback from ASEAN citizens and experts. Policies could be debated in public. Ideas could be crowdsourced. By embracing new 4IR tools for public engagement, a more democratized and decentralized vision for the ASEAN organization could emerge.

e. **Multi-country testbeds:** A pan-ASEAN platform could be established that would nurture multi-country regulatory experiments and cross-border innovation hubs.

An initiative of this kind was set up in Europe in March 2017 called the European Platform of National Initiatives (EPNI). The goal of EPNI is to help European industries respond and stay abreast of the 4IR by linking national initiatives to create multi-country testbeds and "sandboxes" where regulations can be tested in different regulatory contexts to help a rapid roll-out across the wider European Union. EPNI is multi-stakeholder in character, bringing together business leaders, regulators, academics and others to work collectively on crafting new regulatory approaches to digital technologies. Currently 13 national initiatives have joined forces under the EPNI and the EU has earmarked 5 billion euros of investment to support the initiative, with significantly more investment expected to be raised from the private sector. A similar initiative across ASEAN could help the region meet the new demands for inclusive, iterative and agile policy making.

7. SUMMARY AND CONCLUSIONS

The 4IR is upon us and will transform our way of life. "Disruptive technologies" such as artificial intelligence, robotics, blockchain and 3D printing are transforming social, economic and political systems, often in unpredictable ways. The changes are revolutionary not only due to the breadth of the sectors impacted, but also due to the speed.

This paper has explored the impact that is it likely to have on ASEAN focusing how it can take advantage of the opportunities it presents, while at the same time meeting the challenges that it presents. It argues that technologies of the 4IR can bring significant benefits such as empowerment of SMEs and opportunities for countries to leapfrog traditional pathways of development. It will also bring tremendous challenges, such as deep disruption to labor markets and the potential of rising inequality, both within and across countries.

To address the challenges and seize the opportunities of the 4IR, ASEAN will need a new way of formulating policy and regulation that is agile, rapid, iterative, inclusive and open. This will require a number of significant changes, which include: (i) evolution of the ASEAN Secretariat to become a "platform organization"; (ii) greater delegation of key activities to affiliated functional bodies; (iii) a shift from long-term blueprints to three year rolling plans; (iv) democratize and decentralize; and (v) establish multi-country test beds to experiment, learn and adapt.

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[i] Global Financial Development Indicators on proportion of population (age 15 and above) with an account at a formal financial institution in 2014 (latest available).
[ii] 56% in Cambodia and 52% in Myanmar in 2014
[iii] China's carbon asset market introduced a blockchain-based management platform in May 2017
[iv] Based on United Nations Projections of ASEAN's working age population growing by 62 million between 2015 and 2030.
[v] Based on current US$ GDP accessed from World Bank Databank.