

Potential Latin America-Southeast Asia link with Smart Cities and Agritech

Sebastián Sterzer¹

Recibido: 26/04/2023

Aceptado: 23/06/2023

ABSTRACT

In Latin America and Southeast Asia regions, the technology, and its use in urban areas (for example, for the development of smart cities) and rural areas (known as 'agritech' or technology for the development of agriculture) has aroused a growing interest. This has allowed governments to take note of the importance of technology for the development of the community, and present policies that accompany this phenomenon, both at the national and regional levels, among peers -even, forming blocs.

This article seeks to analyze cooperation and business opportunities regarding both smart cities and agritech between the Southeast Asian and Latin American regions. The issue will be addressed, considering the increasingly necessary interrelation to share knowledge and experiences. The relevance of this work will allow to find those aspects to deepen the link between both regions.

Keywords: smart cities, agritech, cooperation, business.

¹ Licenciado en Estudios Orientales (2015) por la Universidad del Salvador (USAL) y Licenciado en Comercio Internacional (2011) por la Universidad Nacional de Luján (UNLu), Argentina. Responsable del Área de Relaciones Internacionales del Observatorio de Comercio Internacional (ARIOC) del Departamento de Ciencias Sociales de la Universidad Nacional de Luján (UNLu), Argentina. Actual Director de la consultora de negocios *PT Dream Destination Solution*, residente en la provincia de Banten, Indonesia. Áreas de investigación: comercio internacional, negocios internacionales, regionalismo, Sudeste Asiático, América Latina. E-mail: sterzarsebastian@gmail.com

Vínculo potencial entre América Latina y el Sudeste Asiático mediante *Smart Cities* y *Agritech*

RESUMEN

En las regiones de América Latina y el Sudeste Asiático, la tecnología y su utilización en las áreas urbanas (para el desarrollo de las ciudades inteligentes o *smartcities*, por ejemplo) y rurales (conocido como *agritech* o tecnología para el desarrollo de la agricultura) ha despertado un interés creciente. Ello ha permitido que los gobiernos tomen nota de la importancia de la tecnología para el desarrollo de la comunidad y presenten políticas que acompañen dicho fenómeno, tanto a nivel país como regional, entre pares –incluso, formando bloques–.

El presente trabajo busca analizar las oportunidades de cooperación y negocios en lo que respecta tanto a *smartcities* como *agritech* entre las regiones del Sudeste Asiático y América Latina. Se abordará la temática en cuestión, habida cuenta de la cada vez más necesaria interrelación para compartir conocimientos y experiencias. La pertinencia del estudio radica en que permitirá encontrar aquellos aspectos para profundizar el vínculo entre ambas regiones.

Palabras clave: smartcities, agritech, cooperación, negocios.

Introduction

The main aim of this research is to analyze cooperation and business opportunities regarding both smart cities and agritech between the Southeast Asian and Latin American regions. The issue will be addressed, considering the increasingly necessary interrelation to share knowledge and experiences. The relevance of this work will allow to find those aspects to deepen the link between both regions.

The article will be carried out based on the use of a secondary source, with information from multilateral and regional organizations, academic papers, and particular cases of companies. The document will be divided as follows: first, the phenomenon of smart cities will be addressed, going from general concepts to the particular in Southeast Asia and then in Latin America regions; second, the same will be

analyzed with agritech, also, starting from the general to what is developed in both regions. Then, the potential for cooperation and business between both regions will be discussed, followed by recommendations from the author, and then the conclusion.

1. Smart cities

Understanding the significance of having an increasingly urban population, the challenges of meeting its demands, on the one hand, and dealing with the consequences of its habitat, on the other, have also increased. Currently, the large cities of the world are concentrated in only 2% of the planet's surface, but they consume 78% of the energy produced, while they damage the environment by 60% of the total world pollution. Furthermore, the urban population of the developing world is expected to double between 2000 and 2030, adding 2 billion city dwellers. According to the United Nations, 70% of the world's population (which is equivalent to more than 6,000 million people) will live in the urban sector by the year 2050, representing a great challenge for all countries (United Nations Human Settlements Programme, 2020). With these data, it is difficult to think that a city does not undergo constant changes to meet that demand.

Making use of technology, the answers to face these challenges and their proposals are possible to materialize. The complexity of the greater urbanization, with the proposals related to the improvement of the habitat, safety, health, transport, among others, leads to think that a smart city should be one that provides the appropriate solutions for the improvement of the resident, and the improvement of the administration by the government. Many times, it is necessary to have a large flow of information, in real time, for efficient and effective administration. General improvements in clean technology (such as smart buildings, increased fuel efficiency, and increased investments in mass transit systems) are behind the general drive towards efficiency.

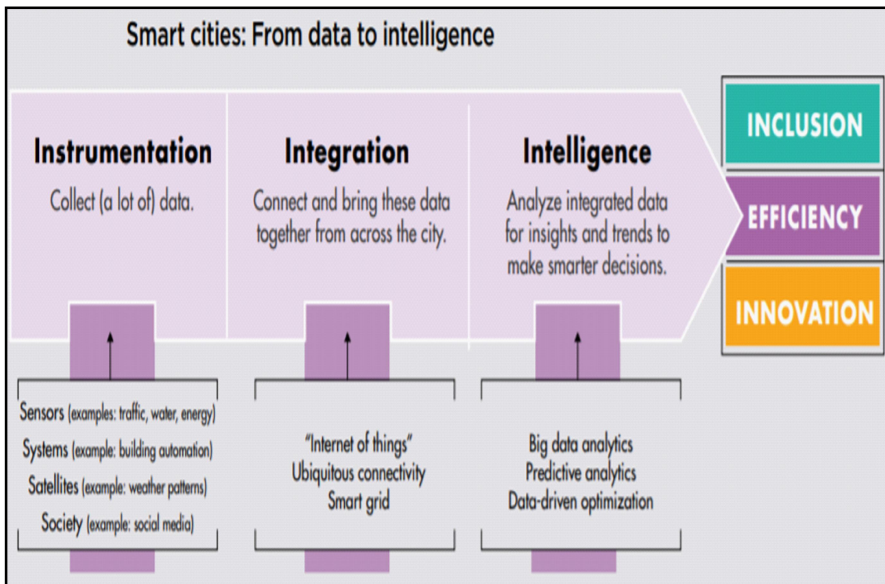
What is a 'smart city'? For the Inter-American Development Bank, a smart city *«is one that places citizens as the center of development, incorporating Information and Communication Technologies into the urban ecosystem with the aim of promoting efficient government management, which includes collaborative planning processes between public and private sectors.»*² (America Digital News, 2020,

² Translation made by the author of this article.

May 9). It is one that finds its center of development in people, incorporating cutting-edge technology, both information and communication for urban management. It seeks to achieve an efficient government, including collaborative planning processes and citizen participation. In this way, and to promote integrated and sustainable development, smart cities become more innovative and competitive cities, more attractive and resilient cities, with the consequence of achieving an improvement in people’s quality of life (Bouskela et al., 2016).Joo& Tan (2020) said that the smart city is more of a development strategy in an era of hyper-connectivity than the pursuit of a tech-enabled utopia.

What characteristics does a smart city have? Linders (2016) highlights three great steps: 1) instrumentation; 2) integration; and 3) intelligence. This, with the idea of achieving inclusion, efficiency, and innovation. In Figure 1, it can be seen how Linders highlights that a smart city collect a significant amount of data through instrumentation, then collect it through integration and, finally, analyze it to obtain intelligence on how to improve the services and quality of life in the city such as reducing traffic congestion, fighting crime, improving air quality, among others.

Figure 1
Smart cities: From data to intelligence



Source: Linders (2016).

The big data that is collected allows cities to better adapt the supply of their public services to needs in real time, preventing emerging problems from becoming future crises. Anonymous cell phone log, sensor and camera data is turned into intelligence to, for example, help optimize traffic flows in real time, from rain to crime hot spots. The smart city can take care of green areas, collaborating with its sustainability and resilience objectives. Having an overview of these areas, it is possible to work on the maintenance and correct distribution of these in the city, to avoid the propensity to floods or landslides, in certain cases (Goldblatt et al., 2018). In addition to big data, artificial intelligence helps cities precisely to collect and process a large amount of data. Cities have many sources of information: the number of tickets sold by public transport systems, local tax information, police reports, road sensors, and local weather stations, among many other sources (Walker, 2019).

Linders (2016) states that governments participate in the development of a smart city through three platforms: 1) through local open data, where cities share certain information with the public, thereby promoting transparency, accountability and problem solving; 2) through «living laboratories», where governments designate certain parts of the city as test beds to put the development of ideas into practice; and 3) through urban analysis centers, where cities partner with local universities and industries to develop interdisciplinary research centers, accessing previously to collected data. Therefore, it follows that governments must have human resources that possess the technical and management skills according to the new challenges.

1.1. Smart cities in Southeast Asia

Southeast Asia is one of the most dynamic regions in the world, both economically and in terms of urbanization. Almost 50% of the population in the region lives in cities, and it is estimated that by 2025 there will be approximately 70 million people who will be incorporated into the urban area. This will not only occur in megacities such as Jakarta, Manila, and Bangkok, but also in mid-level cities (from 200,000 to 2 million inhabitants) such as Makassar, Johor Bahru, Da Nang, Davao City, Mandalay and Chonburi (Martinus, 2020a, 2020b). These mid-level cities are projected to drive 40% of the region's growth (Vineles, 2019). However, urbanization is mainly led by the growth of seven major cities (Jakarta, Manila, Yangon, Ho Chi Minh City, Bangkok, Kuala Lumpur, and Singapore) which play a very important role in the economy of the countries to which they belong (McKinsey Global

Institute, 2018).

Considering that, smart cities are necessarily an issue to be addressed and developed. Southeast Asian cities have invested significantly in cloud computing and artificial intelligence, although this does not occur equally among countries in the region (Hidayat, 2021, May 5). In the Association of Southeast Asian Nations (ASEAN), the ASEAN Smart Cities Network (ASCN) has become the specific collaboration platform for the development of related projects. It was launched during the ASEAN Presidency of Singapore in 2018. In addition to bringing together bankable projects with the private sector, this network channels financial support from ASEAN Dialogue Partners.

Martinus (2020b), who is a researcher of smart cities in the region, mentions that the network has adopted the ASEAN Smart Cities Framework, along with its guidelines and reporting mechanisms, among others. Each member country has a National Representative and a Smart City Director (from each city). The author states that, every year, in addition to meeting, annual reports are prepared to assess the progress of the pilot cities, all of which must be in line with the three ASEAN Communities: Political-Security, Economic, and Socio-Cultural Communities. This network has, broadly speaking, six sectors in which to collaborate: 1) civic and social; 2) health and well-being; 3) safety and security; 4) quality environment; 5) built infrastructure; and 6) industry and innovation. The network has received greater interest in terms of collaborative projects, in the sectors of industry and innovation, and safety and security. Vineles (2019) affirms that the ASEAN Smart Cities Framework was developed as a non-binding guide to facilitate smart city development in each pilot city, and that consists of three strategic objectives: competitive economies, sustainable environments, and higher quality of life. What distinguishes the ASEAN Smart Cities Network is that it works in a collaborative framework between city governments and business sectors, allowing them to take proactive, locally contextualized opportunities.

Martinus (2020b) also comments that the ASEAN Smart Cities Network initiative has gathered great interest from the Dialogue Partners, which has been manifested in various cooperation projects, such as the US-ASEAN Smart Cities Association (USASCP), the ASEAN Australia Smart Cities Trust Fund, the ASEAN-Japan Smart City Network High-Level Meeting, and the Smart City Cooperation Initiative between ASEAN and China. Furthermore, the Republic of Korea expressed interest in collaborating with ASEAN in sectors such as smart cities, digital economy, and cybersecurity, all as part of its New South Policy, which has as its central objective a more vigorous

and fruitful South Korean diplomacy with Southeast Asian countries. All these movements on the part of the ASEAN Dialogue Partners can be understandable as another step in the dispute for regional influence, in an international scenario that has been undergoing years of tension, and that has Southeast Asia as one of the hot spots.

Singapore is undoubtedly the most successful case of smart city development in ASEAN, even one of the most developed in the world³. For example, with the aim of focusing on the environmental footprint in the city (Linders, 2016). One of the most ambitious projects has been Smart Nation, which provides an open and accessible national electronic payment infrastructure, there by facilitating digital transactions. Apart from this, Joo & Tan (2020) argue that Singapore's emphasis on building international cooperation networks and promoting urban solution exports, all reflect goals and approaches that are closely associated with specific local challenges and contexts.

In Indonesia, apart from the interest in smart cities in the capital Jakarta, also in the eastern part of the country the smart city development is encouraged. The International Enterprise (IE) Singapore, for example, signed a memorandum of understanding (MoU) with the Makassar city government in Sulawesi Island to build Makassar's digital services platform that includes smart cards, intelligence transport, flood detection and smart street lighting (International Enterprise, 2016). Vineles (2019) recalls that Makassar (the fifth largest city in Indonesia), started its Smart City Plan in 2014, when at that time a mobile health service program called Dottoro'ta was developed, providing diagnosis, emergency care and follow-up care.

In the Philippines, mobile connectivity allows expanding civic participation, for example, in the identification of vehicles that most pollute the environment. That is one of the three urban practices that Linders (2016) identifies precisely in the developing world: leveraging mobile connectivity to expand civic participation. The other two practices are using data to target development on the most vulnerable sectors and people, and opening data to promote accountability, mapping of facilities, pollution, among others. Vineles (2019) highlights the Davao City's establishment of the Public Safety and Security Command Center (PSSCC), whose centralized CCTV surveillance systems and geographic information systems allow spatial information analysis and mapping data processing. In Thailand, the Phuket Smart City Vision has been established primarily to increase tourism. For

³ Singapore has been the most successful smart city according to the Top50 Smart City Governments report. See <https://www.smartcitygovt.com/>

that purpose, it uses big data analysis, and one of the projects developed is City Data Platform, which is ideal for learning and getting valuable information from local and foreign tourists; that information comes from Wi-Fi, Internet of things and social networks.

1.2. *Smart cities in Latin America*

The Inter-American Development Bank (IDB) has been working together with governments on the issue and drawing up action plans for the municipalities, to facilitate the progress of urban sustainability in the transformation towards a smart city. For instance, the IDB's Emerging and Sustainable Cities initiative, with three pillars: 1) urban sustainability, 2) environmental and climate change sustainability, and 3) sustainability and fiscal governance. This initiative works in cities with populations between 100,000 and 2 million inhabitants (here it is possible to compare what the ASEAN Smart Cities Network does with mid-level cities). In short, it is a technical assistance program that is non-reimbursable and that allows direct support to central and local governments⁴.

In the region, the different blocs are emphasizing the cooperation in digital connectivity, which will allow further progress in the development of smart cities. The South Common Market (MERCOSUR) has established the Digital Agenda Group (GAD) in 2017 with the objective of «promoting the development of a digital MERCOSUR». In its Action Plan (2018-2020), there are those activities related to digital infrastructure and connectivity; security and trust in the digital environment; digital economy; digital skills; digital government, open government, and public innovation; technical and regulatory aspects, and coordination in international forums (CEPAL, 2021). Another regional initiative (which may also have some parallels with the ASEAN Smart Cities Network) is the Mercociudades⁵ Network (Mercocities), an association made up of MERCOSUR cities, which has made possible joint actions between national governments, universities, and other social agents. Another South American platform to help the development of the cities are the South American Cities Network (REDCISUR) and the Andean Network of Cities (RAC) (Mercher *et al.*, 2019).

The Pacific Alliance has proposed the design of a regional digital market strategy, which will allow not only a larger market scale, but

⁴ For more information on which cities were adhering to the initiative or work methodology and reports, visit: <https://www.iadb.org/es/ciudades>.

⁵ For more information, see <https://mercociudades.org/>

also a better coordination of resources and lower transaction costs. Another integration initiative is the Mesoamerican Digital Agenda, which articulates the efforts of the member countries of the Mesoamerica Project. One of its initiatives is to develop telecommunications and digital economy infrastructures in the subregion, both closely linked with each other. For its part, the Caribbean Community (CARICOM) has a strategy that is the digital component of the CARICOM single market; its objective is to create an information and communication technology space without borders that fosters economic, social, and cultural integration.

In Colombia, one of the main cities mentioned in terms of urban development is Medellín. Due to the increase of vehicles in the city, one of the priorities has been the improvement of mobility and traffic management, through the Traffic Control Center (Alcaldía de Medellín, 2019; Amar Flórez, 2016). In Brazil, Rio de Janeiro is one of the main cities that has been promoting digital inclusion initiatives, giving greater participation to citizens for the improvement of the city in which they live (Schreiner, 2016). Rio de Janeiro has established an Intelligent Operations Center where more than 30 agencies are gathered (Linders, 2016).

In Chile, the Santiago Metropolitan Regional Council (CORE) approved the creation of the first Integrated Regional Management Center, operating in 2021, to improve decision-making, the construction of public policies, and the delivery of information to the citizens. In addition, the Government of Chile created Sé Santiago⁶ ('Be Santiago'), which is a program that seeks to make the Chilean capital a more sustainable and intelligent metropolis through actions based on the use of technological resources. The Chilean capital has installed centers for environmental control, mobility, and urban security (America Digital News, 2020, May 9).

Argentina, as part of the deployment of País Digital ('Digital Country'), has presented a State Modernization Plan in response to contextual needs and the preparation of an environment that reacts to current and future challenges. Argentina has been developing three lines of work based on the generation of a baseline (diagnosis of municipalities), on the strengthening of local governments and on the formation of capacities in the communities. In its plan «Smart Cities Model of Digital Country», there are 5 dimensions to be considered: 1) governance; 2) environment; 3) human development; 4) urban planning; and 5) competitiveness. The strengthening of the «governance»

⁶ For more information, see <http://www.sesantiago.cl/>

dimension is constituted as the basis for building and / or consolidating intelligence in the other dimensions of the analysis (Palacio Cortés, 2019). One of the main initiatives to generate debates that lead to future public policies is the Smart Cities Network of Argentina (RECIA). It is a space for exchanging experiences and knowledge to promote smart cities and improve government management.

Mexico has four cities recognized as smart cities by the Inter-American Development Bank: Querétaro, with its Maderas project; the Digital Creative City and Smart Tequila, in Jalisco; and Smart City, in Puebla. In addition, Mexico City has several characteristics that lead it to that category. Monterrey is also going in that direction, with its «sustainable ecosystem» strategy, as well as León (Constantini & Rangel, 2021). Meanwhile, Guadalajara has been trying to position itself as the Mexican version of Silicon Valley for more than a six-year term. The main emblem is the Digital Creative City, an ambitious artistic and technological project to promote creative industries.

2. Agritech

Colloquially, «agritech» (or also «agtech») is the use of technology in the development of agriculture with the aim of improving yield, efficiency, and profitability. Shalini (2020) adds that, in addition to agriculture, horticulture and aquaculture are included within that category. With agritech, it is possible to grow food in urban areas and in a myriad of climates. In addition, it helps to decrease the use of pesticides or chemical fertilizers. In other words, in the long term, agritech helps to get healthier food, in a more sustainable environment.

The technology put at the service of agriculture, undoubtedly, brings benefits to those who are the main actors in the production and marketing chain, among others. It is not only about computers, but also mobile phones. There are mobile payment systems that give farmers the ability to exchange capital, as well as mobile information services that give access to critical and specific information on commodity prices, climate, disease outbreaks, and those helpline services that provide advice in real time, which can result in simplified costs, times, and improved productivity (World Trade Organization, 2020). Despite the verifiable benefits in the technology and its application in agriculture, there are challenges that must be faced to find an extensive use of it; mainly, in remote areas, where coverage, electricity and literacy, among other factors, are not ideal.

In the context of the covid-19 pandemic, agritech can play a critical role for sustainability and prevention, with healthier products available

to consumers. The Food and Agriculture Organization (FAO, 2020) maintains that 1) agricultural education and research; 2) bridging institutions; and 3) companies and their businesses can respond appropriately to a crucial moment such as the one experienced from 2020. Besides, the World Trade Organization (2020) and the United Nations Conference on Trade and Development (UNCTAD, 2021) assert that technologies such as those applied in agriculture have an impact on commodity sectors and related global value chains, calling on policy makers to be aware of the potential impacts of these technologies. They specifically mention the Internet of Things, blockchain, robotics and drones as those technologies that will drive profound transformations in global commodity value chains, resulting in continuous improvements.

Some benefits derived from this, according to UNCTAD (2021), could be demonstrable with certain examples such as the reduction of transaction costs in the cocoa sector. Through blockchain technology, there could be a verifiable access to transactions and in a short time the payment could be get it. Another example can be with the Internet of Things, allowing the establishment of a specific network of smart sensors to inform the characteristics of the climate and soil, among others, allowing an improvement in decision-making on a specific crop. Another benefit is the transparency and reliability that the traceability of a specific product generates, again, with blockchain technology, allowing to know the history of a specific crop or product, its origin and place of production, among other relevant data.

2.1. Agritech in Southeast Asia

In Southeast Asia, agriculture plays an important role in developing and emerging economies. 16% of the land in the region is used for agricultural purposes (Pennington, 2019). Being in a territory characterized by variable and extreme climates, farmers must be able to find those tools, especially technological ones, that allow them to anticipate the phenomena that could affect their productions, and then optimizing them. Having identified the obstacles previously, emerging companies, especially, find in the mobile technology a solution that allows them to develop agribusiness. Pennington (2019) points out that better returns in agriculture through assistive technology, would allow the young people to stay and work in rural areas, without having to move to large urban centers in search of employment. In an economically dynamic region, there will gradually be a greater demand for non-animal protein. This will bring with it an urgent need to be able

to develop the necessary offer, which will require more funds and technology. With a rural ecosystem that has low-income small farmers as the majority, the region will need to carry out greater investments in this sector.

In Cambodia, the agriculture, mainly thanks to rice production, comprises around a third of the country's GDP, in addition to employing 80% of the population. Devanesan (2020) warns that climate change has affected agricultural production in the country, with droughts and floods that have decimated crops. Hence, there is a need for technological solutions for greater optimization of natural resources. Having identified the difficulties, the government has developed the Agricultural Sector Master Plan 2030. By establishing the Agricultural Big Data Platform, the government will be able to rely on its own monitoring and traceability system for agricultural products, something that is already being implemented in the private sector. In this country, the startup Agribuddy connects small farmers, and let them share information about their farms. With a profile based on their credit rating, this allows them to have better access to loans and credits (Shalini, 2020). By the other side, Oxfam has launched BlocRice, a project to connect farmers with buyers, ensuring that there is a fair reward. The blockchain technology that BlocRice develops is used by the country's rice exporters such as Amru Rice. The digital platform ensures that products can be traced from the rice paddies to the consumer. In this way, both retailers and end consumers can understand how and from where the food was produced. Beyond the fact of accessing to technological solutions, farmers can grow their operations by achieving cooperation with their peers, in addition to selling their products at a higher price (Devanesan, 2020; Jones, 2020).

In Indonesia, PT Tani Hub is one of the largest agricultural technology companies not only in its country, but also in the region with more than 46,000 farmers have used their services. In 2020, with its Tani Fund financing line, it has supported 243 projects for farmers (Pramudita, 2021). Another startup, e Fishery successfully integrates a sensory feeding device to measure food intake in fish and shrimp farms; with this, it is sought to avoid water contamination due to overfeeding. Thanks to the Internet of Things, eFishery's customers can manage their production sites more efficiently, even remotely.

The start-up iGrow allows investors to finance agricultural projects in the country. In addition, it helps to provide access to markets for Indonesian farmers. Recently, it has been part of a Memorandum of Understanding on financing, management, and sales cooperation in the agricultural industry together with PT Bank Rakyat Indonesia

AgroniagaTbk (BRI Agro), PT Telkom Indonesia Tbk, PT Kedai Sayur Indonesia, InsanCita Foundation Agro Madani (ICAM) from Brawijaya University and Farmers Group in Malang, Eastern Indonesia (Cahyadi, 2021, June 15). BRI Agro disburses loans through the iGrow digital platform. The purpose of the collaboration is to expand banking access, especially for those from various business sectors so that they can produce accurate data, especially from the agricultural sector. In Malaysia, to exploit the benefits of digital farming, the Malaysia Digital Economy Corporation (MDEC) and CIMB Islamic Bank Berhad («CIMB Islamic») signed a memorandum of understanding which will led to an extension of a microfinance program (Malaysia Digital Economy Corporation, 2021).

Singapore is considered the center of financial technology in the region. Enterprise Singapore has invested approximately USD 65 million in Singapore-based agricultural startups. In any case, beyond recognizing the undisputed success of the city-state, Pennington (2019) remarks that it is still necessary to have more agricultural experience there, which can be obtained in part through associations or by learning from agricultural practices carried out in other countries. In Thailand, the startup Ricult using the artificial intelligence and other technological tools to improve the country's agricultural efficiency, in addition to having business expansion plans in other countries in the region such as Laos, Vietnam and Indonesia. Ricult has developed an application with the help of satellite images which permits data processing; then, farmers are better informed about the right time to irrigate and harvest their fields; in addition, obtaining information on the price of the products and, even, the possibility of chatting with experts in agriculture which could lead to better decision-making processes (Li, 2020).

In Vietnam, Dezan Shira & Associates (2021) is optimistic about the potential of the agritech sector. With a fast-growing middle class and a solid GDP, the government is pursuing an innovative agricultural sector, capable of satisfying the needs of the domestic and international markets. Therefore, among other measures, it has urged the State Bank of Vietnam together with commercial banks to offer a financial package of VND 100 billion (USD 4.37 billion) to support companies and their plans to carry out better agricultural practices by utilizing high technology. Even though agtech remains a relatively unknown concept in rural areas of Vietnam, there are at least 12 certified areas for high-tech agriculture. There are also more than 20 companies in the central highlands of Vietnam that are already developing and applying technological solutions that improve agricultural practices. The startup MimosaTeklever ages the Internet of Things to provide data to support

the decision-making process; the objective is to remotely control agricultural production through sensors in the equipment, in addition to having a cloud platform. Shalini (2020) mentions to Mr. Nam Dang, who is the co-founder and chief strategy officer of Mimososa Tek, who says that local farmers do not have data on crop conditions and cannot optimize yields. He points out also that more than 50% of the water is wasted because of excessive irrigation, up to 60% of the fertilizer is not absorbed by the crops that run off and destroy the environment, while 20% - 30% of the crops are lost due to the existence of pests and diseases and their lack of control. On the other hand, companies like TH True Milk and Vinamilk, with substantial financial capacity and a large production scale, have invested billions of dollars in high-tech agriculture. The grasslands are cultivated with automatic irrigation and cultivators.

2.2. Agritech in Latin America

Just as Southeast Asia is a region that offers opportunities for the agritech sector, the same can be referred for the Latin American region, considering that the latter is a leading producer of crops, adapting very well to digitization. To give a few examples, coffee (Latin America produces 55.4% of the world total) and bananas (80% of world exports) (Loukos & Arathoon, 2021). In South America, agriculture and its production are carried out on a large scale, so it is important to consider what type of technology can be applied there.

Beyond considering climate change as one of the factors that promote optimization of agricultural productivity, another factor in Latin America that influences and, in turn, promotes technology to improve the quality and quantity of production is the existence of a growing middle class that is changing consumption patterns. Higher incomes make possible a greater demand for healthier foods (for example, organic), and their origins and certifications of suitability and safety can be guaranteed.

In Latin America, 4% of the total population (that is, approximately 24 million people), is not yet within the coverage area of a mobile broadband network (Loukos & Arathoon, 2021). This population is found in rural areas, where agriculture is the main source of employment. Therefore, network coverage continues to be one of the main obstacles to development by actors in the agricultural ecosystem. According to Loukos & Arathoon (2021), roughly 233 million people live within mobile broadband coverage areas but are not subscribed to mobile internet services.

In the region, projects are being developed to boost the agritech sector, where some of them have the support of international institutions. The Inter-American Institute for Cooperation on Agriculture mentions several current initiatives in the region classified into seven strategies: 1) community strengthening to promote technological skills and digitization; 2) agricultural e-commerce; 3) training in digital skills for Industry 4.0 and employability; 4) smart farming; 5) specialized digital consulting; 6) search for solutions to promote rural digitization; and 7) competitive funds (Instituto Interamericano de Cooperación para la Agricultura, 2021).

The IDB Lab, for example, has partnered with cooperatives (for example, COOPSOL), agribusinesses (Ritter Sport and Chocolats Halba), fintech (Ethic Hub) and microcredit agencies (Abaco, FACES, and Sembrar Sartawi) to finance and provide technical support for the development of digital tools. Rainforest Alliance and Solidaridad, for example, are two NGOs that have a global presence and have developed the Farmer Training App and Farming Solution, respectively, which are found in several countries. The Inter-American Institute for Cooperation on Agriculture has been collaborating with the Market Information Organization of the Americas (MIOA) and the USDA Foreign Service to launch some of the first agricultural value-added services in the region, generally in partnership with local government agencies (for instance, in Costa Rica to launch Agro mensajes; in Ecuador with SMS-MAGAP; in Trinidad & Tobago with SMS-NAMDEVCO; and in Uruguay with Mercado Móvil) (Loukos & Arathoon, 2021).

In Latin America, some regions need to develop agritech more urgently. This is the case of the Caribbean region, which comprises small, open, and fragile economies, being vulnerable to exogenous factors, including the vagaries of climate change. This is the case of international trade, since this region is a net importer of food (CARDI, 2021). Pests and diseases have had a negative impact on the production of several of the region's key crops, including bananas, cocoa, and coffee. This is particularly true in Central America, a region disproportionately affected by climate change. Hence, several advisory tools for pest and disease management have emerged, such as Coffee Cloud and Tumaini.

In Argentina, Booster Agro is a successful company that is present in several countries such as Brazil, Bolivia, Mexico, Paraguay, and Uruguay. In Brazil, according to ECLAC (2021), more than a third of the new emerging companies specialize in agricultural management solutions, data integration systems, marketing and logistics platforms and traceability. Brazil is the regional leader in the development of digital

agricultural technology. Even in the context of a pandemic, growth has been sustained, with 40% of new startups in the sector in 2020. By the other side, Start-Up Chile is a government-backed incubator that has supported nearly 2,000 startups, including agritech Wuabi (Loukos & Arathoon, 2021).

Compared to other countries in the region in South America, Colombia offers fertile ground with small farmers that is one of the best suited to carry out agricultural innovation. With 40% of its territory suitable for cultivation, and a growth in the agricultural sector that has been sustained in recent years, the possibility of developing agritech has become real and with a great future ahead. In 2020, Corporación Colombia Internacional (CCI) signed an agreement with the Latin Leap Venture Fund with the aim of attracting international technology companies related to the agri-food industry, which are interested in participating in the agricultural sector of Colombia (Maxwell, 2020).

The Colombian government has acted as an incubator or accelerator to promote entrepreneurship and digital innovation. For example, the Ministry of Information Technology and Communications (Min TIC) started Apps.co to encourage entrepreneurship and promote the development of applications from agtechstart-ups such as Kanpo, Plaz, Agromarket, and Comproagro. Under the Control Ganadero's umbrella, the start-up Apptank SAS has developed a set of services to meet the needs of farmers; for example, registering livestock, monitoring weather events, connecting farmers with veterinarians, as well as between buyers and sellers of livestock, as well as providing insurance to farmers when transporting livestock.

In Mexico, Smaatcom is one of the applications for agriculture that has the largest number of active users in the country. Extension is a successful company that, for example, has expanded to countries such as Ecuador and Colombia. Its clients include government and research agencies (Secretariat of Agriculture and Rural Development of Mexico, CIMMYT), and Agro industries (Grupo Modelo, Bavaria). With the application, data can be accessed as well as communicated from remote locations to the field. The advice that the application allows to obtain is based on the collection of data through satellite imagery, from the management of pests and diseases to information about the climate. In Peru, Agri Credit is an agricultural company that has been endorsed by Start Up Peru, within the governmental framework of Innóvate Peru. In 2016, the government of Trinidad & Tobago launched AgriNeTT, an e-government initiative that, using digital technologies to create applications, has tried to promote the growth of the agricultural sector.

3. Potentiality of cooperation and business

Several countries from ASEAN (Singapore, Malaysia, Brunei, and Vietnam) and the Pacific Alliance (Chile, Peru, and Mexico) have signed the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP) agreement, which can help to a greater and better inter-regional understanding. Anyway, both ASEAN and the Pacific Alliance have already formalized their intentions to have a cooperation. For example, ministerial meetings as well as meetings between the Committee of Permanent Representatives to ASEAN and the Group of External Relations of the Pacific Alliance have been held to increase relations. The ASEAN-Pacific Alliance Framework for Cooperation has also been established, as well as the ASEAN-Pacific Alliance Works Plan (2017-2020) (Elms, 2020). Among the priority areas for collaboration are technology and innovation, e-commerce, smart cities, climate change, disaster management, and sustainable development.

Apart also from the South-South Cooperation mentioned above in this chapter, the ASEAN countries could also engage with Latin America through the Asia-Pacific Economic Cooperation (APEC) and the Forum for East Asia-Latin America Cooperation (FEALAC). In addition, ASEAN can interact with Latin American regional blocs (apart from the Pacific Alliance) such as the MERCOSUR, CARICOM, and the Community of Latin American and Caribbean States (CELAC). Within the framework of APEC (2021), one of the thematic areas for inter-regional cooperation has been the smart cities. In FEALAC, cooperative efforts are increased like exchanging knowledge and experiences at the Business Innovation Forum. Topics such as information and communication technologies, industry, transport and logistics, telecommunications, smart cities, agritech, and digital transformation are increasingly considered as strategic.

Bilateral cooperation can also play an important role. Countries could advance bilaterally in the signing of memorandums of understanding on exchange and cooperation mechanisms in areas like open government, technological infrastructure, and smart cities. For example, as in the case between Argentina and the Philippines. Alternatively, the fact that this Southeast Asian country establishes a Joint Economic Cooperation (JEC) with Chile, as well as with Mexico. Malaysia, for its part, has also shown its interest in strengthening bilateral cooperation with Argentina, with a focus on agriculture and highlighting the importance of South-South cooperation. Brazil, for its part, had shown its interest in the Malaysian palm oil industry where the agritech sector can be

fundamental. Meanwhile, Vietnam, which has been signing several Memorandums of Understanding with countries such as Japan, Ireland, the Netherlands, and Australia to learn from these countries and its experiences with high-tech agricultural systems, maybe could do the same with several Latin American countries that also have agricultural developments with the use of technology, whether on a large or small scale.

Activities carried out by Embassies, in cooperation with the Chambers of Commerce and other entities, can serve as a very important source to obtain information on business opportunities. For example, in Thailand, the Department of American and South Pacific Affairs along with the Ambassadors of the Group of Latin American and Caribbean Countries (GRULAC) held meetings with the Thai-Latin American Business Council. From these consultations, potential areas to cooperate and do business have been highlighted: 1) energy and renewable energy; 2) infrastructure, including the transportation and freight system; 3) agro-technology and food; 4) public health; 5) tourism and culture; 6) SMEs and e-commerce; and 7) biotechnology (Ministry of Foreign Affairs of the Kingdom of Thailand, 2020). Furthermore, Anantasirikiat & Attasivanon (2021) mention that there are several regional mechanisms that prioritize international cooperation to promote sustainable and green development, such as FEALAC, CARICOM, the Organization for Economic Co-operation and Development & Latin America and the Caribbean (OECD-LAC) regional program for green economic reform in the region, among others, of which Thailand can obtain information and recommendations that will serve for a better approach with Latin America. Moreover, with the aim of innovation, Thailand's National Innovation Agency (NIA) has signed an agreement with the Chilean Economic Development Agency (CORFO) for the development of startups; meanwhile, with Colombia, the agency seeks to work on the theme of innovation through cooperation between the cities of Bangkok and Bogotá.

4. Recommendations

Some recommendations can be made with the aim that both Latin America and Southeast Asia regions can increase the cooperation and business opportunities in the smart cities and agritech sectors. Therefore, it will be necessary the actions from the public and private sectors. Likewise, the academic community is also indispensable with its scientific contributions and field research. In addition, the support

of regional and multilateral institutions and organizations can provide their platforms, mechanisms and financing which could be needed to carry out the projects.

The establishment of a 'Forum of Smart Cities of Latin America and Southeast Asia'(or ASEAN) to exchange experiences regarding smart cities could be an interesting idea. Although both regions are involved with smart cities to some extent in FEALAC, it would be convenient to organize an annual Forum where one representative of each country from both regions can bring the topic of smart cities and their situation to the group. In addition to the Forum, 'Smart Cities Business Rounds' could be held to exchange offers of goods and services by companies from both regions. The sponsorship of chambers of commerce and government entities, mainly, can make possible this kind of business event.

An 'Essay Contest on Smart Cities in Latin America and Southeast Asia'(or ASEAN) would be a good cooperation proposal, with the academicians taking an active role to the subject. It could be interesting if the contestants are working in groups, made up of people from both regions in a same group, which would allow a greater degree of knowledge and connection between them. Governments, including through their Embassies, can play an active role from the call to papers initial step to the final publication of a book that includes the main papers.

For the agritech sector, a recommended event could be an annual development of the 'Agritech Southeast Asia (or ASEAN)-Latin America Forum', where the main referents of the public and private sector, including contributions from the academic field, could share their experiences, problems, and opportunities. Besides, the development of the 'Agritech Latin America-Southeast Asia Business Rounds', with the support of the public sector, which allows bringing the main players from both regions to explore business potentials. Also, in these rounds, it is advisable to work especially with startups and small farmers and their needs. The development of an 'Agritech Latin America-Southeast Asia (or ASEAN) Essay Contest', on an annual basis, is a suggested activity. With the particularity, also here, of the establishment of groups being integrated in a mixed way by people from both regions. Consequently, greater knowledge and inter-regional link may be possible.

Free trade agreements or other similar modalities between the two regions, even at a bilateral level, can stimulate the development of smart cities and agritech because of tariff benefits, simplification of procedures and any other initiative that has been agreed between the parties for the sole purpose of broadening and deepening regional cooperation and opportunities. Currently, there are few inter-regional agreements of this type (except for those countries under the CPTPP). At the bilateral level,

Chile is the Latin American country that has signed most free trade agreements with the ASEAN countries (which can negotiate free trade agreements bilaterally without major impediments). At the time of this writing, countries such as Vietnam and Indonesia have shown interest in signing free trade agreements with MERCOSUR, but it is something that will take time to explore, negotiate and, in a timely manner, sign the agreement. Beyond free trade agreements, being part of a regional bloc as an Observer State or similar is an interesting option to get closer approach to what is happening not only in that bloc but also in the region, which later enables greater cooperation and business opportunities.

Taking advantage of the fact that ASEAN has the ASEAN Smart Cities Network program, it would be recommended that Latin America, in any way that brings together all countries, or, at the regional bloc level, can carry out, at least, dialogue meetings with ASEAN that serve to detect the central points of cooperation and business opportunities. Perhaps, this ASEAN's platform and the 'Mercociudades' Network could find ways for cooperation. Whether in the areas of industry and innovation, health and well-being, built infrastructure, quality environment, safety and security, or civic and social, those are examples of partnership between ASEAN pilot cities and their peers in Latin America that could be considered and proposed. For illustrative purposes, potential partnerships are being imagined and mentioned in Table 1.

Conclusion

Latin America and Southeast Asia are two regions with potential for smart cities and agritech. Both urban and rural areas show that there are needs that can be covered by using technology in the city and the countryside, respectively. All actors must be involved in its development, from international organizations to companies and academics. The public and private sectors can develop smart cities and agritech if they work together. Greater spaces and meetings for dialogue that simultaneously involve actors from both regions at the same time and place should be proposed and put into practice.

Latin America and Southeast Asia, mainly separately, have platforms where they develop issues concerning the urban environment. ASEAN and the ASEAN Smart Cities Network platform is the best example. In the rural areas, the potentialities of technology for a greater and better sustainable development of agricultural productivity will require greater efforts from the public and private sectors to find the best policies and actions for both regions, which are major players worldwide in the agri-food sector.

Table 1
Potential cooperation between America Latina and the ASEAN Smart Cities Network

Partner	ASCN Pilot Cities	Focus Area
Pacific Alliance	Singapore	Industry and Innovation
CARICOM	Banyuwangi	Health and well-being
MERCOSUR	Bangkok	Industry and Innovation
Pacific Alliance	Chonburi	Quality Environment
MERCOSUR	Ho Chi Minh City	Safety and Security
MERCOSUR	Hanoi	Safety and Security
Pacific Alliance – MERCOSUR	Kuala Lumpur	Safety and Security
MERCOSUR	Jakarta	Safety and Security
Pacific Alliance	Makassar	Industry and Innovation
CARICOM	Davao	Safety and Security
Pacific Alliance	Phuket	Industry and Innovation

Source: made by the author.

References

- Alcaldía de Medellín. (2019, December 10). Medellín tiene nuevo Centro Integrado de Información de Tráfico. *Alcaldía de Medellín, Secretaría de Movilidad*. <https://www.medellin.gov.co/movilidad/component/k2/medellin-tiene-nuevo-centro-integrado-de-informacion-de-traffic>
- Amar Flórez, D. (2016). *International Case Studies of Smart Cities: Medellín, Colombia* (Discussion Paper N° IDB-DP-443). Inter-American Development Bank. <https://publications.iadb.org/publications/english/document/International-Case-Studies-of-Smart-Cities-Medellin-Colombia.pdf>
- America Digital News (2020, May 9). Cómo Santiago se convirtió en la ciudad más inteligente de América Latina – Caso de éxito Programa Smart City Corfo. <https://news.america-digital.com/como-se-prepara-santiago-para-ser-una-ciudad-inteligente-caso-de-exito-programa-smart-city-corfo/>
- Anantasirikiat, S. & Attasivanon, T. (2021). Time to Boost Thailand-LAC Relationship. *International Studies Center (ISC) Points of View*, (5), July. <https://isc.mfa.go.th/en/content/time-to-boost-thailand-lac-relationship>

- APEC. (2021). *APEC Case Study: Best Practices of Smart Cities in the Digital Age*. APEC SOM Steering Committee on Economic and Technical Cooperation. https://www.apec.org/-/media/APEC/Publications/2021/8/Best-Practices-of-Smart-Cities-in-the-Digital-Age/221_SCE_APEC-Smart-Cities.pdf
- Bouskela, M., Casseb, M., Bassi, S., De Luca, C. & Facchina, M. (2016). *La ruta hacia las Smart Cities. Migrando de una gestión tradicional a la ciudad inteligente*. Banco Interamericano de Desarrollo. <https://publications.iadb.org/publications/spanish/document/La-ruta-hacia-las-smart-cities-Migrando-de-una-gesti%C3%B3n-tradicional-a-la-ciudad-inteligente.pdf>
- Cahyadi, A. (2021, June 15). BRI Agro, Telkom, iGrow dan Kedai Sayur Kolaborasi Bangun Ekosistem Digital Pertanian. *Investor.id*. <https://investor.id/finance/bri-agro-telkom-igrow-dan-kedai-sayur-kolaborasi-bangun-ekosistem-digital-pertanian>
- Constantini, A. & Rangel, F. (2021). Las ‘Smart Cities’ Mexicanas. *Expansión*. <https://expansion.mx/tecnologia/2021/05/26/las-ciudades-inteligentes-en-mexico>
- Devanesan, J. (2020). Cambodia is optimizing farming yields with big data insights. *Tech Wire Asia*. <https://techwireasia.com/2020/10/cambodia-is-optimizing-farming-yields-with-big-data-insights/>
- Dezan Shira & Associates.(2021). Why the Agtech Industry Will Aid Vietnam’s Hi-Tech Growth. *Vietnam Briefing*. https://www.vietnam-briefing.com/news/why-agtech-industry-will-aid-vietnams-hi-tech-growth.html/?_cldee=c3RlcnplcnNIYmFzdGhbkBnbWFpbC5jb20%3d&recipientid=lead-2210b6d24fa6e811a96c000d3aa306f0-aecc8dbe50_ea4c_549688_e30cbb9e931d&utm_source=Click_Dimensions&utm_medium=email&utm_campaign=Local%20Vietnam%20market%202019&esid=0f8de39a-42d2-eb11-bacc-000d3aa12540
- ECLAC. (2021). *Foreign Direct Investment in Latin America and the Caribbean, 2021 (LC/PUB.2021/8-P)*, Santiago, 2021.
- Elms, D. (2020). *Impact of the ASEAN Economic Community and implications for Latin America* (Project Documents LC/TS.2020/148). Economic Commission for Latin America and the Caribbean (ECLAC).
- FAO. (2020). *Enabling agricultural innovation systems to promote appropriate technologies and practices for farmers, rural youth, and women during COVID-19*. FAO. <https://doi.org/10.4060/ca9470en>

- Goldblatt, R., Kaiser, K., Tran, H.T.L. & Vu, K. (2018). Artificial intelligence for smart cities: insights from Ho Chi Minh City's spatial development. *Data Blog*, The World Bank Blogs. <https://blogs.worldbank.org/opendata/artificial-intelligence-smart-cities-insights-ho-chi-minh-city-s-spatial-development>
- Hidayat, F. (2021, May 5). Studi Oracle: Jakarta Menuju Smart City. *Berita Satu*. <https://www.beritasatu.com/digital/770093/studi-oracle-jakarta-menuju-smart-city>
- Instituto Interamericano de Cooperación para la Agricultura (2021). *Habilidades digitales en la ruralidad: un imperativo para reducir brechas en América Latina y el Caribe*. IICA, BID, Microsoft. <https://repositorio.iica.int/bitstream/handle/11324/14462/BVE21030190e.pdf?sequence=1>
- International Enterprise. (2016). IE Singapore signs MOU with Makassar City to help Singapore companies capture opportunities in smart city solutions. *IE Singapore Media Release*. https://www.nas.gov.sg/archivesonline/data/pdfdoc/20161114001/MR05116_IE%20Singapore%20signs%20MOU%20with%20Makassar%20City_2016%2011%2014.pdf
- Jones, M. (2020). BlocRice – Cambodia eyes blockchain in future of agriculture. *Tech Wire Asia*. <https://techwireasia.com/2020/07/blocrice-cambodia-eyes-the-future-of-blockchain-for-agriculture/>
- Joo, Y. M., & Tan, T. B. (2020). Smart cities in Asia: An introduction. In Y. M. Joo & T. B. Tan (Eds.), *Smart cities in Asia: Governing development in the era of hyper-connectivity* (1-17). Edward Elgar Publishing. <https://doi.org/10.4337/9781788972888.00007>
- Li, S.P. (2020). *Thai agritech startup raises \$2m in pre-Series A round*. *Nikkei Asia*. <https://asia.nikkei.com/Business/36Kr-KrASIA/Thai-agritech-startup-raises-2m-in-pre-Series-A-round>
- Linders, D. (2016). Smart Cities. *World Development Report 2016* (World Bank), 240-242. https://documents1.worldbank.org/curated/en/896971468194972881/310436360_201602630200228/additional/102725-PUB-Replacement-PUBLIC.pdf
- Loukos, P. & Arathoon, L. (2021). *Landscaping the agritech ecosystem for smallholder farmers in Latin America and the Caribbean*. Inter-American Development Bank. <https://publications.iadb.org/publications/english/document/Landscaping-the-Agritech-Ecosystem-for-Smallholder-Farmers-in-Latin-America-and-the-Caribbean.pdf>
- Malaysia Digital Economy Corporation. (2021). MDEC and CIMB Islamic sign MOU providing RM25 million to scale Agtech pilot. *MDEC News*. <https://mdec.my/news/mdec-and-cimb-islamic-sign-mou-providing-rm25-million-to-scale-agtech-pilot/>

- Martinus, M. (2020a). ASEAN Cities: Putting the Smarts into the Fight Against Covid-19. <https://www.iseas.edu.sg/media/commentaries/asean-cities-putting-the-smarts-into-the-fight-against-covid-19/>
- Martinus, M. (2020b). ASEAN Smart Cities Network: A Catalyst for Partnerships. *ISEAS Perspective*, (32), 1-10. https://www.iseas.edu.sg/wp-content/uploads/2020/02/ISEAS_Perspective_2020_32.pdf
- Maxwell, M. (2020). New venture draws Asian agtech firms to Colombia. *EUROFRUIT*. <http://www.fruitnet.com/americafruit/article/182354/new-venture-draws-asian-agtech-firms-to-colombia>
- McKinsey Global Institute.(2018). *Smart Cities in Southeast Asia*. McKinsey & Company. <https://www.mckinsey.com/~media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Smart%20cities%20in%20Southeast%20Asia/MGI-Smart-Cities-in-SouthEast-Asia.PDF>
- Mèrcher, L., Bernardo, G., & Zampier da Silva, E. (2019). *South American Borderline Cities: the Mercocities Initiatives*(UNU-CRIS Working Papers). United Nations University Institute on Comparative Regional Integration Studies.
- Ministry of Foreign Affairs of the Kingdom of Thailand. (2020). Director-General of the Department of American and South Pacific Affairs discussed with the Ambassadors of the Group of Latin American and Caribbean Countries. *News, Press Release*.<https://www.mfa.go.th/en/content/175-2563-2>
- Palacio Cortés, C. (2019). Gobernanza: base en la estrategia de ciudades inteligentes. El caso Argentino de País Digital. *SMART CITY EXPO CURITIBA 2019*. https://www.argentina.gob.ar/sites/default/files/estrategia_argentina_de_ciudades_inteligentes.pdf
- Pennington, J. (2019). Is ASEAN doing enough to harness agritech's potential? *ASEAN Today*. <https://www.aseantoday.com/2019/02/is-asean-doing-enough-to-harness-agritechs-potential/>
- Pramudita, B.A. (2021). Jelang Terima Pendanaan, Tani HubKlaim Akan Jadi AgTech Terbesar Se-Asia Tenggara. *Warta Ekonomi*. <https://www.wartaekonomi.co.id/read323980/jelang-terima-pendanaan-tanihub-klaim-akan-jadi-agtech-terbesar-se-asia-tenggara>
- Schreiner, C. (2016). *International Case Studies of Smart Cities: Rio de Janeiro, Brazil* (Discussion Paper N° IDB-DP-447). Inter-American Development Bank. <https://publications.iadb.org/publications/english/document/International-Case-Studies-of-Smart-Cities-Rio-de-Janeiro-Brazil.pdf>

- Shalini, J. J. (2020). Agritech and the future of farming in Southeast Asia. *TELECOM Review Asia*. <https://www.telecomreviewasia.com/index.php/news/featured-articles/1829-agritech-and-the-future-of-farming-in-southeast-asia> the Mercocities Initiatives. *Working Paper Series*, W-2019/9. <https://cris.unu.edu/sites/cris.unu.edu/files/W-2019-9.pdf>
- UNCTAD. (2021). *Commodities and Development Report 2021: Escaping from the Commodity Dependence Trap through Technology and Innovation*. UN, UNCTAD. https://unctad.org/system/files/official-document/ditccom2021d1_en.pdf
- United Nations Human Settlements Programme. (2020). *World Cities Report 2020: The Value of Sustainable Urbanization*. https://unhabitat.org/sites/default/files/2020/10/wcr_2020_report.pdf
- Vineles, P. (2019). Realising smart cities in ASEAN. *East Asia Forum*. <https://www.eastasiaforum.org/2019/03/21/realising-smart-cities-in-asean/>
- Walker, J. (2019). Smart City Artificial Intelligence Applications and Trends. *Emerj, Artificial Intelligence Research*. <https://emerj.com/ai-sector-overviews/smart-city-artificial-intelligence-applications-trends/>
- World Trade Organization. (2020). *World Trade Report 2020: Government policies to promote innovation in the digital age*. WTO. https://www.wto.org/english/res_e/booksp_e/wtr20_e/wtr20_e.pdf