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ORIGINAL ARTICLE

Smart Cities and International Trade Law

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Abstract

A 'smart city' is a buzz term and concept. The 'smart city' has mainly been discussed in the scholarly literature on urban planning, architecture, and geography. While the 'smart city' has been under-analyzed in international trade law, the term 'smart city' is commonly used in Asian trade policies. The Association of Southeast Asian Nations (ASEAN) established the 'ASEAN Smart Cities Network' and the 'smart city' is now an important market opportunity for exporting smart technologies and services to ASEAN. Against this backdrop, this article addresses how smart cities can be regulated and governed by international trade law. The trade law perspective facilitates a broader understanding of smart city governance, which includes under-explored 'global' regulatory dimensions concerning the interaction between local governments and foreign firms. This article selects three relevant trade areas for discussions: (1) Internet of Things in the context of trade in goods and services; (2) international standard-setting activities; and (3) data governance. It further considers what kinds of regulatory issues international smart city projects can add to the current digital trade discourse. Drawing on the smart city literature, the article points out additional problems concerning security and privacy that have not yet been acknowledged in digital trade.

Keywords: smart cities; ASEAN; internet of things; international standards; digital trade; security and privacy

1. Introduction

A 'smart city' is a buzz term and concept. The 'smart city' has mainly been discussed in the scholarly literature on urban planning, architecture, and geography. In the smart city literature, there has been a long-standing discussion about the concept of smart cities that arose from concerns over the relationship between high-tech companies, information and communication technologies (ICT), and society. The debate started in the 2000s; early critiques cautioned that smart city initiatives were a form of 'business-led urban development'.[1] The debate continued in the 2010s: scholarship warned that high-tech companies' smart city discourse was 'utopian storytelling',[2] and also criticized smart city research for 'one-size fits all narratives [to urban problems], an absence of in-depth empirical case studies … and comparative research that contrasts smart city developments in different locales'.[3]

[1]R.G. Hollands (2008) 'Will the Real Smart City Please Stand Up? Intelligent, Progressive or Entrepreneurial?', *City* 12(3), 303, 308.

[2]O. Söderström et al. (2014), 'Smart Cities as Corporate Storytelling', *City* 18(3), 307, 315.

[3]R. Kitchin (2015) 'Making Sense of Smart Cities: Addressing Present Shortcomings', *Cambridge Journal of Regions, Economy, and Society* 8(1), 131, 132.

The utopian vision of smart cities is over.[4] Recently, it is argued that 'far from being the imagined utopia of a few years ago, it is a reality in many cities around the world'.[5] In the past, the academic debate over smart cities in Europe and North America addressed high-profile cases, such as London, Amsterdam, Barcelona, New York, and Chicago; however, smart cities are becoming an increasingly real choice for local governments.[6] Smart cities can be possible solutions for implementing the Sustainable Development Goals[7] or responding to changes in city life post the COVID-19 pandemic.[8] Accordingly, smart cities are happening at 'ordinary' cities and also bring business opportunities in Asia. For example, the term 'smart city' is commonly used in Asian trade policies.[9] The Association of Southeast Asian Nations (ASEAN) established the 'ASEAN Smart Cities Network' to promote regional cooperation in smart city projects.[10] For Japan, China, and Korea, the 'smart city' is now an important market opportunity for exporting smart technologies and services to ASEAN. In particular, China is the most active player in supporting smart city projects abroad in the context of the 'digital aspects' of China's 'Belt and Road' Initiative,of which 'Digital Silk Road' projects are one component. While China's 'Belt and Road' initiative refers to China's investment strategies to supply traditional infrastructure outside China,[11] 'Digital Silk Road' projects involve the supply of digital infrastructure (such as 5G networks) as well as e-commerce, mobile payments, and smart city projects.[12] There are a number of smart city projects which are led by Chinese big-tech corporations, such as the Alibaba and Huawei groups, along the 'Digital Silk Road'.[13]

[4]L. Mora and M. Deakin (2019) 'Moving beyond the Smart City Utopia', *Untangling Smart Cities*. Amsterdam: Elsevier.

[5]J. Reia and L.F. Cruz (2021) 'Seeing through the Smart City Narrative: Data Governance, Power Relations, and Regulatory Challenges in Brazil', in B. Haggart et al. (eds.), *Power and Authority in Internet Governance: Return of the State?* Abingdon: Routledge, 219.

[6]For the review research on 'world-class' smart cities, see e.g. M. Angelidou (2017) 'The Role of Smart City Characteristics in the Plans of Fifteen Cities', *Journal of Urban Technology* 24(4), 3–28. However, the smart city literature now turns to study smart urbanization in 'ordinary' cities. A. Karvonen et al. (2018) 'Introduction: Situating Smart Cities', in Andrew Karvonen et al. (eds.), *Inside Smart Cities: Place, Politics, and Urban Innovation*. New York: Routledge, 4. Furthermore, the critical literature emphasizes the importance of smart city case studies outside of Global North, including smart cities that are politically and socially different. See e.g., R. Burns et al. (2021) 'Smart Cities: Between Worlding and Provincialising', *Urban Studies* 58(3), 461, 462. See also, A. Datta and A. Shaban (2017) *Mega-Urbanization in the Global South: Fast Cities and New Urban Utopias of the Postcolonial State*. London: Routledge. The proliferation of international smart city projects in Asia can be also situated in this smart city research trend.

[7]Y. Naiki (2023) 'International Standardization in the Era of Sustainable Development Goals: Smart Cities, the Circular Economy, and Digitalization', in D. Yokomizo et al. (eds.), *Changing Orders in International Economic Law: A Japanese Perspective*. Oxon: Routledge.

[8]See e.g., K.R. Kunzmann (2020) 'Smart City After Covid-19: Ten Narratives', *disP – The Planning Review* 56(2), 20–31.

[9]Asia-Pacific Economic Cooperation (APEC) member economies have also discussed the ideas of smart city solutions and shared their smart city experiences. See, APEC Case Study: Best Practices of Smart Cities in the Digital Age (July 2021), www.apec.org/docs/default-source/Publications/2021/8/Best-Practices-of-Smart-Cities-in-the-Digital-Age/221_SCE_APEC-Smart-Cities.pdf; Promoting Smart Cities through Quality Infrastructure Investment in Rapidly Urbanizing APEC Region (December 2021), www.apec.org/docs/default-source/publications/2021/12/promoting-smart-cities-through-quality-infrastructure-investment-in-rapidly-urbanizing-apec-region/221_cti_promoting-smart-cities-through-quality-infrastructure-investment.pdf. I am grateful to Ying-Jun Lin for our helpful discussion about this.

[10]The ASEAN Smart Cities Network, https://asean.org/our-communities/asean-smart-cities-network/.

[11]For the reasons why China has focused on particularly supplying 'infrastructure', see W. Liang (2021) 'China and the "Belt and Road Initiative" (BRI): Contested Multilateralism and Innovative Institution-Building', in K. Zeng (ed.), *Handbook on the International Political Economy of China*. Cheltenham: Edward Elgar, 361, 370 (arguing that 'infrastructure projects have been carefully chosen by the Chinese government as the focus of the Belt and Road Initiative to fill the vacuum left by Western countries and multilateral development financing institutions').

[12]T.S. Eder et al. (2019) 'Networking the "Belt and Road": The Future is Digital', Mercator Institute for China Studies, www.merics.org/en/tracker/networking-belt-and-road-future-digital.

[13]For cases of China's smart-city technologies exports through Digital Silk Road, see e.g., M.S. Erie and T. Streinz (2021) 'The Beijing Effect: China's "Digital Silk Road" as Transnational Data Governance', *NYU Journal of International Law and Politics* 54(1), 1, 71.

Against this backdrop, this article explores how smart cities can be regulated and governed by international trade law. The proliferation of smart city initiatives (from high-profile to ordinary ones) with emerging technologies has not only expanded research in urban planning and architecture but has also gradually inspired legal research. It has been an issue in domestic public law to consider how local governments regulate smart city development.[14] International trade law also matters for smart cities; however, it is under-analyzed.[15] The trade law perspective facilitates a broader understanding of smart city governance, which includes 'global' regulatory dimensions because international smart city projects inevitably involve the interaction between local governments and foreign firms. This article argues that smart cities can be analyzed from three issue areas of trade regulation: trade in goods and services, international standards, and data governance (although these three issues are interrelated). Especially, the data governance aspect is important in the smart cites context because, for urban solutions, artificial intelligence (AI) and big data are key 'smart' technologies, and it is here where privacy and security issues come in.

The remainder of this article is organized as follows. Section 2 unpacks the concept of smart cities and situates them within the context of global trade. Then, Section 3 examines smart cities in terms of trade in goods and services. In particular, this section focuses on incorporating and applying the Internet of Things (IoT) in smart cities. Section 4 addresses international standard-setting activities for smart cities, which have flourished but are becoming increasingly complex. This section considers how to address standard-setting games for smart cities among stakeholders under international trade law. Section 5 focuses on the data governance aspects of smart cities and examines the current regulatory situation with a focus on the Digital Economy Partnership Agreement (DEPA). This section examines to what extent provisions under existing digital economy agreements are relevant to international smart city projects and further considers what kinds of regulatory issues smart city governance can add to (or go beyond) the traditional digital trade discourse. Drawing on the smart city literature in urban planning and architecture, the section discusses additional questions concerning security and privacy that have been under-explored in digital trade. Section 6 concludes.

2. What are Smart Cities? – Definition and Context

As noted above, there has been a long-standing scholarly debate over the concept of smart cities.[16] This article is not a place for a historical review of the definition and concept of smart cities; instead, it may be helpful to look at the recent trends in smart city definitions. For example, the Organisation for Economic Co-operation and Development (OECD) recently discussed smart cities. The 2019 OECD report defines smart cities as 'initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process'.[17] The report explains that 'while digital innovation remains central to the smart city concept', this definition focuses on 'the life of people' and emphasized 'the importance of citizen engagement'.[18]

[14]See e.g., A. Voorwinden (2022) 'Regulating the Smart City in European Municipalities: A Case Study of Amsterdam', *European Public Law* 28(1), 155.

[15]For a similar research interest and inspiring approach to link trade and emerging technologies, see H-W. Liu and C-F. Lin (2020) 'Artificial Intelligence and Global Trade Governance: A Pluralist Agenda', *Harvard Journal of International Law* 61(2), 407.

[16]The 'smart city' concept has been debated in the literature for a decade. See e.g., V. Albino et al. (2015) 'Smart Cities: Definitions, Dimensions, Performance, and Initiative', *Journal of Urban Technology* 22(1), 3; M. Höjer and J. Wangel (2014) 'Smart Sustainable Cities: Definition and Challenges', in L.M. Hilty and B. Aebischer (eds.), *ICT Innovations for Sustainability*. Cham: Springer, 333; C. Manville et al. (2014) 'The Definition of a Smart City and Its Characteristics', *Mapping Smart Cities in the EU* (European Parliament), www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET(2014)507480_EN.pdf.

[17]OECD (2019) *Enhancing the Contribution of Digitalisation to the Smart Cities of the Future*, at 7.

[18]Ibid.

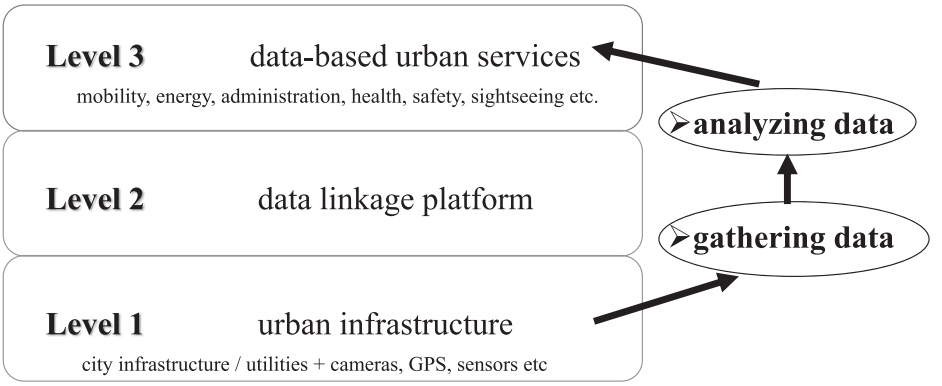

Figure 1. Three-Layered System of Smart Cites.
Source: Created by the author based on The Cabinet Office, Japan, National Strategic Special Zones, Super City Initiative, www.chisou.go.jp/tiiki/kokusentoc/english/super-city/index.html.

This understanding of smart cities has resonated with the scholarly debate in urban studies on the concept of 'human-centric' smart cities.[19]

ASEAN also provides a concept of smart cities. Among ASEAN countries, Singapore has taken the lead in promoting regional urban connectivity through smart city development.[20] In the 2018 ASEAN Summit, Singapore proposed the 'ASEAN Smart Cities Network'.[21] ASEAN identifies three objectives for smart city development: competitive economy, sustainable environment, and high quality of life.[22] Under these objectives, there are six targeted areas for smart city development: (1) civic and social, (2) health and well-being, (3) safety and security, (4) quality of the environment, (5) built infrastructure, and (6) industry and innovation.[23] ASEAN's objectives and targeted areas for smart cities indicate that Asian smart cities are more rooted in 'problem-oriented' projects; that is, in Asia, smart cities are tools to solve specific urban problems.

However, these definitions and concepts may not convey the real image of how smart city projects are actually exported aboard. On this point, it might be useful to conceive of smart cities as a three-layered system (Figure 1).[24] First, the bottom layer (layer 1) consists of city infrastructure and utilities (such as energy management systems, water and waste management systems, and public transportation controls), linked to digital equipment (mobile phones, meter readings, cameras, GPS, sensors etc). Second, in the middle layer (layer 2), data are collected via digital equipment, and connected and integrated by software and applications on a platform. Finally, in the top layer (layer 3), data-based urban services are offered in multiple sectors, such as mobility, energy, administration, health, safety, and sightseeing. What makes smart cities different from ordinary cities is the 'data management' aspect.[25] Here, AI and big data emerge. Ultimately,

[19]S. Andreani et al. (2019) 'Reframing Technologically Enhanced Urban Scenarios: A Design Research Model towards Human Centered Smart Cities', *Technological Forecasting & Social Change* 142, 15; Forbes (2019) 'Japan Sparks New Life in Local Communities with Human-Centric Smart Cities' (23 December 2019), www.forbes.com/sites/japan/2019/12/23/japan-sparks-new-life-in-local-communities-with-human-centric-smart-cities/?sh=61f66e254398.

[20]T.W. Lim (2019) 'Smart Cities in East Asia: ASEAN–China Cooperation in the BRI and Its Digital Nexus', in Y. Yue and L. Fujian (eds.), *The Belt and Road Initiative: ASEAN Countries' Perspectives*. New Jersey: World Scientific, 258.

[21]See Singapore's Concept Note on ASEAN Smart Cities Network (18 March 2018), https://asean.org/wp-content/uploads/2019/02/ASCN-Concept-Note.pdf.

[22]ASEAN, ASEAN Smart Cities Framework (8 July 2018), paras.6–8, https://asean.org/wp-content/uploads/2021/09/ASEAN-Smart-Cities-Framework.pdf.

[23]Ibid., paras. 13–18. See also, Ministry of Foreign Affairs, Singapore, ASEAN Smart Cities Network, at 11, www.clc.gov.sg/docs/default-source/books/book-asean-smart-cities-network.pdf.

[24]See e.g., The Cabinet Office, Japan, National Strategic Special Zones, Super City Initiative, www.chisou.go.jp/tiiki/kokusentoc/english/super-city/index.html.

[25]T. Braun et al. (2018) 'Security and Privacy Challenges of Smart Cities', *Sustainable Cities and Society* 39, 499, 504.

AI and big data are key technologies for urban solutions. 'Smart' technologies usually refer to three elements of technology: collection of data, data processing, and automation of decision-making (using AI) to deliver urban services.[26]

Ideally, the multiple sectors (e.g., mobility, energy, and sightseeing) in layer 3 are all integrated by a data platform created at layer 2. However, the smart city literature has noted that, far from a holistic approach, past smart city initiatives tended to choose only one or two sectors. Thus, not all smart city projects have completed the three-layered system; rather, very few smart cities have achieved such a 'data-centric' and 'interconnected' smart city.

Each smart city project entails unique features and various development pathways – thus, smart cities differ from country to country, and within countries. For example, under the 'ASEAN Smart Cities Network', currently, 26 pilot cities have been launched under the Network.[27] The 26 pilot cities include large Asian cities, such as Bangkok, Singapore, Kuala Lumpur, and Mania. However, there are also new cities; for example, Siem Reap in Cambodia. The Japanese government provides smart city technologies and infrastructure to Siem Reap through the Japan International Cooperation Agency.[28] In Siem Reap, there is an iconic temple 'Angkor Wat', identified as a world heritage site; therefore, tourism has been growing as its main industry.[29] However, the city infrastructure and utilities have not been prepared to receive a number of tourists from aboard and are unable to handle rapid urbanization.[30] Thus, the city needs infrastructure, such as public transport and waste management systems (layer 1). At the same time, the city of Siem Reap is interested in gathering data on tourists (layer 2).[31] Here, data issues will arise. As will be discussed later (in Section 5), privacy issues need to be addressed when collecting data, with the questions on how to share and use the data among relevant stakeholders.

As such, there are various development stages for smart city projects, each interacting at different layer levels. While the reality of smart city projects varies, this three-layered system involves certain elements of international trade law, such as trade in goods and services, international standards, and data governance. In the law of the World Trade Organization (WTO) and in free trade agreements (and even digital economy agreements as will be discussed later), no rules directly mention smart cities. At the international-level agreement, the 2019 G20 Osaka Leaders' Declaration briefly touched upon smart cities: one paragraph in the section addressing 'Innovation: Digitalization, Data Free Flow with Trust' mentioned smart cities along with the issues of AI principles and the promotion of digital security.[32] Thus, while there are no direct

[26]A. Voorwinden (2021) 'The Privatised City: Technology and Public–Private Partnerships in the Smart City', *Law, Innovation and Technology* 13(2), 439, 440 (referring to Mireille Hildebrandt, *Smart Technologies and the End(s) of Law: Novel Entanglements of Law and Technology*. Cheltenham: Edward Elgar Publishing, 2015). See also, A. Smart and D. Curran (2022) 'Prospects and Social Impact of Big Data-Driven Urban Governance in China: Provincializing Smart City Research', in W. Wu and Q. Gao (eds.), *China Urbanizing: Impacts and Transitions*. Philadelphia: University of Pennsylvania Press, 205, 210.

[27]ASEAN Smart Cities Network Website, https://asean.org/our-communities/asean-smart-cities-network/. The discussion of challenges in these pilot cities is beyond the scope of this article. For the realities and difficulties of implementing the projects, see L. Kong and O. Woods (2021) 'Scaling Smartness, (De)provincialising the City? The ASEAN Smart Cities Network and the Translational Politics of Technocratic Regionalism', *Cities* 117, 103326.

[28]For the JICA's smart-city cooperation with Asia, see JICA Magazine, *SMART CITIES for a Brighter Future,* No. 2 (October, 2021), https://jicamagazine.jica.go.jp/en/cms/wp-content/uploads/2021/08/2110en.pdf. See also, M. Zappa (2020) 'Smart Energy for the World: The Rise of Technonationalist Discourse in Japan in the Late 2000s', *International Quarterly for Asian Studies* 51(1–2), 193.

[29]See Ministry of Foreign Affairs, Singapore (2018) ASEAN Smart Cities Network, at 50 ('Siem Reap is looking at a Smart Tourist Management System to assist in handling the increasing number of tourists who visit the city and affect local residents' amenity.'), www.clc.gov.sg/docs/default-source/books/book-asean-smart-cities-network.pdf.

[30]For the JICA's smart-city cooperation with Siem Reap (in Japanese), www.jica.go.jp/Resource/project/cambodia/036/outline/index.html.

[31]JICA, Takamatsu smart-city officials visited Siem Reap (7 February 2022) (in Japanese), www.jica.go.jp/Resource/project/cambodia/036/news/20230207.html.

[32]Ministry of Foreign Affairs, Japan, 'G20 Osaka Leaders' Declaration' (29 June 2019), para.12 ('We reaffirm the importance of bridging the digital divide and fostering the adoption of digitalization among micro, small and medium enterprises

provisions addressing smart cities in existing trade law, this article considers which aspects of international trade law would apply to smart cities as a layered system.

However, one may question how international trade law, which principally binds states,[33] affects the engagement of local governments in smart city projects. There are two dimensions to answer this question. First, according to WTO jurisprudence, state parties are not precluded from being found to be inconsistent with WTO law because the dispute is concerned with sub-national or provincial measures.[34] In this sense, international trade law directs central and local governments. Second, while the main stakeholders in smart city projects are local governments and firms, in the Asian context, states (rather than cities) initially support and promote foreign smart city projects. In the 'ASEAN Smart Cities Network', Singapore's leadership has been echoed by other countries' incentives to export infrastructure and smart technologies to Asia. For example, Japan has formed a mutual partnership with ASEAN to support smart city initiatives, by assisting in project planning and formation and offering financial support.[35] In addition, Korea, China, and Australia are active players in supporting smart city development in ASEAN.[36] Thus, legal provisions at the state level matter and can assist in enabling international smart city projects. This article will now turn to consider how to regulate international smart city projects under international trade law.

3. Smart Cities, IoT, and Trade in Goods and Services

The three-layered vision of smart cities indicates a regulatory complex for smart cities. The complexity is concerned with the distinction between 'goods' and 'services' that has been debated in international trade law against the background of an increase in dual-feature businesses in the ICT sector.[37] On this point, smart city projects are generally a package of 'goods' and 'services' – while layer 3 addresses 'services', layer 1 deals both with 'goods' and related 'services'. Layer 2 also involves 'services': when firms engage in the development of software/applications for foreign smart city projects, they participate in 'services'.[38] For firms, the most common way to participate in international smart city projects is to export urban infrastructure/digital equipment (layer 1) or become involved in the development of software or applications (layer 2). Simultaneously, there

(MSMEs) and all individuals, particularly vulnerable groups and also encourage networking and experience-sharing among cities for the development of smart cities.'), www.mofa.go.jp/policy/economy/g20_summit/osaka19/en/documents/final_g20_osaka_leaders_declaration.html.

[33]J.E. Viñuales and L.L. Reimers (2021) 'The Law of Economic Globalization and Cities', in H. P. Aust and J.E. Nijman (eds.), *Research Handbook on International Law and Cities*. Cheltenham: Edward Elgar, 279, 282–284.

[34]See, Uruguay Round Agreement on Understanding on the Interpretation of Article XXIV of the GATT 1994 (Art. XXIV.12: 'Each Member is fully responsible under GATT 1994 for the observance of all provisions of GATT 1994, and shall take such reasonable measures as may be available to it to ensure such observance by regional and local governments and authorities within its territory.') In this regard, while the GATS clearly stipulates that 'measures by Members' include 'central, regional of local governments and authorities', it also contains a similar provision: 'In fulfilling its obligations and commitments under the Agreement, each Member shall take such reasonable measures as may be available to it to ensure their observance by regional and local governments and authorities … ' (Art. 1.3 (a)).

[35]See activities by the Japan Association for Smart Cities in ASEAN, www.jasca2021.jp/.

[36]See e.g., 'WeGO Promotes ASEAN Smart City Cooperation with Korean Partners' (8 September 2021), https://we-gov.org/news-2021/wego-promotes-asean-smart-city-cooperation-with-korean-partners/; 'ASEAN–China Leaders' Statement on Smart City Cooperation Initiative' (3 November 2019), https://asean.org/wp-content/uploads/2019/11/Final-ASEAN-China-Leaders-Statement-on-Smart-City-Cooperation-Initiative-2.pdf; Asian Development Bank, 'ASEAN Australia Smart Cities Trust Fund' (April 2019), www.adb.org/what-we-do/funds/asean-australia-smart-cities-fund.

[37]See e.g., S. Peng (2020) 'A New Trade Regime for the Servitization of Manufacturing: Rethinking the Goods-Services Dichotomy', *Journal of World Trade* 54(5) 669; R.S. Neeraj (2019) 'Trade Rules for the Digital Economy: Charting New Waters at the WTO', *World Trade Review* 18(S1), S121.

[38]According to the service classification, 'computer and related services' include 'software implementation services', which involve all services related to 'consultancy services on, development and implementation of software'. See WTO, Services Sectoral Classification List, MTN.GNS/W/120 (10 July 1991); UN Statistics Division, CPC, Provisional – Code 842, https://unstats.un.org/unsd/classifications/Econ/Detail/EN/9/842.

are cases in which one firm is in charge of the entire digitalization process (all three layers) for one city (e.g., the Sidewalk Labs smart-city project in Toronto, Canada[39]). Accordingly, firms may trade in both goods and services for foreign smart city projects.

Given the complexity of goods and services, the next sub-section starts by considering layers 1 and 2. Among various ICT (such as blockchains, AI, and machine learning), the deployment of IoT is the basis for layers 1 and 2 of a smart city. Here, it can be described that '[t]he Smart City uses both its own infrastructure network of sensors and data collection as well as those of private parties and the IoT'.[40] In the trading context, IoT systems incorporated into various smart goods/infrastructures are exported and applied to smart city projects. Accordingly, there are two points worth considering: how to regulate IoT incorporation/application in smart cities, and how (trade) agreements concerning digital commerce regulate IoT and smart cities.

3.1 Regulating the Incorporation and Applications of IoT and the Smart City

For a more precise understanding, the definition of IoT is provided by the International Organization for Standardization (ISO)[41] as follows: 'infrastructure of interconnected entities, people, systems and information resources together with services which processes and reacts to information from the physical world and virtual world'.[42] In addition, an IoT system is defined as a 'system providing functionalities of IoT'.[43] On this point, there is a note written that '[a]n IoT system can include, but not be limited to, IoT devices, IoT gateways, sensors, and actuators'.[44] Furthermore, an IoT device is defined as an 'endpoint that interacts with the physical world through sensing or actuating'.[45]

According to these definitions, in the context of smart cities, an IoT system can include (1) classic IT devices, such as smart phones and laptops; (2) smart devices, such as health devices, monitoring cameras, and drones with data-gathering and data-processing functions; and (3) smart infrastructure and networks, such as smart buildings and smart factories that interconnect information on energy use, air conditioning, or entry/exist. One noticeable point from the IoT definition is that IoT does involve 'services'. Accordingly, IoT can include data-gathering and processing services (as well as some kinds of ongoing management services based on these data) provided through smart devices (e.g. health devices, monitoring cameras, and drones) and smart infrastructure (e.g. smart buildings and smart factories).

This perspective of the IoT resonates with Chander's view that the IoT is regulated by both the General Agreement on Tariffs and Trade (GATT)[46] and the WTO's General Agreement on Trade in Services (GATS)[47] disciplines.[48] He suggests *China–Electronic Payment Systems* as a relevant WTO case, where the Panel admitted that an electronic payment 'system' can include services, such as, processing infrastructure and network, delivering information, and managing payment.[49] Chander finds that since 'it seems better to treat the service as bundled with the good itself at the

[39]However, since Sidewalk Labs smart-city project faced severe oppositions against its ambitious planning, the project was ended in May 2020. See K. Jacobs (2022) 'Toronto Wants to Kill the Smart City Forever', *MIT Technology Review* 125 (4), www.technologyreview.com/2022/06/29/1054005/toronto-kill-the-smart-city/.

[40]M.M. Losavio et al. (2018) 'The Internet of Things and the Smart City: Legal Challenges with Digital Forensics, Privacy, and Security', *Security and Privacy* 1(3), 1.

[41]ISO/IEC JTC 1/SC 41 deals with Internet of things and digital twin, www.iso.org/committee/6483279.html.

[42]ISO/IEC 20924:2024, Information Technology-Internet of Things-Vocabulary (February 2024), 3.2.8.

[43]Ibid., 3.2.15.

[44]Ibid., Note 1, 3.2.15.

[45]Ibid., 3.2.11.

[46]General Agreement on Tariffs and Trade, 30 October 1947, 55 U.N.T.S. 194.

[47]General Agreement on Trade in Services, 15 April 1994, 1869 U.N.T.S. 183.

[48]A. Chander (2019) 'The Internet of Things: Both Goods and Services', *World Trade Review* 18(S1), s9, s19.

[49]Panel Report, *China–Certain Measures Affecting Electronic Payment Services,* WT/DS413/R (31 August 2012), para. 7.41.

point of sale [of smart objects]', 'it makes sense to see a Smart Object as both a good and an ongoing service'.[50]

Furthermore, regulating IoT incorporation/applications necessarily involves addressing cybersecurity and privacy issues,[51] which are also concerned with international smart city projects. Cybersecurity concerns have increased in smart cites because 'critical services and infrastructure are digitally connected and data dependent on the smart network'.[52] As noted previously, Chinese big-tech corporations, such as Huawei, have been engaging in foreign smart city projects. Chinese companies' technologies and systems can spread through overseas smart city projects along the 'Digital Silk Road' under China's 'Belt and Road' Initiative.[53] Such business activities involve cybersecurity risks in IoT. On this point, we can recall that Huawei 5G devices have been banned by the US, Australia, Japan, and other countries.[54] However, under smart city projects backed up by a mutual agreement between China and other countries, such import bans on Chinese smart devices will not be applied based on certain trusts between the two countries. Regardless of smart city projects using Chinese devices, both city governments and companies doing business with smart IoT devices should ensure to 'insert cyber security in the process as design, deployment, and sustainment consideration for every new project'[55] in the age of 5G systems.

However, despite being proactive against security threats, privacy concerns arising from data gathered by smart IoT devices remain. This concerns how a city or central government regulates data issues, which are addressed in Section 5.

3.2 Agreements Concerning Digital Commerce and IoT

Second, it is important to examine e-commerce chapters under free trade agreements (in particular, this article looks at the Comprehensive and Progress Agreement for Transpacific Partnership [CPTPP, 2018][56] and Regional Comprehensive Economic Partnership [RCEP, 2022],[57] considering the context of smart city initiatives in ASEAN) and digital regulation under so-called Digital Economy Agreements (DEAs). Such agreements regulate digital commerce beyond WTO rules. In particular, DEAs are new and special agreements on digital trade that facilitate regulatory cooperation within the digital economy.[58] This article addresses five DEAs: (1) Agreement between the United States of America and Japan concerning Digital Trade (the US–Japan

[50]Chander, supra n. 48, s19.

[51]J. Trachtman (2019) 'Cybersecurity versus Trade in Internet of Things Products', *Manchester Journal of International Economic Law*, 16(3), 301; Chander, supra n. 48, at s12; Losavio et al., supra n. 40.

[52]Braun et al., supra n. 25, 504.

[53]For cases of China's smart city development abroad, Erie and Streinz, supra n. 13; P. Drahos (2021) *Survival Governance: Energy and Climate in the Chinese Century*. Oxford: Oxford University Press, 161–164; J. Kynge et al., (2021) 'Exporting Chinese Surveillance: The Security Risks of "Smart Cities"', *Financial Times* (9 June 2021), www.ft.com/content/76fdac7c-7076-47a4-bcb0-7e75af0aadab; C. Atha et al., *China's Smart Cities Development* (SOS International LLC, 2020), 78, www.uscc.gov/sites/default/files/China_Smart_Cities_Development.pdf.

[54]For trade tensions between China and those countries arising out of Huawei's technology and national security issues, see e.g., G. Shaffer (2021) 'Trade Law in a Data-Driven Economy: The Need for Modesty and Resilience', *World Trade Review* 20(3), 259, 276; W. Zhou et al. (2023) 'Trade vs. Security: Recent Developments of Global Trade Rules and China's Policy and Regulatory Responses from Defensive to Proactive', *World Trade Review* 22(2), 194.

[55]T. Wheeler and D. Simpson (2019), 'Why 5G Requires New Approaches to Cybersecurity', Brookings Research (3 September 2019), www.brookings.edu/articles/why-5g-requires-new-approaches-to-cybersecurity/#:~:text=5G%20expands%20cyber%20risks,%2C%20software%2Ddefined%20digital%20routing.

[56]Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) (30 December 2018, in force), https://mfatgovtnz2020.cwp.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/cptpp/.

[57]Regional Comprehensive Economic Partnership Agreement (RCEP) (1 January 2022, in force), https://rcepsec.org/legal-text/.

[58]For a definition of digital trade and the scope of digital trade law, see M. Burri and A. Chander (2023) 'What are Digital Trade and Digital Trade Law', *AJIL Unbound* 117, 99.

Digital Trade Agreement, 2020);[59] Australia–Singapore Digital Economy Agreement (the Australia–Singapore DEA, 2020);[60] Digital Economy Partnership Agreement between Singapore, Chile and New Zealand (the DEPA, 2020);[61] Digital Economy Agreement between the United Kingdom of Great Britain and Northern Ireland and the Republic of Singapore (the UK–Singapore DEA, 2022);[62] and Digital Partnership Agreement between the Government of the Republic of Korea and the Government of the Republic of Singapore (the Korea–Singapore DPA, 2023).[63]

Among the CPTPP, RCEP, and five DEAs, only the UK–Singapore DEA uses the term of 'IoT' (under the cybersecurity and AI provisions). Other agreements do not use the term 'IoT'; instead, the term 'digital products' is used. The definition of 'digital products' is almost the same wording among the agreements (except for the RCEP and the UK–Singapore DEA, without a definition); 'digital products' includes 'a computer programme, text, video, image, sound recording or other product that is digitally encoded, produced for commercial sale or distribution, and that can be transmitted electronically'.[64] This definition is usually accompanied by a note: 'The definition of digital product should not be understood to reflect a Party's view on whether trade in digital products through electronic transmission should be categorised as trade in services or trade in goods'.[65] Again, the boundaries between goods and services remain open.

While there are variations in the regulatory topics for e-commerce chapters under free trade agreements and DEAs, there are some common rules across the agreements concerning digital products. One common rule across the agreements concerns 'no customs duties on electronic transmissions'.[66] Another common rule across the agreements may be the 'non-discriminatory treatment of digital products'.[67] However, the RCEP and the UK–Singapore DEA do not contain this rule. One research suggests that the non-discrimination principle for digital products is not so obvious among trade agreements because of digital products' intangible character and diversity in consumption behavior, which makes it difficult to assess 'like product' criteria under the principle.[68] Data issues in the agreements are addressed in Section 5.

4. International Standard-Setting Activities Relevant to Smart Cities

4.1 International Trade Rules on International Standards

To address the question of how smart cities are regulated under international trade law, setting international standards for smart cities is the most active area to explore. What is the role of international standards for firms participating in overseas smart city projects? As the international

[59]Agreement between the United States of America and Japan concerning Digital Trade (US–Japan Digital Trade Agreement) (1 January 2020, in force), https://ustr.gov/countries-regions/japan-korea-apec/japan/us-japan-trade-agreement-negotiations/us-japan-digital-trade-agreement-text.

[60]Australia–Singapore Digital Economy Agreement (Australia–Singapore DEA) (8 December 2020, in force), www.dfat.gov.au/trade/services-and-digital-trade/australia-and-singapore-digital-economy-agreement.

[61]Digital Economy Partnership Agreement between Singapore, Chile and New Zealand (DEPA) (28 December 2020, in force), www.mti.gov.sg/Trade/Digital-Economy-Agreements/The-Digital-Economy-Partnership-Agreement.

[62]Digital Economy Agreement between the United Kingdom of Great Britain and Northern Ireland and the Republic of Singapore (UK–Singapore DEA) (14 June 2022, in force), www.gov.uk/government/collections/uk-singapore-digital-economy-agreement.

[63]Digital Partnership Agreement between the Government of the Republic of Korea and the Government of the Republic of Singapore (Korea–Singapore DPA) (14 January 2023, in force), www.mti.gov.sg/Trade/Digital-Economy-Agreements/KSDPA.

[64]See e.g., CPTPP, art. 14.1.

[65]See e.g., CPTPP, art. 14.1, note 3.

[66]See e.g., CPTPP, art. 14.3.1; but see RCEP, art.12.11.1, which uses slightly different words that '[e]ach Party shall maintain its current practice of not imposing customs duties on electronic transmissions...'.

[67]See e.g., CPTPP, art. 14.4.

[68]J. Suh, J. Lee, and J. Roh (2023) 'On the Non-Discrimination Principles in Digital Trade', *World Trade Review* 23(1), 72, 77.

standardization literature explains, 'standard battles' occur among members (i.e., firms) of international standard-setting bodies. While international standard-setting bodies usually aim at reaching consensus among members, 'standardization is rarely about reaching compromise among different regulatory models and approaches … but instead about battles for preeminence of one approach or solution over another'.[69] Accordingly, when developing international standards, members of international standard-setting bodies attempt to shape standard content that reflects interests – for example, standards that reflect certain technologies or systems developed by a particular firm. This is based on the pursuit of a first-mover advantage, that is, minimizing switching costs to unfavorable international standards and gaining foreign market opportunities.[70] Thus, in the context of smart cities, if members succeed at developing international standards for smart cities reflecting their interests, the firms will have an advantage over participation in overseas smart city projects, insisting that their technologies and systems are accepted as international standards.

This advantage is further underpinned by the WTO Agreement which encourages WTO Members to consider the existence of international standards. First, the WTO's Agreement on Technical Barriers to Trade (TBT Agreement)[71] is relevant in the context of international standardization in the ICT sector. The TBT Agreement requires WTO Members to base their domestic regulations on international standards if relevant standards exist except if such international standards are ineffective or inappropriate for fulfilling legitimate objectives (Art. 2.4). Furthermore, whenever a domestic technical regulation is in accordance with relevant international standards, 'it shall be rebuttably presumed not to create an unnecessary obstacle to international trade' (Art. 2.5). Thus, when firms export smart devices and infrastructure for overseas smart city projects, international standards aligned with their goods may promote exports.

GATS also addresses international standards. As noted, the sales of smart devices or smart infrastructure often entail data gathering and data processing services and some kinds of ongoing management services. In addition, when firms develop software/applications for foreign smart city projects, they participate in 'services'. On this point, GATS Article VI (5) states that WTO Members shall not nullify their specific GATS commitments by applying technical standards, and when conformity with this obligation is evaluated, international standards are taken into account. In this regard, the Joint Initiative on Services Domestic Regulation is also relevant. At the 12th WTO Ministerial Conference in 2021, a reference paper on services domestic regulation was adopted by a group of WTO Members under the Joint Initiative. According to that reference paper, Members shall encourage their domestic competent authorities or relevant international organizations 'to adopt technical standards developed through open and transparent processes'.[72]

Moreover, international standards are concerned with government procurement. When goods and services associated with smart cities fall under city governments' procurement processes, the WTO's Agreement on Government Procurement (GPA)[73] applies to GPA

[69]T. Büthe and W. Mattli (2011) *The New Global Rulers: The Privatization of Regulation in the World Economy*. Princeton: Princeton University Press, at 11.

[70]Ibid., at 9. See also, N. Brunsson and B. Jacobsson (2000) 'The Contemporary Expansion of Standardization', in Nils Brunsson et al. (eds.), *A World of Standards*. Oxford: Oxford University Press, 1, 9 ('A company may be very eager for its own particular solution to be accepted as the general standard: if it succeeds, it will have a great advantage over its competitors in the market-place … '); P. Delimatsis (2015) 'Introduction: Continuity and Change in International Standardisation', in P. Delimatsis (ed.), *The Law, Economics and Politics of International Standardisation*. Cambridge: Cambridge University Press, 1, 7 ('In standard-setting, firms that have launched alternative technologies typically compete for inclusion in a given standard that may consolidate the best available technology.')

[71]Agreement on Technical Barriers to Trade, 15 April 1994, 1867 U.N.T.S. 276.

[72]WTO, Joint Initiative on Services Domestic Regulation, WT/L/1129 (2 December 2021), para. 21, available at WTO news, Negotiations Services Domestic Regulation Conclude Successfully in Geneva (2 December 2021), www.wto.org/english/news_e/news21_e/jssdr_02dec21_e.htm.

[73]Agreement on Government Procurement (as amended on 30 March 2012), www.wto.org/english/docs_e/legal_e/rev-gpr-94_01_e.htm.

Members.[74] GPA Article X(2)(b) states that when a procuring entity prescribes technical specifications for the goods and services being procured, it is necessary to base these technical specifications on international standards.

Finally, a few DEAs include a provision on 'standards and conformity assessment'.[75] This provision generally highlights the importance of the role of standards and conformity assessment procedures in the digital economy and fosters cooperation in developing standards and procedures.

4.2 Complexities in International Standard-Setting for Smart Cities

In which forums have international standards for smart cities been developed? In the ICT sector, there are the 'big three' plus one, i.e., the well-known 'big four' international standard-setting bodies.[76] The 'big three' bodies are as follows: ISO, International Electrotechnical Commission (IEC), and International Telecommunication Union (ITU). The fourth body (or 'plus one' body) is the ISO/IEC Joint Technical Committee (JTC) 1, which was established in 1987, specializing in standardization for information technology.[77]

Although the ISO, IEC, and ITU are often collectively considered large international standard-setting bodies in the ICT sector, their memberships differ. Since the ITU is a specialized agency of the United Nations (UN), UN Member States are full participants in the standard development processes.[78] However, the ISO and IEC are often described as 'private organizations' or 'hybrid public–private bodies'[79] because their members are national standard-setting bodies (either public or private) and do not necessarily represent governments on their own.[80] One consequence of this difference is that, while ITU standards (which are termed 'recommendations') are available free of charge,[81] ISO and IEC standards are not.

Among the 'big four' forums, the ISO has been the most active in developing smart-city standards. ISO 37120 (Indicators for city services and quality of life) is one of the well-known ISO standards under ISO/TC 268 (first created in 2014, later updated in 2018).[82] This ISO

[74]As a WTO's 'plurilateral' Agreement, currently the GPA has 22 Parties. See WTO, 'What is the GPA?', www.wto.org/english/tratop_e/gproc_e/gp_gpa_e.htm. Parties are required to specify 'the sub-central government entities' and 'all other entities' whose procurement are covered by the GPA (Article II (4)).

[75]Australia–Singapore DEA, art. 30; Korea–Singapore DPA, art. 14.31; UK–Singapore DEA, art. 8.61–D.

[76]The term 'big four' is borrowed from C.B. Biddle (2018) 'No Standard for Standards: Understanding the ICT Standards-Development Ecosystem', in J.L. Contreras (ed.), *The Cambridge Handbook of Technical Standardization Law*. New York: Cambridge University Press, 17, 19.

[77]See JTC1, 'JTC 1 History', https://jtc1info.org/sd-2-history/.

[78]See ITU-T (Telecommunication Standardization Sector), FAQ 'How do Member States and Associates participate in the work of ITU-T?', www.itu.int/net/ITU-T/info/faqs.aspx. However, private actors (e.g. firms and industries) can become 'sectoral members' or 'associates', giving influences over the standard-setting process. ITU-T, FAQ 'Why Should My Company Become a Member of ITU-T?, www.itu.int/net/ITU-T/info/faqs.aspx. For the background of the ITU reform of private actors' participation, see W. Mattli (2003) 'Public and Private Governance in Setting International Standards', in M. Kahler and D.A. Lake, *Governance in a Global Economy: Political Authority in Transition*. Princeton: Princeton University Press, 199, 222–223.

[79]See e.g., H. Schepel (2006) 'The Empire's Drains: Sources of Legal Recognition of Standardisation under the TBT Agreement', in C. Joerges and E-U. Petersmann (eds.), *Constitutionalism, Multilevel Trade Governance and Social Regulation*. Oxford: Hart Publishing, 397, 403; G. Shaffer and J. Trachtman (2011) 'Interpretation and Institutional Choice at the WTO', *Virginia Journal of International Law* 52(1), 103, 113.

[80]International Organization for Standardization (2015) 'ISO Membership Manual', 6 ('ISO has one member per country … Many ISO Members are part of the government structure in their country or mandated by government. Others are private-sector organizations.'), www.iso.org/iso/iso_membership_manual.pdf. Similarly, 'one National Committee per country' can be a Member for the IEC. IEC, 'Who We Are' 'National Committees', www.iec.ch/national-committees#nclist.

[81]See ITU, 'ITU-T-Recommendations', www.itu.int/en/ITU-T/publications/Pages/recs.aspx.

[82]ISO/TC 268, *ISO37120: Sustainable Cities and Communities – Indicators for City Services and Quality of Life*, www.iso.org/obp/ui/#iso:std:iso:37120:ed-2:v1:en. Currently, this ISO standard is used by the World Council on City Data (WCCD) as

standard comprises about 100 indicators under 19 sectors relevant to city life.[83] It was originally developed at the University of Toronto in Canada, under the Global City Indicators Facility project.[84] Later, Canada took the initiative under the ISO/TC 268 to transform the University of Toronto's project into an ISO standard. Moreover, in 2019, a new complementary ISO standard was developed with a special focus on smart cities under TC 268/ WG2[85] – ISO 37122 (Indicators for Smart Cities).[86]

Another notable standardization activity is undertaken by the ITU (as noted, ITU standards are termed 'recommendations'). In 2016 and 2022, the ITU adopted three recommendations for 'Key Performance Indicators in Smart Sustainable Cities'.[87]

The importance of assessing smart city projects by indicators has been well recognized because indicators will help cities (1) define the goal they want to pursue; (2) quantify outcomes and measure their success or failure; and (3) compare themselves with other cities.[88] It is beyond the scope of this paper to review and analyze the vast array of smart-city indicators developed under the ISO and ITU; however, interesting comparative research has already been undertaken regarding these indicator standards in light of the areas covered (e.g., environment, transportation, waste, water, health, safety, etc.) and indicator types (e.g., indicators for measuring processes, results, or impacts, etc.).[89]

Finally, the ISO/IEC JTC1 is active in setting standards for smart cities. Under the JTC 1, several sub-committees and working groups are operating: in particular, working group 11 ('WG 11') was created in 2015 to deal with smart cities.[90] China has taken the lead in WG 11 as a convenor and secretary, and under its leadership, seven standards for smart cities have been published (as of September 2023), including smart city ICT indicators.[91] Indeed, the smart city is one of the topics on which China's presence in international standardization has received attention.[92] Notably, China has increased the number of its secretariat positions in the committees of

a baseline to compare and rank cities. WCCD, *About ISO 37120 – Indicators for Sustainable Cities*, www.dataforcities.org/iso-37120.

[83]Such 19 sectors are: economy, education, energy, environment, finance, governance, health, housing, population, recreation, safety, solid waste, sport/culture, telecommunication, transportation, agriculture, urban planning, wastewater, and water.

[84]P.L. McCarney (University of Toronto), 'Global City Indicators Facility' (9 September 2009), https://d3dqsm2futmewz.cloudfront.net/docs/SCN/sept09_valleywide/globalindicators-pres.pdf. While there is not much about 'private standards' in the field of smart cities, this project by University of Toronto is one such private standard. By 'private standards', it means standards created by non-governmental organizations and private entities, thereby being distinct from governmental standards and international standards. As for the dynamics of governing private standards within and outside the trading system, see Y. Naiki (2020) 'Meta-Regulation of Private Standards: The Role of Regional and International Organizations in Comparison with the WTO', *World Trade Review* 20(1), 1.

[85]C. Naden, 'ISO News: Stronger Cities for the Future: A New Set of International Standards Just Out' (6 July 2018), www.iso.org/news/ref2305.html.

[86]ISO/TC 268, ISO37122:2019: Sustainable Cities and Communities – Indicators for Smart Cities, www.iso.org/obp/ui/#iso:std:iso:37122:ed-1:v1:en.

[87]These three recommendations are: (1) ITU-T, Y.4901/L.1601 (06/2016): 'Key Performance Indicators Related to the Use of Information and Communication Technology in Smart Sustainable Cities'; (2) ITU-T, Y.4902/L.1602 (06/2016): 'Key Performance Indicators Related to the Sustainability Impacts of Information and Communication Technology in Smart Sustainable Cities'; and (3) ITU-T, Y.4903 (03/2022): 'Key Performance Indicators for Smart Sustainable Cities to Assess the Achievement of Sustainable Development Goals'.

[88]R.Y. Clarke (2017) 'Measuring Success in the Development of Smart and Sustainable Cities', in M.J. Cronin and T.C. Dearing (eds.), *Managing for Social Impact: Innovations in Responsible Enterprise*. Cham: Springer, 239, 244.

[89]E. Estevez et al. (2021) 'Review of International Standards and Policy Guidelines for Smart Sustainable Cities', in E. Estevez et al. (eds.) *Smart Cities and Smart Governance. Public Administration and Information Technology,* vol 37. Cham: Springer, 69.

[90]See ISO/IEC JTC 1/WG 11, https://jtc1info.org/sd-2-history/jtc1-working-groups/wg-11/.

[91]Ibid.

[92]Drahos, supra n. 53, at 161–162 ('China's smart-city projects are also helping Chinese companies to enter standard-setting clubs'.).

international standard-setting bodies, catching up with the United States, Germany, and Japan.[93] Occupying secretariat positions in standard committees is one effective strategy for controlling the consensus-building process and winning standard battles. While seeking the basis for consensus among various participants in the committee, a secretariat is in a good position to control the discussion within the committee, thereby skillfully advancing domestic firms' interests in the standardization process.

In 2020, one standard-setting initiative by China has received significant attention: China proposed standard drafts regarding 'public health emergencies' before all four smart city standardization forums.[94] The draft titles were not the same; however, all drafts focus on public health emergencies in smart cities. Such standard-setting initiatives by China resonate with the observation that since 2020 'China has accelerated the international promotion of some of its smart city technologies', and 'providing "anti-epidemic solutions" has become the new selling point for several Chinese tech companies'.[95] Moreover, China's proposal is interesting because it proposes drafts with cross-cutting concerns over 'public health emergencies' that may have broader impacts across multiple standard-setting forums. Thus, creating and submitting draft standards that involve cross-cutting issues may be an effective standardization strategy to advance China's national interests in international standard-settings.

Indeed, it has been noticed that 'the COVID-19 pandemic is accelerating the deployment of innovation and technology in urban areas'.[96] Although surveillance and monitoring technologies have been widely used even before the COVID-19 pandemic, a novel development noticed during the pandemic is 'the digitalization of disease surveillance through disease tracking and contact tracing' which can generate individual health data.[97] Villarreal argues that during the COVID-19 pandemic, 'digital tools based on the use of tracking software emerges as a feasible alternative to the "classic" manual surveillance'.[98] On this point, one important research question for the post-pandemic period is whether there are changes in citizens' attitudes and behavior towards such digitalized surveillance technologies compared to before the pandemic.[99] The question is: Do citizens benefit from using smart technologies for outbreak detection and pandemic control, setting back negative concerns about privacy issues?[100] The answer depends on several factors, such as the technological development stage or the political regimes of the countries.[101] However, we can imagine that health data collected at international airports may be shared across

[93]US–China Business Council (2020), *China in International Standards Setting: USCBC Recommendations for Constructive Participation*, 3 ('From 2011 to 2020, the number of Chinese-occupied secretariat positions in technical committees (TCs) or subcommittees (SCs) increased by 73 percent in ISO. In IEC, they increased 67 percent from 2012 to 2020.'), www.uschina.org/sites/default/files/china_in_international_standards_setting.pdf?msclkid=d23ac959ac9511ec93d29764111d97bc.

[94]ISO/TC 268: 'Good practice case studies in how smart city operating models support effective public-health emergency response'; IEC/SyC Smart cities: 'Smart City Standards Inventory and Mapping: Part 4 Guidance on standards for public health emergencies'; ISO/IEC JTC 1 WG11: 'City Service Platform for Public Health Emergency'; and ITU-T SG 20: 'Requirements and Reference Architecture of Smart Service for Public Health Emergency'.

[95]A. Ekman and C.E. Picardo (2020) 'Towards Urban Decoupling? China's Smart City Ambitions at the Time of Covid-19', *European Union Institute for Security Studies Brief* 10 (May 2020), p. 2, www.iss.europa.eu/sites/default/files/EUISSFiles/Brief%2010%20Smart%20Cities.pdf.

[96]UNHABITAT (2020) *World Cities Report 2020: The Value of Sustainable Urbanization*, at XXX.

[97]P.A. Villarreal (2023) 'International Law and Digital Disease Surveillance in Pandemics: On the Margins of Regulation', *German Law Journal* 24, 603, 605.

[98]Ibid., at 609. Villarreal noted, 'The COVID-19 pandemic was not the first known use of digital tools for conducting disease tracking or contact tracing procedures … But none of these efforts came close to matching the scope of similar software during the COVID-19 pandemic.' Ibid.

[99]See e.g., O. Troisi et al. (2022) 'Covid-19 Sentiments in Smart Cities: The Role of Technology Anxiety Before and During the Pandemic', *Computers in Human Behavior* 126, 106986. See also, D.G. Costa and J.P.J. Peixoto (2020) 'COVID-19 Pandemic: A Review of Smart Cities Initiatives to Face New Outbreaks', *IET Smart Cities* 2(2), 64; J.W. Sonn et al. (2020) 'Smart City Technologies for Pandemic Control without Lockdown', *International Journal of Urban Sciences* 24(2), 149.

[100]Troisi et al. ibid.

[101]Villarreal, supra n. 97, at 613.

nations during future disease outbreaks, and if so, the standardization of data communication and sharing is necessary.[102] It is against this backdrop that China's proposal of international standardization for public health emergencies in smart cities should be considered.

Another implication from different proposals backed up by countries is that standardization is not only 'a strategic tool in interfirm competition' but also 'a competitive tool among nations'.[103] Accordingly, 'strategic behaviour is sometimes observable',[104] both for firms and nations. Thus, possibilities for 'standard-setting games' are not limited to firms: governments may also get interested in the games.[105] In this regard, the US–EU Trade and Technology Council (TTC), launched in 2021, is an interesting initiative. One of the TTC's purposes is to coordinate and cooperate in developing technology standards.[106] Such a cooperation initiative between the US and EU may prove the importance of coordinating and enlightening different standard-setting forums over digital technologies, which may also lead to a counter against China's growing presence in international standardization.

4.3 The Legitimacy Question on International Standards for Smart Cities

As such, international standard-setting activities for smart cities have flourished and become increasingly complex. There has been a marked increase in standard-setting topics in the ICT sector. Wi-Fi, USB, and HTML attracted considerable attention a decade ago.[107] The current issues include self-driving cars, drones, cryptographic mechanisms, and AI. Existing literature has already noted 'complexity' in international standardization (due to member competitions within a standard-setting body or between such bodies)[108] or a 'balkanization of ICT standard-setting' situation (due to the rise of new standard-setting actors other than the 'big four').[109] The topic of smart cities is not an exception.

Then, how can we address the observed growth of international standards for smart cities under international trade law? In other words, are those international standards considered *legitimate* under international trade law? The WTO jurisprudence provides several key points for answering this question.

[102]Z. Allam and D.S. Jones (2020) 'On the Coronavirus (COVID-19) Outbreak and the Smart City Network: Universal Data Sharing Standards Coupled with Artificial Intelligence (AI) to Benefit Urban Health Monitoring and Management', *Healthcare* 8, 1.

[103]R.W. Hawkins and R. Mansell (1995) 'Conclusion', *Standards, Innovation and Competitiveness: The Politics and Economics of Standards in Natural and Technical Environments*. Cheltenham: Edward Elgar Publishing, 231.

[104]Delimatsis, supra n. 70, at 8.

[105]It has been pointed out in the standardization literature that standard-setting bodies enjoy 'autonomy', following the 'self-regulatory' model of standard development. In other words, governments usually show deference to 'industry-led processes' of standard development and do not interfere with the processes. See J. Barton et al. (2019) 'Making the Rules: The Governance of Standard Development Organizations and Their Policy on Intellectual Property Rights', *JRC Science for Policy Report, EUR 29655 EN* (March 2019), at 10–11. This view resonates with a general understanding of the US standard-setting system that has been decentralized and industry-driven, and therefore, the role of the US federal government has not been pronounced. See e.g., Büthe and Mattli, supra n. 69, at 148. However, considering the importance and impacts of digital technologies, there is a growing demand for the active involvement of the US federal government to influence the development of international standard-setting on 5G, AI, and cybersecurity. See National Institute of Standards and Technology (NIST), US Department of Commerce, 'Testimony – Setting the Standards: Strengthening U.S. Leadership in Technical Standards' (17 March 2022), www.nist.gov/speech-testimony/setting-standards-strengthening-us-leadership-technical-standards.

[106]United States Department of States (2021) US–EU Trade and Technology Council (TTC), www.state.gov/u-s-eu-trade-and-technology-council-ttc/.

[107]H-W. Liu (2014) 'International Standards in Flux: A Balkanized ICT Standard-Setting Paradigm and Its Implications for the WTO', *Journal of International Economic Law* 17(3), 551, 552.

[108]See, e.g., D. Eom et al. (2021) 'Committee Standards Battles in the Era of Convergence: Implications for Smart Systems', *International Journal of Information Management* 60, 102380.

[109]Liu, supra n. 107, at 571. See also, S. Peng (2021) 'Autonomous Vehicle Standards under the Technical Barriers to Trade Agreement: Disrupting the Boundaries?', in S. Peng et al. (eds.), *Artificial Intelligence and International Economic Law: Disruption, Regulation, and Reconfiguration*. Cambridge: Cambridge University Press, 121; O. Kanevskaia (2022) 'ICT Standards Bodies and International Trade: What Role for the WTO?', *Journal of World Trade* 56(3), 429.

First, while the 'big four' international standard-setting bodies have been recognized as major bodies in the ICT sector, it should be noted that the TBT Agreement has not expressly specified these bodies as recognized international bodies/organizations for ICT standardization. Even in the most recent WTO's 2021 reference paper on services domestic regulation, 'relevant international organizations' for technical standards are merely referred to as 'international bodies whose membership is open to the relevant bodies of at least all Members of the WTO'.[110]

This understanding of international bodies aligns with the *US–Tuna II (Mexico)* case. In the *US–Tuna II (Mexico)* case, the Appellate Body explained that standards could be recognized as 'international standards' when standards are approved by an international standardizing body, that is, 'a body that has recognized activities in standardization and whose membership is open to the relevant bodies of at least all Members'.[111] The Appellate Body further explained that 'the body's standardization activities are recognized, for example, if a large number of WTO Members participate in the development of the standard, and acknowledge the validity and legality of the standard'.[112] On this point, the Appellate Body was asked to address the 2000 TBT Committee's Decision on Principles for the Development of International Standards, Guides, and Recommendations[113] when interpreting international bodies' 'open' membership requirements and the concept of 'recognized activities' by international bodies. The Appellate Body admitted the TBT Committee Decision as a 'subsequent agreement' under the Vienna Convention, and stated that 'this Decision will inform the interpretation and application of a term or provision of the TBT Agreement in a specific case'.[114]

According to this Appellate Body's explanation, the 'big four' forums can be admitted as 'recognized' international standard-setting bodies for smart cities. However, the question remains as to why the TBT Agreement does not explicitly list these bodies. Again, the TBT Agreement merely defines an international body/system as '[b]ody or system whose membership is open to the relevant bodies of at least all Members' (Annex 1.4). This is contrasted with the WTO's Agreement on the Application of Sanitary and Phytosanitary Measures[115] where names of three international standard-setting bodies (the so-called 'three sister' organizations, i.e. Codex Alimentarious Commission, International Office of Epizootics, and International Plant Protection Convention) are listed (Annex A.3). This (not listing the names of international standard-setting bodies in the TBT Agreement) is largely explained by the disagreement between the European Community and the US during the Uruguay Round negotiations.[116] The European Community strategically approached international bodies and attempted to influence their standard-setting processes (i.e., to shape standards to reflect European interests). In contrast, the multiple US domestic standard-setting bodies tended to focus on their internal work on national standards for US markets: they did not have much incentive to work with international standard-setting bodies. It is explained that such a different stance towards international bodies consequently led to different views on the specification of international bodies in the TBT Agreement during the Uruguay Round.

[110]WTO, Joint Initiative on Services Domestic Regulation, supra n. 72, footnote 16.

[111]Appellate Body Report, *United States – Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (US–Tuna II (Mexico)*, WT/DS381/AB/R (16 May 2012), para. 359.

[112]Appellate Body Report, *US–Tuna II (Mexico)*, para. 394.

[113]Decision of the Committee on Principles for the Development of International Standards, Guides and Recommendations with relation to Articles 2, 5 and Annex 3 of the Agreement, in WTO document G/TBT/1/Rev.10, Decisions and Recommendations adopted by the WTO Committee on Technical Barriers to Trade since 1 January 1995, 9 June 2011, pp. 46–48. The Decision proposes 'six principles' that should be observed in the development of international standards. Appellate Body Report, *US–Tuna II (Mexico)*, para. 376. Such six principles are: (1) transparency; (2) openness; (3) impartiality and consensus; (4) effectiveness and relevance; (5) coherence; and (6) development dimension.

[114]Appellate Body Report, *US–Tuna II (Mexico)*, para. 372.

[115]Agreement on the Application of Sanitary and Phytosanitary Measures, 15 April 1994, 1867 U.N.T.S. 493.

[116]See H. Schepel (2005) *The Constitution of Private Governance: Product Standards in the Regulation of Integrating Markets*. Oxford: Hart Publishing, at 186–187.

Even if international standards are developed by recognized international bodies, a question of 'legitimacy' of international standards still remains.[117] In the *EC–Sardines* case, the question was addressed as to whether only standards adopted by consensus in international bodies were treated as relevant international standards under the TBT Agreement.[118] The Appellate Body denied this view; thus, adoption by consensus is not required for recognition as an international standard in the WTO.[119] However, the Appellate Body's view was criticized by trade law scholarship. For instance, Howse argued that if their practices or procedures upon adopting international standards were never scrutinized by the WTO, it would mean that the authorities of international standards were *automatically* introduced into the WTO.[120] Relatedly, Scott argued that international standards' development processes could be considered in reviewing 'appropriateness' (or 'inappropriateness') of international standards under Art. 2.4 of the TBT Agreement.[121] On this point, Delimatsis argues that 'the principles set out in the TBT Committee decision are not sufficiently inclusive', and proposes to include additional criteria 'for a standard to be regarded as a genuinely international standard', such as participation of stakeholders, voting rules, and scientific rigour.[122]

Such scholarly debates indicate that the legitimacy question of international standards is still controversial, particularly in light of development processes. However, the current situation of international standards for smart cities is too complex to oversee the standard development processes. One advice for national standard-setting bodies is not to miss the chance to voice one's interests in the development processes of important international standards,which is a more practical approach than assessing legitimacy after adopting international standards. Moreover, in the face of the uncoordinated increase in standardization of smart cities, national bodies participating in international bodies can collect information on standard proposals submitted by foreign members across various standard-setting forums in a timely fashion and consider effective strategies to create meaningful competition. At the same time, it would be ideal to seek opportunities for coordination between different standardization proposals based on shared information and to attempt to reduce fragmented standardization activities for smart cities.[123]

5. Smart Cities and Data Issues

Smart city initiatives are described as 'data-driven' urbanism.[124] While the smart city literature has already recognized how big data can transform cities and enhance smart city

[117]See e.g., H. Horn and J.H.H. Weiler (2002) 'European Communities – Trade Description of Sardines: Textualism and its Discontent', in H. Horn and P.C. Mavroidis (eds.) *The WTO Case Law of 2002.* Cambridge: Cambridge University Press, 248, 254–256; Y. Naiki (2009) 'Accountability and Legitimacy in Global Health and Safety Governance: The World Trade Organization, the SPS Committee and International Standard-Setting Organizations', *Journal of World Trade* 43(6), 1255.

[118]Appellate Body Report, *European Communities – Trade Description of Sardines* (hereinafter, '*EC–Sardines*'), DS/231/AB/R (23 October 2002), paras. 35–36.

[119]Appellate Body Report, *EC–Sardines*, paras. 222–225.

[120]R. Howse (2007) 'A New Device for Creating International Legal Normativity: The WTO Technical Barriers to Trade Agreement and "International Standards"', in C. Joerges and E-U. Petersmann (eds.), *Constitutionalism, Multilevel Trade Governance and Social Regulation*. Oxford: Hart Publishing, 383, 387.

[121]J. Scott (2004) 'International Trade and Environmental Governance: Relating Rules (and Standards) in the EU and the WTO', *European Journal of International Law* 15(2), 307, 332 ('Thus reason-giving and transparency – including access to dissenting opinions in the standard-setting process – may be viewed as essential prerequisites for any assessment of "appropriateness" of adequacy.').

[122]P. Delimatsis (2015) '"Relevant International Standards" and "Recognised Standardisation Bodies" under the TBT Agreement', in *The Law, Economics and Politics of International Standardisation* (supra n. 70), 104, 133–135.

[123]See J. Barton et al., supra n. 105, at 179, for a somewhat similar and inspiring suggestion of the need of standardization policy coordination based on 'collaborative efforts involving the participation of [standard developing organizations], industry stakeholders, public authorities, and independent experts' in the European intellectual property sector.

[124]See e.g., R. Kitchin (2018) 'Data-Driven Urbanism', in R. Kitchin et al. (eds.), *Data and the City*. Abingdon: Routledge, 44.

services,[125] the challenges posed by urban big data – security and privacy – have also been recognized.[126] Concerns over security and privacy related to big data and cities usually revolve around three general questions:[127] (i) who has access to the collected data and who can control the data, especially when outsourcing smart city services to firms; (ii) how do we ensure data security, particularly when creating systems to connect different data sources; and (iii) how do we secure privacy when data are used and shared by several actors. Particularly in the (i) context, the smart city literature points out that one of the controversies is to define who can decide 'the purposes and means of data processing' under a data-processing contract between a local government and a private company.[128] This is important because, in the smart city context, 'it is likely that data is processed or even controlled by private companies that try to miximise its value'.[129]

This section examines how digital trade regulation addresses data issues related to smart cities. On this point, it is again important to highlight regulation under the DEAs and this section focuses on the DEPA's regulation because of its wide scope and potential impacts. It is noticed that 'its scope is wide, flexible and covering several emergent issues, such as those in the areas of AI and digital inclusion'.[130] Also, the DEPA's potential impacts on businesses are notable: 'The DEPA responds [to business interests] by seeking to put in place rules and frameworks that create a more enabling digital environment overall'.[131] Such a DEPA's 'business-oriented' approach is backed up by Singapore's leadership in digital trade and is also parallel to Singapore's strong initiative in promoting 'ASEAN Smart Cities Network'. Notably, China and Korea are showing interests in joining the DEPA; this seems rational when we recall that Korea and China are active players in supporting smart city development in ASEAN. It is already pointed out that 'DEPA's "soft" approach to rulemaking and norm-setting has proved effective in an Asian context … '[132]

[125]See e.g., Special Issue on Urban AI, *AI & Society* (online first, 30 September 2022); R. Brauneis and E.P. Goodman (2018) 'Algorithmic Transparency for the Smart City', *Yale Journal of Law and Technology* 20, 103; J.S. Hiller and J.M. Blanke (2017) 'Smart Cities, Big Data, and the Resilience of Privacy', *Hastings Law Journal* 68, 309; I.A.T. Hashem et al. (2016) 'The Role of Big Data in Smart City', *International Journal of Information Management* 36, 748; A.M. Townsend (2013) *Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia*. New York: W W Norton & Co Inc; R. Kitchin (2014) 'The Real-Time City? Big Data and Smart Urbanism', *GeoJournal* 79(1), 1.

[126]In this regard, international standards related to security and privacy already exist in the standard-setting fora – those standards have been developed in the committee concerning 'information security, cybersecurity, and privacy protection', not in the smart-city-related committees addressed in the previous section. For instance, the ISO/IEC 27000 standard series concerns information security management systems, and ISO/IEC 29100 standard series addresses a privacy framework – both are well known standards developed by the ISO/IEC JTC 1/SC 27. Specifically, ISO/IEC 27701:2019 deals with how organizations can process personally identifiable information in the context of the EU General Data Protection Regulation (GDPR). The standard includes a comparative table of the requirements under this standard and those under the GDPR in Annex D. See ISO/IEC 27701:2019, Security Techniques – Extension to ISO/IEC 27001 and ISO/IEC 27002 for Privacy Information Management – Requirements and Guidelines, www.iso.org/standard/71670.html?browse=tc.

[127]Kitchin, supra n. 124, at 51–53.

[128]Voorwinden, supra n. 26, at 457.

[129]L. Vandercruysse, C. Buts, and M. Dooms (2019) 'Data Control in Smart City Services: Pitfalls and How to Resolve Them', *European Data Protection Law Review* 5(4), 554, 558.

[130]M. Burri (2023) 'The Impact of Digitalization on Global Trade Law', *German Law Journal* 24, 551, 570. See also, S. Honey (2021) 'Enabling Trust, Trade Flows, and Innovation: The DEPA at Work', *Hinrich Foundation White Paper,* at 4 ('… the agreement has a far broader scope than previous digital rules. This reflects a new way of thinking about "trade in the digital economy" rather than the more limited scope of previous rules confined to data flows and border measures.'), www.hinrichfoundation.com/research/article/digital/enabling-trust-trade-flows-and-innovation-depa-at-work/; M. Soprana (2021) 'The Digital Economy Partnership Agreement', *Trade, Law, and Development* 13(1), 143, 163 ('Applying to measures affecting trade in the digital economy, the DEPA allegedly constitutes the most comprehensive agreement among those under examination, covering a wider range of issues than those typically found in most PTAs.')

[131]Honey (2021) ibid.

[132]M.P. Goodman (2021) 'DEPA and the Path Back to TPP', *Commentary, Center for Strategic and International Studies (CSIS)* (July 2021), www.csis.org/analysis/depa-and-path-back-tpp.

5.1 Issues Related to Smart Cities

This section looks at the following data issues in the DEPA: (1) data flows; (2) cyber security; (3) personal information protection; (4) emerging technologies; (5) data innovation; and (6) open government data. While the DEPA is regarded as the most innovative DEA, some provisions follow the paths of previous free trade agreements, e.g. the CPTPP. On this point, the following analysis also includes a comparative analysis among agreements.

First, in the smart city context, data will flow between public and private actors inside one country, and even go outside the country if private companies process data at their home countries. On this point, the DEPA recognizes the principle of no restrictions on cross-border data transfer except for being subject to legitimate public policy objectives.[133] Similarly, the DEPA prohibits the localization of computing facilities as a business condition in the territory, except when it is subject to legitimate public policy objectives, which is parallel to the CPTPP.[134]

In terms of cyber security, the DEPA has relatively simple provisions, recognizing the importance of building the capabilities of national entities responsible for a computer security incident response and using existing collaboration mechanisms for cooperation.[135] On this point, the UK–Singapore DEA contains the most detailed cybersecurity provision and touches on IoT, stating that parties should recognize the importance of 'establishing mutual recognition of a baseline security standard for consumer Internet of Things devices to raise overall cyber hygiene levels and better secure cyberspace domestically'.[136]

Regarding personal information protection, the DEPA is written in more detail than the CPTPP and RCEP.[137] Like the CPTPP and RCEP, the DEPA basically requires parties 'to adopt or maintain a legal framework that provides for the protection of the personal information of the users of electronic commerce and digital trade'.[138] In addition, the DEPA sets detailed principles underlying the legal framework, such as collection limitations, purpose specification, transparency, and accountability.[139] Moreover, there is a unique provision under the DEPA, promoting the use of 'trustmarks'[140] – that is, the DEPA encourages parties to adopt 'data protection trustmarks by businesses that would help verify conformance to personal data protection standards and best practices'.[141] Furthermore, there are relevant provisions promoting information exchange and sharing experiences on data protection trustmarks and efforts to mutually recognize the other parties' trustmarks as a valid mechanism.[142]

Moreover, unique features of the DEPA can be found in the DEPA's novel provisions on emerging technologies and data innovation.[143] First, concerning emerging technologies, the provision

[133]DEPA, art. 4.3; CPTPP, art. 14.11. RCEP has a similar provision on this issue with a 'legitimate public policy objective' exception; however, there is a note stating that 'such legitimate public policy shall be decided by the implementing Party' (art. 12.15, note 14).

[134]DEPA, art. 4.4; CPTPP, art. 14.13. RCEP has a similar provision on this issue with a 'legitimate public policy objective' exception; however, there is a note stating that 'such legitimate public policy shall be decided by the implementing Party' (art. 12.14, note 12).

[135]DEPA, art. 5.1.

[136]UK–Singapore DEA, art. 8.61-L.1 (d).

[137]CPTPP, art. 14.8; RCEP, art. 12.8.

[138]DEPA, art. 4.2.2. In developing the legal framework, the Australia–Singapore DEA requires parties to 'take into account the principles and guidelines of relevant international bodies, such as the APEC Cross-Border Privacy Rules ("CBPR") System and the *OECD Guidelines Governing the Protection of Privacy and Trans-border Flows of Personal Data*' (art. 17.2). See also, Korea–Singapore DPA, art. 14.17.8.

[139]DEPA, art. 4.2.3. See also, UK–Singapore DEA, art. 8.61-E.3.

[140]Soprana, supra n. 130, at 159.

[141]DEPA, art. 4.2.8.

[142]DEPA, arts. 4.2.9 and 4.2.10.

[143]However, there is a provision that the DEPA does not have. Some agreements (but not in the DEPA and RCEP) involve a 'source code' provision, which prohibits requiring 'the transfer of, or access to, source code of software owned by a person of the other Party, as a condition for the import, distribution, sale or use of such software, or of products containing such software, in its territory' (CPTPP, art. 14.17.1; Australia–Singapore DEA, art. 28.1). The US–Japan Digital Trade Agreement,

for AI is important. The DEPA states, 'The Parties shall endeavour to promote the adoption of ethical and governance frameworks that support the trusted, safe and responsible use of AI technologies'.[144] While it is an 'endeavour' provision, such an AI provision can influence countries engaging in smart city projects. A similar AI provision exists in the Australia–Singapore DEA: the provision also recognizes the importance of developing ethical governance framework but emphasizes cooperation among relevant parties. For instance, cooperation through 'promoting and sustaining the responsible use and adoption of AI technologies by businesses and across the community'[145] seems to be more relevant to smart city projects. In addition, the UK–Singapore DEA contains an AI provision, which seems to be the most detailed among existing trade agreements and DEAs.[146] This provision addresses AI and other 'emerging technologies', including the IoT. The provision also emphasizes cooperation by 'promoting collaboration between each Party's governmental and non-governmental entities across research, academia, and industry',[147] which is also concerned with smart city development.

Second, the DEPA promotes data innovation, by stating that 'innovation may be enhanced within the context of regulatory data sandboxes where data, including personal information, is shared amongst businesses in accordance with the Parties' respective laws and regulations'.[148] Additionally, the DEPA provides, 'The Parties shall endeavour to collaborate on data-sharing projects and mechanisms, and proof of concepts for new uses of data, including data sandboxes, to promote data-driven innovation'.[149] Such innovative provisions will be helpful for countries and companies participating in smart city projects because data sharing is an important data management aspect for developing and implementing smart services.

Finally, the DEPA includes the provision on 'open government data'. Open data provision is important in the smart city context because it can promote transparency and accountability and strengthen public trust in city operations. While the CPTPP and RCEP do not include this provision, all five DEAs do. However, the DEPA's open government data provision is simpler than that of other DEAs, which facilitates access to government information and open data and promotes cooperation.[150] In contrast, other DEAs provide more detail, ensuring that 'the information is appropriately anonymised, contains descriptive metadata and is in a machine readable and open format that allows it to be searched, retrieved, used, reused and redistributed'.[151]

5.2 Going Beyond the Current Digital Trade Discourse

Overall, the data provisions above can provide certainty for smart city businesses abroad; however, a question that can arise from such issues is whether existing digital rules are sufficient

UK–Singapore DEA, and Korea–Singapore DPA also cover 'an algorithm expressed in that source code'. (US–Japan Digital Trade Agreement, art. 17.1; UK–Singapore DEA, art. 8.61-K.1; Korea–Singapore DPA, art. 14.19). While such provisions are helpful for high-tech companies engaging in smart city development, governments can require the companies to disclose source codes/algorithms in certain situations. For instance, the CPTPP provides that 'software used for critical infrastructure' is not subject to the prohibition of requiring transfer of/access to source code of software (CPTPP, art. 14.17.2). This may include software for the network infrastructure related to smart cities. Another relevant situation is the disclosure of source codes/algorithms based on 'the monitoring of compliance with codes of conduct and other standards' (UK–Singapore DEA, art. 8.61-K.3). Such a situation of 'the monitoring of compliance with codes of conduct and other standards' may include a case for ensuring 'compliance with domestic laws and regulations and with the principles of data ethics, such as ensuring algorithmic accountability'. N. Mishra (2021) 'International Trade Law Meets Data Ethics: A Brave New World', *NYU Journal of International Law and Politics* 53(2), 303, 364. This may also happen in the context of smart city development.

[144]DEPA, art. 8.2.3. See also, Korea–Singapore DPA, art. 14.28.3(a).

[145]Australia–Singapore DEA, art. 31.1 (b).

[146]UK–Singapore DEA, art. 8.61-R.

[147]UK–Singapore DEA, art. 8.61-R.3 (c).

[148]DEPA, art. 9.4.1.

[149]DEPA, art. 9.4.3. For data innovation, see also, Australia-Singapore DEA, art. 26; UK–Singapore DEA, art. 8.61-I; Korea–Singapore DPA, art. 14.25.

[150]DEPA, art. 9.5.

[151]UK–Singapore DEA, art. 8.61-H, 2(a); Australia–Singapore DEA, art. 27.3 (a); Korea–Singapore DPA, art. 14.26.2 (a); but see, US–Japan Digital Trade Agreement, art. 20.2.

to regulate/govern international smart city projects. Smart cities involve additional data concerns: for instance, it has been pointed out that 'smart city security is inherently more difficult than securing individual smart objects, such as smartphones, IoT objects, and service platforms' because the sum of vulnerabilities of these objects 'increases smart city's attack surface'.[152] This leads us to question whether the DEPA's general cyber security provision is sufficient for ensuring security in smart cities.

Furthermore, collecting data from citizens and integrating data from different sources add more data complexity. Smart cities integrate and combine data from different sources on a data platform, which has not been the focus of attention in traditional digital trade discourse. Based on the smart city literature in urban planning and architecture, at least two considerations can inform future research agenda.

The first concerns accessible and open government data provision.[153] Data related to smart cities are not necessarily administrative and bureaucratic datasets collected by governments; they are often collected from citizens by private companies. Then, a question arises whether accessible and open government data include data collected/processed by private companies in addition to data maintained by governments. At this point, the purposes and means of data processing based on a data contract between a local government and a private company are relevant and necessarily affect the accessibility and openness of the data afterward. Moreover, we must consider data 'anonymization'. As noted, the open government information provision under several DEAs requires ensuring appropriate 'anonymization' of the information; however, the scholarship discusses how the concept of anonymization (or de-identification) varies among different legal contexts.[154] Reflecting a variety of techniques for anonymization (or de-identification) and possible risks of re-identification, it is necessary to consider what is appropriate anonymization when releasing the information as open data to the public.[155] However, one difficulty in the smart city context lies in the fact that '[t]he more data is combined about a single person, the more easily that person can be re-identified'.[156]

The second consideration relates to a smart city's public character and privacy issues.[157] In smart city projects, data can be collected through 'connected cars' and 'wearable devices', and data analysis can be conducted regarding driving patterns and health management. Simultaneously, data can be collected with a much wider scope via monitoring and surveillance devices (e.g., cameras, GPS, and sensors). Monitoring data (sometimes, real-time data) collected by such devices in public spaces is necessary for urban safety and environmental protection. However, the use of monitoring data raises privacy concerns. What should cities do if they 'cannot notify citizens about a specific data collection in advance or at the time of collection'?[158] Occasionally, obtaining consent from all citizens regarding routine monitoring data is impractical. Thus, in the smart city context, there is always a tension between smart city surveillance in public spaces and privacy issues that is difficult to address. Additional rules for smart city governance may include, for instance, setting up an ethical review board inside governments and conducting a privacy impact assessment by governments,[159] which are not yet written into the current DEAs.

[152]Braun et al., supra n. 25, 502.

[153]The role of governments in providing data is also the focus of attention in the field of AI. See, CEIMIA, Data for Artificial Intelligence, https://ceimia.org/en/projet/the-role-of-governments-as-a-provider-of-data-for-artificial-intelligence/.

[154]See e.g., M.D. Smith and J. Waldo (2023) 'Anonymity, De-Identification, and the Accuracy of Data', Harvard Online blog, www.harvardonline.harvard.edu/blog/anonymity-de-identification-accuracy-data.

[155]K. Finch and O. Tene (2018) 'Smart Cities: Privacy, Transparency, and Community', in E. Selinger, J. Polonetsky, and O. Tene (eds.) *The Cambridge Handbook of Consumer Privacy*. Cambridge: Cambridge University Press, 125, 141–143.

[156]L. Vandercruysse, C. Buts and M. Dooms (2020) 'A Typology of Smart City Services: The Case of Data Protection Impact Assessment', *Cities* 104, 102731.

[157]Vandercruysse, Buts and Dooms, supra n. 129, 557.

[158]Finch and Tene, supra n. 155, 146.

[159]Ibid.

On this point, it is useful to look at how a soft-law agreement regulate data issues over smart cities. The 'G20 Global Smart Cities Alliance' activity is such an example. Currently, the World Economic Forum (i.e., the Centre for the Fourth Industrial Revolution, Japan) serves as a secretariat for the Global Smart Cities Alliance.[160] One important project undertaken by the Alliance was the development of global norms 'for data collection and use, transparency and public trust, and best practices in smart city governance'.[161] The Alliance established five principles: (1) equity, inclusivity, and social impact; (2) security and resiliency; (3) privacy and transparency; (4) openness and interoperability, and (5) operational and financial sustainability.[162] Furthermore, the implementation of these five principles is supported by a 'Policy Roadmap'[163] that encompasses detailed policy elements, such as ensuring open data and privacy impact assessment. For instance, the model policy for 'open data' addresses the need for 'permission-based access' for 'sensitive data … where anonymization or deidentification is neither possible nor practical'.[164] The model policy for 'privacy impact assessment' provides details of 'a consistent method for identifying, evaluating and addressing privacy risks' in smart city projects.[165]

Moreover, other forums consider data governance and smart cities. For example, the OECD is discussing concerns posed by data and smart cities, including 'privacy risks'.[166] The EU is another example; the European Commission hosts a platform among relevant actors (e.g. cities, industries, investors, and researchers) named 'The Smart Cities Marketplace',[167] where 'the Citizen's Control of Personal Data Initiative'[168] has been launched. Thus, the challenges posed by data regarding smart cities are discussed and regulated in many ways – by treaties or soft-law approaches, at the local, regional, and global levels.

6. Conclusion

Previously, smart cities were not a global concern; instead, they reflected the concerns of local governments, high-tech companies, and citizens. While privatization and digitalization by companies have been concerned with city governance,[169] it is not an international issue. However, smart cities are now receiving significant global attention because they are an important area of international cooperation that also generates business opportunities abroad, especially in the

[160]World Economic Forum, *News Releases: World Economic Forum to Lead G20 Smart Cities Alliance on Technology Governance* (27 June 2019), www.weforum.org/press/2019/06/world-economic-forum-to-lead-g20-smart-cities-alliance-on-technology-governance.

[161]World Economic Forum, 'Our Alliance is Creating Smart City Governance' (6 October 2023), www.weforum.org/impact/smart-cities-governance-alliance/.

[162]The Centre for the Fourth Industrial Revolution Japan, 'Making Rules with World Cities: Smart City Policy Roadmap' (1 February 2021) (in Japanese), https://note.com/c4irj/n/nadf562eb2ff4.

[163]G20 Global Smart Cities Alliance, 'Global Policy Roadmap', www.globalsmartcitiesalliance.org/policy-roadmap. Currently, 36 'pioneer cities' are using and testing the roadmap. World Economic Forum, News Release, 'In the Face of Extraordinary Challenges, 36 Pioneer Cities Chart a Course Towards a More Ethical and Responsible Future' (17 November 2020), www.weforum.org/press/2020/11/in-the-face-of-extraordinary-challenges-36-pioneer-cities-chart-a-course-towards-a-more-ethical-and-responsible-future/.

[164]G20 Global Smart Cities Alliance, 'Model Policy Open Data', 3: Relationship to Wider City Policy, Strategy, and Initiative, 3.1 and 3.4, www3.weforum.org/docs/WEF_Open_Policy_Model_Policy_2023.pdf.

[165]G20 Global Smart Cities Alliance, 'Model Policy Privacy Impact Assessment', www3.weforum.org/docs/WEF_Private_Impact_Assessment_Model_Policy_2023.pdf.

[166]OECD (2020) *Measuring Smart Cities' Performance: Do Smart Cities Benefit Everyone?*, at 3–4, www.oecd.org/cfe/cities/Smart-cities-measurement-framework-scoping.pdf. See also, OECD (2019) *Enhancing the Contribution of Digitalisation to the Smart Cities of the Future*, at 19–20, www.oecd.org/cfe/regionaldevelopment/Smart-Cities-FINAL.pdf.

[167]European Commission, Smart Cities Marketplace, https://smart-cities-marketplace.ec.europa.eu/.

[168]European Commission, Smart Cities Marketplace, News, 'New Initiative "Citizen Control of Personal Data" within the Citizen Focus Action Cluster' (11 January 2021), https://smart-cities-marketplace.ec.europa.eu/news-and-events/news/2021/new-initiative-citizen-control-personal-data-within-citizen-focus-action.

[169]See e.g., Voorwinden, supra n. 26.

ASEAN context. Accordingly, this article considered how smart city projects can be situated in international trade law.

As discussed, smart cities involve long-standing trade law issues, such as the intersection between goods and services or international standard-setting complexities in the ICT sector. Simultaneously, smart cities are concerned with new digital trade issues. As big data and AI have become the focus of attention, smart cities are facing global ethical and responsibility issues. In other words, smart cities do encounter challenges similar to those posed by the digital economy in general, such as 'social inequality; social control through public and private surveillance … national security threats and geopolitical rivalry; cyber security risks; and threats to personal privacy and dignity'.[170]

Such questions related to data issues are not theoretical. Imagine future developments in the 'ASEAN Smart Cities Network'. The ASEAN network envisages to 'stimulate and catalyse greater collaboration and connectivity within and among ecosystems [of people, businesses and infrastructure] for a better world across ASEAN'.[171] Accordingly, data communication and sharing from multiple smart-city sources may occur among ASEAN smart city projects in the future, after a certain period of time of development and collaboration. After the COVID-19 pandemic, we can imagine that such data communication and sharing across countries are more likely in the context of regional disease outbreaks and urban safety management. Thus, central/local governments, high-tech companies, and citizens should recognize the importance of privacy and security issues in international smart city projects.[172] How these regulatory efforts actually affect smart city initiatives in Asia and other regions remains to be seen.[173]

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[170]Shaffer, supra n. 54, at 263.

[171]Ministry of Foreign Affairs, Singapore (2018) *ASEAN Smart Cities Network*, at 50, www.clc.gov.sg/docs/default-source/books/book-asean-smart-cities-network.pdf.

[172]For a discussion of the importance of capacity building in the context of cybersecurity and digital trade, see L.Y-C. Chang and H-W. Liu (2022) 'Ensuring Cybersecurity for Digital Services Trade', in J.W. Kang et al. (eds.), *Unlocking the Potential of Digital Services Trade in Asia and the Pacific*, Asia Development Bank, 184, 199–200, https://aric.adb.org/pubs/unlocking-the-potential-of-digital-services-trade/Unlocking-the-Potential-of-Digital-Services-Trade_Chapter8.pdf.

[173]International cooperation on digital governance may make some progress at the WTO. In December, 2023, it was announced from co-convenors (Australia, Japan, and Singapore) of the WTO Joint Statement of Initiative on E-commerce that Members have reached 'substantial conclusion of a number of global digital trade rules' and 'aim to conclude negotiations in a timely manner in 2024.' See, Ministry of Economy, Trade, and Industry, Japan, 'WTO Joint Statement of Initiative on E-Commerce: Co-Convenor Statement Released' (20 December, 2023), www.meti.go.jp/press/2023/12/20231220004/20231220004-1.pdf.

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