What factors drive policy transfer in smart city development? Insights from a Delphi study

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A B S T R A C T

Smart city initiatives are viewed as an input to existing urban systems to solve various problems faced by modern cities. Making cities smarter implies not only technological innovation and deployment, but also having smart people and effective policies. Cities can acquire knowledge and incorporate governance lessons from other jurisdictions to develop smart city initiatives that are unique to the local contexts. We conducted two rounds of surveys involving 23 experts on an e-Delphi platform to consolidate their opinion on factors that facilitate policy transfer among smart cities. Findings show a consensus on the importance of six factors: having a policy entrepreneur; financial instruments; cities' enthusiasm for policy learning; capacity building; explicit regulatory mechanisms; and policy adaptation to local contexts. Correspondingly, three policy recommendations were drawn. Formalizing collaborative mechanisms and joint partnerships between cities, setting up regional or international networks of smart cities, and establishing smart city repositories to collect useful case studies for urban planning and governance lessons will accelerate policy transfer for smart city development. This study sheds light on effective ways policymakers can foster policy learning and transfer, especially when a jurisdiction's capacity is insufficient to deal with the uncertainties and challenges ahead.

1. Introduction

Over the last decade, the world has witnessed the dramatic growth of smart city initiatives. By 2020, there were a record of 565 smart city projects across 324 cities globally (Navigant Research, 2020). To date, there is no commonly accepted definition of "smart city" (Bibri and Krogstie, 2017; Ruhlandt, 2018). Many studies have discussed the disparities in smart city definitions (Castelnovo et al., 2016; Lim and Taeihagh, 2018; Pereira et al., 2018; Ruhlandt, 2018; Silva et al., 2018; Tan and Taeihagh, 2020; Bibri and Krogstie, 2017). Despite this, several studies concur on the basic tenet of smart cities, which centres on the adoption of technological applications – especially information and communication technology (ICT) – to enhance quality of life, competitiveness, and operational efficiencies in urban systems (Araya, 2015; Kondepudi, 2014; Lim and Taeihagh, 2018; Bibri and Krogstie, 2017; Tan and Taeihagh, 2020). Smart city studies follow two mainstream approaches: people-oriented or technology-oriented (Bibri and Krogstie, 2017). Rather than focusing on a technology-oriented approach, most recent smart city studies have acknowledged that smart city

development needs to embrace a more holistic concept (Castelnovo et al., 2016; Li et al., 2022; Yigitcanlar et al., 2022), with smart cities being perceived as multidimensional systems connecting physical, social, and entrepreneurial capital alongside ICT infrastructure to uplift a city's intelligence (Harrison et al., 2010; Silva et al., 2018). Besides, an overarching sustainability goal is recommended to be incorporated into smart city practices (Bibri, 2018; Clarke et al., 2019; Tsolakis and Anthopoulos, 2015; Yigitcanlar et al., 2019c, 2019a). Scholars have shown concern about the huge energy demand of artificial intelligence (AI) and the Big Data technologies that are applied in urban systems (Anthopoulos and Kazantzi, 2021). Smart city development should be pursued to formulate innovative solutions to various social, economic, and environmental challenges to enhance the sustainability and liveability of cities. Hence, building a smart city requires the engagement of multiple actors and multiple economic sectors at multiple political levels (Castelnovo et al., 2016; Silva et al., 2018).

Many cities are advancing towards being "smart", and smart city forerunners such as London and New York are setting a model for others to follow (Allwinkle and Cruickshank, 2011). Berrone and Ricart (2020)

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developed the Cities in Motion Index to rank smart cities using 101 indicators across 10 key dimensions, including governance and public management, social cohesion, the environment, mobility and transportation, technology, international projection, urban planning, human capital, and the economy. After evaluating 174 cities worldwide, the Cities in Motion Index showed that London ranks as the smartest city, followed by New York, Paris, and Tokyo. None of the top 20 smart cities is from a developing country (Berrone and Ricart, 2020), highlighting the disparity in smart city development between developed and developing countries. On the other hand, in many developing countries such as Nepal, Cambodia, Bangladesh, and Vietnam, the urban population growth is faster than the world average (World Bank, 2018a), which is creating a growing demand for water, transport, energy, and other services (Valdez et al., 2018) and placing increasing pressures on urban infrastructure and the environment (Estevez et al., 2016). As of 2018, 55.27% of the world's population live in urban areas (World Bank, 2018b) and 29.25% of the urban population live in slums without access to basic services such as water and sanitation (World Bank, 2018c), indicating that continuous efforts are needed for urban development and governance, particularly in low- and middle-income countries. For cities that plan to build smart cities or that are in the process of doing so, it is important to understand the critical factors that accelerate smart city development. Few studies have explored how these factors activate the policy transfer processes city-to-city. This study fills this gap in the literature and explores how these factors activate the policy transfer process. It is based on primary data collected from an e-Delphi study.

Smart city development cannot depend solely upon cutting-edge technologies. It also requires smart urban governance and policies that can guide the selection and adoption of technologies, such as government support for incubators and accelerators, regulations to maintain cybersecurity and personal data protection, and public engagement (Aurigi, 2006; Caird and Hallett, 2019; Ivars-Baidal et al., 2019; Lim et al., 2021). Urban governance, defined as the "formulation and pursuit of collective goals at the local level of the political system", studies the ways in which decisions are made in a city context (Peters and Pierre, 2012, p.1). Urban governance frameworks shed some light on key variables that either limit or promote decision-making at the city level and the networks within which they exist (Kearns and Paddison, 2000). However, far less attention has been given to smart city governance and policies than to smart technologies (Lim et al., 2021). Yigitcanlar et al. (2019b) suggest that smart city development should place urban policy and governance strategies at its core.

City-to-city policy transfer can draw on knowledge of policy ideas, philosophies, concepts, instruments, and negative lessons from other jurisdictions to inform smart city development (Hasan et al., 2020; Martin and Geglia, 2019; Miao, 2018; Yong and Cameron, 2019). There are also intergovernmental initiatives to facilitate city-to-city policy transfer in smart city development, such as the Association of Southeast Asian Nations (ASEAN) Smart City Network (ASCN); IBM's Smarter Planet initiative; the World Resources Institute's Ross Centre for Sustainable Cities; Cisco's "Smart + Connected" Communities; United Cities and Local Governments; the Smart Cities and Inclusive Growth programme of the Organisation for Economic Co-operation and Development (OECD); the City-to-City Pairings programme of the European Union's International Urban Cooperation; and the United Smart Cities programme initiated by the United Nations Economic Commission for Europe and its partnerships.

Studies on knowledge transfer help smart city actors comprehend the dynamics of knowledge exchange and the politics involved, and map out the stakeholders involved in the process. For instance, the policy transfer framework by Dolowitz and Marsh (1996) looks into the components of the policy transfer process. This framework examines the type of transfer, the actors involved in the transfer, what is transferred, the "transferrer", the degrees of transfer, the demonstration of policy transfer, and the causes of policy transfer failure.

The e-Delphi method has increasingly been applied to examine many

public policy issues from the perspectives of different stakeholders, including issues concerning urban governance, the environment, climate change adaptation, energy, health, and land use. In this study, we capitalize on the novelty and efficiency of this design to consolidate expert opinions through a two-stage Delphi study engaging 23 experts to address two overarching research questions revolving around smart city development: what are some of the most important factors driving the development of smart cities, and how do these factors activate the policy transfer processes between cities? The study focuses on improving how smart city planning and urban governance principles inform one another, especially principles that are translated and adopted by cities of developing countries and those in the ASEAN region.

2. A review of factors affecting policy transfer in smart city development

The world has witnessed the diffusion of smart city initiatives in cities with diverse needs and contexts. Against a background of rapid population growth and urbanization, current cities, as complex systems, face various technical, organizational, and socioeconomic problems, including traffic congestion, pollution, and social inequality (Kim and Han, 2012). In some cities, the smart city initiatives mainly focus on applying ICT-based solutions to enhance resource management in metropolitan areas, assuring the future variability and sustainability of a city (Neirotti et al., 2014). Nevertheless, the smart city, in a broader sense, covers various social, economic, regulatory, and environmental aspects. Smart city development relies not only on ICT-based solutions, but also on many non-ICT factors, such as proximity to essential infrastructure (e.g. airports; top-ranked universities), cultural diversity, labour productivity, and unemployment levels (Li et al., 2022; Yigitcanlar et al., 2022). Governments need to enhance policy capacity, construct clear regulatory rules, raise more revenue, and pursue digital inclusivity and environmental sustainability to realize their smart city agendas (Neirotti et al., 2014; Tan and Taeihagh, 2020). Investigating knowledge and policy transfer in the context of smart cities can help generate a better understanding of smart city best practices and predict future trends.

"Policy transfer" is conceptualized as a process by which "knowledge about policies, administrative arrangements, institutions and ideas in one political system (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political system" (Dolowitz and Marsh, 2000, p.5). Policy transfer can happen across time, between two cities within a country, or between two countries (Stone, 2012). A related concept is policy diffusion. Policy diffusion occurs when an innovation or "best practice" in a jurisdiction is advocated through certain channels over time, resulting in the successive or sequential adoption of a programme, policy, or practice (Berry and Berry, 1999; Stone, 2012). While sharing similarities with policy transfer studies, policy diffusion studies examine the dispersion of policy innovation from a common point of origin (i.e. "pioneer") and focus on identifying patterns of policy adoption (Stone, 2012). Policy transfer studies take an agent-centred approach and focus on proactive knowledge or lesson learning from a policy developed elsewhere; before analysing the logic of policy choice, the interpretation of circumstances, and bounded rationality in imitation and modification (Stone, 2012).

When facing new or changing policy problems, governments increasingly look for solutions from other cities or countries (Dolowitz and Marsh, 2000). One of the most notable examples, the "Manhattan Transfer", was prevalent among many cities in the Asian–Pacific region in the 1990s as they intended to learn the spectacular high-rise skyline urban design from New York City (King, 1996). Urban policy transfer (involving aspects of intelligent buildings and transportation) from Kuala Lumpur (Malaysia) to Hyderabad (India) occurred in the 2000s as the former became an inspiration and model for the latter to build a high-tech city (Bunnell and Das, 2010; Das, 2015); Singapore's smart urban planning and development model has made it a main source for

urban policy transfer in the Southeast Asia region (Bunnell et al., 2012). What is transferred is not necessarily a specific policy instrument or programme. Objects of policy transfer are classified by Dolowitz and Marsh (1996) as: i) policy goals, structure, and content; ii) policy instruments; iii) administrative techniques; iv) institutions; v) ideology; vi) attitudes, ideas, and concepts; and vii) negative lessons. Policy transfer studies recognize the importance of agents or actors in the transfer processes (Evans, 2009; Marsh and Sharman, 2009). Policy transfer engages political actors, policy entrepreneurs and experts, political parties, elected officials, bureaucrats/civil servants, pressure groups, think tanks, transnational corporations, supranational governmental and non-governmental institutions, and consultants (Dolowitz and Marsh, 2000; Peck, 2002). For instance, policy entrepreneurs "sell" policy solutions worldwide, and international policy networks develop and promote ideas (ibid.).

Policy learning and entrepreneurship are crucial in accelerating smart city development and promoting policy transfer between cities. Because of the novelty of the smart city domain, many cities face similar challenges, such as ambiguity about what smart cities are and how smart cities can be developed (Zuzul, 2019). Countries or cities must learn from one another to understand smart city concepts and the development pathways towards smart cities. The policy transfer or diffusion literature formerly focused on processes between countries or states (Dolowitz and Marsh, 2000), while recent studies have turned their attention to active knowledge learning between cities (Einstein et al., 2019; Marsden et al., 2011). For instance, Einstein et al. (2019) investigated policy diffusion across cities based on a survey of US mayors and highlighted that city similarity, distance, and capacity all affect the likelihood of a mayor learning policy information from a particular city. In addition to policy learning, policy entrepreneurship is also touted as a key driver in accelerating smart cities development. Kingdon's work on the multiple streams framework, or Sabatier's advocacy coalition framework, help flesh out the drivers of decision-making and the catalysts of policy change (Sabatier and Weible, 2014). Kingdon's work has highlighted the important role of the policy entrepreneur in the policymaking process. Policy entrepreneurs "could be in or out of government, in elected or appointed positions, in interest groups or research organizations. However, their defining characteristic, much as in the case of a business entrepreneur, is their willingness to invest their resources – time, energy, reputation, and sometimes money – in the hope of a future return" (Kingdon, 1984, p.122). Such entrepreneurs are important for policy changes, not only because they actively advocate and spread ideas, but also because they build strong policy support through developing a wide policy network (Dolowitz and Marsh, 1996). To promote policy learning and enable policy entrepreneurship to fuel smart cities development, many cities have engaged in collaborative initiatives or regional networks. For instance, ASCN is a collaborative platform through which cities in the ASEAN region work towards a common policy goal – smart and sustainable urban development (ASEAN, 2020). It was established by the ASEAN Leaders at the ASEAN Summit in 2018 and engages 26 pilot smart cities, including Singapore, Phnom Penh, Ho Chi Minh, and Bangkok (ASEAN, 2020). With a growing number of city networks globally, cities must interact and engage with networked landscapes more strategically (Acuto et al., 2017).

Financial resources are also a key issue for smart cities. One of the most notable examples of the role of financial resources in smart city development is the New Songdo City project in Korea. With the ambitious aim of establishing ubiquitous ICT systems, it was led by the Incheon Free Economic Zone between 2006 and 2020 with a sizeable budget that stood at US$ 490 million (Paolo et al., 2016). Many smart city projects have had to be halted due to financial constraints or unsustainable business models (Anand and Navío-Marco, 2018; Yigitcanlar et al., 2019b). Financial resources are needed to carry out physical infrastructure projects and to support capacity building (OECD, 2006). Initiatives to support the establishment and operation of smart city

networks – including organizing workshops, training, visits, or creating informational platforms – require extensive resources from a city. In the smart city domain, financial resources might come from the public sector, the private sector, or a combination of both. Many studies have emphasized the importance of financial or business models for smart city services or technologies, such as e-government services (Agudo-Peregrina and Navío-Marco, 2016; Anthopoulos and Fitsilis, 2015; Kuk and Janssen, 2011), smart mobility (Laurischkat et al., 2016), and smart electricity and grid (Bulkeley et al., 2016; Galo et al., 2014).

Strengthening regulations and building policy capacity is another factor that has been highlighted in smart cities development. Technological innovations are often inextricably associated with risks, such as data privacy, cybersecurity threats, environmental risk, and unemployment (Li et al., 2018; Taeihagh and Lim, 2019). For instance, while AI algorithms, technologies, and applications are focuses of technological innovation in smart cities, their wide utilization also brings new challenges of data accessibility, management, privacy, and security (Yigitcanlar et al., 2020). Regulations are necessary to manage the risks and prevent unintended consequences from technological innovation, ensuring that society reaps the maximum gains (Batty et al., 2012; Lim and Taeihagh, 2018; Taeihagh and Lim, 2019; Trencher et al., 2020; Quirapas & Taeihagh, 2021). For example, environmental regulations help promote environmentally friendly technological innovation and discourage emission-intensive technologies (Li and Taeihagh, 2020). The European Union and Singapore have established the General Data Protection Regulation and the Personal Data Protection Act (Goyal et al., 2021; Lim and Taeihagh, 2018). Regulators in France and Spain have prohibited the operation of Uber, a sharing economy platform, due to concerns regarding its negative impact on local markets and the under-regulation of Uber drivers (Frenken and Schor, 2017; Li and Ma, 2019; Shead, 2019). In cases of transnational businesses, smart services or technologies can be diffused across countries, but regulators may find it difficult to hold transnational companies responsible and accountable (Djelic and Sahlin-Andersson, 2006; Hedley, 1999).

Building policy capacity is imperative to establish strong regulations to manage the technological risks and uncertainties associated with smart city development. Policy capacity refers to the competencies and capabilities that are important for intelligent policymaking to serve public ends (Painter and Pierre, 2005; Wu et al., 2015). Three major types of policy capacity are identified in the literature: political, analytical, and operational (Wu et al., 2015). Each of these three capacities further involves three different levels of resources or capabilities: the individual level, the organizational level, and the systemic level (Gleeson et al., 2009; Wu et al., 2015). Political capacity enables governments to design policies to overcome barriers of vested interests through the effective mobilization of various actors to develop a consensus on policy instruments and agendas (Capano, 2018). One way to build political capacity is to draw on innovative insights from active citizen participation. Many studies argue for the greater participation of urban residents and communities in city planning to create "responsive cities" (Goldsmith and Crawford, 2014; Yigitcanlar et al., 2019a). Citizens demanding parity with neighbouring jurisdictions for certain services may promote the adoption of best policy practices from other cities (Keating et al., 2012; Keating and Cairney, 2012). Analytical capacity (also referred to as technical capacity in some articles) indicates the extent to which policy design incorporates evidence-based knowledge when implementing policy instruments (Capano, 2018; Howlett, 2015). The explosive growth of Big Data and the emergence of advanced data science and analytics have created more analytical capacity challenges for civil servants and decision-makers in pursuing evidence-based or data-driven urban planning and designs (Bibri, 2022). Think tanks, academics, and non-governmental organizations are important agents of policy transfer, as they possess extensive expert knowledge that can be leveraged by governments to build analytical capacity (Stone, 2012; Takao, 2014). Operational capacity allows resources to be allocated effectively through systematic implementation of specific policy

instruments (Wu et al., 2015). Engaging multi-stakeholders is an important strategy to build both political and operational capacity. The involvement of the private sector facilitates the transboundary transfer of knowledge, capital, and technology financing (Zhan and de Jong, 2017). For instance, Kansas City in Missouri is a smart city known for its deployment of technology; the city government developed its operational capacity by strategically establishing various collaborations with private technology companies so the city could benefit from long-term private sector investment in local digital infrastructure development (Middleton, 2018).

Local contextual factors also matter for smart city development and affect policy transfer across cities (Dussauge-Laguna, 2013; Stone, 2012). Even though technological innovations and the internet are shrinking distances between people, geographical dimensions such as location, distance, and space continue to matter for urban development and innovation (*Bradford, 2004; Nam and Pardo, 2011*). For instances, the concentration of intellectual and infrastructural resources at specific sites, such as financial and industrial districts, continues to induce innovation (Amin and Graham, 1997; Wolfe and Bramwell, 2016). Other contextual factors involving political, economic, social, and cultural dimensions closely affect urban policy design and implementation (Gil-García and Pardo, 2005). For instance, cities concerned with ageing issues may direct resources towards technologies that serve ageing populations and their caregivers, creating specific niches and spaces for "gerontechnologies" (Yusif et al., 2016). The political contexts on both sides of the transfer can help explain why policy transfer happens (Dolowitz and Marsh, 1996).

City branding is also a driving factor in smart city development. The theoretical development and the wide adoption of city branding in the 1990s was a reaction to the growing competition between cities, led by globalization and the preference for market-based tools (Ashworth and Voogd, 1990; Berg et al., 1990; Gold and Ward, 1994; Kotler et al., 1993; Ward, 1998). Branding creates an identity for an object, which can be a product, a policy idea, or a model (Minkman and van Buuren, 2019); it can be applied to cities through place branding (Kavaratzis and Hatch, 2013) or to public policies through policy branding (Marsh and Fawcett, 2011). City branding is a type of place branding; it adopts "the concept and techniques of product branding for use within place marketing, pursuing wider urban management goals" (Kavaratzis and Ashworth, 2005, p.506). Brand development can mobilize material and human capital resources and raise interest among policy communities (Minkman and van Buuren, 2019). For a specific policy measure, branding can serve as a tool for policy translation and transfer, increasing the chance of a policy measure being mobilized internationally (Minkman and van Buuren, 2019).

Based on the discussions above, we constructed the Delphi study, to concentrate on the following factors that activate policy transfer in smart cities development: policy learning and policy entrepreneurship; mobilizing financial resources; strengthening regulations and policy capacity; local contextual factors; and city branding.

3. Methodology

The Delphi method involves a group of experts systematically reaching an informed group consensus on a topic (Linstone and Turoff, 1975). It is typically administered by a researcher or a research team that gathers a group of experts, poses survey questions, synthesizes responses, and directs the expert group towards a common ground (Donohoe et al., 2012). The consensus is normally achieved through iterative rounds of sequential surveys; the experts involved are supposed to reconsider their initial positions by considering the opinion trends in the group (Donohoe et al., 2012). The Delphi method is suitable for research problems that need collective thinking to shed light on future strategies that cannot be well addressed through linear or precise analytical techniques (Donohoe et al., 2012; Galo et al., 2014). In addition, the anonymity inherent in a Delphi method allows participants

to interact freely and reduces the risk that group dynamics will negatively influence outcomes (ibid.). The process stops according to a pre-defined stopping criterion, such as the number of rounds or stability of the results (e-Delphi, 2021). The internet has allowed the development of the e-Delphi technique, which is much more efficient, feasible, and convenient than the traditional paper-based Delphi method (Deshpande et al., 2005; MacEachren et al., 2006).

Several studies have applied the Delphi method in the smart city field. Galo et al. (2014) established the methodology for smart grid deployment in Brazil using the Delphi method. Ivars-Baidal et al. (2019) employed the Delphi technique to obtain expert opinions regarding emerging smart tourism. Lee et al. (2013) conducted Delphi surveys to identify current and future trends in service provision in smart cities.

In this study, the Delphi method is employed to collect expert opinions about critical factors that promote policy transfer between smart cities, anchoring on the theoretical insights derived from the literature review. Studies have employed the Delphi method qualitatively, quantitatively, or in mixed-method designs (Chamberlain et al., 2020; Fletcher and Marchildon, 2014; Kennedy, 2004; Rikkonen et al., 2019; Sekayi and Kennedy, 2017). We use a mixed-method approach, designing a questionnaire with open-ended and Likert scale questions to collect both quantitative and qualitative data. Studies have shown that open-ended questions in Delphi research allow more nuanced responses and better clarification of expert opinions on the topic explored (Chamberlain et al., 2020; Kennedy, 2004; Sekayi and Kennedy, 2017).

This research conducted a two-round Delphi over the course of in three months (21 July–5 October 2020). In each round, we invited the experts to participate by email, explaining the project aim and the Delphi questionnaire link that we created on the e-Delphi.org platform (www.edelphi.org). After the experts provided voluntary informed consent to take part, two reminder emails were sent before the end of a two-week deadline.

We sent the first questionnaire on 21 July. Of the 25 experts who agreed to participate, 23 (92%) completed this first round. The questionnaire contained Likert scale questions where factors or statements were rated by level of importance or agreement on a five-point Likert scale. Open-ended questions were also designed to allow experts to expand on their points.

The second e-Delphi questionnaire was sent on 23 September to the 23 experts who had contributed to the first round. In the end, 15 experts completed the second round. A narrative summary of the responses in the first round was shared with experts, highlighting areas where consensus was achieved and areas where opinions diverged. The questionnaire in the second round included mainly open-ended questions to elicit deeper discussion on why certain factors are more important than others in facilitating city-to-city transfer in smart city development and what strategies that promote the transfer processes (See supplementary material for details of the questionnaire).

We performed a thorough content analysis of the resultant qualitative data. The quantitative data were analysed using Cronbach's alpha analysis. When analysing Likert scale survey data, calculating the Cronbach's alpha (α) value is essential to measure the internal consistency and reliability of the questionnaire (Croasmun and Ostrom, 2011). It indicates how all questions surrounding a factor relate to one another and to the respective factor (Cronbach, 1951; Gay et al., 2011). A Cronbach's alpha of 0.50–0.70 is recognized as reflecting moderate reliability, and 0.70–1.0 as reflecting great reliability (Hinton et al., 2014). Davis (1964, p.24, as cited in Peterson, 1994) suggests a cut-off value of 0.5 for a Delphi study that involves a small group. Hair et al. (1998) echoes this and recommends that Cronbach's alpha should be above 0.55. In a Delphi research, Cronbach's alpha also measures the homogeneity of responses, i.e. consensus, among the experts (Chamberlain et al., 2020; Taber, 2018). A detailed analysis of the results is presented in the following section.

4. Results

4.1. Descriptive statistics

Table 1 displays the basic demographic information of the respondents for the first and second rounds of the Delphi survey. We gathered an expert panel of members with diverse professional backgrounds, including academics, civil servants, technocrats, and business/private actors from 13 countries. The majority were academics and from the business/private sector. Around half of respondents predominantly focus on the ASEAN region in their work, aligning with our research focus on smart city policy in that region (see supplementary material for more demographic details). The data analysis of the Likert scale questions in round one showed an overall a Cronbach's alpha of 0.8 (Table 2), indicating the excellent reliability of the questionnaire and great internal homogeneity and internal consistency of the responses among the experts. We also performed the Cronbach's alpha analysis for each factor identified as important in facilitating policy transfer between or among cities in smart city development. For each factor, several relevant questions were asked. The data analysis by factor demonstrated that Cronbach's alpha values were not lower than 0.60, denoting a reliable questionnaire design and internal consistency of responses for each factor. Given the consistency of responses among panellists in round one, we asked mainly open-ended questions in round two to elicit deeper insights.

4.2. Accelerating smart city development via policy learning and entrepreneurship

First and foremost, the respondents emphasized the importance of policy learning and policy entrepreneurship to accelerate smart city development. The enthusiasm of cities to learn from one another fosters mutual learning of knowledge about best practices and technology adoption between cities. For instance, data sharing on the adoption of certain technological solutions in a city would be an asset in fostering policy learning between cities. Data from both successful and failed smart city projects could be stored to enable cities to draw lessons from previous experiences. Collaborations between universities, think tanks, and city officials are extremely important on this front. In addition, regional smart city initiatives such as the ASCN could be developed as a platform to drive learning across jurisdictions. The ASCN could be a catalyst to ensure knowledge transfer and establish common ground for

Table 1
Demographic information for respondents

	Round 1(n=23)	Round 2(n=15)
Gender		
Female	8 (34.78%)	5 (33.33%)
Male	15 (65.22%)	10 (66.67%)
Predominant work focus		
ASEAN region	10 (43.48%)	5 (40.00%)
Global focus	13 (56.52%)	9 (60.00%)
Profession		
Academic	13 (56.52%)	9 (64.29%)
Business/private sector	5 (21.74%)	2 (14.29%)
Civil servant	2 (8.70%)	1 (7.14%)
Technocrat	1 (4.35%)	-
Other	2 (8.70%)	2 (14.29%)
Age		
<=30	2 (8.70%)	-
31-40	11 (47.83%)	8 (53.33%)
41-50	7 (30.43%)	5 (33.33%)
51-60	2 (8.70%)	1 (6.67%)
>60	1 (4.35%)	1 (6.67%)
Education		
Bachelor's degree or equivalent	4 (17.39%)	1 (6.67%)
Master's degree or equivalent	7 (30.43%)	6 (40.00%)
Doctorate degree or equivalent	12 (52.17%)	8 (53.33%)

Table 2
Cronbach's alpha analysis

Factors	Questionnaire	Obs.	Cronbach's α=
Overall	All questions	23	0.8
Accelerating smart city development via policy learning and entrepreneurship	Q1	23	0.7
	Q2	23	
	Q3	23	
	Q6	23	
	Q7	23	
	Q8	23	
	Q9	23	
Developing financial instruments for smart cities	Q11	23	0.7
	Q12	23	
	Q13	23	
Strengthening regulations and policy capacity	Q15	23	0.6
	Q16	23	
	Q17	23	
	Q18	22	
	Q19	23	
	Q21	22	
Adapting to the local context	Q23	23	0.7
	Q24	23	
	Q25	23	
	Q26	23	

research and development across cities, especially in facilitating partnerships between different smart cities and supporting emerging smart cities in applying for international funding and grants.

In addition, the multifaceted and diverse roles played by the policy entrepreneur in smart city development were highlighted, including becoming an effective communicator, becoming a broker to various stakeholders, and facilitating the delivery of tangible results. In terms of communication, a policy entrepreneur needs to link the complex implementation of smart city policies to the political promises made by politicians to citizens. They should be able to gain buy-in from political leaders and also to garner support from citizens through the effective framing of smart city initiatives. In becoming a broker to various stakeholders, a policy entrepreneur needs to possess capabilities in mapping the dynamics of the governance structure related to smart cities; in identifying the *de facto* leaders in smart city policies; and in creating incentives for successful implementation to take place. In addition, a policy entrepreneur needs to facilitate cooperation and co-ordinate plans involving multiple stakeholders, especially the public. For example, a policy entrepreneur might create favourable conditions for the users or members of the public and other potential partners to exchange information, particularly involving sharing details on existing and new projects. To make this a reality, either an *ad hoc* team, a special task force, or a hybrid team could be created to form a steering committee to govern smart city development. A policy entrepreneur also needs to focus on delivering citizen-facing services that will be relevant to the citizens, rather than focusing merely on creating blueprints, road maps, and concepts. For example, user-oriented programmes such as 5G pilots or trials can be set up in small pop-up locations for the public to sign up so that citizens feel their participation in smart city initiatives is being prioritized. To facilitate the delivery of smart city promises, building project teams that can deliver these promises is also an essential task for a policy entrepreneur. Different implementation teams need to be formed that comprise people with diverse skillsets, such as policy researchers, programmers, product managers, designers, project managers, and business analysts. To accelerate smart city development, a policy entrepreneur needs to champion recruiting the best talent within and beyond the government to fill these roles. By and large, fostering policy learning and entrepreneurship in smart city development requires a short-term, medium-term, and long-term playbook of strategies focusing on the needs of people rather than on grandiose smart city visions. Short-term strategies will entail building digital literacy among citizens and building capabilities for businesses; medium-term strategies

include using the literacy and knowledge that have been acquired to build infrastructure and a user base as a means of gathering data and building better connectivity; and long-term strategies encompass using data and connectivity to form complete systems of interoperability for smart city development.

4.3. Developing financial instruments for smart cities

Creating various financial instruments was also identified as an important factor driving successful smart city development. One of the financial instruments currently widely applied in smart city development, especially in developing countries, is funding from multilaterals. In mobilizing resources, financing from development banks should be considered alongside national or federal government financial instruments through a public–private partnership financing model. Specifically, it is important to identify what aspects of smart city infrastructure can be financed entirely by the government and what aspects might be financed via a public–private partnership financing model. Additional tax revenues must also be raised in developing countries via alternative sources beyond car and fuel taxation. A "bar trade" concept has also been raised in which the promotion of smart city investment can be formed between developed and developing countries. Developed countries can be incentivized to invest in the digital infrastructures of developing countries in exchange for key exports from those countries. Other financial instruments that cities should explore to ensure sufficient market incentives and resources in executing smart city projects include raising smart city bonds, building a network of investors for the city, reducing the red tape required to conduct public or private fundraising programmes, tapping into the potential revenues that a creative economy could bring, and setting up special tax credits for smart city projects that prioritize sustainability. For instance, the Government of the Philippines passed its Green Jobs Act in 2016 recognizing the potential of the green building sector to bring about sustainable economic development through improving energy efficiency in the country's major cities. This act provides special tax deductions of approximately 50% of training and research development costs to companies that generate and sustain green jobs.

4.4. Strengthening regulations and policy capacity

In accelerating smart city development, many survey respondents deemed strengthening regulations and building capacity to be crucial. Explicit regulatory mechanisms that do not stifle innovations are important to facilitate successful smart city development. Regulations should be designed that institutionalize explicit mechanisms to enable governments to take charge of the smart city developmental ecosystem, to avoid vendor lock-in, and to allow better adoption of innovative solutions. Clear regulatory mechanisms are important because many private enterprises often find ways to circumvent regulatory constraints in navigating the business environment, especially in developing countries. It is important for investors, private corporations, and start-ups to trust the regulatory regime and play by the book. As such, clear enforcement measures should be put in place to ensure there is no gap between what is stated in the legislature and what is practised on the ground. There is also a need for emerging smart cities in developing countries to brief start-ups and potential investors on those countries' regulations, creating a level playing field for all new entrants and for incumbents. Explicit regulations will be even more relevant and crucial, as widening internet access and use of social media in rural areas and smaller towns in developing countries will result in increasing demand for accountability.

For policy transfer to happen effectively between a transfer city and a recipient city, regional smart city initiatives, such as the ASCN, would be an effective platform to drive capacity building efforts. In addition, extended rotations that involve small teams in different governmental departments serving as interfaces to prioritize funds disbursement could

also be effective. Besides policy transfer, public participation was seen by respondents as important to improve the policy capacity of a city in ensuring the success of smart city initiatives. Public participation can be leveraged to influence the performance indicators of cities by ramping up the capacity of electronic government (e-government), in which city governments will be held accountable for the efficiency and effectiveness of various public services delivery. Additionally, specialized training, workshops, and seminars within the public sector via focused technical cooperation training was also seen as important to build capacity. In this respect, the expertise of academics and consultants should be harnessed through partnerships with governments to help public departments improve policy capacity and to assist the implementation process in smart city development. Private sector best practices and case studies demonstrating successful smart city development could also be leveraged to promote capacity building in smart city development.

4.5. Adapting to the local context

The vast majority of respondents noted the importance of adapting smart city solutions that have been shown to work in other cities to local contexts in the process of knowledge transfer. This includes tweaking existing instruments to suit the specific needs of a city based on its unique geography, culture, climate, and political–economic context. The current financial capacity of a city, the availability of talent, interoperability, and the view of citizens regarding the adoption of novel technology were also deemed important in building up a local understanding of the nuances of smart cities in a way that would suit the local context. For instance, experienced foreign companies or external agents could work with local teams, politicians, and technocrats to create local solutions that meet specific needs. Adapting existing solutions to the local context is often more effective, given the higher cost that will inevitably be incurred by "reinventing the wheel".

Furthermore, adapting smart city solutions to the local context will shorten the learning curve, as the learning and adaptation processes enable countries or cities to learn from failures to avoid repeating mistakes and to explore how best practices can be modified. Most respondents shared that it is important for cities not to transfer the entire suite of smart city initiatives that have worked in other cities, but instead to tweak these ideas and integrate them with local solutions, including policy instruments and processes and frameworks for smart city development. However, in certain domains of smart city development – such as the development of energy-efficient technologies – borrowing instruments might be a better approach, because there is already an array of existing policy tools or solutions that are widely applicable to most policy contexts. While best practices could serve as a guide, they must be treated more as benchmarks and inspirations guiding the development of solutions relevant to local needs. Moreover, developing countries simply do not have sufficient resources to develop new solutions from scratch, hence tweaking existing solutions that have worked in other cities to the local context would be crucial.

Table 3 summarizes all the above factors that drive smart city development and activate city-to-city policy transfer.

5. Discussion

This article has applied the Delphi method to facilitate a group discussion about the critical factors that activate policy transfer in smart city development between two cities. We identified potential factors from the literature review and, through the Delphi process, a consensus among the participating experts on the importance of the following factors: policy learning and policy entrepreneurship; developing financial instruments for smart cities; strengthening regulations and policy capacity; and adapting to the local context. A content analysis of the resultant qualitative data (see the results section) allowed us to understand not only "what" factors accelerate policy transfer in smart city development, but also "how" they do so. Building on previous work in

Table 3

A summary of the factors and their major attributes driving smart city development and activating city-to-city policy transfer

Factors driving smart city development and activate city-to-city policy transfer	Major attributes
1. Accelerating smart city development via policy learning and entrepreneurship	• Use smart city networks and initiatives to spur mutual learning between cities • Become a broker to various stakeholders • Link the complex implementation of smart city policies to political promises • Garner support from citizens through the effective framing of smart city initiatives • Understand the dynamics of the governance structure relating to smart cities development • Design short-term, medium-term, and long-term strategies focusing on human development
2. Developing financial instruments for smart cities	• Mobilize resources from multilaterals • Raise additional tax revenues via alternative sources • Open up investment opportunities in smart cities development through a "bar trade" concept • Raise smart city bonds • Reduce red tape for private investments • Set up special tax credits for smart city projects that emphasize sustainability
3. Strengthening regulations and policy capacity	• Bridge the gap between legislation and actual practice on the ground • Create a level playing field for all start-ups • Allow extended rotations that involve small teams in different governmental departments • Encourage public participation by ramping up the capacity of the e-government platform • Conduct specialized training, workshops, and seminars within the public sector • Harness the expertise of academics and consultants and forge partnerships
4. Adapting to the local context	• Tweak existing instruments to suit the specific needs of a city • Consider the current financial capacity of a city, the availability of talent, interoperability, and the view of citizens regarding the adoption of novel technology

the literature, we further elaborated on the "how" question, deciphering the major attributes and characteristics that activate the factors.

Our analysis finds that policy learning and entrepreneurship are intertwined and mutually reinforcing in driving policy transfer between smart cities. Enthusiasm for policy learning between cities facilitates a common understanding of best practices and technology adoption for smart cities, while policy entrepreneurship fuels policy learning and technology adoption. Politicians, lobbyists, civil servants, researchers, and private persons can all function as policy entrepreneurs (Knaggård, 2015), while networks of state and non-state actors could help facilitate policy learning between or among cities (Evans, 2017; Stone, 2004, 2000). Local officials are critical players in the policy transfer processes (Marsden et al., 2011). Due to strategic need or curiosity, local officials rely on trusted networks to access policy information (Marsden et al., 2011). Non-state actors, such as think tanks or universities, primarily contribute to policy transfer through their involvement in policy networks and sharing their expertise and information (Stone, 2004, 2000). To promote significant policy change through learning, a policy entrepreneur can work as an idea broker, as an effective communicator, and as a facilitator of smart city project implementation. As such, policy entrepreneurs contribute both to problem definition and to solution creation (Guldbrandsson and Fossum, 2009). The role of a policy entrepreneur in accelerating smart city learning and development as reported in our e-Delphi survey corresponds with how the existing literature conceptualizes the characteristics of a policy entrepreneur. For instance, our study suggests that a policy entrepreneur needs to be willing to invest time and resources in promoting smart city developments (Mintrom, 1997). Policy entrepreneurs also have to be persistent, credible, able to speak for others, and accessible to policy-makers to succeed in problem/idea brokering (Guldbrandsson and Fossum, 2009; Knaggård, 2015). To get a policy problem or idea on the agenda, a policy entrepreneur needs to make use of their knowledge and values to frame the problem in a way that can attract attention from a broad range of individuals and groups (Knaggård, 2015; Mintrom and Norman, 2009). They also need to communicate their smart city ideas to a wide audience through networking in policy circles, building advocacy coalitions, and shaping the terms of policy debates (Mintrom, 1997). Policy entrepreneurs can sell policy ideas through pursuing concrete projects (Pesch et al., 2017) and often need to take action to reduce risk perception and demonstrate the feasibility of intended projects (Mintrom, 1997). The ability to understand the ideas, concerns, and motives of citizens and other actors is another quality a policy entrepreneur should possess to align the incentives of actors with smart city goals, form project implementation teams, and push forward the delivery of citizen-centred projects (Mintrom and Norman, 2009). Temporally, policy entrepreneurs must act rapidly before windows of opportunity close or they must wait until the next chance arises (Kingdon, 1984). Furthermore, our study shows that policy entrepreneurs are able to promote policy learning and collaboration between cities. When two cities are open to policy learning and collaboration over matters of mutual interest, they are more likely to mobilize knowledge and resources to address the emerging challenges of smart city development. By engaging in international policy networks, policy entrepreneurs might learn directly about smart city measures that have worked in other jurisdictions, drawing insights from the direct accounts of experts from other jurisdictions based on their experiences with a specific policy measure. This could eventually enhance the probability of legislative approval for policy innovations (Mintrom, 1997; Mintrom and Vergari, 2016; Pesch et al., 2017). Our study shows that local and international policy entrepreneurs play critical roles in enabling policy learning that will in turn accelerate the transfer of smart city ideas between cities.

We also identify developing financial instruments as an important factor for smart city development. It is critical for governments to recognize the diverse financial models that exist to support different services, applications, or infrastructures in the smart city domain. Previous studies have shown that smart city infrastructure, such as intelligent traffic systems, is largely financed by the public sector. Smart neighbourhoods that apply ICT-enabled infrastructure to develop sustainable residential areas are often financed by both public and private investments, while testing ICT-enabled new technologies in many cases involves collaboration between local governments and industrial partners (Manville et al., 2014). Confirming insights found in previous studies, our findings suggest the need for smart cities to move away from traditional expensive and unsustainable public infrastructure and towards engaging state-of-the-art technologies and social innovations (Anand and Navío-Marco, 2018). To achieve this, civic participation can prepare the ground for sustainable and diverse financial models (Saunders and Baeck, 2015). In addition to domestic public and private investments, financial resources involving loans or grants from donors or multilateral organizations are highlighted as an important input for some cities, especially those located in low- and middle-income countries. In this e-Delphi study, participants shared concerns about the conflicts between the self-interests of multilateral organizations and actual local needs. Many previous studies have discussed similar concerns (Elayah, 2016; Flint and Meyer zu Natrup, 2019; OECD, 2006). As far as external financial resources are concerned, the way forward is to obtain a precise understanding of local contexts and to ensure the voices

of citizens and local communities are accounted for in the policymaking processes in drawing policies that suit local needs.

The e-Delphi study shows high agreement regarding the importance of strengthening the regulations and policy capacity of governments. Explicit regulatory mechanisms are considered important for successful smart city development in that they help prevent vendor lock-in and enable the better adoption of innovative solutions. Some respondents shared the concern that governmental regulations, such as environmental standards, may make it difficult for novel technologies to reach the market in a timely manner. Some academic studies have reflected debates around regulatory constraints on technological innovation (Lee et al., 2013). Technologies often advance much faster than the formulation of the regulations that govern them (the "pacing" problem), posing substantial challenges for policymakers (Marchant, 2011; Taeihagh et al., 2021). The way forward is for regulatory mechanisms to be designed to guide technology development and investments without stifling innovation (Taeihagh and Lim, 2019). Government policies play a crucial role in fostering smart cities (Yigitcanlar et al., 2008), and regulations do not necessarily discourage technological innovation. Some environmental regulations have even been found to positively affect the innovation of corporations and to encourage firms to produce more environmentally friendly products and services (Zhao and Sun, 2016). In terms of policy capacity, different policy choices require different dimensions of policy capacity to function effectively. A lack of critical policy capacity might lead to policy failure (Howlett and Ramesh, 2014). For instance, while market-based policy instruments – such as tradeable permit schemes – are theoretically cost-effective and allow low governmental involvement (Jordan et al., 2003), for the policy instruments to operate successfully, a government must build adequate policy analytical capacity to cope with the complex economic and market conditions involved in market regulation (Howlett and Ramesh, 2014). Collaborative governance aims to bring various actors together in a constructive way and demands high organizational–operational capacity; this might involve, for instance, pre-existing governmental networks, sound organizational structures, good personnel management, strong societal leadership, and sufficient state steering capacities (Gleeson et al., 2011; Howlett and Ramesh, 2014; Wu et al., 2015). In the absence of high organizational–operational capacity, some resources or organizations, such as civil society organizations, may not be effectively directed to address targeted policy issues (Von Tunzelmann, 2010). For smart city governance, city governments should also have the high organizational–operational capacity to engage multi-stakeholders (such as citizens and civil society organizations, private sector, academics, consultants, citizens, and international networks) and to create an inclusive environment for participatory design. For instance, in Europe, many smart cities use living labs to develop citizen-centred applications and services (Mann et al., 2020; Paskaleva et al., 2015). In lieu of disruptive, complex, and constant technological innovation, formulating regulatory mechanisms and building policy capacity based on proactive, dynamic, and responsive processes may be the solution (Fenwick et al., 2017). Regulatory design and capacity building should happen within an inclusive policy environment, making citizens the central pillar of smart city governance and tapping into the collective expertise, skills, knowledge, and financial resources of multiple stakeholders (Fenwick et al., 2017; Tan and Taeihagh, 2020) such as regulators, citizens, start-ups, established enterprises, experts, and academics to help co-design urban services that directly serve citizens' needs while aligning with overarching policy goals (Paskaleva et al., 2015).

When borrowing smart city solutions that have worked in other cities, accounting for local context is necessary to suit the specific needs, capacity, and public acceptance of the recipient city. Local context is closely intertwined with all the above factors discussed in this paper. For instance, to garner political support, policy entrepreneurs need to frame their policy ideas to align with the political ambition of local governments. To strengthen policy capacity, understanding the local context is fundamental in assessing the baseline of individual, organizational, and systemic capacity. Issues such as lack of skilled individuals, a fragmented government, and corruption may hinder the development of policy capacity (OECD, 2006). Engaging multi-stakeholders can help adapt problem definition and solutions to local contexts. Ensuring public participation is especially vital to enhancing the public perception and acceptance of the functions and opportunities of smart cities (Esmaeilpoorarabi et al., 2020).

Even though we have included city branding as one potential factor, the survey respondents disagreed on its importance, especially given that many smart city plans are still in their infancy. Our findings revealed that city branding contributes to smart city development only when smart city development prioritizes the basic needs of citizens. However, city planners often tend to adopt and overuse fashionable slogans to gain political support (Kavaratzis and Ashworth, 2005). Another explanation for why city branding did not feature strongly in the e-Delphi responses is likely due to resource constraints. A lack of resources causes branding activities to be perceived more as a luxury than as a necessity. Branding consists of three steps: brand development, brand management, and brand maintenance. To effectively place a city brand in the spotlight, the first two phases can be particularly resource-intensive (Minkman and van Buuren, 2019), calling for considerable intellectual, cultural, organizational, and material resources (McCann, 2013). A survey of 28 cities in 12 European countries revealed that the annual city marketing budgets ranged from €0.13 to €10 million (Seisdedos, 2006). Berlin spent up to €5 million on city branding annually (TPBO, 2016). The city branding budget was US$ 33 million in Singapore (Jacobsen, 2012, 2009). In many cases, the budgets for city branding are restricted (Jacobsen, 2009; Zenker and Martin, 2011), particularly in low- and middle-income countries. In sum, city branding should centre on the perceptions and images held by citizens, placing them at the heart of city planning and management rather than merely promoting visual elements such as catchy slogans and colourful logos (Kalandides et al., 2012; Kavaratzis and Hatch, 2013). Resource constraints, the effective allocation of branding budgets, and the efficiency and effectiveness of branding activities are important issues to address before city branding can contribute substantially to smart city development.

Overall, this study contributes both theoretical and empirical understandings of factors that promote policy transfer across cities in accelerating smart cities development. Rather than functioning independently, these factors complement each other. For instance, local contexts should be reflected in multiple dimensions, including developing capacity building and regulatory measures adapted to the local environment. Financial resources, on the other hand, can support capacity building programmes, policy learning, and the advocacy activities of policy entrepreneurs, as well as the operation of city networks. Enthusiasm for policy learning and entrepreneurship leads to cities being open to policy ideas advocated by policy entrepreneurs. Therefore, smart cities must strategically use their resources to strengthen all the above factors.

In this research, we have used the e-Delphi platform and followed the general practices in the literature for conducting and reporting a Delphi study (Avery et al., 2005; Brüggen and Willems, 2009; Donohoe et al., 2012; Firth et al., 2019; Galo et al., 2014; Hasson et al., 2000; Hasson and Keeney, 2011; Lee et al., 2013). Through the e-Delphi method, we have been able to seek a consensus from real-world experts and professionals to establish a set of critical factors that activate policy transfer processes in smart city development. The e-Delphi research occurred across two rounds, with qualitative questions designed for each round. Therefore, another significance of our research is that it has not merely been a consensus-building activity; it also provides a concrete articulation of each identified factor through coding and analysing qualitative comments. By the very nature of our research, we have presented the collective thinking of the expert panel in smart city development.

6. Recommendations and implications for policy

To move smart city projects from the planning to the implementation stage, the six factors identified through our study can serve as a compass for policymakers to guide policymaking in accelerating smart cities development. For these factors to work, governments have to be genuinely interested in working together to enhance collaborations between cities to exchange and accumulate knowledge about policy challenges and solutions. Beyond signing a Memorandum of Understanding to establish diplomatic agreements, we suggest governments formalize clear collaborative mechanisms and joint partnerships that are periodic and symbiotic to ensure the sustainability of transfer and learning between countries or cities. In 2021, the UK and Thai governments established partnership to advance digital technology capabilities for smart cities and to match over 200 businesses between both countries to promote digital trade and investment opportunities in Thailand (Sharon, 2021). Likewise, ASEAN and China have also formed similar collaborations to accelerate smart city development (Lim, 2019). In addition, city-to-city policy transfer for smart city development can be achieved by setting up regional-level or international-level smart city networks to establish formal platforms for both public and private actors to meet and to encourage active dialogues among them, such as the ASEAN Smart Cities Network (Tan et al., 2021). Through such networks and platforms, capacity building workshops can be organized, strategic partnerships can be formed, and the transfer of technologies and governance lessons across cities can be accelerated. Furthermore, our study could be a starting point to inspire a repository of smart city policy development case studies whereby clear comparisons and explanations of success stories and failed attempts to transfer urban planning strategies and governance lessons can be stored and referenced in future. Such a knowledge repository can adopt a knowledge-based urban development (KBUD) framework – an integrated framework to create knowledge dynamics and foster innovation for sustainable urban development (Chang et al., 2018). For instance, Helsinki has demonstrated the successful adoption of KBUD by benchmarking its performance in four areas of development with eight other smart cities in the world (Yigitcanlar and Lönnqvist, 2013). Table 4 below summarises the policy recommendations for accelerating smart city development through policy transfer.

7. Conclusion

Smart city projects have mushroomed, but there are few cases of cities that have successfully implemented smart city projects and become "smarter". As many cities, especially those in developing countries, are in the initial stages of becoming "smarter", knowledge exchange and learning between them become important for smart city development. How novel technologies should be added to existing urban systems, and how technological solutions can be properly applied to address various challenges and problems faced by modern cities without incurring unintended consequences, are all challenging in the context of smart cities, and no practitioners or policymakers have clear answers. It is beyond the scope and capacity of a single jurisdiction to identify solutions to such questions independently. For cities to be smart, therefore, cities must inevitably learn from one another.

To the best of our knowledge, no study has examined the critical factors that drive city-to-city learning and transfer in the context of smart city development. Our study fills this knowledge gap by tapping into the collective intelligence of experts and professionals using a qualitative method and leveraging an effective online e-Delphi tool. By performing two rounds of an e-Delphi study targeting an international expert panel, we have identified the following factors that facilitate policy transfer between smart cities: policy learning and entrepreneurship, developing financial instruments, strengthening regulations and policy capacity, and accounting for local contexts. Our study enriches the existing knowledge about policy transfer in smart city development and its critical factors and sheds light on the policy priorities for smart city development for policymakers. Determining these factors is significant for countries and cities that aspire to a head start in developing smart cities, especially given that resources are scarce and constrained. Understanding these driving factors will also help governments and industries strengthen the fundamentals – particularly through developing political capital and building policy capacity, understanding local contexts, creating a supportive ecosystem, allowing policy entrepreneurship, and networking of smart city development, because without doing so, smart city ideas cannot flourish. Besides, adjusting the regulatory system to be adaptive and resilient to technological innovations, being willing to learn from experiences in other places, being meticulous with resource planning and distribution, and increasing the acumen to raise financial revenues are all means of laying a solid foundation for the successful development of smart cities in the longer term.

Theories of policy transfer between smart cities could be further enhanced and validated in future research. For example, examining the order of importance of the factors activating city-to-city policy transfer in the smart city context and developing an in-depth examination of a cross-jurisdictional comparative case study focusing on how policy transfer occurs in the smart city context would be two important areas of interest for future research. Capacity building is also essential for the development of smart cities. Studying how capacity building at the systematic, organizational, and individual levels can be developed and galvanized to facilitate policy transfer processes would be relevant for advancing knowledge and improving policy and practice in smart city policy development.

CRediT authorship contribution statement

Lili Li: Formal analysis, Investigation, Data curation, Writing – review & editing. **Araz Taeihagh:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Si Ying Tan:** Methodology, Formal analysis, Investigation, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

Table 4

Policy recommendations for accelerating smart city development through policy transfer

Policy recommendations for accelerating smart city development through policy transfer	Examples
1. Formalize clear collaborative mechanisms and joint partnerships that are periodic and symbiotic between countries or cities	ASEAN–China cooperation (Lim, 2019); UK–Thailand Tech Export Academy (Sharon, 2021)
2. Set up regional-level or international-level smart city networks as formal platforms to encourage policy transfer in smart city development	ASEAN Smart Cities Network (et al., 2021)
3. Establish smart city repositories to develop case studies that are useful for the policy transfer of urban planning strategies and governance lessons	KBUD in Helsinki (Yigitcanlar and Lönnqvist, 2013)

the work reported in this paper.

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Supplementary materials

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References

Acuto, M., Morissette, M., & Tsouros, A. (2017). City diplomacy: Towards more strategic networking? Learning with WHO healthy cities. *Glob. Policy, 8*, 14–22. https://doi.org/10.1111/1758-5899.12382

Agudo-Peregrina, Á. F., & Navío-Marco, J. (2016). Extended framework for the analysis of innovative Smart City business models. In *27th European Regional Conference of the International Telecommunications Society (ITS): "The Evolution of the North- South Telecommunications Divide: The Role for Europe." International Telecommunications Society (ITS)*.

Allwinkle, S., & Cruickshank, P. (2011). Creating smart-er cities: An overview. *J. Urban Technol., 18*, 1–16.

Amin, A., & Graham, S. (1997). The ordinary city. *Trans. Inst. Br. Geogr., 22*, 411–429. https://doi.org/10.1068/a45516

Anand, P. B., & Navío-Marco, J. (2018). Governance and economics of smart cities: opportunities and challenges. *Telecomm. Policy, 42*, 795–799. https://doi.org/10.1016/j.telpol.2018.10.001

Anthopoulos, L. G., & Fitsilis, P. (2015). Understanding smart city business models: A comparison. In *International World Wide Web Conference Committee (IW3C2)* (pp. 529–533). ACM. https://doi.org/10.1145/2740908.2743908.

Anthopoulos, L. G., & Kazantzi, V. (2021). Urban energy efficiency assessment models from an AI and big data perspective: tools for policy makers. *Sustain. Cities Soc.* , Article 103492. https://doi.org/10.1016/j.scs.2021.103492

Araya, D. (2015). Smart cities and the network society: Toward commons-driven governance. In D. Araya (Ed.), *Smart Cities as Democratic Ecologies* (pp. 11–22). London: Palgrave Macmillan. https://doi.org/10.1057/9781137377203_2.

ASEAN, 2020. ASEAN Smart Cities Network [WWW Document]. URL https://asean.org/asean/asean-smart-cities-network/ (accessed 12.9.20).

Ashworth, G. J., & Voogd, H. (1990). *Selling the city: Marketing approaches in public sector urban planning*. London: Belhaven Press.

Aurigi, A. (2006). New technologies, same dilemmas: policy and design issues for the augmented city. *J. urban Technol., 13*, 5–28.

Avery, A. J., Savelyich, B. S. P., Sheikh, A., Cantrill, J., Morris, C. J., Fernando, B., Bainbridge, M., Horsfield, P., & Teasdale, S. (2005). Identifying and establishing consensus on the most important safety features of GP computer systems: e-Delphi study. *Inform. Prim. Care, 13*, 3–11. https://doi.org/10.14236/jhi.v13i1.575

Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., Ouzounis, G., & Portugali, Y. (2012). Smart cities of the future. *Eur. Phys. J. Spec. Top.*, 481–518.

Berg, L.van den, Klaassen, L. H., & Meer, J.van der (1990). *Marketing metropolitan regions*. Rotterdam: European Institute for Comparative Urban ResearchEuropean Institute for Comparative Urban Research.

Berrone, P., & Ricart, J. E. (2020). *IESE Cities in Motion Index 2020*. Pamplona, Spain: IESE Business School, University of Navarra. https://doi.org/10.15581/018.ST-542

Berry, F., & Berry, W. (1999). Innovation and diffusion models in policy research. In P. A. Sabatier (Ed.), *Theories of the Policy Process* (pp. 169–200). Boulder CO.: Westview Press. https://doi.org/10.4324/9780367274689-8.

Bibri, S. E. (2022). Eco-districts and data-driven smart eco-cities: Emerging approaches to strategic planning by design and spatial scaling and evaluation by technology. *Land use policy, 113*, Article 105830. https://doi.org/10.1016/j.landusepol.2021.105830

Bibri, S. E. (2018). A foundational framework for smart sustainable city development: Theoretical, disciplinary, and discursive dimensions and their synergies. *Sustain. Cities Soc., 38*, 758–794.

Bibri, S. E., & Krogstie, J. (2017). Smart sustainable cities of the future: An extensive interdisciplinary literature review. *Sustain. Cities Soc., 31*, 183–212. https://doi.org/10.1016/j.scs.2017.02.016

Bradford, N. (2004). Place matters and multi-level governance: Perspectives on a new urban policy paradigm. *Policy Options, 25*, 39–44.

Brüggen, E., & Willems, P. (2009). A critical comparison of offline focus groups, online focus groups and e-Delphi. *Int. J. Mark. Res., 51*, 363–381. https://doi.org/10.2501/S1470785309200608

Bulkeley, H., McGuirk, P. M., & Dowling, R. (2016). Making a smart city for the smart grid? The urban material politics of actualising smart electricity networks. *Environ. Plan. A, 48*, 1709–1726. https://doi.org/10.1177/0308518x16648152

Bunnell, T., & Das, D. (2010). Urban pulse- A geography of serial seduction: Urban policy transfer from Kuala Lumpur to Hyderabad. *Urban Geogr, 31*, 277–284. https://doi.org/10.2747/0272-3638.31.3.277

Bunnell, T., Goh, D. P. S., Lai, C. K., & Pow, C. P. (2012). Introduction: Global urban frontiers? Asian cities in theory, practice and imagination. *Urban Stud, 49*, 2785–2793. https://doi.org/10.1177/0042098012452454

Caird, S. P., & Hallett, S. H. (2019). Towards evaluation design for smart city development. *J. Urban Des., 24*, 188–209. https://doi.org/10.1080/13574809.2018.1469402

Capano, G. (2018). Policy Design Spaces in Reforming Governance in Higher Education: The Dynamics in Italy and the Netherlands. *High. Educ., 75*, 675–694. https://doi.org/10.1007/s10734-017-0158-5

Castelnovo, W., Misuraca, G., & Savoldelli, A. (2016). Smart cities governance: The need for a holistic approach to assessing urban participatory policy making. *Soc. Sci. Comput. Rev., 34*, 724–739. https://doi.org/10.1177/0894439315611103

Chamberlain, D., Harvey, C., Hegney, D., Tsai, L., Mclellan, S., Sobolewska, A., Wood, E., Hendricks, J., & Wake, T. (2020). Facilitating an early career transition pathway to community nursing: A Delphi Policy Study. *Nurs. Open, 7*, 100–126. https://doi.org/10.1002/nop2.355

Clarke, R., Heitlinger, S., Light, A., Forlano, L., Foth, M., & Disalvo, C. (2019). More-than-human participation: Design for sustainable smart city futures. *ACM Interact, 26*, 60–63. https://doi.org/10.1145/3319075

Croasmun, J. T., & Ostrom, L. (2011). Using Likert-type scales in the social sciences. *J. Adult Educ., 40*, 19–22.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297–334. https://doi.org/10.1007/BF02310555

Das, D. (2015). Hyderabad: Visioning, restructuring and making of a high-tech city. *Cities, 43*, 48–58. https://doi.org/10.1016/j.cities.2014.11.008

Davis, F. B. (1964). *Educational measurements and their interpretation.* Belmont, CA: Wadsworth Publishing Company. Wadsworth Publishing Company.

Deshpande, A. M., Shiffman, R. N., & Nadkarni, P. M. (2005). Metadata-driven Delphi rating on the internet. *Comput. Methods Programs Biomed., 77*, 49–56. https://doi.org/10.1016/j.cmpb.2004.05.006

Djelic, M. L., & Sahlin-Andersson, K. (2006). Introduction: A world of governance- The rise of transnational regulation. *Transnational Governance: Institutional Dynamics of Regulation.* https://doi.org/10.1017/CBO9780511488665.001

Dolowitz, D. P., & Marsh, D. (2000). Learning from abroad: The role of policy transfer in contemporary policy-making. *Governance, 13*, 5–23. https://doi.org/10.1111/0952-1895.00121

Dolowitz, D. P., & Marsh, D. (1996). Who learns what from whom: A review of the policy transfer literature. *Polit. Stud., 44*, 343–357. https://doi.org/10.1111/j.1467-9248.1996.tb00334.x

Donohoe, H., Stellefson, M., & Tennant, B. (2012). Advantages and limitations of the e-Delphi technique: Implications for health education researchers. *Am. J. Heal. Educ., 43*, 38–46. https://doi.org/10.1080/19325037.2012.10599216

Dussauge-Laguna, M. I. (2013). Policy Transfer as a "Contested" Process. *Int. J. Public Adm., 36*, 686–694. https://doi.org/10.1080/01900692.2013.791312

Einstein, K. L., Glick, D. M., & Palmer, M. (2019). City learning: Evidence of policy information diffusion from a survey of U.S. mayors. *Polit. Res. Q., 72*, 243–258. https://doi.org/10.1177/1065912918785060

Elayah, M. (2016). Lack of foreign aid effectiveness in developing countries between a hammer and an anvil. *Contemp. Arab Aff., 9*, 82–99. https://doi.org/10.1080/17550912.2015.1124519

Esmaeilpoorarabi, N., Yigitcanlar, T., Kamruzzaman, M., & Guaralda, M. (2020). How does the public engage with innovation districts? Societal impact assessment of Australian innovation districts. *Sustain. Cities Soc., 52*, Article 101813. https://doi.org/10.1016/j.scs.2019.101813

Estevez, E., Lopes, N. V., & Janowski, T. (2016). *Smart sustainable cities – Reconnaissance study*. United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV); International Development Research Center (IDRC). https://doi.org/10.1007/s11726-011-0521-5

Evans, M. (2017). Understanding policy transfer. *Policy Transf. Glob. Perspect., 77*, 10–42. https://doi.org/10.4324/9781315246574-2

Evans, M. (2009). Policy transfer in critical perspective. *Policy Stud, 30*, 243–268. https://doi.org/10.1080/01442870902863828

Fenwick, M. D., Kaal, W. A., & Vermeulen, E. P. (2017). Regulation tomorrow: What happens when technology is faster than the law? *Am. Univ. Bus. Law Rev., 6*, 561–594.

Firth, A. M., O'Brien, S. M., Guo, P., Seymour, J., Richardson, H., Bridges, C., Hocaoglu, M. B., Grande, G., Dzingina, M., Higginson, I. J., & Murtagh, F. E. M. (2019). Establishing key criteria to define and compare models of specialist palliative care: A mixed-methods study using qualitative interviews and Delphi survey. *Palliat. Med., 33*, 1114–1124. https://doi.org/10.1177/0269216319858237

Fletcher, A. J., & Marchildon, G. P. (2014). Using the delphi method for qualitative, participatory action research in health leadership. *Int. J. Qual. Methods, 13*, 1–18. https://doi.org/10.1177/160940691401300101

Flint, A., & Meyer zu Natrup, C. (2019). Aid and development by design: local solutions to local problems. *Dev. Pract., 29*, 208–219. https://doi.org/10.1080/09614524.2018.1543388

Frenken, K., & Schor, J. (2017). Putting the sharing economy into perspective. *Environ. Innov. Soc. Transitions, 23*, 3–10. https://doi.org/10.1016/j.eist.2017.01.003

Galo, J. J. M., Macedo, M. N. Q., Almeida, L. A. L., & Lima, A. C. C. (2014). Criteria for smart grid deployment in Brazil by applying the Delphi method. *Energy, 70*, 605–611. https://doi.org/10.1016/j.energy.2014.04.033

Gay, L. R., Mills, G. E., & Airasian, P. W. (2011). *Educational research: Competencies for analysis and applications, Pearson Higher Education.* New Jersey, USA: Pearson Higher Ed.

Gil-García, J. R., & Pardo, T. A. (2005). E-government success factors: Mapping practical tools to theoretical foundations. *Gov. Inf. Q., 22*, 187–216. https://doi.org/10.1016/j.giq.2005.02.001

Gleeson, D., Legge, D., O'Neill, D., & Pfeffer, M. (2011). Negotiating tensions in developing organizational policy capacity: Comparative lessons to be drawn. *J. Comp. Policy Anal. Res. Pract., 13*, 237–263. https://doi.org/10.1080/13876988.2011.565912

Gleeson, D. H., Legge, D. G., & O'Neill, D. (2009). Evaluating health policy capacity: Learning from international and Australian experience. *Aust. New Zealand Health Policy, 6*, 1–15. https://doi.org/10.1186/1743-8462-6-3

Gold, J. R., & Ward, S. V. (1994). *Place promotion: The use of publicity and marketing to sell towns and regions.* Chichester: John Wiley and Sons.

Goldsmith, S., & Crawford, S. (2014). Toward responsive cities. *The Responsive City: Engaging Communities Through Data-Smart Governance.* London: John Wiley & Sons.

Goyal, N., Howlett, M., & Taeihagh, A. (2021). Why and how does the regulation of emerging technologies occur? Explaining the adoption of the EU General Data Protection Regulation using the multiple streams framework. *Regul. Gov..* https://doi.org/10.1111/rego.12387

Guldbrandsson, K., & Fossum, B. (2009). An exploration of the theoretical concepts policy windows and policy entrepreneurs at the Swedish public health arena. *Health Promot. Int., 24*, 434–444. https://doi.org/10.1093/heapro/dap033

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis.* Upper Saddle River, New Jersey: Prentice Hall, Inc.

Harrison, C., Eckman, B., Hamilton, R., Hartswick, P., Kalagnnam, J., Paraszczak, J., & Williams, P. (2010). Foundations for smarter cities. *IBM J. Res. Dev., 54*, 1–16. https://doi.org/10.1147/JRD.2010.2048257

Hasan, S., Evers, J., & Zwarteveen, M. (2020). The transfer of Dutch Delta Planning expertise to Bangladesh: A process of policy translation. *Environ. Sci. Policy, 104*, 161–173. https://doi.org/10.1016/j.envsci.2019.11.001

Hasson, F., & Keeney, S. (2011). Enhancing rigour in the Delphi technique research. *Technol. Forecast. Soc. Change, 78*, 1695–1704.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *J. Adv. Nurs., 32*, 1008–1015.

Hedley, R. A. (1999). Transnational corporations and their regulation: Issues and strategies. *Comp. Sociol., 40*, 215–230. https://doi.org/10.1177/002071529904000202

Hinton, P., McMurray, I., & Brownlow, C. (2014). *SPSS explained.* Routledge. https://doi.org/10.4324/9781315797298

Howlett, M. (2015). Policy analytical capacity: The supply and demand for policy analysis in government. *Policy Soc, 34*, 173–182. https://doi.org/10.1016/j.polsoc.2015.09.002

Howlett, M., & Ramesh, M. (2014). The two orders of governance failure: Design mismatches and policy capacity issues in modern governance. *Policy Soc, 33*, 317–327. https://doi.org/10.1016/j.polsoc.2014.10.002

Ivars-Baidal, J. A., Celdrán-Bernabeu, M. A., Mazón, J. A., & Perles-Ivars, Á. F. (2019). Smart destinations and the evolution of ICTs: a new scenario for destination management? *Curr. Issues Tour., 22*, 1581–1600. https://doi.org/10.1080/13683500.2017.1388771

Jacobsen, B. P. (2012). Place brand equity: A model for establishing the effectiveness of place brands. *J. Place Manag. Dev., 5*, 253–271. https://doi.org/10.1108/17538331211269657

Jacobsen, B. P. (2009). Investor- based place brand equity: A theoretical framework. *J. Place Manag. Dev., 2*, 70–84. https://doi.org/10.1108/17538330910946029

Jordan, A., Wurzel, R. K. W., & Zito, A. R. (2003). New" instruments of environmental governance: Patterns and pathways of change. *Env. Polit., 12*, 1–24. https://doi.org/10.1080/714000665

Kalandides, A., Kavaratzis, M., Boisen, M., & Kavaratzis, M. (2012). From "necessary evil" to necessity: Stakeholders' involvement in place branding. *J. Place Manag. Dev., 5*, 7–19. https://doi.org/10.1108/17538331211209013

Kavaratzis, M., & Ashworth, G. J. (2005). City branding: An effective assertion of identity or a transitory marketing trick? *Tijdschr. voor Econ. en Soc. Geogr., 96*, 506–514. https://doi.org/10.1111/j.1467-9663.2005.00482.x

Kavaratzis, M., & Hatch, M. J. (2013). The dynamics of place brands: An identity-based approach to place branding theory. *Mark. Theory, 13*, 69–86. https://doi.org/10.1177/1470593112467268

Kearns, A., & Paddison, R. (2000). New challenges for urban governance. *Urban Stud, 37*, 845–850. https://doi.org/10.1080/00420980050011118

Keating, M., & Cairney, P. (2012). Introduction: Policy-making, learning and devolution. *Reg. Fed. Stud., 22*, 239–250. https://doi.org/10.1080/13597566.2012.688269

Keating, M., Cairney, P., & Hepburn, E. (2012). Policy convergence, transfer and learning in the UK under devolution. *Reg. Fed. Stud., 22*, 289–307. https://doi.org/10.1080/13597566.2012.688272

Kennedy, H. P. (2004). Enhancing Delphi research: Methods and results. *J. Adv. Nurs., 45*, 504–511. https://doi.org/10.1046/j.1365-2648.2003.02933.x

Kim, H. M., & Han, S. S. (2012). City profile. *Seoul. Cites, 29*, 142–154.

King, A. D. (1996). Worlds in the city: Manhattan transfer and the ascendance of spectacular space. *Plan. Perspect., 11*, 97–114. https://doi.org/10.1080/02665439608559398

Kingdon, J. W. (1984). *Agendas, alternatives, and public policies.* Boston: Little-Brown.

Knaggård, Å. S. A. (2015). The multiple streams framework and the problem broker. *Eur. J. Polit. Res., 54*, 450–465. https://doi.org/10.1111/1475-6765.12097

Kondepudi, S. N. (2014). *Smart sustainable cities: An analysis of definitions.* Geneva, Switzerland.

Kotler, P., Haider, D., & Rein, I. (1993). *Marketing places: Attracting investment, industry and tourism to cities, states and nations.* New York: The Free Press.

Kuk, G., & Janssen, M. (2011). The business models and information architectures of smart cities. *J. Urban Technol., 18*, 39–52. https://doi.org/10.1080/10630732.2011.601109

Laurischkat, K., Viertelhausen, A., & Jandt, D. (2016). Business models for electric mobility. *Procedia CIRP, 47*, 483–488. https://doi.org/10.1016/j.procir.2016.03.042

Lee, J. H., Phaal, R., & Lee, S. H. (2013). An integrated service-device-technology roadmap for smart city development. *Technol. Forecast. Soc. Change, 80*, 286–306. https://doi.org/10.1016/j.techfore.2012.09.020

Li, L., & Taeihagh, A. (2020). An in-depth analysis of the evolution of the policy mix for the sustainable energy transition in China from 1981 to 2020. *Appl. Energy, 263*, Article 114611. https://doi.org/10.1016/j.apenergy.2020.114611

Li, W., Yigitcanlar, T., Liu, A., & Erol, I. (2022). Mapping two decades of smart home research: A systematic scientometric analysis. *Technol. Forecast. Soc. Change, 179*, Article 121676. https://doi.org/10.2139/ssrn.3938715

Li, Y., & Ma, L. (2019). What drives the governance of ridesharing? A fuzzy-set QCA of local regulations in China. *Policy Sci, 52*, 601–624. https://doi.org/10.1007/s11077-019-09359-x

Li, Y., Taeihagh, A., & Jong, M.de (2018). The Governance of Risks in Ridesharing: A Revelatory Case from Singapore. *Energies, 11*, 1277. https://doi.org/10.3390/en11051277

Lim, H. S. M., & Taeihagh, A. (2018). Autonomous vehicles for smart and sustainable cities: An in-depth exploration of privacy and cybersecurity implications. *Energies, 11* (5), Article 1062. https://doi.org/10.3390/en11051062

Lim, S. B., Malek, J. A., Yussoff, M. F. Y. M., & Yigitcanlar, T. (2021). Understanding and acceptance of smart city policies: Practitioners' perspectives on the malaysian smart city framework. *Sustain, 13*, 9559. https://doi.org/10.3390/su13179559

Linstone, H. A., & Turoff, M. (1975). *The Delphi method: techniques and applications.* Reading, Mass: Addison-Wesley Pub. Co., Advanced Book Program.

MacEachren, A. M., Pike, W., Yu, C., Brewer, I., Gahegan, M., Weaver, S. D., & Yarnal, B. (2006). Building a geocollaboratory: Supporting Human-Environment Regional Observatory (HERO) collaborative science activities. *Comput. Environ. Urban Syst., 30*, 201–225. https://doi.org/10.1016/j.compenvurbsys.2005.10.005

Mann, M., Mitchell, P., Foth, M., & Anastasiu, I. (2020). #BlockSidewalk to Barcelona: Technological sovereignty and the social license to operate smart cities. *J. Assoc. Inf. Sci. Technol., 71*, 1103–1115. https://doi.org/10.1002/asi.24387

Manville, C., Cochrane, G., Cave, J., Millard, J., Pederson, J. K., Thaarup, R. K., Liebe, A., Wissner, M., Massink, R., & Kotterink, B. (2014). *Mapping smart cities in the EU.* Brussels.

Marchant, G. E. (2011). Addressing the pacing problem. In G. E. Marchant, B. R. Allenby, & J. R. Herkert (Eds.), *The Growing Gap between Emerging Technologies and Legal-Ethical Oversight* (pp. 199–205). Dordrecht: Springer. https://doi.org/10.1007/978-94-007-1356-7.

Marsden, G., Frick, K., May, A., & Deakin, E. (2011). How do cities approach policy innovation and policy learning? A study of 30 policies in Northern Europe and North America. *Transp. Policy, 18*, 501–512. https://doi.org/10.1016/j.tranpol.2010.10.006

Marsh, D., & Fawcett, P. (2011). Branding, politics and democracy. *Policy Stud, 32*, 515–530. https://doi.org/10.1080/01442872.2011.586498

Marsh, D., & Sharman, J. C. (2009). Policy diffusion and policy transfer. *Policy Stud, 30*, 269–288. https://doi.org/10.1080/01442870902863851

Martin, B., & Geglia, B. (2019). Korean tigers in Honduras: Urban economic zones as spatial ideology in international policy transfer networks. *Polit. Geogr., 74*. https://doi.org/10.1016/j.polgeo.2019.102041

McCann, E. (2013). Policy boosterism, policy mobilities, and the extrospective city. *Urban Geogr, 34*, 5–29. https://doi.org/10.1080/02723638.2013.778627

Miao, J. T. (2018). Parallelism and evolution in transnational policy transfer networks: the case of Sino-Singapore Suzhou Industrial Park (SIP). *Reg. Stud., 52*, 1191–1200. https://doi.org/10.1080/00343404.2017.1418979

Middleton, E., 2018. Smart city strategic planning in North America: Learnings for London. Present. toTheo Blackwell Stephen Lorimer 1–21.

Minkman, E., & van Buuren, A. (2019). Branding in policy translation: How the Dutch Delta approach became an international brand. *Environ. Sci. Policy, 96*, 114–122. https://doi.org/10.1016/j.envsci.2019.03.005

Mintrom, M. (1997). Policy entrepreneurs and the diffusion of innovation. *Am. J. Pol. Sci., 41*, 738–770.

Mintrom, M., & Norman, P. (2009). Policy entrepreneurship and policy change. *Policy Stud. J., 37*, 649–667. https://doi.org/10.1111/j.1541-0072.2009.00329.x

Mintrom, M., & Vergari, S. (2016). Policy networks and innovation diffusion: The case of state education reforms. *J. Polit., 60*, 126–148.

Nam, T., & Pardo, T. A. (2011). Smart city as urban innovation: Focusing on management, policy, and context. In *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance* (pp. 185–194). https://doi.org/10.1145/2072069.2072100

Navigant Research, 2020. Smart city tracker 3Q20 [WWW Document]. URL https://www.navigantresearch.com/research/smart-city-tracker-1q17 (accessed 11.11.20).

Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in smart city initiatives: Some stylised facts. *Cities, 38*, 25–36. https://doi.org/10.1016/j.cities.2013.12.010

OECD. (2006). *The challenge of capacity development: Working towards good practice.* Paris, France.

Painter, M., & Pierre, J. (2005). Unpacking policy capacity: Issues and themes. In M. Painter, & J. Pierre (Eds.), *Challenges to State Policy Capacity* (pp. 1–8). Hampshire and New York: Palgrave MacMillan.

Paolo, S., Delhi, N., & Korean, S. (2016). Smart cities around the world. *Geoforum Perspekt, 14*, 61–67. https://doi.org/10.5278/ojs.perspektiv.v14i25.1289

Paskaleva, K., Cooper, I., Linde, P., Peterson, B., & Götz, C. (2015). Stakeholder engagement in the smart city: Making living labs work. In M. P. Rodríguez-Bolívar (Ed.), *Transforming City Governments for Successful Smart Cities* (pp. 115–145). Switzerland: Springer International Publishing. https://doi.org/10.1016/s0267-3649(96)90014-x.

Peck, J. (2002). Political economies of scale: Fast policy, interscalar relations, and neoliberal workfare. *Econ. Geogr., 78*, 331–360. https://doi.org/10.1111/j.1944-8287.2002.tb00190.x

Pereira, G. V., Parycek, P., Falco, E., & Kleinhans, R. (2018). Smart governance in the context of smart cities: A literature review. *Inf. Polity, 23*, 143–162. https://doi.org/10.3233/IP-170067

Pesch, U., Vernay, A.-L., Bueren, E. Van, & Iverot, S. P. (2017). Niche entrepreneurs in urban systems integration: On the role of individuals in niche formation. *Environ. Plan. A, 49*, 1922–1942. https://doi.org/10.1177/0308518x17705383

Peters, B. G., & Pierre, J. (2012). Urban governance. In P. John, K. Mossberger, & S. E. Clarke (Eds.), *The Oxford Handbook of Urban Politics*. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195367867.013.0005.

Peterson, R. A. (1994). A meta-analysis of Cronbach's coefficient alpha. *J. Consum. Res., 21*, 381–391. https://doi.org/10.1086/209405

Quirapas, M. A. J. R., & Taeihagh, A. (2021). Ocean renewable energy development in Southeast Asia: Opportunities, risks and unintended consequences. *Renew. Sustain. Energy Rev., 137*, Article 110403. https://doi.org/10.1016/j.rser.2020.110403

Rikkonen, P., Tapio, P., & Rintamäki, H. (2019). Visions for small-scale renewable energy production on Finnish farms – A Delphi study on the opportunities for new business. *Energy Policy, 129*, 939–948. https://doi.org/10.1016/j.enpol.2019.03.004

Ruhlandt, R. W. S. (2018). The governance of smart cities: A systematic literature review. *Cities, 81*, 1–23. https://doi.org/10.1016/j.cities.2018.02.014

Sabatier, P. A., & Weible, C. M. (2014). *Theories of the policy process* (3rd ed.). Boulder: Westview Press. https://doi.org/10.4324/9780429494284-1. Theories of the Policy Process.

Saunders, T., & Baeck, P. (2015). *Rethinking smart cities from the ground up.* Nesta Innovation Charity Organization.

Seisdedos, G. (2006). State of the art of city marketing in European cities. In *42nd IsoCaRP Congress* (pp. 1–11).

Sekayi, D., & Kennedy, A. (2017). Qualitative delphi method: A four round process with a worked example. *Qual. Rep., 22*, 2755–2763.

Shead, S. (2019). *Uber's rocky road to growth In Europe: Regulators, rivals and riots.* Forbes.

Silva, B. N., Khan, M., & Han, K. (2018). Towards sustainable smart cities: A review of trends, architectures, components, and open challenges in smart cities. *Sustain. Cities Soc., 38*, 697–713. https://doi.org/10.1016/j.scs.2018.01.053

Stone, D. (2012). Transfer and translation of policy. *Policy Stud, 33*, 483–499. https://doi.org/10.1080/01442872.2012.695933

Stone, D. (2004). Transfer agents and global networks in the "transnationalization" of policy. *J. Eur. Public Policy, 11*. https://doi.org/10.1080/13501760410001694291

Stone, D. (2000). Non-governmental policy transfer: The strategies of independent policy institutes. *Governance, 13*, 45–70. https://doi.org/10.1111/0952-1895.00123

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res. Sci. Educ., 48*, 1273–1296.

Taeihagh, A., & Lim, H. S. M. (2019). Governing autonomous vehicles: emerging responses for safety, liability, privacy, cybersecurity, and industry risks. *Transp. Rev.*, 103–128. https://doi.org/10.1080/01441647.2018.1494640

Taeihagh, A., Ramesh, M., & Howlett, M. (2021). Assessing the regulatory challenges of emerging disruptive technologies. *Regul. Gov.*. https://doi.org/10.1111/rego.12392

Tan, S. Y., Taeihagh, A., & Sha, K. (2021). How transboundary learning occurs: Case study of the ASEAN Smart Cities Network (ASCN). *Sustainability, 13*(11), Article 6502. https://doi.org/10.3390/su13116502

Tan, S. Y., & Taeihagh, A. (2020). Smart city governance in developing countries: A systematic literature review. *Sustain, 12*(3), Article 899. https://doi.org/10.3390/su12030899

TPBO (The Place Brand Observer), 2016. How much does the branding and marketing of places [WWW Document]. URL https://placebrandobserver.com/cost-place-branding-marketing-campaigns/ (accessed 3.16.21).

Trencher, G., Taeihagh, A., & Yarime, M. (2020). Overcoming barriers to developing and diffusing fuel-cell vehicles: Governance strategies and experiences in Japan. *Energy Policy, 142*, Article 111533. https://doi.org/10.1016/j.enpol.2020.111533

Tsolakis, N., & Anthopoulos, L. (2015). Eco-cities: An integrated system dynamics framework and a concise research taxonomy. *Sustain. Cities Soc., 17*, 1–14. https://doi.org/10.1016/j.scs.2015.03.002

Valdez, A. M., Cook, M., & Potter, S. (2018). Roadmaps to utopia: Tales of the smart city. *Urban Stud, 55*, 3385–3403. https://doi.org/10.1177/0042098017747857

Von Tunzelmann, N. (2010). Technology and technology policy in the postwar UK: market failure or network failure? *Rev. d'Economie Ind., 129–130*, 237–258. https://doi.org/10.4000/rei.4157

Ward, S. V. (1998). *Selling places: The marketing and promotion of towns and cities 1850–2000.* London: E & FN Spon.

Wolfe, D., & Bramwell, A. (2016). Innovation, creativity and governance: Social dynamics of economic performance in city-regions. *Innov. Manag. Policy Pract., 18*, 449–461. https://doi.org/10.1080/14479338.2016.1265054

World Bank, 2018a. Urban population growth (annual %) [WWW Document]. World Dev. Indic.

World Bank, 2018b. Urban population (% of total population) [WWW Document]. World Dev. Indic. URL https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS (accessed 11.25.20).

World Bank, 2018c. Population living in slums (% of urban population) [WWW Document]. World Dev. Indic. URL https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS (accessed 11.25.20).

Wu, X., Ramesh, M., & Howlett, M. (2015). Policy capacity: A conceptual framework for understanding policy competences and capabilities. *Policy Soc, 34*, 165–171. https://doi.org/10.1016/j.polsoc.2015.09.001

Yigitcanlar, T., Degirmenci, K., Butler, L., & Desouza, K. C. (2022). What are the key factors affecting smart city transformation readiness? Evidence from Australian cities. *Cities, 120*, Article 103434. https://doi.org/10.1016/j.cities.2021.103434

Yigitcanlar, T., Desouza, K. C., Butler, L., & Roozkhosh, F. (2020). Contributions and risks of artificial intelligence (AI) in building smarter cities: Insights from a systematic review of the literature. *Energies.* https://doi.org/10.3390/en13061473

Yigitcanlar, T., Foth, M., & Kamruzzaman, M. (2019a). Towards post-anthropocentric cities: Reconceptualizing smart cities to evade urban ecocide. *J. Urban Technol., 26*, 147–152. https://doi.org/10.1080/10630732.2018.1524249

Yigitcanlar, T., Han, H., Kamruzzaman, M., Ioppolo, G., & Sabatini-Marques, J. (2019b). The making of smart cities: Are Songdo, Masdar, Amsterdam, San Francisco and Brisbane the best we could build? *Land use policy, 88*, Article 104187. https://doi.org/10.1016/j.landusepol.2019.104187

Yigitcanlar, T., Kamruzzaman, M., Foth, M., Sabatini-Marques, J., da Costa, E., & Ioppolo, G. (2019c). Can cities become smart without being sustainable? A systematic review of the literature. *Sustain. Cities Soc., 45*, 348–365. https://doi.org/10.1016/j.scs.2018.11.033

Yigitcanlar, T., Velibeyoglu, K., & Martinez-Fernandez, C. (2008). Rising knowledge cities: The role of urban knowledge precincts. *J. Knowl. Manag., 12*, 8–20. https://doi.org/10.1108/13673270810902902

Yong, L. M. O., & Cameron, A. (2019). Learning from elsewhere: Integrated care development in Singapore. *Health Policy (New. York), 123*, 393–402.

Yusif, S., Soar, J., & Hafeez-Baig, A. (2016). Older people, assistive technologies, and the barriers to adoption: A systematic review. *Int. J. Med. Inform., 94*, 112–116. https://doi.org/10.1016/j.ijmedinf.2016.07.004

Zenker, S., & Martin, N. (2011). Measuring success in place marketing and branding. *Place Brand. Public Dipl, 7*, 32–41. https://doi.org/10.1057/pb.2011.5

Zhan, C., & de Jong, M. (2017). Financing Sino-Singapore Tianjin Eco-City: What lessons can be drawn for other large-scale sustainable city-projects? *Sustain, 9*. https://doi.org/10.3390/su9020201

Zhao, X., & Sun, B. (2016). The influence of Chinese environmental regulation on corporation innovation and competitiveness. *J. Clean. Prod., 112*, 1528–1536. https://doi.org/10.1016/j.jclepro.2015.05.029

Zuzul, T. W. (2019). Matter battles": Cognitive representations, boundary objects, and the failure of collaboration in two smart cities. *Acad. Manag. J., 62*, 739–764. https://doi.org/10.5465/amj.2016.0625