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RESEARCH ARTICLE

State-society relations and government technology: a survey of public awareness and communication in Hong Kong

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Abstract

A survey of Hong Kong residents finds that public support for government technology, as understood through the concept of smart cities, is associated with concept-awareness and official communications. The statistical analysis identifies moderating effects attributable to personal social media use and controls for personal ideological views about scope of government intervention and perceived political legitimacy of smart city policies. The study builds on a growing body of empirical scholarship about public support for government technology, while also addressing a practical trend in urban governance: the growing sophistication of technologies like artificial intelligence and their use in strengthening government capacities. The Hong Kong case exemplifies ambitious investments in technology by governments and, at the time of the survey, relatively high freedom of political expression. The study's findings help refine theories about state-society relations in the rapidly evolving context of technology for public sector use.

Policy Significance Statement

This study offers empirical evidence about factors that influence the political legitimacy of government technology, including the effect of concept-awareness and public communication. Findings imply that message credibility and comprehension are instrumental in crafting policy narratives and that participatory co-construction of these narratives can strengthen the political legitimacy of government technology.

1. Introduction

This article presents the results and statistical analysis of a survey of over 700 Hong Kong residents concerning public perceptions of government technology. The study focuses on the concept of smart cities as representative of government technology in urban settings, finding that in-principle public support for smart cities and willingness to pay taxes to support smart cities are significantly and positively associated with public awareness and official government-to-public communications about smart cities. Controlling for personal ideological positions regarding scope of government intervention in general and the political legitimacy of smart cities as a policy endeavor, the study isolates factors that plausibly impact the effectiveness of political narratives and socio-technical imaginaries.

Addressing an ongoing reorientation towards digitization in urban governance, this study is timely due to the transformational effects of advancements in technologies like artificial intelligence (AI), machine

learning, big data, and cloud computing. The Hong Kong case exemplifies ambitious public investment in government technology, particularly as smart city projects appear to play an increasing role in the government's efforts to strengthen legitimacy amidst political and administrative change. At the time of this study's survey in 2019, Hong Kong was characterized by general freedom of personal expression. In the years thereafter (not covered by this survey), the resolute imposition of the city's National Security Law quelled political opposition and substantially curtailed some forms of personal expression. The Hong Kong case is also characterized (both before and after the social unrest of 2019; Purbrick, 2019) by an interventionist role for the government, a policy commitment to smart cities, and a relatively robust technological innovation ecosystem.

This study contributes to a growing strand of literature concerning the political legitimacy of smart cities and government technology more generally. Much early literature about smart cities addressed only a narrow scope of technical and managerial issues, such as the application of technology to ring-fenced urban policy problems (e.g., traffic and waste management) and the impacts of technology on policy-making (e.g., e-governance). The broader political context of smart cities was not robustly integrated into these relatively granular studies. In the past decade, however, the literature has significantly broadened the concept of "smartness," including through research on the socio-technical dimensions of smart cities. For example, Dashkevych and Portnov (2022) identify in a study of 51 publications that definitions of smartness fall into 48 "identification metrics" across three categories: smart digital technology, living conditions, and environmental sustainability. As the literature moves towards these and other "softer" conceptualizations of smartness (i.e., beyond technical and managerial issues), there arise opportunities to consider how political dynamics shape the evolution of the smart cities concept and policy agenda. This study focuses on two such forces: high expectations for and investment in smart city technologies by governments (IDC Research, 2018; Keppo et al., 2019) and popular skepticism about the use of technology in government activities (e.g., concerns about data privacy and security; Van Zoonen, 2016).

In recent years, a stronger focus on theoretical critiques of smart cities has emerged; an example topic is the capture of related policymaking by corporate and elite political interests (Grossi and Pianezzi, 2017; Datta and Odendaal, 2019; Kuecker and Hartley, 2020). This trend has intensified research interest in political and democratic legitimacy as topics of smart cities research. These often nuanced academic discussions about smart cities, along with practical recommendations emerging from them, can benefit from more systematic empirical grounding. This study contributes to newly emerging survey-based research about the political dimensions of smart city governance, responding to the call by Desouza et al. (2020) to better understand the multiple pathways by which smart cities materialize. These pathways can be a complex amalgam of technological, social, political, and economic factors, inviting deeper analysis about how technical imaginaries are received and refashioned by a public asked to embrace and fund them. Findings from this study can also be used to refine understandings about socio-technical systems, which take a broad view of the relationship between society and technology; see studies of digital platforms (Langley and Leyshon, 2017; Fields et al., 2020; Sadowski, 2020), algorithms (Kitchin, 2017), networks for urban resilience (da Silva et al., 2012), urban transitions (Hodson and Marvin, 2010), energy transition in suburban areas (Dodson, 2014), and sustainable development in rural areas of the Global South (Calzada, 2023).

No single combination of factors determines the social and policy feasibility of smart cities (Dameri and Benevolo, 2016), and this study acknowledges the effect of multiple factors in various combinations and settings. Enabling conditions include not only the mechanics of smart city applications but also ancillary policies concerning local economic development, resident quality-of-life, and the built and natural environments (see Aldegheishem [2019] for a systematic review). In democratic settings, success factors for almost any policy effort include political legitimacy, trust, and state-society relations; these are now receiving more empirical attention in the smart cities literature (Meijer and Bolívar, 2016; Datta and Odendaal, 2019; Yigitcanlar et al., 2020a,b; Hartley, 2021, 2023; Li and Yarime, 2021; Zhang et al., 2022).

With the emergence of more nuanced discussions about the political legitimacy of smart cities, new case opportunities arise for connecting theory and empirical observation to understand state-society

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relations. This study examines public perceptions about smart cities by hypothesizing a relationship between public support for smart cities and two interest variables whose examination is justified by existing literature: public awareness and public communication. This article proceeds with a review of literature addressing public perceptions of and trust in smart cities and the dynamics of political legitimacy concerning smart cities. The review identifies a need for deeper empiricization of research about democratic participation and policymaking for smart cities, including critical perspectives that have, until recently, been dominated by theoretical work. Following the literature review is a background about smart city policy endeavors in Hong Kong and a justification for the selection of this case. Thereafter is a description of the study's methodology and presentation of findings, structured around awareness and communication as interest variables and support for smart city policy aspirations and willingness to pay additional taxes for them as dependent variables. The article concludes with policy implications and a call for more robust research empiricizing the political dimensions of smart cities.

2. Literature review

This study focuses on the concept of smart cities as one among numerous applications of urban technology. A consensus scholarly understanding of the term "smart cities" is elusive (Anthopoulos, 2017), although various definitions and ontologies have been proposed (Fernandez-Anez, 2016; Vasudavan et al., 2019). First-generation definitions focused primarily on mechanics and policy enablers, as exemplified by Vu and Hartley (2018): "the institutionalized and integrated application of smart technologies with a digital age mindset to the tasks and challenges of urban management" (p. 849). Extending the concept, Yigitcanlar et al. (2019) provide an empirically grounded and relatively holistic framework for conceptualizing smart cities that spans the economy, society, environment, and governance, and references the public as both a community and policy constituency with respect to smart cities. The literature now increasingly recognizes that the concept is not confined only to technological parameters but falls within a larger social and political sphere that interprets, qualifies, and mediates the effects of smart cities (hence, the term "mindset" as an epistemological frame for "smartness"; Chourabi et al., 2012; Lara et al., 2016; Appio et al., 2019; Visvizi and Lytras, 2019; Kuecker and Hartley, 2020). Even with this conceptual evolution, a constant flow of emerging technologies and applications continues to be the subject of ring-fenced studies about new urban conveniences like e-government platforms (Fietkiewicz et al., 2017), data portals and "dashboards" (Matheus et al., 2018), and "smart cards" for public services (Belanche-Gracia et al., 2015). From a practical perspective, smart city adoption does not reflect the sweeping transformational imaginaries discussed in theoretical literature and techno-optimistic discourses but incremental and piecemeal supplements to existing capacities that governments consider technically and fiscally feasible (see Mainka, 2018).

Public perceptions about smart cities have received increasing attention in both theoretical and empirical research. Examples are studies about public support for facial recognition technologies in policing equipment (Bromberg et al., 2020), public perceptions about collecting and sharing data in smart city programs for safety and automated transport (Ziefle et al., 2019), public satisfaction concerning the development of smart cities in China (Shih and Liao, 2019), determinants of public opt-in for e-participation in smart city contexts (Vázquez and Vicente, 2019), public perceptions about and uptake of smart city technologies in Eastern Europe (Klimovsky et al., 2016), community perceptions of smart city projects in Australia through a study of Twitter content (Yigitcanlar et al., 2020b), and public acceptance of individual facets of smart city programs in Taiwan (e.g., quality, innovativeness, and security) (Yeh, 2017). Other studies have examined smart city perceptions among public managers and policymakers, including those of city officials (Ching and Ferreira, 2015) and "city practitioners" (Bolívar, 2018), the basis on which individuals tracked for future political leadership build their own understandings about smart cities (Bounazef and Crutzen, 2019), and perceptions about smart city preparedness among business and government leaders in Vietnam (Vu and Hartley, 2018). These studies are examples of how the literature has observed public perceptions of smart cities through both theoretical and empirical perspectives.

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Table 1. *Literature on political legitimacy and application to smart cities*

Topic	Literature	Relevant themes/findings
Political legitimacy	Miller (1974). Levi and Stoker (2000), Gilley (2006), Blind (2007), Grimmelikhuijsen et al. (2013), Netelenbos (2016), Andeweg and Aarts (2017), Van der Meer and Hakhverdian (2017), Chaiyapa et al. (2021), Chovanecek et al. (2023)	Trust, expertise, elitism, ideology, participation; representative, process, and influence legitimacy
Public trust and legitimacy in public sector technology	Carter and Bélanger (2005), Welch et al. (2005), Bélanger and Carter (2008), Savoldelli et al. (2014), Yigitcanlar et al. (2020a), Milz et al. (2023), Nummi et al. (2023)	Generally positive association between e-government and public trust or perceptions of government effectiveness and responsiveness
Public trust in the context of smart cities	Bohli et al. (2013), Khan et al. (2014), Patsakis et al. (2015), Edwards (2016), van Zoonen (2016), Chatterjee et al. (2017), Khan et al. (2017), Braun et al. (2018), Anwar et al. (2020), Johnson et al. (2020a, b), Julsrud and Krogstad (2020), Tyagi et al. (2020), Hartley (2021, 2023), Cole and Tran (2022), Spicer et al. (2023)	Security and privacy; public value; direct engagement and government-to-public communication
"Critical studies" literature critiquing the above	Klauser et al. (2014), Datta and Odendaal (2019), Kitchin (2019), Sadowski and Bendor (2019), Kitchin et al. (2020), Kuecker and Hartley (2020), Törnberg and Uitermark (2020), Willis (2020), Cook and Valdez (2022), Yossef Ravid and Aharon-Gutman (2022), Perperidis (2023)	Smart cities as replication of power structures; Foucault governmentality; social-technical imaginaries

Underlying this study's examination of political perceptions about smart city programs is the concept of political legitimacy and the role of public trust in shaping that legitimacy. Notable is the work of Weatherford (1992) outlining public trust as an essential component of legitimacy. Trust is a particularly instructive topic for understanding the efficacy of government initiatives because it can shape the degree to which the public is predisposed to comply with such initiatives. The literature has explored trust and political legitimacy across various theoretical orientations. Table 1 provides an overview of the progression of literature from broad notions of political legitimacy to public trust and legitimacy in public sector technology, public trust in the context of smart cities, and ultimately to an emerging "critical studies" perspective focusing on smart cities. The table first lists studies that examine political legitimacy through the concepts of trust, expertise, elitism, ideology, and related concepts (Miller, 1974; Levi and Stoker, 2000; Blind, 2007; Netelenbos, 2016; Andeweg and Aarts, 2017; Chaiyapa et al., 2021; Chovanecek et al., 2023). The mature field of literature addressing determinants of political legitimacy provides an operationalizable basis for studying the governance of urban technology and smart cities. While it is not the purpose of this review to provide a systematic overview of the literature on political legitimacy, the review recognizes the value of this formative literature in shaping how scholars understand governance and urban technology (Carter and Bélanger, 2005; Welch et al., 2005; Bélanger and Carter, 2008; Savoldelli et al., 2014).

There is a growing effort to apply the concept of political legitimacy to analyses of how smart city policies are made. This literature was originally narrow in scope, with a focus on the application of

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technology to improve the efficiency and effectiveness of public services. These early studies provided a foundation for deeper scholarly examinations of public trust in the context of smart cities. This line of inquiry has since been carried forward in numerous studies, as shown in Table 1 (Chatterjee et al., 2017; Khan et al., 2017; Braun et al., 2018; Anwar et al., 2020; Julsrud and Krogstad, 2020; Tyagi et al., 2020; Cole and Tran, 2022; Ip and Cheng, 2022; Spicer et al., 2023). Issues examined include security and privacy, ethical dimensions of surveillance, creation of public value through digitization of public services, and the ability of technology to facilitate productive state-society interactions in smart city governance. Misalignment between strategic visions and public preferences is also highlighted, as exemplified in a study by Spicer et al. (2023) of smart cities in Canada that finds "a sizeable gap between the smart city preferences of residents and the offerings of their respective municipalities" (p. 8). Moreover, evolving types of public engagement have been enabled through smart city technologies; for example, Robinson and Johnson (2023) examine the emergence of digital platformization as a conduit for public feedback in policymaking and the implications for social representation and fairness in decision-making (see also Robinson and Biggar [2021] on smart city engagement norms in Canada). This literature has been fruitful in bringing studies about the politics of policymaking together with the practical realities, opportunities, and challenges of applying technology to governance.

Finally, in a body of scholarship emerging since the mid-2010s, social, curatorial, and critical-theoretical orientations have been applied to understand smart city governance (Datta and Odendaal, 2019; Kitchin, 2019; Kitchin et al., 2020; Kuecker and Hartley, 2020; Törnberg and Uitermark, 2020; Willis, 2020; Cook and Valdez, 2022; Yossef Ravid and Aharon-Gutman, 2022; Perperidis, 2023). Topics of interest in this literature include power dynamics, social and political marginalization, socio-technical imaginaries, and the importation of longstanding theoretical propositions (e.g., Foucault's governmentality) to the practical and ground-level exercise of smart city policymaking. Relatedly, a technology-focused literature has developed around the concepts of participation, inclusion, and digital citizenship (Castelnovo et al., 2016; Bolívar, 2018; Johnson et al., 2020a,b; Calzada, 2022; Becker et al., 2023). Of note is a study by Yigitcanlar et al. (2020a) about public perceptions concerning the use of AI in urban planning, including technologies with high political salience such as content-generators, drones, and robotics.

It is within the latter line of inquiry that this study makes its principal contribution. Theories in this strand of literature have recently been informed by more robust empirical observation (e.g., that of Esmaeilpoorarabi et al. [2020a,b] about public perceptions of innovation districts in Australia). Connecting the novel application of critical theoretical perspectives with practice, and grounding these perspectives in empirical observation are crucial steps in escorting this line of inquiry to a new generation of theory-making and practical relevance. This study advances that effort through surveys and quantitative analysis, building on survey-based work by Hartley (2023, 2021) that examines public perceptions about the mechanics of Hong Kong's smart city policies, their contribution to quality of life, and related policies. This article proceeds with a background of the Hong Kong case, followed by a description of the research methodology and a presentation and discussion of findings.

3. Case background: Hong Kong

Hong Kong is an instructive case for examining the political legitimacy of smart city programs. The case is defined largely by (1) the historically interventionist posture of Hong Kong's government and its stated policy commitment to smart cities, (2) general protection of political expression (up to and at the time of the survey), and (3) a lively innovation ecosystem including the private sector and institutionalized research capacity through universities and science parks. Hong Kong is a semi-autonomous and largely urbanized territory with a population of over 7 million inhabitants. At nearly USD 50,000 in 2021 (World Bank, 2023), Hong Kong's GDP per capita is among the world's top 20. The territory's high level of development has been reflected in its performance on various global indices: #2 in economic freedom (Heritage Foundation, 2020), #4 in human development (United Nations, 2021), #9 in sustainability (Arcadis, 2018), and #14 for overall innovation (Global Innovation Index, 2022). In addition to its high

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performance on these rankings, Hong Kong likewise performs well on measures of education,[1] healthcare,[2] and infrastructure.[3]

It can be considered an anomaly, then, that Hong Kong's performance on smart city indices has been mixed. In a global index of the top smart city governments produced by consulting firms Eden Strategy Institute and ONG&ONG, Hong Kong ranked #18 (behind regional peers Singapore, Seoul, Shanghai, Shenzhen, and Taipei) in 2018 and #14 in 2021. The 2017 EasyPark smart cities index ranked Hong Kong #68, as explained by poor performance in public participation and car-sharing services. On the other hand, Hong Kong fared better on other indices: a "super-champion" in IMD's 2023 Smart City Index,[4] #2 in technology by IMD's (2022) "Digital Competitiveness Ranking," and #10 by IESE's (2020) smart city-based "Cities in Motion" ranking. While rankings and indices are prone to subjectivity, gaming, and reporting or measurement errors (see Lai and Cole [2023] for a discussion and comparison of smart cities indices), on the few comparisons available, Hong Kong has not historically shown consistently high performance on smart cities that might be expected given its high performance on other measures.

The government of Hong Kong[5] appears to recognize this performance deficiency at some level and has recently allotted resources to boost its smart city capacities. Targeting the core of smart city capabilities—data collection, storage, and analysis—the government committed HKD 300 million in 2018 to the further development of a geographic database called Common Spatial Data Infrastructure (Government of Hong Kong, 2018a). In 2019, the government extended this commitment by earmarking HKD 1 billion for a "Smart Traffic Fund" and a further HKD 60 million for a Geospatial Lab "to encourage the public to make use of spatial data in developing mobile applications" (Government of Hong Kong, 2019a, pp. 44–45). Other government-backed programs include the development of a territory-wide 3D digital map, a "one-stop" digital platform for public access to government services ("iAM Smart"), accelerated development of 5G infrastructure (Government of Hong Kong, 2019b), WiFi in MTR (rail transit) stations, AI-based chatbot functionality for government service portals (Government of Hong Kong, 2018b), and development of "smart farm management" and a "smart port" (Government of Hong Kong, 2022). Additional actions pledged in the government's 2024–2025 budget (Government of Hong Kong, 2024) include linkage of the "iAM Smart" platform to the Guangdong (province) Government Service Network, launch of a business version of "iAM Smart," and promotion of technology-driven creative initiatives (e.g., "CreateSmart") and private sector initiatives (e.g., "new industrialization," "smart production," and "smart logistics." The Smart City Blueprint for Hong Kong 2.0 was released in 2020, with the Innovation and Technology Bureau assigned to oversee coordination and monitor progress. The Hong Kong government has also made some efforts to publicize its smart city ambitions. These efforts include an e-Newsletter published several times per year since 2016 by the Smart City Consortium (a government-supported consultative body),[6] the "iAM Smart" Sandbox Bulletin in March 2023,[7] and an interactive website providing information about Hong Kong's Smart City Blueprint.[8] However, it is unclear whether the intended audience of these communication efforts extends beyond experts in government and the private sector to reach the general public.

While Hong Kong's smart city commitments are presented as ways to leverage technology for improving public services, the ability of smart city programs to reach their pledged potential is contingent

[1] https://www.info.gov.hk/gia/general/201912/03/P2019120300476.htm.

[2] https://www.bloomberg.com/news/articles/2018-09-19/u-s-near-bottom-of-health-index-hong-kong-and-singapore-at-top.

[3] https://www.info.gov.hk/gia/general/202006/16/P2020061600521.htm.

[4] https://www.imd.org/news/competitiveness/asian-and-european-citizens-see-their-cities-as-the-smartest-finds-2023-imd-smart-city-index/.

[5] For methodological scoping and analytical purposes, references to 'government' in this study and survey concern the government of the Hong Kong Special Administrative Region as distinct from central government (China). Hong Kong has no additional layer of government at the provincial level, as exists in mainland China.

[6] https://smartcity.org.hk/index.php/en/info/enews.

[7] https://iamsmart.cyberport.hk/wp-content/uploads/iAM-SMART-Sandbox-Bulletin-vol01.pdf.

[8] https://www.smartcity.gov.hk/index.html.

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on acceptance and support from the general public (Sepasgozar et al., 2019). There have been several efforts to measure public opinion about smart cities in Hong Kong. An early and comprehensive survey on this issue was conducted by KPMG (2018), measuring the perceptions of more than 1500 respondents about Hong Kong's strengths and weaknesses with respect to smart cities; the study also addressed public and business perceptions about issues like transportation and mobility, finance, education, environment, healthcare, energy, and resources. Several surveys conducted for academic research have also addressed perceptions about smart cities in Hong Kong. Recent examples are studies of resident perceptions about smart cities and quality-of-life (Hartley, 2023), relative levels of trust in smart cities across issues of program benefits, trust, and governance (Hartley, 2021), the relationship between pre-existing levels of trust in government and trust in smart city technologies and applications (Cole and Tran, 2022; Lai and Cole, 2022), and the relationship among public trust, digital trust, and collective pride in the context of smart cities (Lai and Cole, 2024). Surveying 243 residents, Chan and Marafa (2018) investigate a variety of issues related to the concepts of a "green" and "smart" city, including physical and organic green-smart infrastructure, governance and livelihoods, the "quality" of a smart society, and perceptions about water quality, employment opportunities, information and communications technology (ICT), and transport services. In a similar study by Chan (2019), a survey of 263 residents indicated that the brand equity associated with "smart" status was stronger than that associated with "green" or "creative" status. In a survey of 505 respondents, Mah et al. (2012) examined the perceptions of Hong Kong residents about "smart grids" (electricity) and identified interest for greater participation in policymaking. While insightful and diverse in scope, such studies are relatively few in number and often focus on ring-fenced topics (e.g., transportation and "smart grids") and contexts (e.g., green branding). Given the early stage of development in survey-based studies concerning public perceptions about the general concept of smart cities in Hong Kong, including governance aspects and the ability of smart cities to meet policy needs and public welfare objectives, this study makes an empirical contribution by examining public support through the prism of awareness and communication.

4. Methodology

4.1 Data collection

The survey instrument was designed by the author, and ethical approval was obtained from the Human Research Ethics Committee at the author's university. All data were collected through telephone interviews using a Web-based Computer Assisted Telephone Interview (Web-CATI) system that allowed for real-time capture and consolidation of data. Landline and mobile telephone numbers were randomly selected using known prefixes assigned to telecommunication services providers under the Numbering Plan provided by the Hong Kong Office of the Communications Authority (OFCA).

The target population included Cantonese-speaking Hong Kong residents aged 18 or above. For landline telephone number samples, when contact was successfully established, one person was selected from all those present using the "next birthday" rule (forward in the calendar year). No second-level sampling procedure was used for mobile samples. The survey was conducted during October and November 2019, and 1017 qualified respondents were successfully interviewed (505 landline and 512 mobile). The effective response rate (successful responses as a percentage of calls made) was 60.4, and the standard sampling error for percentages based on the overall sample was less than ±1.6 percentage points. The sampling error for all percentages using the total sample was less than ±3.1 percentage points at a 95% confidence level.

A quality-control question was applied to assess individual respondent credibility. No ineligible or doubtful cases were identified during the quality-checking and data verification process. A successful case was defined as one returning answers to at least 70% of the opinion questions. Standard data verification and logical checks were performed, and no serious problems were encountered during the fieldwork operation or data-cleaning stage. The average interview time of 9.5 min was considered acceptable.

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4.2 Dependent variables

Two dependent variables are used, both based on a 5-point Likert scale (*very disagree*, *disagree*, *half-half*, *agree*, *very agree*). Questions and answer options were originally developed in English and translated into Cantonese. The questions associated with the dependent variables are:

- How much do you agree or disagree with the following statement? "Hong Kong should aspire to be a smart city and embrace technology." (variable name "*Aspire*")
- How much do you agree or disagree with the following statement? "I am willing to pay more in taxes for better technology and smart city services." (variable name "*Tax*")

The first dependent variable measures public support for smart city programs as an abstract ideal (hence the term "aspire"). This variable helps determine the extent to which respondents harbor in-principle support for smart cities independent of personal financial commitment; as such, it can be seen as the expression of a personal ideal without the intervening effect of economic interest. Additionally, the question asked respondents to consider smart cities as a general concept without guiding them to reflect on their support for individual programs or technologies (e.g., environmental sensing and monitoring, technology for traffic control, and streamlined waste management). As the interpretation of the term "smart" could be broad, the question was expanded to include the term "technology" so as to guide respondents" view of the topic generally but without reference to any individual application that might bias the response. The second dependent variable measures the degree to which people are willing to financially sacrifice in support of smart city programs; this question situates the terms "aspire" and "smart" within a practical context where there are material trade-offs personally experienced by the respondent (i.e., enjoying the benefits of a smart city requires higher taxes to help governments meet resource needs). From a methodological perspective, the inclusion of this question was motivated by a "contingent valuation" or "willingness-to-pay" approach that has a long history in survey-based research about policy preferences (Knetsch, 1990; Roe et al., 2001; Kotchen et al., 2013; Shao et al., 2018).

4.3 Independent variables

The study examines two interest variables likewise based on a 5-point Likert scale. It is hypothesized that, at the individual level, awareness about the concept of smart cities and perception of being well-informed about smart city and technology policies[9] associate positively with the sentiment that smart cities are a worthy policy aspiration and with the willingness to personally sacrifice financially through taxation to support such aspirations. The questions associated with the independent variables of interest are

- How much do you agree or disagree with the following statement? "I am aware of the concept of smart cities." (variable name "*Aware*")
- How much do you agree or disagree with the following statement? "The Hong Kong government is good at keeping me informed about its smart city and technology policies (e.g., through media)." (variable name "*Informed*")

Regarding the first interest variable, public awareness is conceptualized by Mareth (2003) as "a general understanding or knowledge on the part of the public at all levels of society" (p. 275). Rose (2004) identifies facets of public awareness about policy issues, including evidence, satisficing and trade-offs, complacency and commitment to status-quo, level of public contentment, and the influence of individual events. The latter is reflected in a concept—focusing events (Birkland, 1997)—that is,

[9] It is prudent to note the relative absence of survey-based literature empiricizing public perceptions as a consequence of public communication about smart cities. For a brief discussion of public communication for smart cities programs, see Pereira et al. (2018).

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influential in studies about agenda-setting for public policy. The agenda-setting literature (Araral et al., 2012; Zahariadis, 2016; Wu et al., 2017) has highlighted the role of information and awareness in bringing a policy idea from the agenda universe (where all ideas compete for attention) into the institutional and decision agenda (where a policy idea receives direct consideration from legislators). Effing and Groot (2016) provide five case studies of smart city agenda-setting as a society-initiated phenomenon, underscoring the role of public awareness and its connection to grassroots action for a policy domain (smartness and technology) that is often dominated by experts and technocrats. Given the use of a variable for awareness in studies about political preferences and smart cities, the inclusion of the variable for this study is justified.

The second interest variable, public communication, is conceptualized by Sanders and Canel (2013) as "the role, practice, aims and achievements of communication as it takes place in and on behalf of public institution(s) whose primary end is executive in the service of a political rationale, and that are constituted on the basis of the people's indirect or direct consent and charged to enact their will" (p. 4). While the connection between public communication and public awareness is clear, it is prudent to note that within the context of smart cities—as with other policy issues relating to technical or scientific matters—the strengthening of political legitimacy is contingent in part on the translation of complicated information into content that is understandable and meaningful to those affected by the policy (Campbell, 2002; Sarkki et al., 2014). The variable is included in this study to account for the other side of the narrative-building dynamic: efforts by governments to shape public sentiment about a policy domain (smart cities) that has not only a high degree of technical complexity but also a substantial impact on the lived experiences of individuals.

The remainder of the variables in the model are control variables, including age and three questions based on a 5-point Likert scale:

- "How frequently do you use social media such as Facebook, Twitter, WhatsApp, WeChat and Instagram?" Answer options are *once or more per hour (very frequently)*, *one to three times per day (frequently)*, *one to three times per week (sometimes)*, *one to three times per month (rarely)*, and *never.* (variable name "*Social media*")
- How much do you agree or disagree with the following statement? "Government policies are capable of improving my quality of life." (variable name "*Policy-QOL*")
- How much do you agree or disagree with the following statements? "A smart city can provide me with a better quality of life." (variable name "*SC-QOL*")

The variable *Social media* controls for the possible influence of engagement with ICT applications on individual attitudes about or support for smart cities. While the relationship between these two variables has not been explicitly addressed in the literature, the association between the use of social media and trust in government policies has been found statistically significant (Park et al., 2015; Porumbescu, 2016; Song and Lee, 2016). Additionally, the variable is selected based on the proposition that a latent statistical relationship exists between the frequency of social media use and support for smart cities; individuals who frequently use personal communications technologies may be predisposed to hold stronger sentiments about government initiatives that utilize technology or facilitate the use of technology by the public (Linders, 2012; Lytras and Visvizi, 2018). The variable *Policy-QOL* controls for the possible influence of political or ideological attitudes about the role of government and public policy on individual attitudes about or support for smart cities. This variable is included because the smart city phenomenon has led to a substantial increase in budgetary appropriations in many governments, reflecting a more interventionist role for government with fiscal implications that may impact public support (a factor observable in the Hong Kong case). This argument is based on a history of literature addressing the dynamics of political debates about the scope of government (Persson and Tabellini, 1999; Kau and Rubin, 2002; Gelissen, 2008; Pickering and Rockey, 2011; Bjørnskov and Potrafke, 2013). This study controls for the effect of this explanatory factor (as hypothesized based on findings of existing literature) in order to isolate the

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effects of the interest variables. The variable *SC-QOL* controls for the possible impact of perceptions about the ability of smart cities to positively impact the lives of individuals on individual attitudes about or support for smart cities. Perceptions about quality-of-life factors related to smart cities have likewise been addressed in survey-based literature (Macke et al., 2018; Vázquez et al., 2018; De Guimarães et al., 2020; Yigitcanlar et al., 2020b). This study acknowledges that other factors may influence support for smart cities, but variables selected here have been deemed the most plausible, are found to have the most convincing empirical support in the literature, and enable the construction of a parsimonious model. Finally, the survey questionnaire did not prime respondents with an initial definition of smart cities. This decision was made based on the scale of the analysis unit; rather than asking respondents about specific technologies, the survey focuses on public perceptions of smart cities as a broader concept. Given this focus, the ex ante presentation of a definition, no matter how general, risked inducing some level of response bias.

This subsection concludes by presenting descriptive statistics (Tables 2 and 3). This is done respectively for the series of models using the first dependent variable (*Aware*) and the second (*Tax*). The difference in the number of observations between the two variables (766 and 791, respectively) is the result of a data-cleaning process that removed fields for respondents giving non-responses to one or more survey questions. This was a necessary step in producing a balanced dataset suitable for regression analysis.

Table 2. *Descriptive statistics (dependent variable Aspire)*

Variable	Obs.	Median	IQR	Min	Max
Aspire[a]	766	4	2	1 (very disagree)	5 (very agree)
Aware	766	3	2	1 (very disagree)	5 (very agree)
Informed	766	2	2	1 (very disagree)	5 (very agree)
Social media	766	1	1	1 (once or more per hour)	5 (never)
Age	766	40.87 (mean)	27	18	90
Policy-QOL	766	2	2	1 (very disagree)	5 (very agree)
SC-QOL	766	4	1	1 (very disagree)	5 (very agree)

Source: Author's survey.
Note. Data are treated as ordinally scaled; therefore, for measures of central tendency, median is selected over mean and interquartile range (IQR) is selected over standard deviation.
[a]Dependent variable; all other variables are independent.

Table 3. *Descriptive statistics (dependent variable Tax)*

Variable	Obs.	Median	IQR	Min	Max
Tax[a]	791	3	2	1 (very disagree)	5 (very agree)
Aware	791	3	2	1 (very disagree)	5 (very agree)
Informed	791	2	2	1 (very disagree)	5 (very agree)
Social media	791	2	1	1 (once or more per hour)	5 (never)
Age	791	41.3 (mean)	28	18	90
Policy-QOL	791	2	2	1 (very disagree)	5 (very agree)
SC-QOL	791	4	1	1 (very disagree)	5 (very agree)

Source: Author's survey.
Note. Data are treated as ordinally scaled; therefore, for measures of central tendency, median is selected over mean and interquartile range (IQR) is selected over standard deviation.
[a]Dependent variable; all other variables are independent.

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5. Findings

5.1 Univariate analysis

Regarding dependent variables, univariate analysis reveals that more than half of respondents (57%) strongly agree or agree that Hong Kong should aspire to be a smart city, 9% strongly disagree, and 7% disagree, with the remainder neutral. Despite this general support, responses are more evenly distributed on the question of whether respondents are willing to pay more in taxes for better technology and smart city services. Nearly half (46%) strongly disagree or disagree, 9% strongly agree, and 14% disagree, with the remainder neutral.

Regarding interest variables, the results are divergent. Awareness about the concept of smart cities is highly balanced, with 34% of respondents strongly agreeing or agreeing that they are aware, 30% strongly disagreeing or disagreeing, and 34% neutral. Of further note is that, despite the relatively high level of public support identified for Hong Kong's smart city aspirations, respondents are largely negative regarding their perceptions about being informed about smart city programs. A majority of respondents (54%) disagree or strongly disagree that the Hong Kong government is good at keeping them informed about its smart city and technology policies, 8% strongly agree, and 12% agree, with the remainder neutral.

The study includes three control variables. About 80% of respondents use social media (e.g., Facebook, Twitter, WhatsApp, WeChat, and Instagram) at least one to three times per day, 8% sometimes (one to three times per week), 3% rarely (one to three times per month), and 9% never. Regarding the sentiment that government policies are capable of improving quality of life, one-third strongly disagree (32%), 18% disagree, 10% strongly agree, and 12% agree, with 26% neutral. This study acknowledges that sociopolitical tensions in Hong Kong, which spilled over into months of street protests in late 2019, may have influenced perceptions about government policies as measured for this survey (conducted in October and November 2019[10]). Finally, regarding sentiment about the claim that smart cities can improve quality of life, respondents are largely sanguine; over half (51%) strongly agree or agree, 26% are neutral, and 21% strongly disagree or disagree.

5.2 Multivariate analysis (dependent variable: Aspire)

Ordered probit (or "cumulative probit"; see Agresti, 2010) is used for all 12 regression models. As one type of generalized linear model, ordered probit is justified because both dependent variables are ordered; that is, the numerical value of an answer (from among a series of categories) reflects a meaningful latent order as ratio-scale, and quantitative distances between contiguous variables are perceived by survey respondents to be equal and uniform across the range of possible values (proportionality assumption). This technique also assumes that the dependent variables have more than two possible values representing underlying qualitative factors, as appropriate for analyzing survey responses about perceptions and attitudes. Ordered probit is preferred over linear regression because, according to Daykin and Moffatt (2002), "use of linear regression implicitly assumes that two respondents who give the same response have exactly the same attitude" (p. 159). Multinomial logistic regression was not used because it would have neutralized the "ordered" effect (low to high) implicit in values of the dependent variable. A proportional odds model was not used because the assumption about the uniform magnitude of independent variable effects across the range of values could not be demonstrated in the collected data. Additionally, given that the perceptions and attitudes of respondents are key statistical determinants in this study, it is prudent to adopt an analytical technique that allows for variation in attitudes across the same answer, even if unmeasured or unobservable. Further, Daykin and Moffatt (2002) argue that, unlike in linear regression, ordered probit estimates the parameters of the distribution of underlying attitudes across the population. This is a more appropriate technique for viewing attitudes as invariant across differing wordings of survey questions. The use of ordered probit in similarly conceptualized research (e.g.,

[10] For more detail about how the 2019 Hong Kong protests reflected attitudes about quality of life and wellbeing, see Shek (2020).

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examining public attitudes and perceptions about policy-related issues) provides a defensible basis for its use in this case (example studies are Duch et al., 2000; Alcorn et al., 2017; Woo et al., 2017; He, 2018).

Models 1 to 6 test the hypotheses that awareness about the concept of smart cities and perception of being well-informed by the government about smart city and technology policies, as analyzed independently of one another, associate positively with the sentiment that smart cities are a worthy policy aspiration. Models 1 to 3 test the effect of the interest variable *Aware*, and models 4 to 6 test that of the interest variable *Informed.* The first of the three models for each respective dependent variable (models 1 and 4) is the base or parsimonious model that includes only the variable of interest and two control variables (*Social media* and *Age*) while introducing no additional sentiment-related explanatory factor. The second of the three respective models (2 and 5) includes the variable *Policy-QOL* to control for political and ideological attitudes, as previously explained. The third of the three respective models (3 and 6) includes the variable *SC-QOL* to control for attitudes about the benefits of smart city programs, as previously explained.

Hypotheses about the relationship between the dependent variable and the two interest variables, as earlier stated, are supported with significance at the 0.01 level in five of six regressions and at the 0.05 level in one (Table 4). Predictably, the magnitude of the average positive effect (in the case of ordered probit, the ordered log-odds estimate) of each interest variable on the dependent variable declined with the addition of control variables, but statistical significance is maintained. The robustness of these results suggests that even when controlling for attitudes about the role of government and about the value of smart cities as a policy endeavor, higher awareness about smart cities and the perception of being well-informed about smart city policies are positively associated with the belief that Hong Kong should aspire to embrace the smart city concept. From a practical perspective, this finding can be used to justify efforts to strengthen public support and political legitimacy for smart city programs, a matter discussed in the following section.

5.3 Multivariate analysis (dependent variable: Tax)

Models 7 to 12 test the hypotheses that awareness about the concept of smart cities and perception of being well-informed by the government about smart city and technology policies, as analyzed independently of one another, associate positively with the willingness to pay more taxes to fund smart city and technology programs at the government level. Models 7 to 9 test the effect of the interest variable *Aware*, and models 10 to 12 test that of the interest variable *Informed.* As with the previous set of models, the first of the three models for each respective dependent variable (models 7 and 10) is the base or parsimonious model that includes only the variable of interest and two control variables (*Social media* and *Age*), while introducing no additional sentiment-related explanatory factor. The second of the three respective models (8 and 11) includes the variable *Policy-QOL* to control for political and ideological attitudes, and the third (9 and 12) includes the variable *SC-QOL* to control for attitudes about the benefits of smart city programs.

In a similar finding to models 1 to 6 (dependent variable *Aspire*), hypotheses about the relationship between the dependent variable *Tax* and the two interest variables are supported with significance at the 0.01 level across all six regressions (Table 5); likewise, the magnitude of the average positive effect of each interest variable on the dependent variable declines with the addition of control variables. Unlike in models 1 to 6, the variable *Social media* is significant at the 0.1 level in all three regressions testing the interest variable *Aware*; *Social media* loses this significance in models 10 to 12 (those testing the variable *Informed*). Thus, there is a modest observed effect regarding the frequency of social media use on support for taxes to fund smart city programs. The robustness of these results suggests that even when controlling for attitudes about the role of government and about the value of smart cities as a policy endeavor, higher awareness about smart cities and the perception of being well-informed about smart city policies are positively associated with willingness to pay more taxes to fund smart city programs. As with the previous finding regarding awareness, this finding reveals strategic pathways for governments to strengthen public support and political legitimacy for allotting tax-funded resources to smart city programs, a matter discussed in the following section.

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Table 4. *Ordered probit regression results (dependent variable Aspire)*

Dep. var.: Aspire	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Aware	0.234	0.202	0.089			
	[0.034]***	[0.034]***	[0.036]**			
Informed				0.272	0.183	0.127
				[0.034]***	[0.037]***	[0.038]***
Social media	0.026	0.016	0.022	−0.035	−0.029	−0.004
	[0.048]	[0.048]	[0.049]	[0.048]	[0.048]	[0.049]
Age	0.006	0.003	0.005	0.002	0.001	0.003
	[0.003]**	[0.003]	[0.003]*	[0.003]	[0.003]	[0.003]
Policy-QOL		0.253	0.122		0.206	0.081
		[0.032]***	[0.034]***		[0.035]***	[0.036]**
SC-QOL			0.482			0.492
			[0.039]***			[0.038]***
Cut 1	−0.515	−0.234	0.647	−0.872	−0.677	0.511
	[0.158]	[0.163]	[0.182]	[0.129]	[0.134]	[0.166]
Cut 2	−0.058	0.252	1.208	−0.411	−0.198	1.071
	[0.154]	[0.160]	[0.180]	[0.123]	[0.128]	[0.164]
Cut 3	0.801	1.156	2.250	0.457	0.698	2.117
	[0.154]	[0.162]	[0.188]	[0.122]	[0.128]	[0.172]
Cut 4	1.535	1.923	3.106	1.202	1.460	2.978
	[0.159]	[0.168]	[0.197]	[0.126]	[0.134]	[0.181]
Log likelihood	−1093.727	−1061.9304	−982.58304	−1085.3115	−1067.3435	−980.10695
N	766	766	766	766	766	766

Source: Author's survey.
Note. Standard errors are reported in parentheses.[11]
*$p < 0.10$;
**$p < 0.05$;
***$p < 0.01$.

In reflecting more broadly on these results, the behavior of the independent variables of interest (*Aware* and *Informed*) is similar across both dependent variables (*Aspire* and *Tax*). This finding largely supports the idea that public support for smart cities is, under the conditions modeled, contingent on awareness and effectiveness of communication both as an in-principle expression and one supported by personal financial willingness. The further implication is that attitudes about public service provision and policy prioritization of smart cities, both significant determinants of the dependent variables in all models, do not constitute the totality of determinants of support and do not neutralize the significant effect of other variables. From a practical perspective, this finding implies the potential effectiveness of a smart city communications plan that is agnostic to the political or normative orientation of its target audience. While the aforementioned is an insight derived from results taken collectively, there is a notable difference in results between the two dependent variables. Only in models 7 to 9 is the independent variable *Social media* statistically significant. These models take *Tax* as the dependent variable and examine the effect of the interest variable *Aware.* The magnitude of the average positive effect for *Social media*, while relatively small compared to that of other variables, is highest in these three models and significant at the 0.1 level.

[11] The results of the likelihood ratio Chi-square test for both interest variables (*Aware* and *Informed*) are not significant at the 0.05 level; thus, treatment of both variables as continuous rather than categorical is justified. The treatment of variables as continuous assumes that differences between one Likert category and its contiguous one are perceived by survey respondents to be roughly equal across all categories.

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Table 5. *Ordered probit regression results (dependent variable Tax)*

Dep. var.: Tax	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Aware	0.293	0.261	0.187			
	[0.034]***	[0.034]***	[0.036]***			
Informed				0.263	0.163	0.124
				[0.032]***	[0.036]***	[0.037]***
Social media	0.082	0.075	0.078	0.027	0.032	0.049
	[0.045]*	[0.046]*	[0.046]*	[0.045]	[0.045]	[0.046]
Age	0.009	0.005	0.006	0.005	0.003	0.005
	[0.003]***	[0.003]**	[0.003]**	[0.003]*	[0.003]	[0.003]*
Policy-QOL		0.258	0.183		0.221	0.141
		[0.031]***	[0.033]***		[0.034]***	[0.035]***
SC-QOL			0.276			0.316
			[0.037]***			[0.036]***
Cut 1	0.774	1.126	1.694	0.244	0.483	1.356
	[0.151]	[0.158]	[0.178]	[0.117]	[0.123]	[0.161]
Cut 2	1.299	1.684	2.281	0.767	1.026	1.935
	[0.154]	[0.162]	[0.183]	[0.119]	[0.126]	[0.165]
Cut 3	2.196	2.627	3.266	1.649	1.935	2.902
	[0.162]	[0.172]	[0.195]	[0.126]	[0.134]	[0.177]
Cut 4	2.942	3.399	4.055	2.387	2.691	3.683
	[0.173	[0.184	[0.206]	[0.137]	[0.146]	[0.188]
Log likelihood	−1145.1815	−1109.9712	−1082.4127	−1150.257	−1128.9271	−1090.2465
N	791	791	791	791	791	791

Source: Author's survey.
Note. Standard errors are reported in parentheses.[12]
*$p < 0.10$;
**$p < 0.05$;
***$p < 0.01$.

This finding suggests a possible interaction effect with the variable *Aware* and, as it is beyond the scope of this study, reveals an opportunity for further research. Topics for other additional research include the effect of social media use on awareness and political perceptions of smart city policies, and the use of social media in government efforts to strengthen the political legitimacy of smart city programs (building on a mature literature in government-initiated social media communication; Kavanaugh et al., 2012; Meijer and Torenvlied, 2016; DePaula et al., 2018).

6. Policy implications and conclusion

Since the introduction of publicly accessible generative AI (e.g., ChatGPT) in late 2022, there has been considerable anticipation about broader impacts, including accelerated innovation (Kanbach et al., 2023) and economic productivity (Noy and Zhang, 2023). Further, generative AI may afford city governments unprecedented capacities for data-gathering and analysis (Wang et al., 2023; Zhu, 2023). Whether

[12] The result of the likelihood ratio Chi-square test for interest variable *Aware* is significant at the 0.05 level; thus, treatment of this variable as categorical is justified. The result of the Likelihood Ratio Chi-Square Test for interest variable *Informed* is not significant at the 0.05 level; thus, treatment of this variable as continuous is justified. For the sake of consistency in comparison of results across both interest variables across all models, treatment as continuous has been applied in all instances. The treatment assumes that differences between one Likert category and its contiguous one are perceived by survey respondents to be roughly equal across all categories.

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emergent technologies like generative AI, machine learning, and robotics are merged with the practices and narratives of "smartness" is a lingering question (see Cugurullo et al., 2023), but the salience of political legitimacy concerning technology is unlikely to subside. As such, the findings of this study about smart cities can be extended to whatever forms digital urbanism takes in the future. This study's analysis shows that public support for smart cities is contingent in part on a government's ability to promote awareness and communicate effectively about related policies (both factors were found to be positively and significantly associated with two measures of public support for smart cities). Examining an under-explored case setting (smart cities in Hong Kong), this study also offers empirical confirmation of research that identifies statistical associations between public communication and political support for public policies in general (Vedung and van der Doelen, 1998; Gabel and Scheve, 2007; Gelders et al., 2007; Linde, 2018; Alon-Barkat, 2020).

Before reflecting on the implications of this study's findings, it is appropriate to consider four methodological limitations that point to opportunities for additional research. First, this study focused on public perceptions about smart cities but not explicitly on the connection between public support and public usage of or participation in smart city projects. The more exploratory approach of the survey was intended to account for variability in the smart city experience across respondents, some of whom may not have interacted directly or knowingly with smart city technologies. Additional research should examine how respondents' level of support impacts their willful use of smart city technologies, aiming to determine whether this association is as strong as it would be for other government services. From a theoretical standpoint, this approach would help specify the potentially circular relationship between smart city technologies and the preferences of respondents, whereby personal sentiments impact technology opt-in and the technology experience, in turn, shapes individual sentiments. Second, the study departs from the common smart city survey strategy of asking respondents about specific technologies, and instead focuses on their perceptions of smart cities as a whole (i.e., through questionnaire wording and by providing no ex ante definition of smart cities that could have primed respondents and introduced perceptual bias). Although the intent was to capture how respondents felt about smart cities as a general narrative or policy discourse, the concept may be too vague at a high rhetorical level to be a reliable survey topic. Further research on public sentiments about smart policy narratives should aim for a level of conceptual specificity offered by many studies of narrowly defined technologies.

As a third methodological limitation, the study's survey was conducted in 2019—before the COVID-19 pandemic. In its public health response, the Hong Kong government instituted an aggressive program of monitoring and tracing that relied on the mandatory use of mobile phone applications. The deteriorating political circumstances under which this effort was made, particularly tensions concerning the government's crackdown on opposition (Hartley and Jarvis, 2020), potentially impacted public trust in smart cities technology at that time and may continue to do so in the future. The topic of Hong Kong's experience with pandemic management deserves further survey-based research, particularly with respect to evolving state-society relations and public trust in technology. Fourth and finally, as a research context, Hong Kong may be considered unique given its historic "one country, two systems" governance model (in which some policy and administrative activities reflect a higher degree of autonomy in comparison to that of mainland municipal governments). Recent efforts by China's ruling Communist Party to impose more centralized control over Hong Kong's government complicate attempts to establish a baseline research context for understanding political variables across time; the situation remains fluid, with little certainty about how the governance model could fully evolve by 2047 (the once-stated date of full integration between Hong Kong and mainland China). Beyond these unique factors, Hong Kong can be examined as a case of urban government on topics like urban planning and smart cities, allowing it to be compared to similarly situated cities (particularly those in the region with similar development levels like Singapore, Shanghai, and Tokyo). As such, this study can offer external insights even as perceptual survey-based findings should be compared cautiously, given differing political factors. Given this caveat, there is an opportunity to further examine the evolving role of public trust and political support for smart cities and government technologies. In the case of Hong Kong, longitudinal studies on government

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communication and policy awareness would offer additional methodological nuance for understanding the evolution of democratic systems and institutions mediating political expression.

This article concludes with a discussion about opportunities and challenges for strengthening public support for smart cities. The following recommendations, while aiming to underscore the practical implications of this study, should be read with the caveat that policy narratives about smart city imaginaries are often top-down efforts that name and frame policy issues to serve elite commercial and political interests. The recommendations reframe those proposed by Weiss and Tschirhart (1994) to suit the context of smart city policies and communications. In crafting narratives about smart cities and other policy domains having technically complex dimensions, message credibility and comprehension are crucial. Credibility (corresponding to the variable *Informed*) and comprehension (variable *Aware*) are found in this study to impact public support for smart cities. According to Weiss and Tschirhart (1994), building credibility requires attention on four issues: source credibility, message clarity, fit with prior (receiver) knowledge, and duration of exposure; the first two are applied in this analysis.

Regarding efforts to strengthen source credibility, a two-part approach may be taken. The first is to foster technical credibility based on knowledge held by technology providers as experts. This focus is particular to the smart cities policy agenda as the enabling technology is developed primarily outside of government, although expert credibility as a legitimizing strategy is relevant to most policy domains (e.g., pandemics and climate change) that rely on scientific or technical input. These expert sources are traditionally perceived as impartial and include academics, think tanks, NGOs, and other "mediating institutions" across knowledge communities (Weiss and Tschirhart, 1994, p. 93). It is important to consider, however, that the traditional notion of impartial policy expertise is now challenged in multiple ways, including by "post-truth" discourses and the politicization of fact (Clarke and Newman, 2017; Fischer, 2021), by the process of democratic feedback that aims to ensure political accountability and responsiveness (Janssen and Van Der Voort, 2016), and by grassroots movements to de-colonialize entrenched authority and power structures that perpetuate oppression and marginalization (Wijsman and Feagan, 2019). Policy narratives relying on expertise for legitimacy can also harbor the normalizing influence of a hegemonic policy epistemic—a particular way of measuring and solving problems—that serves certain interests while presenting itself as impartial "common sense" (see Kuecker and Hartley [2020] for an example in smart cities).

Weiss and Tschirhart's (1994) related concept of comprehension, as interpreted in the context of smart cities, underscores the challenge and usefulness of translating technical knowledge for lay audiences (including efforts to increase awareness, as measured in this study). It has long been accepted that on policy matters of high technical complexity, expertise eclipses lay wisdom; nevertheless, the current era of epistemic contestation may compel scholars and politicians to acknowledge popular pushback against the perceived elitism of expertise and technical or scientific knowledge (Nichols, 2017; Head and Banerjee, 2020). Sector-specific examples are narratives that cast public health issues as a clash between "common people" and the establishment (i.e., medical populism; see Lasco and Curato, 2019) and efforts by central banks and monetary policy authorities to remain independent amidst populist pressure during fiscal crises (Goodhart and Lastra, 2018). Smart cities are a plausible political flash point given high levels of government investment, the complexity and inscrutability of technology from the perspective of lay audiences, and technology's direct and observable influence on the lived experiences of individuals. Whether these dynamics compel governments to more clearly articulate the purposes and methods of smart city projects in a way that fosters informed public awareness is a matter for further study.

The second type of source credibility—political credibility—is based on the goals and policies of government as expressions of public preference (captured in this study by variables measuring support for smart cities and control variables related to personal ideology). In Hong Kong, the COVID-19 crisis tested the government's ability to convince residents to observe policy directives regarding containment and mitigation (Hartley and Jarvis, 2020; Chan, 2021). With the credibility of Hong Kong's government compromised among some communities by non-pandemic-related legislative actions in 2019 and prior (Purbrick, 2019), the legitimacy of response policies during episodes like a public health crisis arguably depends on complex political factors. On matters like smart cities, over which there continues to be public

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concern in Hong Kong as elsewhere about privacy, political control, and surveillance (Hui, 2020; Wong, 2020), political credibility may likewise be regarded as tenuous. One attempted pathway for de-politicizing the smart cities agenda has been to focus on narratives about the role and value of technology in society. According to Weiss and Tschirhart (1994), "governments may find public information campaigns especially useful to shape public perception of problems by creating common understandings and bridging differences in perspective" (p. 93). As one element of policy design, issue-framing has been deemed crucial for fostering a common collective understanding about policy problems and solutions (Birkland, 1997). However, the organized or top-down creation of narratives can be a fraught venture that, intended or otherwise, amplifies hegemonic perspectives while crowding out alternative ones (a view common in the critical, constructivist, and interpretive policy studies literature; see Yanow, 2000; Fairclough, 2013; Fischer et al., 2015).

The power of discourse is particularly relevant when analyzing public support for smart city programs and the role of technology and expertise in supporting technocratic policy agendas. One example is the Hong Kong government's communication strategy concerning the city's "iAM Smart" digital public service platform,[13] which provides users an interactive base for obtaining information on issues of practical and lifestyle interest (e.g., traffic conditions, air quality, hospital wait times, government press releases, and promotions). The government's online communications efforts[14] highlight the rising count of user registrations, ease of service integration between Hong Kong and the mainland, and new services available through the application. Beyond such efforts, building source credibility for Hong Kong's smart city policies appears to rely largely on the projection of output legitimacy (i.e., good outcomes for the public), whereby smart city applications are celebrated for improving service convenience and access. Less clear are what public-consultative capacities are enhanced by these and other "smart" applications, as the Hong Kong government appears not to be using smart cities as a way to enhance governance process legitimacy (e.g., public input in policy decisionmaking; see Cardullo and Kitchin [2019] for a discussion about public participation and empowerment through "smart citizenship"). Accordingly, further digitization and technocratic "double-down" (Hartley and Kuecker, 2022) do not necessarily lead to the removal of underlying barriers to public expression and participation. This is a common characteristic of smart city programs, particularly in non-democratic settings. According to Kuecker and Hartley (2020), "the technocrat's ability to produce knowledge becomes a gesture through which power guides discourse about normative goals…this convergence of policy, technocracy, and planning points to teachable optics…and validates a [particular] discourse" (p. 521). There exists a tension between advancing a communications strategy about the benefits of smart cities and intentionally or inadvertently constructing a narrative that elevates some interests (e.g., economic or elite-political) over others (e.g., popular or environmental). Smart cities are often a top-down endeavor and due to their ostensibly technical nature are not always viewed by governments as a topic for debate in public settings. There are few well-studied cases of open political discussion about urban development projects that have smart city dimensions; examples are Toronto's Quayside (Robinson and Coutts, 2019), New York's Amazon HQ2 (Gupta, 2019), and Berlin-Kreuzberg's Google Campus (Hartmann, 2022). Beyond such cases, whether smart cities become a more frequent topic of political debate—both among the public and in internal policy deliberations—is uncertain given increasingly vague conceptualizations (i.e., evolving narratives of "smartness" as an all-encompassing policy ideal) and given the rise of ever-newer technology paradigms and narratives (e.g., generative AI; see Guenduez and Mettler, 2023; af Malmborg and Trondal, 2023).

In closing, cities can be seen as settings for an increasingly complex convergence of 'wicked' policy problems whose solutions are commonly framed within a technology-policy interface that requires policymakers to mediate expert knowledge and public sentiment. The current era of rapid advancement in technology has afforded governments improved capacity to measure, analyze, and claim to solve policy problems—an apparently triumphant moment for the smart cities imaginary. However, pushback against

[13] https://www.info.gov.hk/gia/general/202012/29/P2020122900647.htm.
[14] https://www.iamsmart.gov.hk/en/.

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the perception of elite capture within governments and knowledge institutions, manifest in part by populist political movements around the world, re-routes the coronation march of smart cities. This study has offered empirical evidence regarding the political legitimacy of smart cities in a way that opens policy narratives to critiques and suggests new ways forward. According to Corsini et al. (2019), this type of research has the opportunity to foster a deeper understanding of "the transformation of sociotechnical imaginaries towards a more participatory idea of smart cities" (p. 331). Indeed, the greatest challenges faced by smart cities and other techno-optimistic narratives in the coming decades will be as much political as technical.

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