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Working Paper

The Impact of Digital Firms on Urban Governance Model in China:
An Empirical Analysis of the Smart City Brain Model in China

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Abstract

This paper aims to gain an overview on how smart city is being interpreted and embedded in China, through the example of Huawei and Alibaba's smart city implementations in Shenzhen and Hangzhou. It examines the emergence of the "Brain-Nerves" model of smart urban governance in Chinese cities, as well as the practices, processes and outcomes that are currently unfolding on the ground. By questioning the logic, promise and imaginaries of "City Brain", the article aims at providing empirical evidences that are specific to the Chinese context, in order to illustrate the interactions and interdependencies between public and private stakeholders that are fostering the transformations of urban governance modes in China.

Keywords: smart city, China, Alibaba, Huawei

Introduction

In recent years, the rapid growth of digital technology is changing the configuration of actors in the global economy and debates on how to govern the digital economy have intensified. The modes of governance are being challenged by the new processes that digitisation is enabling, particularly in the urban context with the rise of the smart city initiatives. The smart city movement, initially driven by the technological advancement, has gone beyond the *technical* dimension to articulate with *political* goals in urban governance. The global tech giants and digital firms have become a major player in the urban fields, varying from Google, IBM to Huawei and Alibaba.

The current literature on smart cities mainly focuses on the conceptual analysis and theoretical implications, including the definition of smart cities, the evaluation, the status quo and the challenges of smart city models. However, few empirical studies have been conducted providing practical implications of smart city development. Furthermore, digital technology cannot be studied *per se,* but contextualised within the political, administrative and social dynamics that are specific to each territory in which it is deployed.[1] Drawing on a field work conducted in 2019, this research aims at providing some empirical elements that are unique to the Chinese context, in order to illustrate the interactions and interdependencies between public and private actors that are fostering a new urban development paradigm in China.

We will first look at how international and Chinese ICT firms shape and participate in the smart city market in China, as well as its local implementations and practices, through the examples of Shenzhen and Huangzhou. This work is based on a field work and interviews with the firm actors, as well as a literature of the annual reports of the firms. Then, we will identify how smart city development enters into the political agenda, drawing on a literature review of national and local administrative documents. Finally, we will illustrate the shift of the relationship between digital firms and public authorities in China driven by smart city initiatives, as well as its impact on urban governance.

Recent critical literature on Chinese smart cities has explored a logic of neoliberal urbanisme, a *laissez-faire* paradigm where private stakeholders dominate, with little or no control from the government (Cugurullo, 2018). This implies a fragmented urban-political *milieu* with few interactions and interdependences between the actors.

This paper tests and questions such fragmentation and neoliberal paradigm, by focusing on the discourses of two central advocates: Huawei and Alibaba, as well as their interactions with the government. Instead of observing a phenomena of fragmentation, this empirical analysis provides evidences that the Chinese smart city agenda is rolled out over consistent interdependences between the public and private stakeholders. The paper reveals the emergence of the "Brain" smart city model and how it activates and enables collective and public imaginaries, as constitutive elements of a powerful public-private coalition in pushing forward China's smart city agenda.

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[1] Antoine Courmont, What Happened to the Smart City? Political Economy of the Digital City, 2018

Other literature on Chinese smart cities emphasises the circulation of international models of smart city (IBM, Cisco, etc.) in China (Henriot et al. 2018) and claims that China's smart city model is in the continuity of *algorithmic urbanism*, an urban development paradigm that is based on rationality (Douay, 2018a).

The paper pushes further the circulation of international model of smart city in China, by revealing the gradual marginalisation and exclusion of international stakeholders like IBM in Chinese smart city market, today taken over by the "Brain" model. Instead of following the continuity of the international exemples, this process highlights different interpretations and imaginaries of desired urban futures in the Chinese context.

1 The making of smart market in China and the emergence of "City Brain" model

The notion of smart city is introduced in China for the first time in 2008 when IBM launches its project *Breakthrough of smart city in China*. Through this project, IBM introduces the smart city concept and initiates the creation of the smart city market in China. This initiative is immediately piloted in five large cities: Beijing, Shanghai, Shenzhen, Hangzhou and Wuxi. IBM promotes its technological solutions as an "obligatory passage point" (Callon 1986; Latour 1987) in the transformation of cities into "smart" ones, by emphasising the widespread installation of sensors in urban space to collect data, in order to support decision-making in city operations.[1] This is followed by the arrival of other international ICT vendors, such as Cisco and Siemens, in the Chinese smart city market with their expertise in the information and communication field.

Over a decade later, the configuration of the smart city market in China has radically changed and international IT firms have gradually left this market, today taken over by Chinese tech giants. The smart city market is firstly taken over by Chinese *hardware* firms, such as Huawei, followed by the *software* solutions developers such as Alibaba and Tencent (Figure 1). As historical technology suppliers and e-commerce platform, both Huawei and Alibaba are far from being the traditional major players in urban services and hardly involve in public market until late 2000s. Facing the global economic crisis, as their international counterparts, the Chinese information and technology firms also start turning to the public sector, promoting the smart city initiatives through the use of digital technologies.

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[1] MIC Research Team, *Business opportunities and development trends of emerging smart cities in China,* Market Intelligence & Consulting Institute, 2012

Figure 1: A comparison of Alibaba and Huawei

	Huawei	Alibaba
Year of Creation	1987	1999
Type	Limited Company	Public
Headquarters	Shenzhen, China	Hangzhou, China
Core business	Telecommunications equipment, mobile phones	E-commerce, Cloud, Entertainment
Revenues	US$105.191 billion (2018)	US$56.152 billion (2019)
Net income	US$8.656 billion (2018)	US$11.955 billion (2019)
Number of employees	190,000 (2019)	101,958 (2019)

Both Chinese players advocate for a "brain" system as a specific form of storytelling. This approach considers the city as "a living organism controlled by a nervous system". This system is led by a "brain" which is the integrating centre aggregating and sharing data - and "nerves", which are network and sensors that collect information. After the collection, the information will be sent back to the "brain" to process analysis, make decision and send feedback. The "brain model" is advocated by both Huawei and Alibaba in their smart city discourse, in order to gain visibility and legitimacy in the Chinese smart city market.

The smart city story-telling of IBM promotes an urban management based on rationalisation and technocratic vision, in order to secure and strengthen its market position in China. This model advocated by IBM emphasises efficiency, optimisation and rationalisation, based on systematic modelling — all the analyses have been pre-constructed and organised *a priori*. It implies a neutral, impersonal and rational mode of urban governance.

As an alternative to IBM's smart city narrative, Huawei and Alibaba's Brain model advocates for a humanised model of urban governance as a specific way of storytelling. Behind the "Brain-nerves" model, is primarily a powerful metaphor creating a surface of equivalence to humanised urban management. Cities are chaotic, uncoordinated and heterogeneous system. The brain, as a high-level learning and centralised system, is capable to understand the complex urban phenomena in its entirety. At cognitive level, this imaginary of "brain" shapes a new public and collective perception of urban governance — it creates an image of centre (Boullier, 2016) and all urban units are collectively connected to this centrality. It emphasises the brain's capacity, intelligence and sensitiveness -– as an *agency,* to act and decide itself.

The marginalisation and exclusion of stakeholders like IBM and their "rationalisation" smart city model in the Chinese market reveals different interpretations of desired urban futures in the Chinese context. The smartness of the city is not only based on the rationality, but also humanity, sensibility and responsibility. Brain and nerves, which are not only a technical system, constitute

a new utopia of smart city in China — it shapes the imaginaries and practices of a myriad of actors concretely building the city through agenda-settings, decisions and everyday practise.

The emergence and construction of "Brain City" is a persuasive and constitutive storytelling about smart city. As discourses, narratives and imaginaries of smart "city brain" raise in China, it shifts the normative modality of coordination among actors, institutions, sectors and representations of the urban governance in China.

Since 2016, Alibaba's "City Brain" has been implemented to a dozen of Chinese and oversea cities, starting from its home city — Hangzhou, to Suzhou, Shanghai, Macao and Malaysia's capital city Kuala Lumpur. Huawei's smart city model, based on "brain-nervous" system, is being tested in more than 160 cities across 40 countries, from Monaco, Nairobi in Kenya to Duisburg in Germany.

2   A look at Shenzhen and Huawei's smart city project

The main objectives of Huawei's smart city project in Shenzhen are to 1) facilitate urban governance 2) improve people's livelihood and 3) boost business growth.

— Huawei BG smart city solution service, Shenzhen

Shenzhen is located in Guangdong Province, Southern China, and borders Hong Kong. In 2019, the population is estimated to be 12.12 million and still growing mainly through rural and urban migration.[1] Shenzhen is selected as a case study for its unique political and administrative status, as well as its booming high-tech industry.[2]

The city is designated as a Special Economic Zone (SEZ) to test, experiment and spearhead China's modernisation agenda of "reform and opening up" since 1980, due to its harbour location and its proximity to Hong Kong, in order to catch the spill-overs of international investment, know-how, industries and trade.[3] Growing from a fishing village to an international metropolis — population growth by 40-fold, employment growth by 68-fold, and gross domestic product (GDP) growth by 11,452-fold — in 40 years, Shenzhen is representative of China's rapid urbanisation and economic growth.[4]

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[1] United Nations Human Settlements Programme, The Story of Shenzhen: Its Economic, Social and Environmental Transformation, 2019

[2] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.

[3] Hu, R. The Shenzhen Phenomenon: From Fishing Village to Global Knowledge City; Routledge: London, UK; New York, NY, USA, 2020.

[4] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.

Shenzhen's 2010 plan marked a fundamental departure from the city's previous development paradigm that had followed an industrialisation-led growth trajectory to an urban regime that emphases the innovation and technology industries.[1]

At the institutional level, the city has implements measures and practices in creating service-oriented government, institutions for innovative, energy-saving and environmental-friendly society[2]. At the policy level, the government introduces institutions and measures to spur business start-ups and investment, attract various professionals, and build policies for technological innovation, aiming at creating an innovative industrial cluster that further attracts global resources[3]. In 2017, Shenzhen had 4,377 registered private equity firms, accounting for one-fifth of the national total. [4]

Shenzhen is home to the Chinese tech giant Huawei, the firm is playing a pivotal role in leading the smart city movement in China. Dubbed as "China's Silicon Valley" and innovation hub, Shenzhen is proactive in embracing the smart city concept and including smart city in local discourse of innovation-led urban development[5], which provides local technology firms like Huawei with enormous market opportunities.

In 2016, Huawei signs strategic collaboration framework with Shenzhen, seeking to enable Shenzhen's smart city development. The core technologies of Huawei Smart City solution include cloud, full-stack, all-scenario AI portfolio, IoT, big data, as well as a geographic information system (GIS). At an operational level, Huawei's smart city solution is led by an Intelligent Operation Centre (IOC), considered as "brain" aggregating and sharing data across Shenzhen's municipal agencies under open and configurable architecture (Figure 1). The intelligent Operation Centre provides the municipality with an integrating platform to respond to fast-changing urban events, prevent accidents and improve efficiency in the daily governance of the city.[6]

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[1] Shenzhen Government. Shenzhen Municipal Master Plan (2010–2020) [Shen Zhen Shi Cheng Shi Zong Ti Gui Hua (2010–2020)]; Shenzhen Government: Shenzhen, China, 2010.
[2] United Nations Human Settlements Programme, The Story of Shenzhen: Its Economic, Social and Environmental Transformation, 2019
[3] United Nations Human Settlements Programme, The Story of Shenzhen: Its Economic, Social and Environmental Transformation, 2019
[4] United Nations Human Settlements Programme, The Story of Shenzhen: Its Economic, Social and Environmental Transformation, 2019
[5] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.
[6] Chen, F. A Look at Shenzhen and Huawei's 'Smart City' Project. Asia Times. 11 July 2019. Available online: https://www.asiatimes.com/2019/07/article/a-look-at-shenzhen-and-huaweis-smart-city-project/
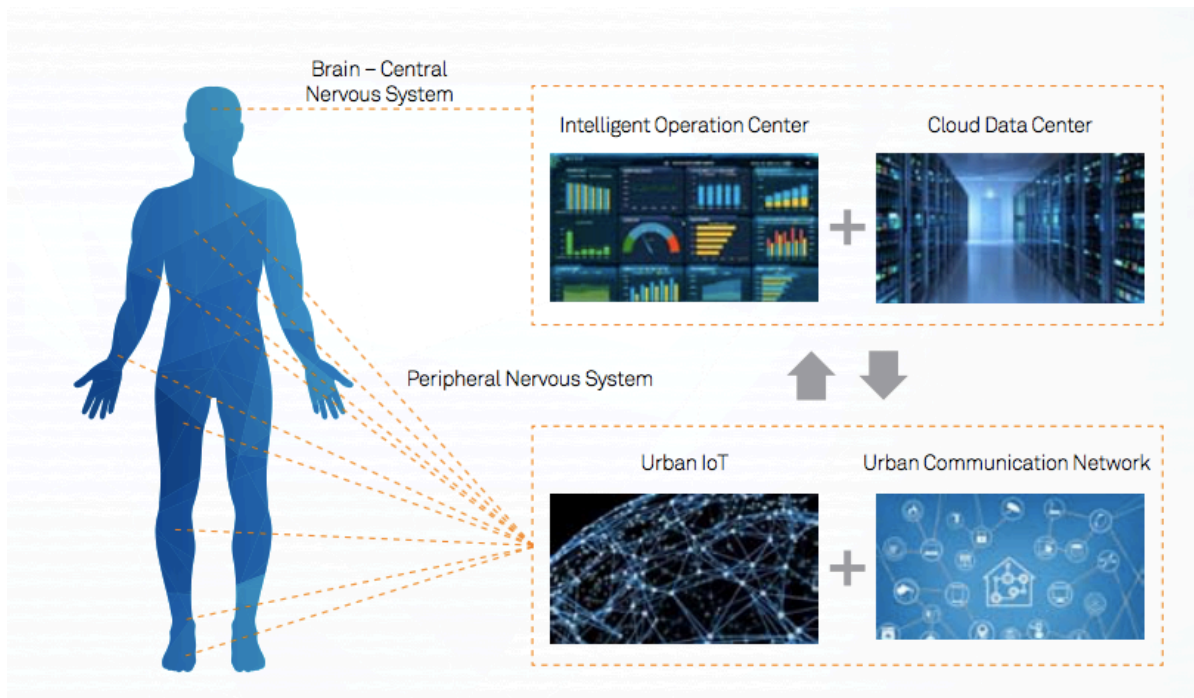
Figure 2: Huawei's smart city hierarchy, Brain-Central Nervous System[1]

The smart city is like a living organism controlled by a nervous system. This system is composed of a "brain" that is the management centre and "nerves", which are network and sensors that collect information about the current state of the city. After that, the information is sent to the "brain", which analyses it, makes smart decisions, sends feedback and immediately performs intelligent actions. This is a powerful link between the real and the digital worlds, which provides accurate management, promotes industry development and improves people's quality of life.
— Edwin Diender, chief digital transformation officer of Huawei Enterprise (Chen, 2019)

According to Huawei, the municipal government of Shenzhen has access to a large number of sensors and cameras in urban space, generating huge volumes of data every day. The sensors and cameras are connected to the "brain" and they are regarded as "peripheral nerves" that report to the Huawei's IoT technology and broadband networks. The data is not checked manually but analysed by cloud-based analytics mechanisms, then centralised, and integrated into data sharing platform to inform urban management, planning and decision-making.

Compared to other smart city solution vendors that offer services individually, Huawei develops a strategy to embody transversal coordination and integration.

— Huawei BG smart city solution manager, Shenzhen

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[1] Source: Huawei, Leading New ICT, Building a Better Smart City

As historical telecommunication supplier to public administrations, compared to Alibaba, Huawei has long been familiar with building relationship with the government and public authorities, as well as identifying the needs of local authorities. Huawei quickly identifies the lack of an integrating and unique platform to implement smart city solutions in current smart city market in China. Different from most players that focus only on offering the platform as a service, Huawei is characterised by its capacity to integrate different small urban services, hardware and infrastructures into its transversal solution.

Under the circumstances of the trade disputes with the United States and targeted by the US Justice Department, the company is currently facing huge challenges since May 2019. Huawei's strategy is to foster its research and innovation capacity, which is also pushing the smart city solution innovation, both in Shenzhen and in its 14 Open Labs and 36 Joint Innovation Centres worldwide to promote joint research and development in the smart city field.

3   Alibaba's "City Brain" in Hangzhou and Alibaba Cloud

Hangzhou is the capital city of Zhejiang Province. Located in the East of China, Hangzhou is one of the major political, economic and cultural centres in China, with a population of 10.36 million (Hangzhou Statistical Bureau, 2019). The city is situated at the core of the Hangzhou Metropolitan area, the fourth largest in China. Hangzhou's GDP reached 22,2 billion USD in 2019. [1]

In 1984, the State Council formally approved Hangzhou as a Special Economic Zone (SEZ), privileged with incentives to create a common labor pool, facilitate buyer-supplier relationships, allow collaboration between firms to refine and develop technologies[2]. At the local level, policies were soon made to attract business investment, by simplifying approval procedures, utilising local revenue for subsidies and providing infrastructure support.[3]

To foster clustering, Hangzhou Hi-Tech Zone (HHTZ) was set up and approved by the State Council in 1990, as a state-level high-tech Industrial Development Zone[4]. Today, it is home to more than 1,100 software and BPO enterprises[5]. Lower office set up costs compared to Shanghai or Beijing, competitive government tax incentives, as well as long-established traditions of

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[1] Hangzhou Statistical Bureau, 2019

[2] The World Bank, Development Research Center of the State Council of the People's Republic of China, China 2030, 2013

[3]   China   Briefing,   Hangzhou   Development   Zones,   https://www.china-briefing.com/regional-intelligence/hangzhou.html

[4] Hangzhou Hi-Tech Zone Website: http://www.hhtz.gov.cn

[5]   China   Briefing,   Hangzhou   Development   Zones,   https://www.china-briefing.com/regional-intelligence/hangzhou.html

entrepreneurship are the major factors for business investors to attribute their choice of Hangzhou[1].

In 1999, the Alibaba Group was created and headquartered in the Hangzhou Hi-Tech Zone. The core business of Alibaba is initially an online business-to-business portal, orienting the users to the individual businesses, generating a large storage of data which allows the company to position itself in the smart city market.

Alibaba enters the smart city market through its implementation of "City Brain" project in its home city. The project is officially launched in 2016 during the 18th Donghu International Exposition, co-organised by the government of Hangzhou and the Group Alibaba. Following this event, the Hangzhou High Tech Development Area is created, gathering 13 digital forms in order to foster collaboratively the smart city development.

Compared to Huawei's integral smart city platform, the City Brain in Hangzhou adopts a sectoral approach, starting from the urban transport through traffic monitoring, combining data from the municipal transport bureau, public transportation system, as well as a geographic information system (GIS). Millions of servers clustered into a huge database via Apsara, Alibaba's large-scale computing operating system, analyse data points and use proprietary algorithms to manage traffic signals to improve traffic.[2]
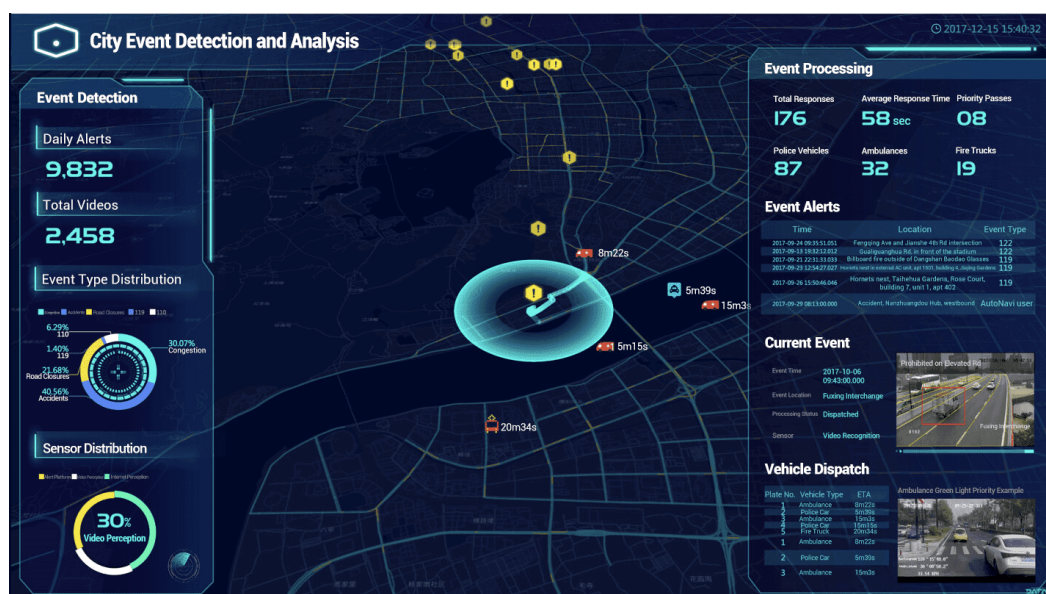

Figure 3: Alibaba's City Event Detection and Smart Processing[3]

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[1] China Briefing, Hangzhou Development Zones, https://www.china-briefing.com/regional-intelligence/hangzhou.html

[2] Smart My City, Hangzhou City Brain Project, available online : https://bldgtmrw.com/projects/hangzhou-city-brain-project-4vo5r, 2019

[3] Source: Alibaba Cloud

By recognising traffic accidents and congestion from video footage, City Brain integrates Internet data and alarm data to instantly and comprehensively perceive traffic incidents throughout the city. Using smart vehicle dispatching technology, it achieves integrated dispatching commands for police, fire, rescue, and other vehicles. It also coordinates traffic lights to give emergency response vehicles priority passage to the sites of emergency.

— Alibaba's City Brain Presentation[1]

Alibaba's City Brain is implemented in 104 traffic light junctions in pilot areas in the Hangzhou's Xiaoshan district. As a result, traffic speed in the district was increased by 15 per cent during the first year of operation in 2016.[2] Following this success, the City Brain then spreads out to the rest of the city of Hangzhou in 2017, under a win-win situation: Alibaba provides the technological means through the software, while all data collected belongs to the city of Hangzhou.
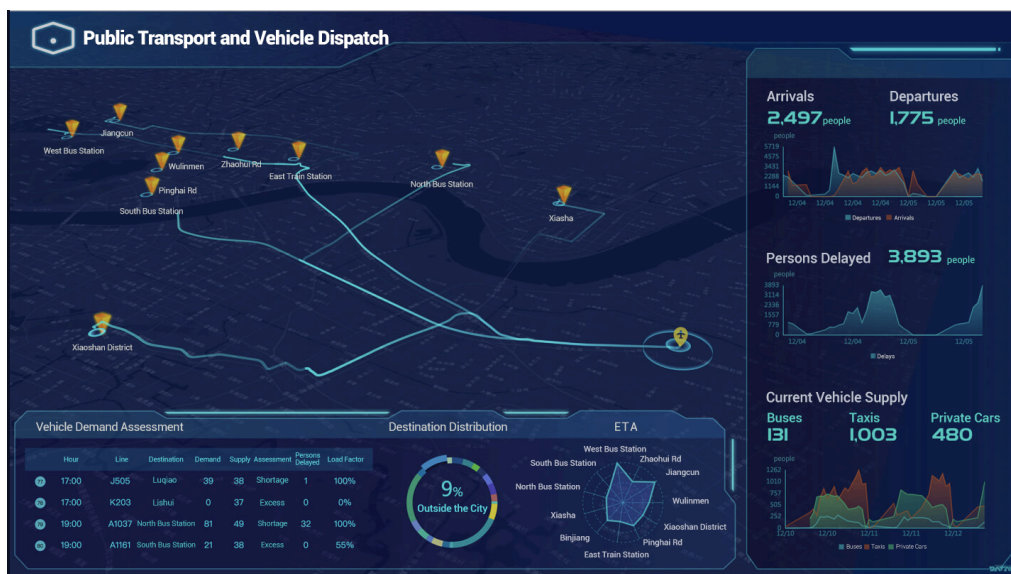

Figure 4: Public Transportation and Vehicle Dispatch[3]

City Brain draws on data from videos, Auto Navi, Wi-Fi probes, carriers, and other sources to effectively monitor passenger delay rates in certain areas and estimate capacity needs. It adjusts and plans bus frequencies based on travel supply and demand, determines shuttle routes, and controls taxi dispatches to minimise the delay rates at key venues and transportation hubs.

— Alibaba's City Brain Overview[4]

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[1] Alibaba, Alibaba's City Brain Overview, available online : https://www.alibabacloud.com/et/city

[2] Abigail Beall, In China, Alibaba's data-hungry AI is controlling (and watching) cities, WIRED, 30 May 2019

[3] Source: Alibaba Cloud

[4] Alibaba, Alibaba's City Brain Overview, available online : https://www.alibabacloud.com/et/city

City Brain's is currently mainly adopted in traffic control and transport governance of Hangzhou. However, traffic management will be only the first step in Alibaba's smart city strategy in covering other urban fields in the future, according to Alibaba.[1] As an e-commerce company, Alibaba is characterised by its strong capacity of building client relationship, through its online applications, as well as its ability of cloud management. Alibaba holds the biggest mobile phone applications in China, Taobao, Tianmao, covering a variety of daily urban services, across online payment, online shopping, food delivery, etc., which generate a huge volume of data every day that the other firms, such as Huawei, don't have access to. The data accessibility, as well as millions of application users, provides Alibaba with a rich resource for its smart city platform development.

4   The smart city initiative at the centre of the political agenda from national to local authorities

The progress and narratives in smart city development, as analysed above, coupled with the industry's pursuit of market opportunities, have long been advocating that the smart city can improve government capacity and efficiency in providing better urban services. The smart city market in China, initiated by private sectors, then enters the discourse of the public sphere in order to tackle economic and environmental problems, pushing forward the smart city movement to China's national and local political agenda.

The rapid urbanisation process in China has generated serious challenges to urban governance in various areas, such as pollution, traffic and resource consumptions. However, the debates did not translate into effective policy making and implementation until the 2010s. The emergence of smart city, as a problem-oriented policy initiative (Albino, 2015) has been seen as a right fit in its technological promise to address complex urban governance problems.

Pushed and pulled by the business advocacy and international experiences worldwide, as well as the increasing urban governance challenges, the concept of smart city is quickly embraced by the Chinese government. China has included the smart city initiative in its national strategy and made significant investments in the smart city projects. In 2010, the Chinese government published the 12th Five-Year Plan, encouraging and strengthening the development of information technology, information industry and smart cities. In 2012, in order to further regulate and promote the development of smart cities, three government agencies, the Ministry of Science and Technology (MOST), the National Development and Reform Commission (NDRC) and the Ministry of Industry and Information Technology (MIIT) start forming a smart city alliance, funding smart city research and projects, developing smart city technologies, developing industry standards and providing smart city solutions to local governments.

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[1] Wang Jian, chairman of the Alibaba Group's Technology Steering Committee, one of the project developers, Alwihda Info, Hangzhou growing 'smarter' thanks to AI technology, Octorber, 2017

In 2013, the China's Ministry of Housing and Urban-Rural Development (MOHURD) joins this smart city alliance, selecting cities to experiment and implement smart city initiatives[1]. At the national level, the MOHURD provides 296 selected pilot cities with funding and technical support, while at the local level, this is followed by further work of monitoring and evaluating in smart city development[2].

In order to further coordinate different ministries and government agencies in overseeing and managing the nationwide smart city development, the NDRC issued the *Guidance for Promoting Healthy Smart City Development* in 2014.[3] The *Guidance* defines smart city as a "new concept and model which applies the next generation of information technology, such as the Internet of Things (IoTs), cloud computing, big data, to promote smart urban planning, construction, management and services for cities."[4] It provides basic principles, objectives and action plans for the smart city development in China.[5]

5 A coalition between digital firms and local authorities in promoting smart cities

Local political objectives are principally convergent with central government's master smart city plan, but put more accent on economic development. The competition with other cities is the first plan for the local leaders. Smart city is seen as a way to gain the "promotion or marketing brand" of the city.

— Huawei BG smart city solution consulting service, Beijing

Due to China's unique political system and central-local government relationship, current smart city initiatives in China are primarily pushed forward by a top-down approach from the central government to local authorities.[6] While smart city initiatives are guided, monitored and evaluated by the central government ministries, the performances of smart city initiatives vary significantly across cities in China.[7] Although most smart city initiatives in China are supported technologically,

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[1] MOHURD (Ministry of Housing and Urban-Rural Development). A Notice on Conducting National Pilot Smart Cities, 2012. Available online: www.mohurd.gov.cn/wjfb/201212/t20121204_212182.html

[2] Johnson, D. (2014, June 17). Smart City Development in China. China Business Review. Available online : http:// www. chinabusinessreview.com/smart-city-development-in-china/

[3] National Development and Reform Commission. (2014). The Guidance on Promoting Healthy Smart City Development. Available online: http://www.sdpc.gov.cn/gzdt/201408/W020140829409970397055.pdf

[4] National Development and Reform Commission. (2014). The Guidance on Promoting Healthy Smart City Development. Available online: http://www.sdpc.gov.cn/gzdt/201408/W020140829409970397055.pdf

[5] Xu. C, Yu. W, 2018, International Journal of Public Administration in the Digital Age, Developing Smart Cities in China: An Empirical Analysis,

[6] Xu. C, Yu. W, 2018, International Journal of Public Administration in the Digital Age, Developing Smart Cities in China: An Empirical Analysis

[7] Zhong, N., Chen, X., & Song, G. (2015). An Empirical Research on Key Issues of Smart City Development in China. City Development Research, 22(06), 27–39.

financially and institutionally by the central government[1], there is a variety of models across Chinese cities in smart city development depending on local political leaders, business dynamics as well as the interactions between the two.

The public-private partnership is adopted while municipal governments develop smart city in collaboration with local firms, in order to share cost, gains and risks. The modes of PPP vary locally in different ways of funding, operation and ownership.

Figure 6: The funding, operation and ownership of smart city solutions

	Shenzhen (City)- Huawei (Firm)	Hangzhou (City) - Alibaba (Firm)
Funding	City	Firm
Operation	Firm	City
Data ownership	City	City

• Government investment-private operate[2]

Shenzhen has adapted the government invest-private operate mode in developing smart city. The city government is primarily responsible for financing the project, while the firm takes charge in the software development and operation. The municipal government provides subsidies to private sectors, the firm take advantage of local tax incentives. The profit of private sectors mainly comes from the advertising business and value-added services.

• Build–transfer[3]

Hangzhou is adapting a build-transfer mode in developing smart city, where the government provides an agreement framework which is a time and cost-fixed contract with private sectors, it is up to companies to take charge of the design, construction and risks within the contract period. Once the project is constructed and finalised, the government repurchases and takes over the

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[1] Xu. C, Yu. W, 2018, International Journal of Public Administration in the Digital Age, Developing Smart Cities in China: An Empirical Analysis

[2] Geertman. Stan, Li. Y, Lin, Y, The development of smart cities in China, 2015

[3] Yin, Y., & Jiang, J. (2011). Study of Control on Investment Upfront in Construction in BT mode. Journal of Beijing Institute of Technology(Social Sciences Edition), 13(2), 1–5.

implementation[1]. During the period of construction, the government does not have the ownership of the projects, but provides a certain amount of property loans or loan guarantees.

Both cases in Hangzhou and Shenzhen shed light on the interactions between public authorities and local firms in engaging in smart city initiatives. These smart city experimentations participate in a logic that encourages the economic development by providing the private firms with large market opportunities, while local authorities adopt a positive role in supporting the local business economy through smart city policies. The smart city initiatives are implemented through the calls for candidates, while the local authorities support and finance the smart city projects via private firms, under a win-win situation: materialising policy goals for innovation-driven urban development and providing a fertile ground for local firms to potentially grow.

> *The digital companies often work directly with the information centres of the city government, rather than the service departments (transport, water, police, etc.) of the municipality. The work of the companies is building trust relationship with the local authorities — publish reports, organise events, and engage governments and the industry to promote the smart city services.*
> — Huawei BG smart city solution manager, Shenzhen

Behind China's smart city movement is a coalition of the public sector and the private sector[2]— the entrepreneurial governments seeking new ways of local economic development and the digital firms capturing market profits—join forces in capitalising the urban development in China. It is estimated that the market value of Chinese smart cities increased from RMB 740 billion in 2014 to RMB 10,500 billion in 2019, and is forecast to reach RMB 25,000 billion (USD 3,640 billion) in 2022.[3]

The digital firms' agency has constructed a smart city market, while city governments are key actors constructing the smart city paradigm in taking root in local territories, with a political discourse of creating people's livelihood benefits, but geared to drive economic growth in a globalised economy[4]. The smart city in China acts to "sell" and "brand" a city in the global economy. Behind the smart city promotion is an entrepreneurial urban governance, oriented to a utility to foster China's multinational business enterprises and further economic development[5].

The relationalities between the governments and the digital firms have forged the leadership of a smart city coalition in China and a new urban paradigm, which has fitted right into the global contexts for entrepreneurial governance pursuing the urban imaginaries of competitiveness,

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[1] Yin, Y., & Jiang, J. (2011). Study of Control on Investment Upfront in Construction in BT mode. Journal of Beijing Institute of Technology(Social Sciences Edition), 13(2), 1–5.
[2] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.
[3] Qianzhan. Market Analysis for Chinese Smart Cities in 2019 [2019 Nian Zhong Guo Zhi Hui Cheng Shi Hang Ye, Shi Chang Fen Xi]. 2019. Available online: https://bg.qianzhan.com/report/detail/300/190226-6493a8ba.html
[4] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.
[5] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.

sustainability and smartness[1], in order to position the Chinese cities in an increasingly competitive global knowledge economy.

6 Shift of the relationship between public and private as a consequence of smart city initiatives

Huawei and Alibaba, are not initially urban firms, but provide smart city solutions and offers that are nowadays at the centre of the smart city agenda in China. Contrary to European cities, where urban service providers dominate the current smart city market[2], the Chinese smart city market is led by digital and IT firms. Instead of passing through the urban service firms, Chinese IT companies address directly to the local authorities and see themselves as a key supporter of the municipalities.

Going through both a top-down approach from the political authorities, and a bottom-up approach from the private actors, the relationship between the public authorities and the firms seem to change. So far, the public authorities play a major role in developing smart city. However, the mode of financing and operation is getting more diverse.

In the future, while the construction of smart city might become more market-oriented, the government's role will focus on the setting of standardisation, regulations and laws[3]. This does not mean that the public power is about to give up its leadership and leave the smart city agenda. Instead, the standardisation and regulation are government's central instruments to structure a viable market for firms to sustainably compete. At an institutional level, the Standardisation Administration of China (SAC) published its Smart City — Top-Level Design Guide[4] in 2018, aiming to set up key standards and indicators system. Under the leadership of the National Standards Commission and other relevant ministries, the National Smart Cities Standardisation General Working Group established evaluation standards team, supporting the evaluation of smart city applications, implementation, verification and indicators test. The establishment of indicators and evaluation process is a key instrument for the government to structure the smart city market.

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[1] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.

[2] Antoine Courmont, What Happened to the Smart City? Political Economy of the Digital City, 2018

[3] Hu, R. The State of Smart Cities in China: The Case of Shenzhen, 2019.

[4] Standardisation Administration of China, Smart City — Top-Level Design Guide, 2018, http://www.cbdio.com/image/site2/20180730/f4285315404f1cc906b957.pdf

Figure 7: Smart City Standardisation Architecture
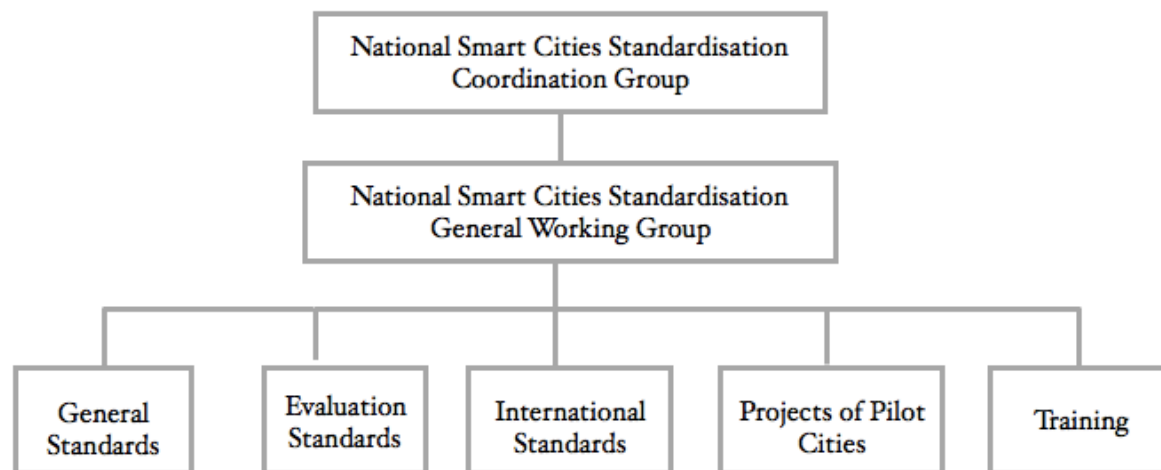
A tendency of depoliticisation of China's smart cities is raising[1]. The local political power's smart city construction is structured by the necessity to guarantee and bring economic development by introducing digital tools. The smart city projects, as the resources of local employments, as well as local fiscal resources, are viewed by local authorities as a tool and instrument to gain competitiveness, to position themselves in national urban competitions, as well as international competitions, in an increasingly competitive global economy.

Smart cities in China build, almost exclusively, upon the latest advancement in the information technology, such as 5G technology, artificial intelligence, Internet of Things (IoT), big data and cloud computing, to explore the use of digital technology and enable more efficient urban management and services. This technology-centric smart city development pathway emphasises and relies on the role of digital firms in smart city construction, creating a dependency on the private sector from the urban governance, due to the strong innovation capacity of the digital industry. As a consequence of smart city initiatives, the relationship between the digital economy and urban governance in China is shifting.

Conclusion

This study has included an overview of the smart city market in China, through the case studies of Shenzhen and Hangzhou, as well as Huawei and Alibaba's intervention in the smart city movement in China. Drawing on the empirical evidences of Shenzhen and Hangzhou, the article has tried to reveal the particularity of smart city models in China in terms of approach, core technology and financing mode, depending on cities and firms. Behind the smart city movement is an increasing mutual exposure of the digital economy to the urban governance in China, and vice versa. China's government-dominated urban regime is shifting to a technology-centric

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[1] Henriot, Carine, et al. « Perspectives asiatiques sur les Smart Cities », Flux, vol. 114, no. 4, 2018, pp. 1-8.

pathway, seeing smart city as an instrument in driving an urban development paradigm towards innovation and economic growth.

The empirical analysis has tested the theoretical conceptions on the Chinese smart city model. A process of depoliticisation is taking place, with the rising force of the Chinese digital firms in advocating, defining and implementing smart city strategies. On one hand, this transition of public-private relationship is driven by the pursuit of economic development of the public actor, leading to a market-oriented smart city model. On the other hand, this is forged by the technology-centric smart city approach, enabled by the strong innovation capacity of the private digital firms. We observe a shift of the relationship between public and private actors in urban governance in China, as a consequence of smart city initiatives, forming a joint alliance in positioning Chinese cities and digital firms in the global economy and international competitions. In the future, the government's role will focus on the setting of standardisation, regulations and laws in order to shape a viable market. Concret efforts on building smart cities standardisation and evaluation indicators are in progress.

Further research could be conducted to shed lights on the exportation of Huawei and Alibaba's "Brain" city model, as Chinese digital firms enter into the global smart city market, as well as their increasing effort to gain legitimacy and visibility beyond the Chinese context. Analysis could provide insights on the public-private coalitions and advocacies, as well as the imaginaries that this model would enable in other political, cultural and material contexts.

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