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Comparison of Smart City Program in Indonesia and China Study Case: Jakarta and Beijing

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ABSTRACT

Smart City was created to shape a city to improve the quality of life by using urban information and technology to improve service efficiency and meet the needs of citizens, to create a safe, comfortable, controlled, and easy-to-access environment for its citizens and strengthen the city's competitiveness in terms of the economy, social, and technology. This study discusses the smart city implementation in Indonesia with the 100 Smart Cities program and the smart city program in China. The study concept compares smart city programs in Jakarta and Beijing, which both cities have the same hard infrastructure conditions. It is hoped that this study can differentiate regarding the smart city approach in Indonesia and China. The method used in this paper is to conduct a literature study by comparing it with empirical conditions. The recommendation of this study is differences and similarities based on adjustment for the local conditions in Indonesia and China.

Keywords: Smart city; success factors; implementation; China; Indonesia

SARI PATI

Kota pintar diciptakan untuk membentuk sebuah kota guna meningkatkan kualitas hidup dengan memanfaatkan informasi perkotaan dan teknologi untuk meningkatkan efisiensi layanan dan memenuhi kebutuhan warganya, guna menciptakan lingkungan yang aman, nyaman, terkendali, dan mudah diakses bagi penduduknya serta memperkuat daya saing kota dalam hal ekonomi, sosial, dan teknologi. Penelitian ini membahas implementasi kota pintar di Indonesia melalui program 100 Smart Cities dan program kota pintar di China. Konsep penelitian membandingkan program kota pintar di Jakarta dan Beijing, di mana kedua kota tersebut memiliki kondisi infrastruktur keras yang serupa. Harapannya, penelitian ini dapat membedakan pendekatan kota pintar di Indonesia dan China. Metode yang digunakan dalam makalah ini adalah dengan melakukan studi literatur yang dibandingkan dengan kondisi empiris. Rekomendasi dari penelitian ini adalah perbedaan dan kesamaan berdasarkan penyesuaian terhadap kondisi lokal di Indonesia dan China.

Kata Kunci: *Kota pintar; faktor keberhasilan; implementasi; Cina; Indonesia*

1. INTRODUCTION

According to the UN, by 2050, over two-thirds of the approximately 9 billion people on the planet will have resided in cities. According to Balkaran (2019), nearly 90% of those individuals will be from one of two continents: Africa or Asia. By 2020, Africa will overtake Asia as the second-fastest urbanizing continent (Headrick, 2018). Many cities have been working hard to offer their residents essential services like clean water, drinking water, housing, as well as services for education and health. Due to the increasing urban population worldwide, planners are aware that cities must become more efficient. Cities worldwide are under strain and working hard to address issues with transportation and congestion, increase efficiency, lower operational costs, and foster competition (Echendu & Okafor, 2021).

Not only in Indonesia but also throughout the world, the population is growing. This is in line with a propensity for people to congregate in urban areas, which are already vital to Indonesia and will soon assume a greater significance. Approximately 59.35 percent of people live in urban settings, according to Firmansyah et al. (2019). By 2025 and 2045, respectively, it is expected that 67.66 and 82 percent of the Indonesian population will reside in urban areas. Numerous societal and economic aspects of cities are impacted by these dynamics. In particular, urban concerns like waste management, transportation, and quality of life will only get worse, necessitating additional infrastructure. Cities therefore require fresh approaches that demand creative circumstances and fixes. One of the solutions is the idea of a "smart city." Cities must become more economically and socially vibrant while maintaining environmental sustainability as a result of population growth and urbanization. Through a digital city platform, it may change cities and give potential answers.

In this paper, we propose to support policymakers in identifying success factors and challenges factors that contribute to the implementation of smart cities in Indonesia, specifically in order to find a smart city concept. This paper also tries to identify what city plans have to be made compared with smart city implementation in China.

This paper is divided into five sections: the first section introduces the paper and sets the context, the second section explains the literature review, the third section analyzes the implementation of smart cities in Indonesia, the fourth section discusses the differentiation of smart city in Indonesia and China, and last section concludes the implementation of smart city in Indonesia by explaining the factors that contribute the successful of smart city program based on implementation of smart city in China.

2. LITERATURE REVIEW

Numerous towns throughout the world have already adopted Smart Cities, which have shown to be effective in finding solutions rapidly. Sectors like education, health, transportation, security, safety, energy, and waste management have benefited greatly from the use of smart city technologies (Echendu & Okafor, 2021). When evaluating a smart city project, its primary goal must be to effectively address urban issues to increase the sustainability of the city and the quality of life for its residents (Herdiyanti et al., 2019).

The next task is how smart city implementations respond and adapt to the specific local conditions and the improvisational practices of their users. It has been suggested that the smart city concept requires adjustment to the local conditions in the developing world (Offenhuber, 2019). All cities in developing countries have their characteristics, so a local approach is needed so that the implementation of smart cities can run very well. Southeast Asian cities, perhaps more than European and American cities, are shaped by informal arrangements and improvisation, the "interplay and overlays of order/disorder, formal/informal, legal/illegal, local/global" (Offenhuber, 2019).

The application of smart cities in several cities in Indonesia turns out to have various advantages and disadvantages.

2.1. Smart City in Indonesia

The definition of a `smart city' often takes place at a high level of abstraction, by listing generic domains. The concept was born in 1994 and has gained much popularity in the last two decades, with many scholars working on denying it. Numerous projects in Asia and America have focused on the development of smart cities. The developing of the concept started with cyber-, digital-, intelligent- and then smart-cities.

Information, supported by the Ministry of Public Affairs, the Ministry of Finance, the Ministry of Public Works and Housing, and the Ministry of National Development Planning (Herdiyanti et al., 2019). Even before the launch of this initiative, several Indonesian cities, including the Jakarta regional government, Bandung, Surabaya, and Makassar, had launched urban control centers, open data portals, participatory budgeting, and other initiatives associated with technological urbanism (Offenhuber, 2019).

In 2017, 25 cities and regencies were appointed to participate in the program. In 2018, 50 cities and regencies were following

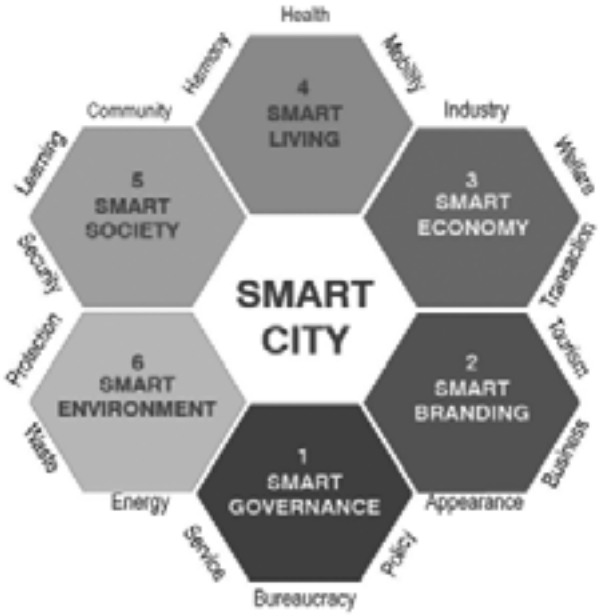

Figure 1. Indonesia Smart City Concept

In the 1990s, smart cities had a focus on Information and Communication Technology (ICT). Years later, the concept started to include citizens and city governance. This widening definition resulted in incorporating multiple domains within smart cities, such as ICT, human resources, economics, and governance. A smart city has been identified as combining various technologies to create a friendly environment while providing the community with a more equitable life (Herdiyanti et al., 2019).

"Gerakan 100 Smart City" was initiated in 2017 by the Ministry of Communication and

to participate in the program. Moreover, by the end of this year, 2019, the other 25 cities and regencies have participated in the program. Several considerations are taken into for the cities and regencies to belong to the movement toward 100 smart cities such as regional financial capability, green-city index, local government performance index and sustainable cities index (Bappenas RI and Kominfo.go.id).

Indonesia's government tries to apply and combine the smart city concept from Giffinger and Cohen. Giffinger (2007) proposes six points, i.e. Smart Economy (competitiveness),

Smart People (social and human capital), Smart Governance (participation), Smart Mobility (transport and ICT), Smart Environment (natural resources), and Smart Living (quality of life) and Cohen Smart City Framework Wheel within which 6 (six) dimensions were defined - smart governance, smart living, smart mobility, smart people, smart economy, smart environment as shown in figure 1 (Herdiyanti et al., 2019). By combining these two theories, six elements of a Smart City become the study in the Master Plan of Smart City made by the Minister of Information and Communication (Kemenkominfo), namely Smart Governance, Smart Economy, Smart Branding, Smart Society, Smart Living, and Smart Environment. Each element's related activities are as follows: the elements of Smart Governance cover Public Services (related to improving the performance of public services), Bureaucracy (related to improving the performance of the government bureaucracy), and Public Policy (related to improving the efficiency of public policies).

In the implementation of the 100 Smart Cities Program. The Indonesian government has made a framework regarding the basic needs for smart city implementation, as shown in Figure 2.

Based on Figure 2, for the development of preparing smart city status, the following essential aspects need to be taken care of, i.e., structure, infrastructure, and suprastructure as a driver, culture (people's readiness) as a mediator, and nature (resources, life, ecosystem) as an enabler. The structure consists of the availability of human resources, the ability of bureaucracy, and the ability of budget; infrastructure consists of the availability of physical facilities, ICT, and social aspects. Meanwhile, suprastructure consists of the readiness of policies (regional regulations), institutions, and implementation (Rachmawati, 2019).

Susanti et al. (2016) described that a smart city has five purposes, namely convenience of the public services, delicacy of city management,

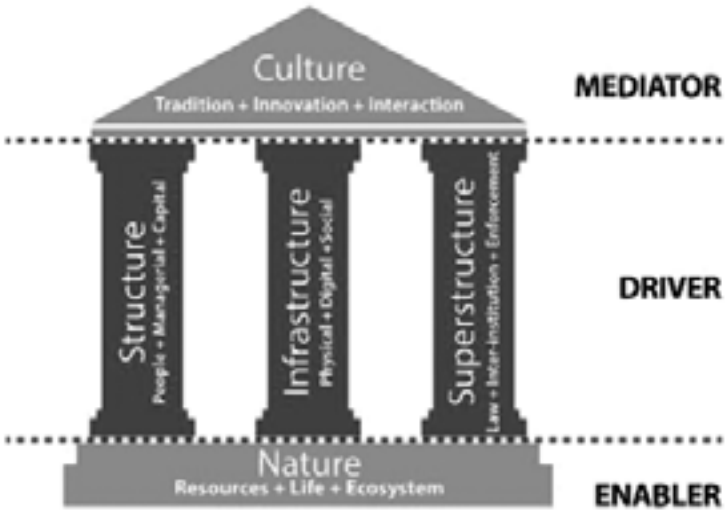

Figure 2. Smart City Readiness

Meanwhile, the elements of smart branding consist of tourism (related to the development of the ecosystem of tourism), businesses (related to the development of business competitiveness; this is TTI and creative industry), and city appearance (related to the setting of facial appearance of a city).

livability of living environment, smartness of infrastructures, and long-term effectiveness of network security. Therefore, a smart city must provide better and more convenient services for citizens, better city governance, a better life environment, more modern industry that is greener and more people-friendly, smarter and

more intelligent infrastructure, and a dynamic and innovative economy.

Not only do data collection, policy, technology, human resources, and organizational aspects become the success factor of a smart city but also good financial management is required, as either financial or financial management can encourage or inhibit innovation. The budget is an important sector for governments in carrying out policy innovation; it can function as a driver or as a barrier to policy innovation can function as a driver or as a barrier to policy innovation.

In building a smart city, roles are needed from various parties, namely the government, academics, and the private sector, to integrate and coordinate all city components when building a smart city system (Sholeh et al., 2019).

In addition to the important components of smart cities mentioned, one component is also the most important factor, namely, identifying the local needs that motivate the cities to develop smart cities. Smart city implementations should respond and adapt to the specific local conditions and examine their consequences for planning, design, and maintenance.

2.2. Smart City in China

According to the Beijing Government (2021), there are some stages to making a smart city program in China as follows:

1. Phase 1 Pilot Exploration (2012-2014)
   In December 2012, China's Ministry of Housing and Urban-Rural Development issued two documents, "Interim Management Measures for National Smart City Pilot" and "National Smart City (District/Town) Pilot Index System (for Trial Implementation)," marking the beginning of China's smart city construction.
2. Phase 2 Implementation (2014-2016)
   In August 2014, the State Council issued the "Guiding Opinions on Promoting the Healthy Development of Smart Cities", proposing to build a number of distinctive smart cities by 2020, marking the full-scale implementation stage of "smart cities." in March 2015, smart cities were written into the government work report at the national level for the first time
3. Phase 3 Development Transformation (2016-2020)
   In December 2016, the National Development and Reform Commission released the "New Type of Smart City Evaluation Index (2016)" to transform smart cities to the new goal of "innovation, coordination, green, openness and sharing."
4. Phase 4 New Chapter
   In the 14th Five-Year Plan period, the construction of smart cities is combined with China's "carbon peak" and "carbon neutral" goals with new connotations and objectives.

China has carried out more than 500 trial cities related to smart cities; more than 89% of the cities and 47% of the county have proposed the construction of smart cities. The formation of development trends of the Yangtze River Delta, the Pearl River Delta, and other smart city clusters have currently been organized and carried out by the Ministry of Housing and Construction, the Ministry of Industry and Information Technology, the National Development and Reform Commission, the Central Internet Information Office, and other ministries and commissions.

3. METHODS

This paper will discuss the implementation of Smart Cities in Indonesia overall, especially in big cities, and its effect on better city management. The discussion is based on a literature study comprising best and empirical practices related to the implementation of Smart Cities in Indonesia. This paper will explain the best practices of the implementation of Smart City toward better city management with the

Program Toward 100 Smart Cities in Indonesia.

The method used in this research is a qualitative method with a descriptive analysis method, and data collection was carried out through literature. Good practices and lessons learned are good mechanisms to code and disseminate methodologies, strategies, and effective services. The result of empiric and theoretical research publications sidelined help to draw up the smart city performance in China and indicators that contribute to the success of smart city programs in Indonesia.

4. RESULTS AND DISCUSSION

The application of smart cities in several cities in Jakarta and Beijing turns out to have various types.

1.1 Jakarta

The Jakarta Smart City (JSC) initiative was launched in 2014 by the former governor Basuki Tjahaja Purnama, known by his nickname Ahok. The initiative encompasses a remarkable number of projects addressing issues, including governance, mobility, environment, and human services. JSC includes the familiar insignia of smart city projects: an urban operations center with wall-sized screens displaying feeds from CCTV cameras and data visualizations indicating the urban condition. The Jakarta government launched the Qlue application as a platform to submit complaints regarding damage to public facilities in Jakarta; however, because this facility is not user-friendly, residents are reluctant to use this application. A recurring motive behind the smart city initiative is formalizing informal practices and arrangements inside and outside the city government. (Offenhuber, 2019).

1.2 Beijing

Beijing, China's capital and political and cultural hub, is developing a smart city that is strongly influenced by the government and has more options for policy assistance. Based on the top-level design of smart cities, the model of government-led, market participation, and multi-party cooperation is primarily used, with the active participation of large Internet companies like Baidu, Alibaba, Tencent, and Jingdong to provide corporate support for the urban construction of smart cities. Additionally, under the direction of the government, a multi-party cooperation model is being developed, with Tsinghua, Peking University, NPC, and other universities having strong relationships with businesses and the government. Beijing's smart government mainly includes four aspects: smart convenient life, smart information management, smart legal affairs, and smart engineering, which are dedicated to breaking information silos, realizing interconnection, streamlining office processes, digitizing engineering matters, and realizing unsupervised and real-time supervision (Wang, 2022).

The following is a comparison table for smart city implementation in Jakarta and Beijing:

References	Jakarta	Beijing*
Start of Implementation	2014	2017
Name of Project	Jakarta Smart City (JSC)	N/A
Features	a. Qlue = citizen feedback system, developed by a private company funded by the government	a. Smart Government through the Mentougou application was developed by the Mentougou District Government.

References	Jakarta	Beijing*
Start of Implementation	2014	2017
Name of Project	Jakarta Smart City (JSC)	N/A
Features	b. Crop = designed for city workers and surveyors to manage issues and translate them into work orders, serving as the basis of KPI. Installed 90,000 Philips's sensor driven LED street lights c. 6,000 surveillance cameras d. 1,200 real-time location municipal garbage trucks e. Cashless payment system for students and low-income residents for government subsidies f. IoT pilot districts g. PetaBencana = a flood mapping project, connect with Twitter using hashtag #banjir	This application provides an office guide, online reporting, progress inquiries, and other services. b. Smart Health Mentougou application access to 58 hospitals in the whole district of Mentougou, and citizens can also register online, and receive notification and inquiries about laboratory tests and other convenient services. c. Smart Transportation promoting driverless testing; realizing mobile payment for public transportation and subway; gradually changing from deposit mode to shared transportation use mode based on user credit value; realizing ETC non-stop payment; building intelligent facilities such as intelligent signal lights and intelligent parking lots; and promoting electronic traffic police. d. Smart Education The interconnection of information between different districts and schools, digitalizing school management, creating a more individual and diverse teaching model for students, improving teaching quality and reducing teachers' burden e. Smart Economy Characterized by the digitization of business processing and the provision of services such as online business processing and 24-hour customer service for individual users through platforms such as WeChat and APP; and real-time approval of loans and other businesses for corporate users

References	Jakarta	Beijing*
Start of Implementation	2014	2017
Name of Project	Jakarta Smart City (JSC)	N/A
Features		f. Smart Living The interconnection of information and sharing of urban public resource information, digital management of residents' information, strengthening of community security through high-definition cameras, face recognition, automated supervision of household appliances and community, an unmanned supermarket with face recognition can be used for paying when leaving the store g. Smart Environment The combination of online information collection and storage and offline resource carrier exchange and communication promotes environmental data sharing and provides a reference for policy formulation, and improves emergency response capabilities through real-time monitoring of environmental violations.
Approach	Formal Top Down	Top Down
Type of Data	Open Data	Open data.
Smart City Master Plan	Has Master plan	Has Master Plan
Regulation	Has local regulation	Has local regulation
Focus	Urban issues, including governance, mobility, environment, and human services	The model of government-led, market participation and multi-party cooperation
IT Company	Global and local Company	Local Company
Community Participant	Middle	High, i.e, application found by the community itself

**Source : Data Analysis and Wang, 2022*

Tabel 1. Comparison of Smart City in Jakarta and Bandung

Based on the comparison of the implementation of smart cities in Jakarta and Beijing, several factors that play an important role in the successful implementation of smart cities can be conveyed as follows:

1. Leadership and strong political will

A comparison of the implementation of smart cities in Jakarta and Beijing shows that they all have a similar name: "government will." Even though they have different formats, Jakarta, with its governor being active on social media to promote smart city activities so that people can find government activities quickly and accurately; meanwhile, in Beijing, the government has a strong influence in implementing smart city programs. The importance of managing a smart city is evident because, in the current era of globalization and digital technology, the public demands that the government provide fast, precise, and accurate information services. Smart City roll-out requires leadership, vision, and a clear strategy for all stakeholders (Balkaran, 2019).

The government is central in developing every smart city, from planning to implementing and running projects (Echendu & Okafor, 2021). The government's role is to enforce policies enabling large-scale participation that drives many smart-city approaches. (Headrick, 2018). Strong political leadership and full understanding from people (citizens, businesses, and organizations) are paramount to overcoming local challenges (Rachmawati, 2019). The role of the government is of primary importance in the efforts to establish city infrastructure to facilitate the citizens' activities (Rachmawati, 2019).

2. Law and Regulations

Several policies at the macro, mezzo and micro levels are required to transform users' concerns regarding opportunities for sustainable smart city services and applications (Lytras & Visvizi, 2018). Steve H (2011) emphasized that the legal/regulatory basis is an important aspect of the activities undertaken by the government. In the absence of regulation or legal basis in the implementation of a smart-city concept, making the government apparatus that runs the concept becomes difficult, especially in integrating existing applications (personal communication). The government regulation aims to improve the performance of local government administration.

The smart city offers solving innovation to collect information and policy design through government, nor technology beyond regulation, digitization, and integration of sensors of city elements, which is just the infrastructure of a smart city. Policies are implemented by tech support, not the other way around (Hudjolly, 2017).

3. People Readiness (IT Culture)

Indonesian and Chinese people are the type of people who like to interact in cyberspace. The data shows that 73,7% of the Indonesians (202 million) are active internet users, 170 million active social media users, and 3 hours 14 minutes of internet spending time/day. The duplicative habit of urban society and the positivistic attitude of middle-class society, which is all-loving towards technology, have contributed to the realization of a smart city in Indonesia (Hudjolly, 2017). Soft skills are required to enhance citizens' capacity to use smart city services (Lytras & Visvizi, 2018).

Smart City must be supported by "smart people" because local people and cultures are expected to accept change. To realize a smart city, participation support is needed for multi-stakeholders, a smart society with equality and good education, a strategic, sustainable, and integrated plan, and partnerships. Smart City implementation must involve community participation from the beginning so that the equality of citizens, government, private sector, and academics can create a smart city (Conoras & Hikmawati, 2018).

Citizens need to be involved in public policy and decision-making processes by using

the technology of e-participation and good governance practices to help the government successfully implement policies, programs, and projects related to development goals in the economic, social, and environmental fields, increased participation in public decision-making that has an impact on the welfare of the community.

4. Master Plan

The master plan of a smart city needs to cover all the elements of a Smart City, including smart living and smart environment. A roadmap is of great help in giving guidelines for important steps that need to be taken to realize Smart City. It is important to determine that the concept must be in line with the formulated vision and mission of the city (Rachmawati, 2019). This is echoed by Susanti et al. (2016), who moved from abstract strategic planning for smart cities to more concrete strategies, for instance, by starting with an assessment of what exists in a city and then setting goals accordingly on domains such as the soft (e.g., knowledge and innovation economy) and challenging aspects of infrastructure (e.g., transportation, energy). Planning from the unique indigenous or homegrown people is expected to provide effectiveness and efficiency for better implementation.

The definition of a `smart city' often takes place at a high level of abstraction, by listing generic domains. Policymaking takes place in a specific context rather than in an abstract form. A definition should thus clearly identify what is relevant to selecting and implementing a smart city agenda in a context of use, such as one particular town. For instance, the connections exist between people, technology, and governance (Herdiyanti et al., 2019)

5. Big Data (Data Collection)

Data collection is the main step toward a smart city (Sholeh et al., 2019). A comprehensive data can facilitate the government in knowing the problems that occur in the city. The Government can also use the information to create comfort, safety, order, and a better life (Utomo & Hariadi, 2016). The simplicity of services and user-friendliness improve their adoption, while real-time data ecosystems with advanced analytics capability enhance the efficiency of smart city infrastructure (Lytras & Visvizi, 2018). The only consents that constrain smart city added value are security and privacy concerns as the poor quality of infrastructures. Smart city platforms are information systems encompassing technical infrastructure, processes, people, and organizational structures. the infrastructure-centric perspective is largely aligned with the technical; the user-centric perspective with the social metaphor. the infrastructure is partly the result of these interactions (Offenhuber, 2019).

The difference between the implementation of smart cities in Jakarta and Beijing is the amount of funding used to build smart cities. The smart city program in Jakarta is more small-scale and partial and still focuses on smart governance. In contrast, the smart city program in Beijing is more large-scale and has touched all aspects of smart cities, such as government, environmental, transportation, and health. However, Jakarta and Beijing also already have people with an IT culture and are technologically responsive so that all smart city programs can be quickly disseminated to the public.

4. POLICY IMPLICATION

This paper studied each country's different cultural, political, social, and economic contexts under investigation. It provided a perspective on smart city implementation in Indonesia and China, specifically Jakarta and Beijing. This needs to be studied further, considering that big cities in Indonesia and China have many similarities in implementing smart city programs, but it turns out that the application of the Smart City concept in each of these big cities has a different background. The implementation of a smart city in Jakarta and Beijing is not

the same. Differences in regional potential, both in terms of natural and human resources, impact where a smart city will be built. Smart-city design in China has its unique approach since urbanization in most of China has been decoupled from industrialization, and it is not only concentrated in large cities. Therefore, a smart city concept and the area's potential must be researched and carried out in-depth studies.

The results of this research were based on an analysis of available literature to determine the effectiveness of smart city implementation in Jakarta and Beijing. There is a possibility that if the amount of literature is added, it will get different results, so a more profound study is needed to assess the implementation of smart cities in Indonesia and China.

Different results may be obtained if the number of cities sampled also increases, so considering the smart city factor in Indonesia and China must be studied more deeply.

5. CONCLUSIONS

Based on the results of the analysis and literature study of smart city implementation in Jakarta and Beijing, we conclude that five factors influence the success of the smart city if hard infrastructure already well established are: leadership and strong political will, law and regulations; IT culture; and master plan. In realizing a smart city concept, the support of multi-stakeholder participation, intelligent communities with equality and good education, sustainable and integrated strategic plans, and partnerships are needed. Basically, funding is also a factor that will determine how many elements of a smart city can be implemented. The bigger the source of funding, the more integrated and smarter the city programs that can be implemented.

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