

BHUMI: Jurnal Agraria dan Pertanahan

Received: August 27, 2019; Reviewed: October 16, 2019; Accepted: November 22, 2019.

To cite this article: Pinuji, S, Wahyuni 2019, 'Make the cities work: some stories of smart city initiatives around the globe', *Bhumi, Jurnal Agraria dan Pertanahan*, volume 5, no. 3 (special edition), hlm. 68-76.

DOI: 10.31292/jb.v5i3.393

Copyright: ©2019 Sukmo Pinuji, Wahyuni. All articles published in *Jurnal Bhumi* are licensed under a Creative Commons Attribution-ShareAlike 4.0 International license.

MAKE THE CITIES WORK: SOME STORIES OF SMART CITY INITIATIVES AROUND THE GLOBE

Sukmo Pinuji, Wahyuni
National Land College
Email: sukmo.pinuji@stpn.ac.id

Abstract: The concept of Smart City (SC) has been popular recently, and has been adopted by many cities in the world with various implementation and development. As the world most population now concentrates on urban area, a sustainable city planning and management become important. As the population keeps growing, pressure and tension on a city arise: space for living, waste management, traffic congestion, sufficient clean water resources, and other issues. Beginning in around 2009, the concept of SC was designed to solve problems related to city growth in a sustainable manner. By using technology, Internet of Things (IoT), and community participation, SC aims to make the city a livable place for its inhabitants, putting people as the center of interest and in quality of life in sustainable manners as ultimate goal. This paper aimed to deliver a study on the trend of SC adopted by two cities: Amsterdam and Jakarta. The study was conducted through literature review. The data were analyzed to compare the concept of SC in each city from different parameters, focusing on the development process, technological adoption, political and institutional arrangement and implementation. The results show that each city has specific strategy to implement SC, based on their economic, social, environment and demographic characteristics. It is also important to underline that the main concept of SC is to attract related stakeholders in taking charge of their roles for the success of SC. Furthermore, both cities has a sharing vision in putting environment as the main framework of the development of SC.

Keywords: smart city, public participation, sustainable livelihood

A. Introduction

As world biggest population now tend to concentrate on urban area, the cities experience more pressure compared to decades ago. Urbanization gives many benefits to cities: boosting economic growth, providing job opportunities, supporting national development and enhancing quality of living in general. However, as a city grows, it impacts on a more complicated management system related to economic social, and environment quality in order to make a city a pleasant and sus-

tainable place for living. As the population growth, pressure arise: limited land available for business and settlement area, traffic congestion, pollution, source of fresh water, waste and sewerage managements. They are common classic problems faced by a growing city, not to mention social problems such as quality of living, criminalization and economic gaps, emergence of slum area. A failure of management of a city might jeopardise its economic, social and environmental sustainability, therefore leads to failure in making a city

a liveable place for its citizens (Neirotti et al. 2014). Therefore, a feasible and sustainable urban planning become a key factor in urban management system. It is mentioned that future development giving broad opportunities for a new technology-based solution as alternatives on urban planning and living, giving solutions on urban management system in an effective and holistic manners.

The concept of Smart City Initiatives (SCs) has been emerging since 1990s, as a breakthrough in resolving city problems using technological approach. Has been adopted by numbers of cities throughout the world in various ways and domains, it is difficult to identify shared definition and common current trend of SC (Neirotti et al. 2014). However, it is agreed that SC adoption shares a common concept in utilizing of technology to resolve city problems in an effective and efficient manner, as well as in the use and management of city resource. It was mentioned as intelligence urban development, due to its ability to provide solutions and improve living conditions of the cities in a sustainable manner, using limited assets and other challenges. Various adoptions of SCs do not necessarily indicate city performance as general. The idea of SC is to promote a better living conditions and sustainable urban management using its own resources as efficient as possible. It includes enhancing human resource capacity of the citizens to actively taking part on the initiatives as a part of self-system to integrate economic, urban, demographic and geographic resources of a city as a living system of the city. Paralleled with that idea, it is also difficult to conclude a common guideline on the success of SC, or key factors in implementing it, since different city have different problems, characteristics, and resources.

A common system of calculating SC performance was introduced by the researcher using Coverage Index (CI) analysis, by calculating the number of application domains launched by the city and its relationship with economic, social, geographic, demographic and environmental characteristics of the city to find common points and differences of each city in performing SC

(Neirotti et al. 2014). This paper aims to compare the adoption of SC in different cities. To simplify the process, description and comparison used classification of domain implemented in CI analysis. Two chosen cities that has been implementing SC are Amsterdam and Jakarta. The selection of these cities was based on the consideration that they are able to represent cities from different continents, with different development stages and different characteristics of cultural background, despite its common characteristic as a metropolitan with multi-ethnic and multi-background population. The comparison does not necessarily aims to find the best implementation of SC in the selected cities, but rather to explore more on the common practices of SC and how they use their resources to tackle their problems through SCs.

First part of the paper introduced the concept of SC in relationship with sustainable development as a key motive of its implementation, thus accepted as common background on the concept of SC. Second part of the paper discussed about the concept of CI analysis to determine city performance on implementing SC. The classification of domain and sub-domain implemented on SC was used to describe the findings and draw conclusions as the results of the analysis. Third part of the paper introduced the adoption of SC in selected cities, presented using components of CI analysis. Finally, a common sharing of the implementation of SC were drawn in the last section of this paper, to find out the key factors on the success of SCs, obstacles and how the SCs are able to bring the city into a more liveable and sustainable place for living.

B. Smart City and sustainable development

Urban expansion is something unavoidable in this modern era. Cities become more attractive for most people, as it provides job opportunities, better living condition and a more dynamic life. In 2018, the UN reported that 55% of the world population was living in urban area, and by 2050, it is projected that the number will increase as 68%. This condition, however, gives more pressure to the cities to provide a feasible, yet sustain-

able place for the citizens. Population pressure impacted on several areas: degraded quality of environment, increase of energy consumption, scarcity of space and living area, not to mention the increase of social problems as well as other issues (Hoornweg, Bhada-Tata and Kennedy 2013; Buhaug and Urdal 2013; Uttara, Bhuvandas and Aggarwal 2012; Dociu and Dunarintu 2012; Madlener and Sunak 2011; McKenzie 2008; Santamouris et al. 2001). Numbers of studies were conducted to identify and value these impacts on many sectors, and all come to one conclusion: a sustainable urban planning should be implemented in order to provide a liveable and sustainable city. Urbanization is something unavoidable, but its effects can be mitigated through a comprehensive urban planning.

Began in 1990s, the concept of Smart City (SC) becomes more popular in recent days. Many cities in the world claimed that they have adopted the concept of SC to solve common urban area problems in various focuses and methods. It is difficult to describe the definition of SC into a single description since SC has been adopted in various aspects and methods, depending on the characteristics of the city. However, it is believed that the implementation of SC shared a common aspect in taking advantages on technology to resolve crucial problems such as traffic, pollution, poverty and over-population (Dameri 2017; Anthopoulos 2015; Dameri 2013). Moreover, Dameri (2013) also highlighted that the concept of SC is used to identify a large scope of various solutions and city programs, involving different types of technology without any well-defined goals. Some papers also highlighted that SC initiatives are usually performed in a more bottom-up initiatives rather than the top-down ones as conventional urban planning has been done. It was begun with projects and initiatives using technology, including information-technology and Internet of Things (IoT) (Letaifa 2015; Dameri 2013; Cosgrave, Arbuthnot and Tryfonas 2013).

Furthermore, researches also mentioned that the concept of SC is able to promote Sustainable Development Goals (SDGs), by developing a more

integrated services and more sustainable footprints. In a traditional urban development concept, a city is mentioned to have higher energy consumption rather than other areas. The bigger the city is, the higher the energy consumption, thus related to higher resource consumption and leaving higher energy footprint. However, by the concept of SC, energy consumption can be reduced, productivity level can be increased, city problems can be resolved and resource management can be implemented in a more efficient way. Several cities as pioneer in implementing SC including Rio de Janeiro, Barcelona, Copenhagen, Dublin and Amsterdam.

As mentioned before, the development of SC is different in different cities. Each city has its own concept of the development of SC initiatives, it is context-specific based on their focus of interests and what problems they should resolve, or how the city project itself in improving their performance. However, on his study, Phadtare (2017) showed that there is a link between SC initiatives with SGDs, while most of the programs in SC are, indeed, usually linked with SDGs, such as smart ecology, economy, government, living and environment. In many cases, the design of SC initiatives bring the enthusiasm in improving quality of life and promoting city resource management in an efficient manner using smart technology and community empowerment.

C. Introduction to CI analysis

First introduced by Neirotti *et al.* in 2013, the concept of Coverage Index (CI) analysis was used to value performance of the city in implementing SC. As mentioned before, it is difficult to determine a common description of SC that can be applied generally. It is also difficult to conclude goals of SC, since the nature of SC does not come up with certain visions, but rather to elaborate complex problems with available technology and resources, as well as involved stakeholders, including citizens. While SC project is broad in scope and range, CI index is used to classify the domain of each project launched on SC, and then is used to value the performance of the city in imple-

menting SC. As samples, 70 international cities have been valued using this classification method and were analysed its relationship with economic, social, geographic, demographic and environmental characteristics of the cities concerned. By using this classification, it is possible to find out common points and differences on the implementation of SC in different places of the world (Neirotti et al. 2014). However, the score of CI did not solely represent a city performance.

The concept of CI divides SC projects into 6 domains: natural resources and energy, transport and mobility, buildings, living, government and economy, and people. Each domain then is divided into several sub-domains, as described in Table 1. In a CI analysis, a value of 1 or 0 is assigned to each domain and sub-domain, depending on how a city implements the projects on the concerned domain. The value of CI is an indication of the ability of an SC to develop projects and consolidate best practices in a smaller or larger scopes of vertical domain (Neirotti et al., 2014).

This paper did not value the implementation of CI in sample cities, but rather to describe the implementation of the projects performed by each city sample to conclude general practices and differences of the projects. It is believed that the city samples have different characteristics of economic, social, demographic and environment, even though they all are metropolitan cities with population of more than 3 millions.

Table 1 Classification of domains and sub-domains in Coverage Index.

Domain	Sub-domain	Description
Natural resources and energy	Smart grid	Electricity networks are able to take into account the behaviours of all of the connected users for efficiency.
	Public lighting	Illumination of public spaces with street lamps that offer different functions, such as air pollution control and wifi connectivity, with efficient management and maintenance.
	Green/renewable energies	Exploiting natural resources that are regenerative or inexhaustible, such as heat, water and wind power.
	Waste management	Efficiency in waste management and recycling.
	Water management	Managing hydrological cycle of water (quality and quantity) when water is used for agriculture, municipal and industrial purposes.
Transport and mobility	Food and agriculture	Wireless sensor networks to manage crop cultivation and precise agriculture.
	City logistics	Improving logistic flows in cities by effectively integrating business needs with traffic, geographical and environmental issues.
	Info-mobility	Distributing and using selected dynamic

Buildings	People mobility	and multi-modal information, pre-trip and on-trip, to improve traffic and transport efficiency.
	Facility management	Innovative and sustainable ways to provide transportation of people in cities. Cleaning, maintenance, property, leasing, technology, and operating modes associated with facilities in urban areas.
	Building services	Various systems existing in a building, such as electric network, elevator, fire safety, etc.
Living	Housing quality	Aspects related to the quality of life in a residential building, such as comfort, lighting and heating.
	Entertainment	Ways of stimulating tourism and providing information about entertainment events and proposals for free time and night life.
	Hospitality	Ability of a city to accommodate foreign students, tourists and other non-resident people by offering appropriate solutions to their needs.
	Pollution control	Controlling emissions and effluents by using different kind of devices.
	Public safety	Protecting citizens and their possessions through the active involvement of local public organizations, the police force, and the citizens themselves.
	Healthcare	Prevention, diagnosis and treatment of disease supported by ICT.
	Welfare and social inclusion	Improving quality of life by stimulating social learning and participation, with particular reference to specific categories of citizens such as the elder and disabled.
	Culture	Facilitating the diffusion of information about cultural activities and motivating people to be involved in them.
	Public spaces management	Care, maintenance, and active management of public spaces to improve attractiveness of a city.
	Government	e-government
e-democracy		Using innovative ICT systems to support ballots.
Procurement		Allowing public sector improving procurement procedures and the associated contract management.
Transparency		Enabling every citizen to access official documents in a simple way and to take part in the decision process of a municipality.
Economy and people	Innovation and entrepreneurship	Measure to foster the innovation systems and entrepreneurship in the urban ecosystem.
	Cultural heritage management	The use of ICT system to deliver new customer experience in enjoying city's cultural heritage.
	Digital education	Extensive use of modern ICT tools in public schools.
	Human capital management	Policies to improve human capital investments and attract and retain new talents, avoiding human capital flight (brain drain).

Source: Neirotti et al. 2013.

D. From Cities to Cities: The Implementation of SCs in Different Place

This part describes the implementation of SC initiatives in two different cities with different characteristics: Amsterdam and Jakarta. Both cities are metropolitan, inhabit by more than 3 million people from various backgrounds. The cities also the most inhabited city in their country and mostly inhabited by migrants. Amsterdam is chosen as an example of a more well-established city implementing SC initiatives and referred as one of the most prosperous city in implementing smart city initiatives.

a. Amsterdam Smart City Initiatives

First began in 2009, Amsterdam is one of the cities implemented smart city initiatives. This program was introduced as “Amsterdam Smart City Programme”, as a collaboration between the Amsterdam Innovation Motor (AIM), the energy-network operator Liander, and the municipal of Amsterdam, with the aims to achieve sustainable economic growth, efficient use of natural resources and a high quality of life. The area of interest of development includes smart housing, open data, smart grid, home energy storage, connectivity and smart mobility (Amsterdam Smart City 2019).

As the most populated city in the Netherlands, Amsterdam is inhabited by 866,737 people within the city proper, 1,380,872 in the urban area, and 2,410,960 in the metropolitan area. Amsterdam also attract tourists all around the world, with approximately 5,340,000 tourists visit per year, and most of them (4,359,700 people) are foreign tourists (Amsterdam 2019).

The first development of Amsterdam Smart City began with the recognition that there were many available data that can be used to improve urban living. As data availability is the key success in implementing smart city, it is important to collaborate with diverse groups of stakeholders, private or public sector, to realize the goals of SC in term of data collection. This has been considered by the municipality of Amsterdam, and this initiative was designed as a collaboration between the governments, knowledge institutions, companies and foundations. The program focused on four societal transitions: energy, digital city, circular city and mobility (Amsterdam 2019). It is also important to giving a highlight that community and residents play important roles in the development of the city, and Amsterdam Smart City engages them through its partners, by online community and offline events. Amsterdam Smart City also gives opportunities to the community to take part in the program, and become a member of the community. Up to now, there are 6,955 members joined the community, and there are numbers of institutions and organizations joined

on the program partners. The platform also gives opportunities for the members to share their initiatives and ideas related to SC.

There are numerous products provided by Amsterdam Smart City on several themes with different goals: digital city, energy, mobility, circular city, government and education, and citizens and living. The community members are invited to participate in developing a program for Amsterdam Smart City based on the themes. The products can be a web-based application, technology innovation, invention, social activities and other forms. There are more than 80 products that has been launched. Table 2 below describes how Amsterdam Smart City adopted the themes of SC initiatives in some domains based on CI.

Table 2. The description and performance of Amsterdam Smart City based on the domain in CI

Domain	Description and Performance
Natural resources energy	In particular, this domain was designed to optimize the use of natural resources including water, electricity and the use of renewable energy. The goal is the implementation of sustainable energy in the future. Recent condition show s that there are 57 products provided by Smart City Amsterdam related to the management of natural resource energy.
Transport and mobility	Amsterdam Smart City engaged with mobility issues of the city, to improve accessible and efficient traffics for the citizens. Even though Amsterdam , as a capital city of cycling giving less traffic problems compare to other city, the city considered that it is important to improve city transportation and mobility by smart city programs. There are 34 products provided in this domain with various functions from traffic management, park shuttle, share - ride platform, mobility portal (providing best travel advice such as nearest and empty parking lots, travel hours to provide traffic jam), platform to connect unused bike s and boats for rent, and many more.
Buildings	This domain accommodates projects related to building and environment in residential area, and related to energy consumption and optimization , for example the use of solar energy for heating and energy storage system to reduce electricity consumption.
Living	This domain is accommodated in the platform of digital city and citizen & living. Amsterdam is committed to provide better living by managing daily needs in a more sustainable way. It is also including so cial events, cultural experiences, etc.
Government	This domain accommodates projects, platforms and startups supporting government performance, and education to achieve policy-makers with smart governance tools. It is now counted that 921 start -ups has been established, a collaboration between the Municipality of Amsterdam with all seven city departments.
Economy and people	SC Amsterdam did not specifically state this domain, but some programs related to economy and people were accommodated in the platform of citizens and living. This platform giving the chances to exchange information, events, etc.

Based on the description, there are some lessons learned from the development of Amsterdam Smart City. Some key factors play important roles in the success of the implementation of SC. Lesson learned from Amsterdam Smart City

could be outlined as follows.

1. Community participation is the most important success factor in developing a smart city. In many cases, a program was developed based on the community needs to be useful for everyday life, also to ensure that the project will attract people to use it in their daily basis.
2. Data integration from various sources were essential, both private and public, online and offline. Without data, smart city initiatives would not implement optimally. It is also necessary to use crowd sourcing data, to provide real-time data.
3. The initiative is iterative. In many cases, it began with simple inventory that inspires others to invent other projects. A room for creativity and participation is essential, since Amsterdam Smart City emphasized on participation of the community. Therefore, it is important to make the citizens feel getting involved with the projects and interested in participating.
4. Public-private partnerships play essential roles in the success of smart city initiatives. Without support from private sectors, the implementation of SC will not be optimal. This partnership will also boost SC financially and be useful to develop innovations.
5. The essence of SC is indeed the use of technology and IoT to improve quality of life, but the programs are not necessarily technology-based products. For an example, the initiatives can be social events to gather people with the same interests or needs.

b. Jakarta Smart City (JSC) Initiatives

Jakarta is a city with the highest urbanization flows in the world. It is inhabited by around 10.6 million people and is dominated by productive age population with an age range of 15-64 years, with a number of 7.5 million people (<http://katadata.com> 8 August 2019). The cultural background of Jakarta's population, which comes from almost all ethnic groups in Indonesia, makes the character of the people of Jakarta to be an inclu-

sive society. Jakarta is also the highest centre of economic activity and a barometer of Indonesia's economic growth. Jakarta's per capita income is the highest GDP in Indonesia.

Jakarta is targeting to achieve smart city in the year of 2025, which bases on the 6 pillars: sSmart Governance, Smart People, Smart Living, Smart Mobility, Smart Economy and Smart Environment. Smart city must be beneficial for the whole community so that they can get a better life (Jakarta Smart City 2019).

As a transitioning city, Jakarta has to find its own strategies to achieve this vision, of which could be different with other cities regarding to its cultural, economic, geographic and demographic background. Learning from other cities, which are classified as legacy city such as Amsterdam, New York, London and Toronto, or the new cities such as Dubai, Putra Jaya and Songdo, the most challenging aspect in the transitioning city is infrastructures. This discussion is highlighted on how JSC giving efforts to provide infrastructures for a better quality of life regarding the concept of SC.

The Jakarta Smart City initiation began in 2014, as stipulated through Governor Regulation No. 280 of 2014 concerning the Establishment, Organization and Administration of the Jakarta Smart City Management Unit. This initiative is a collaboration between the Provincial Government, PT. Qlue Indonesia and PT. IBM. PT. Qlue Indonesia is a provider of qlue applications and PT. IBM Indonesia is a provider of software and hardware, including Subject Matter Experts/SMEs (consultants) in the field of information technology (Ziadi Yossomsakdi and Wijaya 2016; Novianti and Syahid 2017).

Jakarta Smart City aims to become an integrated information-hub of Jakarta. To achieve this goal, the government agencies and all of its working units are required to disclose their data. As an integrated information hub, JSC uses crowdsourcing as a method of data collection. In particular, this is practiced through public reporting tools that are integrated with JSC: Qlue, Waze and @petajkt. In these projects, citizen participation is the cornerstone of JSC initiative (Putri, Ch

and Tanaya, 2016). For example, Qlue application is known as a program that provides information on Jakarta such as traffic condition, public service delivery and flood report based on crowdsourcing data. This program promotes deeper citizen engagement to create more effective public services using technology (Putri, Ch and Tanaya 2016). Qlue application is inspired by the term clue which means clue or 'clue' or it can also mean 'to complaint'. This concept is used to realize the vision of JSC that is transparent and involves public participation. Qlue is an application that can be accessed by all city residents and anyone who wants to get services from JSC (Novianti and Syahid 2017). Qlue is integrated with applications for stakeholders, the City Government and SKPD, which is called CROP (Cepat Respon Opini Publik). Qlue is also a means for the citizens to submit complaints about services provided by city managers, such as health facilities, cleanliness of city parks and highways, environmental order, and various other infrastructures linked to CROP and integrated on the Jakarta Smart City website. Qlue can also be accessed by residents to facilitate citizens to participate and also provide space for citizens to take the initiative to make changes or improvements to the lack of services by doing community movements. The Provincial Government of Jakarta continuously creates various innovations and programmes, including infrastructure development with environment-friendly concept to serve the city inhabitants in smart ways. The interesting part regarding infrastructure development is JCS involving the society and private sector to design and planning.

As stated in the method part, this paper will analyze the performance of JSC implementation in CI domain.

Table 3. The description and performance of Jakarta Smart City based on the domain in CI

Domain	Description and Performance
Natural resources and energy	JSC to introduce City Touch Technology for Jakarta street lighting. City Touch Technology is a web-based information management system focusing on long distance monitoring and maintenance street lighting. A periodic physical examination is no longer required and any disturbance or damage to street lights can be monitored in real time. Supported by LED-based technology, the system can save electrical energy up to 40 percent compared to conventional street lights. Source: Mulia 2017, https://nowjakarta.co.id

Transport and mobility	JSC also plan to implement a waste-to-energy plant concept, that combusts wastes to produce electricity. This type of power plant is sometimes called a trash-to-energy, municipal waste incineration, energy recovery, or resource recovery plant. This programme was inspired by similar project in Sweden, which has been run a waste-to-energy plant for almost 2 decades. A modern, properly run waste-to-energy plant sorts material before burning it and can co-exist with recycling. The only items that are burned are not recyclable, by design or economically, and are not hazardous. The waste-to-energy (W2E) facility is expected to turn 2,200 tons of the 7,000 tons of waste the city produces every day into 35 megawatts per hour (Mwh) of electricity. Source: 'Jakarta runs', <i>The Jakarta Post</i> 2018 Traffic congestion, public transportation and sidewalk are inevitable issues in the city. Inhabitants spend their time on the streets by traffic and it limits the citizens productivity and triggers stresses. Jakarta has launched Transjakarta Card in November 2016 to serve the citizens with public transport using Transjakarta bus. Citizens with special conditions such as the elderly, disabled, veterans, holder of The Social Security Cards and the residents of Kepulauan Seribu has the facility to use the bus free of charge. This policy aims to attract people to use public mass transportation. JSC also develops new public transportation schemes known as Mass and Light Rapid Transit (MRT and LRT). This system's main idea is to reduce the use of vehicles on the road by providing a larger vehicles to carry more people and eliminate traffic decongestion. Furthermore, mass transit reduces the travel time as it moves at high speed and stops only at specific points, making this transportation mode a perfect choice to increase mobility in high-populated cities like Jakarta. The rail-based Jakarta MRT is stretching across the city for 108 kilometres, including 21.7 km for the North-South Line (from Lebak Bulus to Kampung Bandan) and 87 km from East-West Line (from Balaraja to Cikarang). The project has been finished in 2018, despite LRT is expected to be completed in 2019. Source: Mulia 2017, https://nowjakarta.co.id
Buildings	A smart building is the integration of building, technology, and energy systems. These systems may include building automation, life safety, telecommunication, user systems and facility management systems. The implementation of Smart Building initiative in Jakarta is based on Governor Regulation of DKI Jakarta No. 38 of 2012 which stated of Green Building, published in 11 th April 2012. The regulation enforces building management to pay attention to aspects of energy-saving and efficient resource utilization. JCS provides guidance of green building in https://greenbuilding.jakarta.go.id . JSC targeting the green building project in Jakarta will save 3,785 GW/h of electricity, 2.4 billion litres of water consumption, also reduce emissions about 3.37 million tons of CO ₂ .
Living	Smart city with a liveable ecosystem is now strongly demanded for urban living. The ability of the property industry in adopting this smart city concept will be critical. Smart living includes creating a harmonious ecosystem among residential, commercial and recreational areas; providing a healthy life ecosystem, which includes healthy food, healthcare facilities and sport facilities; and being supported by easy, affordable and convenient mobility or transportation solutions, whether private, public or logistical. Almost all housing property in Jakarta was developed in the smart living concepts.
Government	The Jakarta Smart City is implementing smart governance by using smart technology to support better planning and design. Smart community synergizes with residents to facilitate participation and communication. The smart planning and design was formulated into a master plan, zoning regulation and design of cities, i.e. Kampung Aquarium development, which is collaborating local community, residents of Kampung and the provincial government. Smart governance uses ICT to increase public serving efficiently. As mentioned before, JSC promotes the use of Qlue and CROP application to invite public participation.
Economy and people	The people of Jakarta has the highest income per capita, but there are still many problems such as poverty and slum area. To increase the growth of small and medium businesses, the government encourages the emergence of creative economy. The Provincial Government of DKI Jakarta established Jakarta Smart City Hive (JSCHive), a conducive and affordable workspace to facilitate discussion and collaboration between the government and digital start-up companies. EV Hive and Provincial Government collaborated in creating a more productive and sustainable technological ecosystem that can improve the overall economy. The most important goal of JSC initiatives is to increase quality of people. To achieve this goal, JSC has a 12-year of basic education programme for free. The JSC also provides Jakarta Smart Card (<i>Kartu Jakarta Pintar</i>) for students from low income family and Jakarta Health Card (<i>Kartu Jakarta Sehat</i>). Public participation is also encouraged by social media platform as a crowdsourced media.

The description of JSC performance in CI domain above indicates several points as lessons learned, as described below.

1. Private sector plays important roles to initiate JSC. At the beginning of the JSC initiation, the private sector and the DKI Jakarta provincial government became the central actors to start JSC.
2. Public participation plays important roles to the success of JSC initiatives. Lack of public participation will cost some misleadings in the JSC implementation, because the needs of the citizen will bring up gaps with the government initiations.
3. JSC initiatives need strong commitment among stakeholders. Government, citizens and private sector are engaged together to run smart city.
4. Information and communication technology was not the dominant key factors of JSC initiatives success story. The more important one was participation of stakeholders. The ICT and IoT played roles as enabler of JSC initiatives.
5. As a high density city, Jakarta faces more challenges to encourage its citizens, as part of the enablers, to participate more in driving JSC in order to sustain their own livelihood.

A. Conclusion

Finally, conclusions were drawn from lesson learned of the implementation of SC in the research study of the two cities.

1. Each city has specific strategy to implement SC. Amsterdam, as the city that first initiated SC, already had infrastructures at the beginning of the initiation. Meanwhile Jakarta, classified as transitioning city, has to provide the needed infrastructure such as wireless fidelity backbone, electricity, public area, etc with the green concept.
2. The main concept of SC is how to attract stakeholders to play their roles in making the cities work and provide sustain livelihood for its inhabitants. Both Amsterdam and Jakarta has common policy to engage citizen, private sector and government collaborating their energy to develop their cities.
3. Environment became the main framework in the Smart City development.
4. The essence of SC is how to enable better quality of life using technology and IoT, even though it is not the only key factor. The most important thing is how the involved stakeholders engaged by either digital-based or manual-based application system.

References

- Amsterdam 2019, No Title.
- Amsterdam Smart City 2019, No Title.
- Anthopoulos, LG 2015, 'Understanding the smart city domain: a literature review', *Transforming city governments for successful smart cities*, Springer, Manhattan, NYC, pp. 9–21.
- Buhaug, H and Urdal, H 2013, 'An urbanization bomb? Population growth and social disorder in cities', *Global Environmental Change*, Elsevier, 23(1), pp. 1–10.
- Cosgrave, E, Arbuthnot, K and Tryfonas, T 2013, 'Living labs, innovation districts and information marketplaces: a systems approach for smart cities', *Procedia Computer Science*, Elsevier, 16, pp. 668–677.
- Dameri, RP 2013, 'Searching for smart city definition: a comprehensive proposal', *International Journal of Computers & Technology*, 11(5), pp. 2544–2551.
- Dameri, RP 2017, 'Smart city definition, goals and performance', *Smart City Implementation*, Springer, Manhattan, NYC, pp. 1–22.
- Dociu, M and Dunarintu, A 2012, 'The socio-economic impact of urbanization', *International Journal of Academic Research in Accounting, Finance and Management Sciences, Human Resource Management Academic Research Society*, 2(1), pp. 47–52.
- Hoornweg, D, Bhada-Tata, P and Kennedy, C 2013, 'Environment: waste production must peak this century', *Nature News*, 502(7473), p. 615.
- 'Jakarta runs against time to build first waste-to-energy project', *The Jakarta Post* 2018, ac-

- cessed 31 August 2019, <https://www.thejakartapost.com/news/2018/12/20/jakarta-runs-against-time-to-build-first-waste-to-energy-project.html>.
- Letaifa, S Ben (2015) 'How to strategize smart cities: revealing the SMART model', *Journal of Business Research*, Elsevier, 68(7), pp. 1414–1419.
- Madlener, R and Sunak, Y 2011, 'Impacts of urbanization on urban structures and energy demand: What can we learn for urban energy planning and urbanization management?', *Sustainable Cities and Society*, Elsevier, 1(1), pp. 45–53.
- McKenzie, K 2008, 'Urbanization, social capital and mental health', *Global Social Policy*, SAGE, London, 8(3), pp. 359–377.
- Mulia, K 2017, 'Connecting Jakarta', *NOW! JAKARTA*, accessed 31 August 2019, <https://nowjakarta.co.id/updates/news/connecting-jakarta>.
- Neirotti, P et al. 2014, 'Current trends in smart city initiatives: some stylised facts', *Cities*, Elsevier, 38, pp. 25–36, doi: 10.1016/j.cities.2013.12.010.
- Novianti, K and Syahid, CN 2017, 'Towards smart city/: lessons from the implementation of smart city's concept in Jakarta and Surabaya', Lembaga Ilmu Pengetahuan Indonesia (LIPI), Jakarta, April 2016, pp. 1–8.
- Putri, DA, Ch, MK and Tanaya, J 2016, 'From smart city to open city: Lessons from Jakarta Smart City'.
- Santamouris, M et al. 2001, 'On the impact of urban climate on the energy consumption of buildings', *Solar Energy*, Elsevier, 70(3), pp. 201–216.
- Uttara, S, Bhuvandas, N and Aggarwal, V 2012, 'Impacts of urbanization on environment', *International Journal of Research in Engineering and Applied Sciences*, 2(2), pp. 1637–1645.
- Ziadi, AR, Yossomsakdi, S and Wijaya, AF 2016, 'The Implementation of E-Government (Smart City Program) to Achieve an Effective Public Service (Case Studies on Qlue and CROP in Management Unit of Jakarta Smart City)', *International Conference on Ethics of Business, Economics, and Social Science*, pp. 434–440.