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FOSTERING HUMAN DIMENSION OF SMART CITIES: Lessons from Jakarta for Nusantara, Indonesia's New Capital City in the Making

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Cover Page Footnote

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Lessons from Jakarta for Nusantara, Indonesia's New Capital City in the Making

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ABSTRACT

A city's problems often arise as the population grows and urbanization happens. This process is linear to the development of information-and-communication technologies (ICT), especially in urban areas. As a result, cities have adopted an initiative to solve the problems which are popularly known as the smart city. Over decades, the idea of a smart city has evolved from a mere technological modernization to advanced utilization through community involvement. However, in practice, smart city ideas and initiatives often put a heavy emphasis on technical aspects and ignored the more human side, which has caused a digital divide. This paper argues that centering the human perspectives in the smart city initiative is essential, and thus proposes an approach and its implementation measures to make an inclusive and smart Nusantara. Using systematic literature review and content analysis, the article attempts to explore human perspectives in smart city discourses as well as to analyze the gaps to do so. The proposed approach then applied in Indonesia's newest capital, which has the ambitious idea of making a smart world class city yet it still lacks attention to significantly address the human dimension in their smart city ecosystem. Therefore, our research suggests three recommended actions: improving equal access to ICT infrastructure, building digital literacy and capacity, and improving data security and protection efforts.

Keywords: Human dimension; Inclusive and smart Nusantara; Nusantara Capital City; Smart city

INTRODUCTION

Slightly more than half of the world's population today live in cities. Indonesia is also experiencing a similar phenomenon albeit with a considerably more rapid pace of urban population growth. By 2020, 56% of Indonesia's population already live in urban areas. According to Indonesia's Central Bureau of Statistics, the country's level of urbanization will reach 73% by 2045, which amounts to 233 million urban dwellers. It is still not yet known when and at what point Indonesia's degree of urbanization will level off, a situation most developed countries have now reached. For the developing world, though, urbanization cannot be stopped.

We have known that cities all over the world are facing multi-dimensional challenges: housing shortages, lagging infrastructure, traffic congestion, air and water pollution, waste management as well as various other social, cultural, demographic, economic, administrative and even political issues, just to name a few. Cities also absorb resources from non-urban areas, often unsustainably. Indeed, some solutions to those problems are found as time goes by. But they often are inadequate to solve both the long-standing as well as the newly-emerged urban problems. As our planet becomes more and more urban, the associated problems become more and more complex, while at the same time supporting natural resources are depleting, cities need to find smarter ways of managing the ever-increasing complexity of urban life (Rizzo et al., 2015).

To deal with these multifaceted and ever-evolving urban problems, people have been using technologies, among other sources of solutions. While new techniques and technologies have always been invented and used to deal with new and old urban problems throughout the history of mankind, the relatively more recent development and increasingly widespread use of digital-based information and communication technologies have brought about the so-called "smart cities". This use of such technology in the day-to-day management of cities has been aimed at solving urban problems, enhancing cities' performance and improving the quality of the people's lives.

However, the implementation of this "smart cities" approach has tended to be dominated by its technological parts while overlooking its human dimension. We have learned this particular phenomenon partially from our works in organizing a series of Multi-Stakeholder and Policy Dialogues (MSPDs) from 2020 to 2022 as part of the European Union-funded, Berlin Senweb-executed Smart Change Project in cooperation with the Jakarta Smart City unit of the Jakarta Government. Carried out by a consortium of RuangWaktu and Hukumonline, these series of activities were meant to improve Jakarta's smart city performance by organizing mostly online dialogues—due to the Covid-19 pandemic—by asking a variety of stakeholders (civil society organizations, community organizations, business entities, youth and women groups, people with different abilities, academicians, media people and many others) regarding their opinions on various aspects of Jakarta Smart City, including its so-called "super-app" JAKI (Jakarta Kini).

Lessons from this two-year multi-stakeholder dialogues in Jakarta, in combination with the results of systematic literature review as well as content analysis of literature on smart cities are priceless for the implementation of smart city concept in Indonesia's new capital city—shortened to become IKN, currently is still under development—that has been aiming to be one of the smartest cities in the world. A few recommendations will then be put forward to decision makers for the development of IKN.

Purpose of the Study and Contribution to the literature

This study aims to show the need to recognize the importance of human dimension in any smart city application. In the final section, we propose an approach to strengthen the

integration of the human dimension into smart cities. We also put special attention to the smart city concept that is being promoted for the development of Nusantara New Capital City, which is currently still in the process. The lack of a human dimension in the smart city concept of Nusantara could prevent the vision to make Indonesia's new capital city sustainable and inclusive.

METHODS

This study uses systematic literature review (SLR) and content analysis to go over literature related to smart city concepts. Compared to traditional literature overviews, which often leave a lot to the expertise of the authors, SLR treats the literature review process like a scientific process, and apply concepts of empirical research in order to make the review process more transparent and replicable and to reduce the possibility of bias (Lame, 2019). SLR consists of eight standard processes: formulate review questions, define inclusion and exclusion criteria, locate studies, select studies, assess study quality, extract data, analyze and present results, and interpret results. In addition to systematic literature review, the paper uses content analysis as a method to determine and develop the approach and framework of integrating human dimension into the smart city ecosystem. Content analysis is a quantitative method to analyze and categorize related text on a research topic (Al Sharif & Pokharel, 2022).

The use of systematic literature review and content analysis is based on the need to identify the components of smart city before coming into an argument of human dimension in smart city. This research focuses on smart city literatures which contain the definition, framework or model, and the human dimension of smart city. We obtain thirteen literatures about smart cities to be assessed and extracted to address the purpose of the research. At least, six keywords were used, namely 'smart city', 'human smart city', 'human dimension in smart city', 'smart community in smart city', 'digital divide', and 'Nusantara new capital'.

This research methodology has three stages: identification, literature selection and grouping, and formulation of an approach to strengthen the human dimension of smart city. First, in the identification part, the research questions are being identified as follows.

1. What are the gaps in planning and implementing smart cities in Indonesia?
2. How to strengthen the human dimension in a smart city?
3. How to center the human approach in the smart city of Nusantara Capital City?

Second, literature from various sources are collected to address the research questions. These literatures are later grouped into three categories: smart city concept and definition, smart city framework/model, and human dimension of smart city. Lastly, this paper attempts to elaborate an approach and framework to strengthen the human dimension in smart city concept, as well as making the approach and framework work in Nusantara Capital City.

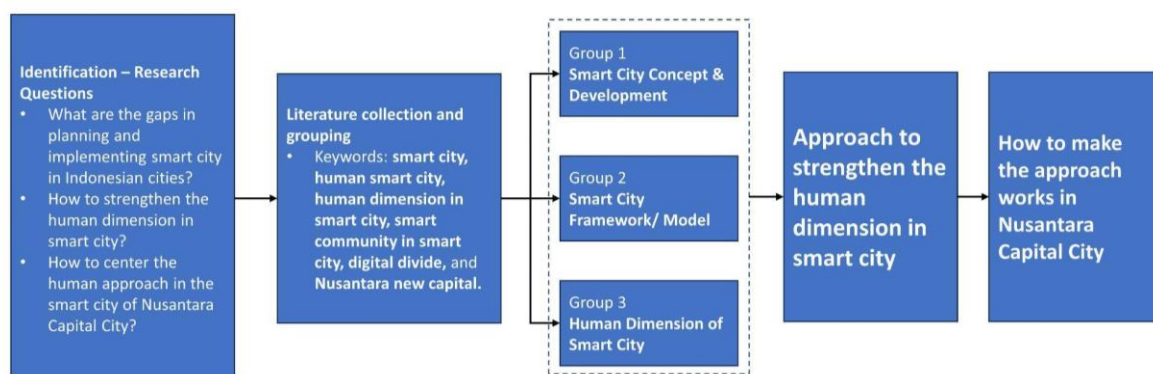


Figure 1. The Research Methodology

LESSONS FROM JAKARTA: MULTI-STAKEHOLDER AND POLICY DIALOGUE

The Multi-Stakeholder and Policy Dialogues (MSPDs) is a two-year program to conduct a series of dialogues inviting various stakeholders with particular concern of strengthening Jakarta Smart City ecosystem. The program aims at centering human perspectives in the smart city ecosystem by allowing wider public participation to address various urban challenges with smart solutions. The dialogues were then resulted in transformative and smart solutions in the form of 15 pilot initiatives and 20 policy recommendations, including improvement of JAKI, the first government-initiated super-app which allows the public to access various public services and information.

One of the key highlights during the dialogues is how to make JAKI more inclusive and useful for different groups of people in Jakarta. The platform allows the public to access various city-related information, channel their aspirations and communicate with the Jakarta2 Government through a number of features. While JAKI serves essential public services, the utilization of its features is still limited. We find that people with different abilities, poor communities, elderly and many other vulnerable groups remain largely disconnected with various JAKI services. Nevertheless, the use of JAKI continues to increase, especially during the Covid-19 pandemic which encourages access to digital public services.

Drawing from this experience with Jakarta, technological solutions offered by various smart city initiatives are insufficient to create better livelihood for citizens of Jakarta. While Jakarta aspired to become City 4.0, in which the city and the citizens become co-creators and collaborators, the utilization of ICT advancement could not neglect the important roles that the human sides are playing. The government should enable industry collaborations to take place between private enterprises and its public agencies, in sharing data, developing insights, and further improving its public services to better meet its citizen needs (Eden Strategy Institute, 2018). Citizens can also make useful suggestions and feedback for the cities' improvement and the government as a decision maker needs to listen to the needs of the community and use technological approaches as one of the smart solutions. In the long run, the most successful smart cities projects are the ones made for and eventually by the residents themselves (Prado et al., 2016).

THE HISTORY OF SMART CITY DEVELOPMENT

Along with the development of knowledge and technology, experts subdivided the definition of the smart city concept into several parts. Vishnevetskaya and Alexandrova (2019) arranged those concepts into three phases: Smart City 1.0, Smart City 2.0, and Smart City 3.0.

Smart City 1.0 is a stage where smart cities technologies are commonly used to modernize the infrastructure. In Smart City 2.0, the implemented technology is designed to improve the quality of urban services and solve the cities' problems, such as traffic, public health, or environmental issues. At this stage, the government is still the main actor. Communities begin to take on a more important role in Smart City 3.0, where information technology that has been established is used by the citizens to exchange ideas, provide input for the government, and launch various initiatives to develop the daily used technology.

Furthermore, the development of smart city concepts can also be divided into two generations. The first generation of smart city concepts was developed when ICT began to influence the city management process. This concept is followed by the second generation which considers the human element as the most important dimension in its formation (Depiné et al., 2017).

The first generation of smart cities was promoted by the world's largest software and hardware companies, such as IBM and Siemens, in order to explore new market opportunities

(Rizzo et al., 2015, Kitchin, 2014, Harrison & Donnelly, 2011, as cited in Depiné et al., 2017). The convergence of technological advancement in the areas of information and communication is transforming the urban environment, so that new technologies can be used not only to automate routine systems and functions, but also to monitor, understand, analyze, and plan the city through the management of information (Batty et al., 2012).

Although technological evolution has contributed to the improvement of urban management from the application of information systems to the operation and integration of its infrastructure and services, the cities still demand a greater participation of the community in this transformation (Depiné et al., 2017). This concern leads to the second generation of smart city concepts - human smart cities.

So far, a commonly accepted definition of a smart city that would fully explain the essence of the concept has not been developed (Kozłowski & Suwar, 2021). However, people try to define it from various elements that they can identify by themselves. Those definitions then lead to the conclusion that the dimension of a smart city demonstrates that city development depends not solely on hard infrastructure (physical capital), but is also shaped by the availability and quality of human and social capital (intangible capital) (Kozłowski & Suwar, 2021). This explains why almost all existing smart city concepts list the community as one of their pillars.

The concept of smart cities has gained attention in academia, business, and government to identify cities that are monitored by systems and technology, but are also overseen by smart people (Kitchin, 2014). Many concepts already included a human dimension as an important component in the formation of a smart city, but some literature stated that those concepts are still not enough (Depiné et al., 2017). In the basic principles of 'smart' infrastructure design project by the United Nations, development must be based on a human-centered approach rather than a technological approach (Boykova et al., 2016).

Although some concepts do not explicitly mention the importance of the human aspect to conduct a comprehensive smart city ecosystem, there are several principles in common regarding the existence of community and how they can play a role. Those principles are encapsulated in the following key-phrases: interdisciplinary collaboration (Boykova et al., 2016; Smith et al., 2023), citizen participation (Smith et al., 2023; Sujata et al., 2016; Prado et al., 2016), citizen-centric program (Smith et al., 2023; Prado et al., 2016) and help to address inequalities in cities (Smith et al., 2023).

From the above mentioned discussion, we can conclude that the definition of smart city continues to evolve along with the development of knowledge. At the same time, concepts and various keywords that are closely related to it as well as some components of smart city are also continuing to change. But there are three keywords that could not be separated even though various new definitions and concepts have developed; ICT, society, and governance. Further explanation about the components and how those three main elements create a good smart city ecosystem will be more elaborated at the Result and Findings' section.

ISSUES AND CHALLENGES OF SMART CITY IMPLEMENTATION

The trajectory of smart cities has shown a significant shift, particularly in terms of moving from merely technological solutions to the integration of human perspectives into the ecosystem. This shift has demonstrated some positive impacts towards achieving a more inclusive smart ecosystem in the city. For example, there are growing initiatives to allow urban residents to actively participate in the management and governance of the city (Monfaredzadeh & Krueger, 2015; Oliviera & Campolargo, 2015). Another example is that a smart city could help to foster social inclusion amongst members of the urban community through connecting and bringing people together and improve access to public services. This example can only be

beneficial if the digital interaction of the community, facilitated by the smart city ecosystem, could lead to the co-design and co-management of the city (Monfaredzadeh & Krueger, 2015).

The numerous variations of the smart city definition, to some extent, put the emphasis on the technological aspect that influences the urban quality of life. Little attention to the social dimension and human dimension of the smart city may affect the ability of the city to thrive as the potential of the human capital cannot be optimized to the fullest (Monfaredzadeh & Krueger, 2015). The social impacts of smart city initiatives on quality of life have been assessed in recent times. These impacts can be categorized as follows (Reuter, 2020):

1. Too focused on technical solutions that lack context for the underlying social, political, and economic problems in the city.
2. Smart city is often implemented as a top-down agenda and dominated by corporate interests in adopting technological solutions within the government.
3. Privatization of public goods because most public services are handed to private entities with profit-making motives.
4. Exacerbating digital divides and inequalities because smart city and technology advancement are often used by political elites and the wealthiest, while neglecting the poorest to have a better and just life through the digital ecosystem.
5. Violations of privacy as the smart city ecosystem often collect privacy data of the citizens, which could be used as a surveillance system.
6. Issues on data security in the midst of potential cybersecurity attacks which expose the vulnerability of data protection.

In addition to being techno-centric, the promise to create safe digital space for participation is also contested. Some related projects of digital participation have not been able to address the root cause of the urban society problems, it was merely lip service (Kitchin et al, 2019 in Reuter, 2020). In addition, the digital participation platform often requires a tech-savvy person who are mostly middle-and high-income groups (Shin et al., 2021). While there are many other successful digital platforms to encourage citizen participation, the replication and transfer to other cities remains a challenge because the projects were very contextual. This condition, in turn, has made the human dimension of smart cities rather elusive if the smart ecosystem fails to understand the underlying cause of the societal problems.

Another challenge in integrating human perspective into the smart city ecosystem is the digital divide, which exacerbates the existing socio-economic inequality within our society. The digital gap persists mainly between urban and rural settings, in which globally around 72% of urban households have access to the internet at home while the rate for rural households is nearly 38% (UN Habitat, 2021). In the same vein, global metropolises also experience digital divide, where around one third of the population are not connected to the digital world, especially those living in informal settlements. Young people, women, urban elderly, as well as urban poor were also largely disconnected from the advancement of ICT, particularly in emerging cities (Shin et al., 2021; UN Habitat, 2021).

Many studies have shown that the deployment of digital technology in daily life has further created a social division rather than inclusion, as many members of the society do not have access to internet broadband as well as devices (Reuter, 2020; UN Habitat, 2021; Shin et al., 2021). The poor and many other marginalized communities have very limited access to internet services, even though in many large cities, the internet penetration rate remains quite high. In addition, several smart city services and features only cater the needs of the rich and the powerful, such as vehicle tax payment, bank and financial services. Most of these features are not able to recognize the needs of the underrepresented communities, thus leaving them behind (Reuter, 2020).

The complexity of the urban situations is expected to be streamlined by digital infrastructures, creating an orchestrated city that lacks a sense of community and informal

networks among residents. The city is seen as a place to be operated and controlled and as an entity to make data-informed decisions (Halegoua, 2019). For example, urban streets in the smart city are viewed as a circulation network that is monitored through sensors and devices to keep it uncongested. Smart city streets are designed for flow, efficient circulation, monitoring and quantification, and momentum, not pausing or wandering (Halegoua, 2019).

Smart-city developers readily engage in conversations about digital media and data accumulation for responsive environments rather than how digital media could enrich citizen experience or emotional attachment to urban space (Halegoua, 2019). It challenges the placemaking of smart-from-the-start-cities because citizens are positioned as technology consumers or users, not as community members that belong to the city. The role of the smart cities' citizens has been criticized by Jennifer Gabrys who emphasized the idea of reducing residents' roles to become 'citizen sensors' or sensing nodes. Even some engineers said that smart city residents might "come along and destroy all our nice optimized systems". On one hand, people and public engagement are viewed as integral to the character and functioning of a smart city, but on the other hand, urban life is viewed as a set of activities that can be orchestrated and understood through urban programming and computer code (Halegoua, 2019).

SMART CITY INITIATIVES IN INDONESIAN CITIES AND NUSANTARA

In Indonesia, the smart city concept has been widely encouraged in the city planning, regulation, and government programs. For instance, the Ministry of Communication and Informatics has established a "100 Smart Cities" program in 2017 inviting at least 100 cities and regencies to become "smart" by 2019 (Kusumastuti & Rouli, 2021). However, the implementation of smart city could not be claimed as successful, partly due to the issue of digital divide. The digital divide could happen not only caused by infrastructure insufficiency, but also due to the quality of human resources; lack of instruction in Bahasa Indonesia which leads to low digital literacy in rural areas; and low internet utilization—people know how to access internet, but do not know how to make it beneficial and improve their quality of life (Ariyanti, 2013). A study about the digital divide index in Indonesia showed that 14 out of 34 provinces in Indonesia have a large digital divide (Wilantika et al., 2018).

The megaproject of Indonesia's new capital city is also planned to be a smart city. Indonesia planned to move its capital to a vast area in East Kalimantan Province, over a land cover of mostly rainforest, production forestry and a few settlements. This newly built city will be called *Ibu Kota Nusantara* (IKN; Nusantara Capital City) or just Nusantara, consisting of 256.142 hectares development area with a maximum of 25% will be zoned as urban area. Nusantara will be divided into three levels: KP-IKN (*Kawasan Pengembangan IKN*, Development Area), K-IKN (*Kawasan IKN*, Urban Area) and KIPP (*Kawasan Inti Pusat Pemerintahan*, Core Government Area).



Figure 2. Location of Nusantara
Source: Bappenas (2022)

Moreover, Nusantara is not completely ‘a blank sheet’ among the forests of East Kalimantan. There are some areas that are already inhabited and developed. Coastal areas (Kuala Samboja, Simpang Samboja and Muara Jawa) and also some villages nearby the core area (Bukit Raya, Bumi Harapan, Pemaluan and Sepaku) are already developed with approximately 150.000 inhabitants and 4.531,38 hectare of area in total (1,77% of whole Nusantara area). The relocation and development, without planning and good approach, could lead to social issues, especially regarding the agrarian and customary land tenure (*tanah ulayat*), as well as conflict between local people and immigrants (Kodir et al., 2021).

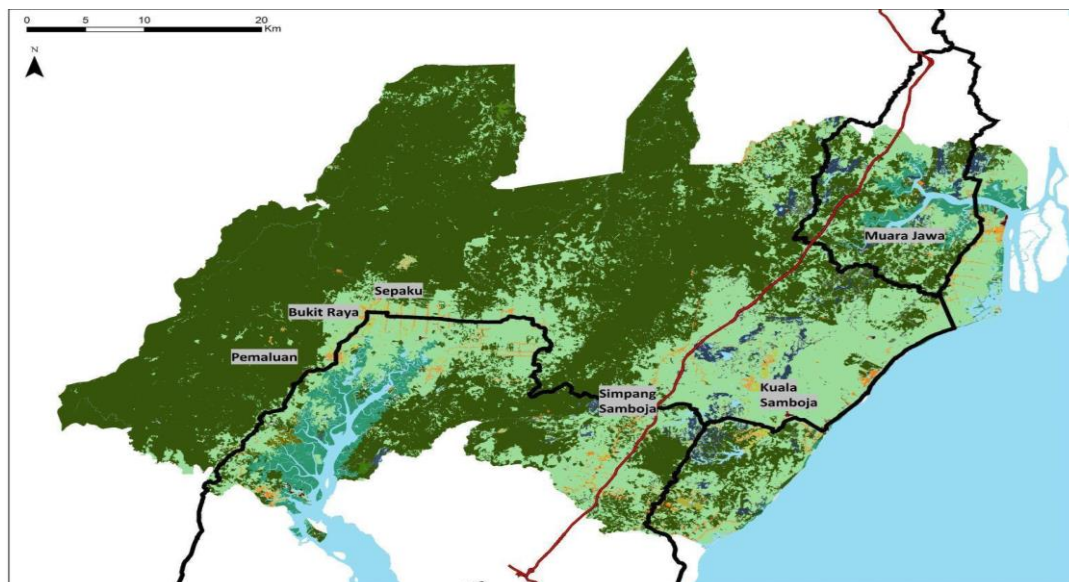


Figure 3. Existing Land Use of Nusantara (Areas colored in orange are settlements, while areas in dark green are forest and light green are plantations)
Source: Indonesia Geospatial Information Agency (2019)

As a newly built city, based on the Masterplan, Nusantara aims to be a global and smart city. The idea of a smart city in Nusantara is embedded in eight principles and 24 KPIs. However, the smart city concept in Nusantara did not mention or acknowledge the human aspects, both in the Regulation of Capital City (Regulation no. 3/2022) and Detailed Masterplan (Presidential Regulation no. 63/2022). The smart city concept in Nusantara still puts heavy

emphasis on the technical aspects and service of the infrastructure, such as digital and ICT connectivity.



Figure 4. Vision, Target, KPIs and Principles of Nusantara

Source: Bappenas (2022)

An initiative took place to develop a smart village and digital society in Bukit Raya Village, one of the closest existing inhabited villages to the core government area (KIPP). Bukit Raya Village was developed as a smart village, with efforts such as digital creative, smart government and digital transactions (Telkom Indonesia, 2022). However, it is still not sufficient and it needs to be implemented on a wide scale. Nonetheless, as a sustainable and smart city, considering the human dimension in the planning of Nusantara is highly required.

RESULTS AND FINDINGS

Our preliminary findings from literature suggest that there has been limited attention to put human dimension at the center of smart city initiatives as it was mostly focused on the ICT infrastructure as well as technological advancement (see Table 1 below). Many literatures stressed the human dimension as one of the pillars in making a smart city, which was occasionally mentioned as smart people or smart communities. This, of course, can indicate the beginning of acknowledgement of the human-side into the smart city ecosystem. However, this is still inadequate as it often fails to understand the needs of the society that have to be addressed in a smart city. Smart community or smart people pillar often defined as a component of smart individuals that formed a smart city.

Table 1. Components of Smart City

No.	Authors	Components
1	Nam and Pardo, 2011	<ul style="list-style-type: none"> - technology - people - institution
2	Chourabi, Nam, Walker, Gil-Gracia, Mellouli, Nahon, Pardo and Scholl, 2012	<ul style="list-style-type: none"> - management and organization - technology - governance

No.	Authors	Components
		<ul style="list-style-type: none"> - policy context - people and communities - economy - built infrastructure - natural environment
3	Mosannezadeth and Vettorato, 2014	<ul style="list-style-type: none"> - services - transport - community - government - energy - buildings
4	Neirotti, De Marco, Cagliano, Giulio and Scorrano, 2014	<ul style="list-style-type: none"> - natural resources and energy - buildings - transport and mobility - living - government - economy and people
5	UrbanTide, 2014	<ul style="list-style-type: none"> - strategic intent - data - technology - governance and service delivery - citizen and business management
6	Ganesha Smart City Maturity Model, 2015	<ul style="list-style-type: none"> - economy - society - environment
7	Anthopoulos, 2017	<ul style="list-style-type: none"> - smart government - smart people - smart environment - smart living - smart economy - smart mobility - smart infrastructure - smart transportation - smart services
8	Camero and Alba, 2019	<ul style="list-style-type: none"> - smart economy - smart environment - smart governance - smart living - smart mobility - smart people
9	Vishivetskaya and Alexandrova, 2019	<ul style="list-style-type: none"> - smart business - smart living - smart education - smart citizen - smart government - smart infrastructure

No.	Authors	Components
		<ul style="list-style-type: none"> - smart utility - smart mobility - smart environment
10	Smart Sustainable City Framework, 2021	<ul style="list-style-type: none"> - smart people - smart living - smart environment - smart mobility - smart governance - smart economy

Our experiences with Jakarta Provincial Government through their Jakarta Smart City Unit also share a similar notion that there has been insufficient attempts to allow greater and meaningful public participation in the smart city ecosystem. While the hard ICT infrastructure indeed plays a significant role in designing smart initiatives, we should also reconsider the human perspectives as the critical point of the smart city, not merely just an exclusive smart pillar. Rather than seeing human/community as one of the smart pillars of the smart city, it is important to set the human perspectives as the core of any smart initiatives.

There has been a growing body of knowledge in smart city literature acknowledging the central roles the human dimension can play (see Table 2 below). The idea of bringing people's perspectives into the smart city framework should be widely appreciated, as it shifted the focus from just technological solutions to addressing real urban life problems. However, the proactive roles of urban society in the smart city ecosystem remains rather challenging, as many view them as merely "users". Citizens are often seen as the beneficiaries of various smart initiatives, leaving little space for them to actually contribute for the betterment of the smart city ecosystem as a whole.

Table 2. Summary of Content Analysis

Category	Title	Author(s)	Type	Key Points
Smart City Concept and Definition	Camero and Alba, 2019	Smart City and information technology: A review	Journal article	The keyword is emphasized on how smart city ecosystem could bolster working life, human resource and education
	Vishivetskaya and Alexandrova, 2019	Smart City Concept. Implementation Practice	Journal article	Explains the development of smart city from 1.0 to 3.0, and how the community is involved in the development
	Mosannezadeth and Vettorato, 2014	Defining Smart City	Journal article	Community is explained as one of the stakeholders in the smart city development, but not being the fundamental

Category	Title	Author(s)	Type	Key Points
	Neirotti, et al., 2014	Current trends in Smart City initiatives: Some stylised facts	Journal article	Explained as policies to improve human capital investments and attract new talents, avoiding brain drain
Smart City Framework/ Model	Widiyastuti, et al., 2021	Smart Sustainable City Framework	Journal	States that the smart people factor is led by the educational institution and smart living is the tools to improve quality of life
	UrbanTide, 2014	Overview of the Smart Cities Maturity Model	Book	Emphasizes on the inclusive model of smart city and later the high digital literacy came as a result
	Anthopoulos, 2017	A Unified Smart City Model (USCM) for Smart City Conceptualization and Benchmarking	Journal article	Proposes the USCM which “people” become one of the eight classes/pillars
	Ganesha Smart City Maturity Model, 2015	<i>Laporan Akhir: Kajian Pengembangan Smart City di Indonesia</i>	Report	Smart society component is interpreted on how well the people could access the city service based on ICT system
	Chourabi, et al., 2012	Understanding Smart Cities: An Integrative Framework	Journal article	Argues that it is important to refer to the city dwellers as a community and how smart city could be beneficial for a large group
Human Dimensions of Smart City	Sarosa, 2020	Kota untuk Semua	Book	Argues that the human/people aspect in smart city should be the underlying factors
	UN Habitat, n.d.	Centering People in Smart Cities: A Playbook for local and regional governments	Book	Proposes the idea of people-centered smart cities with five pillars

Category	Title	Author(s)	Type	Key Points
	Nam and Pardo, 2011	Conceptualizing Smart City with Dimension of Technology, People and Institutions	Journal article	Argues that the smart city initiative should be led by the human dimension side, rather than ICT
	UN Habitat, 2021	Addressing the Digital Divide: Taking action towards digital inclusion.	Report	Assess on the digital equity pillar and shows how the digital divide happens

Drawing from the literature review above, we find that it is still insufficient to simply put people/community as the main pillar of a smart city. A progressive smart city concept should start from the human capital side, rather than blindly believing that IT itself can automatically transform and improve cities (Hollands, 2008). Instead of assuming that smart city components consist of different pillars that construct a unit, Nam and Pardo (2011), emphasized that smart city components actually are an integrated process. They simplified the components into three categories that are called the core factors: technology, people and institution. Given the connection between the factors, a city is smart when investments in human/social capital and IT infrastructure fuel sustainable growth and enhance a quality of life, through participatory governance (Caragliu et al., 2009).

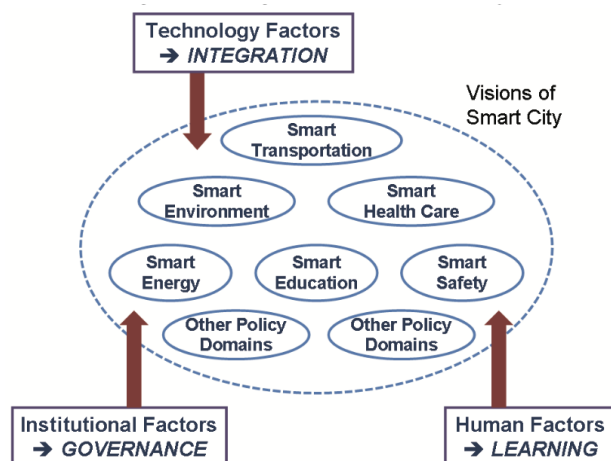


Figure 5. The Interlinkages of Smart City Components

Source: Nam and Pardo (2011)

Some elements are still missing or lacking in conceptualizing human-centered smart city initiatives. According to smart human rights city framework, there are three main points to make human dimension an integral part of the smart city ecosystem (Reuter, 2020):

- Focus and prioritize to solve the social, political, and economic issues of the city and put technology as one of the tools and solutions. This means that city planners and policy makers have to better understand the problems and see how technology can help

in addressing such issues. Adoption of technology should be part of comprehensive urban policies.

- Implement human rights approaches in cities along with understanding that there is diversity in city population. For example, smart mobility solutions have to be able to address inequalities, ICT could enhance democratic engagement, mathematical and coding models help the marginalized communities, and so on.
- Establish a multi-stakeholder platform. This effort is intended to develop inclusive governance of smart cities which puts urban citizens at the center of development. More importantly, the platform should encourage marginalized groups to take part in the citizen-driven decision making-processes so that their needs can be accommodated.

Social interaction and education are also missing ingredients in strengthening human perspectives in smart cities. Technology cannot transform the city without human capital, so the effort on improving the population's capacity to learn is crucial (Neirotti et al., 2014). Regarding this matter, community learning desires will lead to IT skills improvement, facilitate a social learning environment that enhances IT training in schools, organizations and industries. In addition, Gil-Gracia, et al. as cited in McKenna (2020) convinced that people, education, learning, and knowledge have been identified as of central importance to cities' ability to innovate. ICT also helps cities to respond more quickly to changing needs and requirements of residents and optimize services (Kozlowski & Suwar, 2021).

The approach to integrate and strengthen human perspectives into smart city requires better understanding of the stakeholders involved. As illustrated by the framework of "People-Centered Smart Cities" by UN Habitat, the groundwork experiences from cities all over the world has resulted in five pillars of making people at the center of smart city initiatives (see Picture 5 below). The community pillar highlights the importance of recognizing and working with the local community to establish inclusive digital governance. The Digital Equity pillar focuses on the process to build equitable access to ICT infrastructures, which could foster a meaningful participation for marginalized communities. The Infrastructure Pillar provides a framework for digital transformation in cities through digitization of public services and platforms. The Security Pillar enhances data protection and security strategies in close collaboration and participation of relevant stakeholders. Lastly, the Capacity Pillar organizes multi-stakeholder partnership to encourage organizational empowerment in a more inclusive smart city ecosystem.

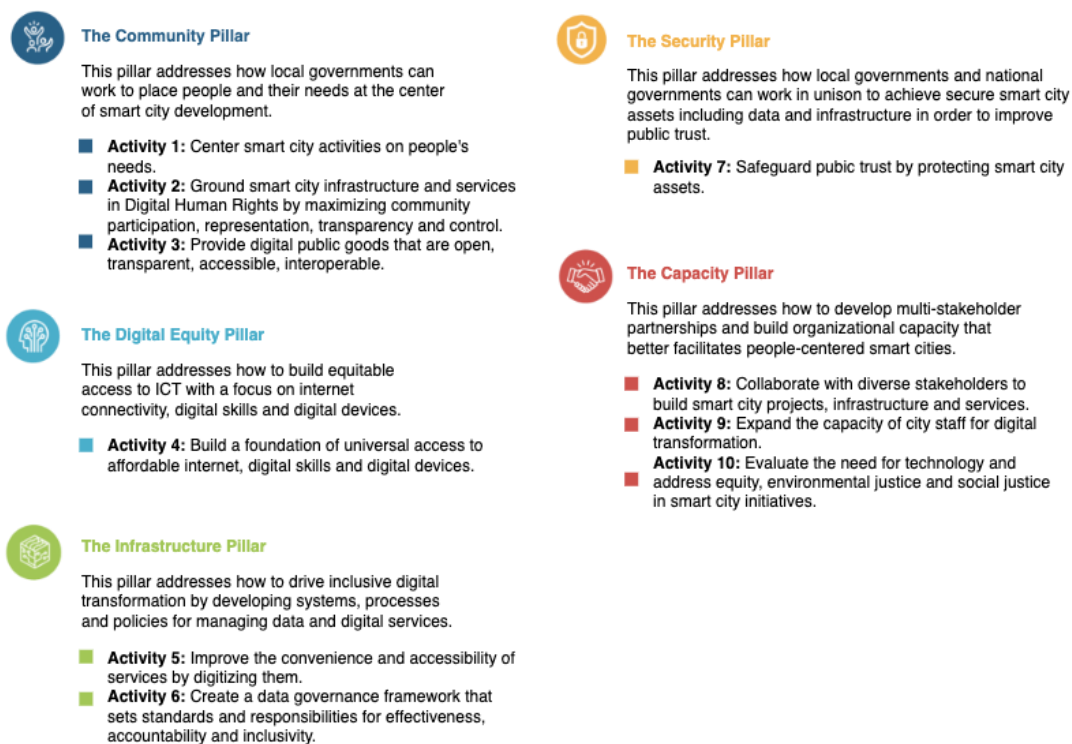


Figure 6. People-Centered Smart Cities Framework

Source: UN Habitat, n.d.

APPROACH TO STRENGTHEN HUMAN DIMENSION OF SMART CITY

Our proposed approach to strengthen human dimension in the smart city ecosystem is mainly based on the idea of what Nam and Pardo (2011) offer in their article, which view people as part of the interlinkages process that define smart city. The emphasis on process, rather than separate smart pillars, highlights the significance of putting people's perspective as the first foundation to develop smart city vision. The whole process can later be translated into various smart city pillars, depending on the needs of the city and its society.

The approach begins with recognizing that our today's society and technological advancement mutually influence one another (see Picture 6 below). Society, to some extent, affects how technology and smart city landscapes are designed. For example, the design of smart initiatives where most young people live will be quite different compared to the elderly. Conversely, technology clearly has a significant impact in our everyday lives. In many instances, the newest advancement of ICT, such as the invention of online transportation, has shifted the city's mobility pattern.

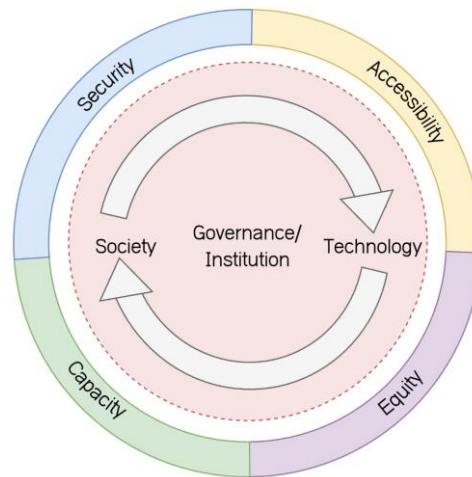


Figure 7. The Approach to Strengthen Human Dimension in Smart City Ecosystem

Source: Authors' analysis

The society-technology nexus also comes in both positive and negative ways. Technology can negatively influence urban society, or at least has adverse consequences that are not intended earlier. Using similar examples of online transportation, the innovation later on brings several traffic and labor challenges, even though this initiative has been praised for creating jobs and economic growth. On the contrary, society can also determine the way technology is rolling out. Realizing that the labor cost is expensive and an aging population, the Japanese society started to use vending machines replacing the old and conventional shops (Fuller, 2017). This has shown that the characteristics of society and economic condition have driven the use of technology to better suit the needs of the society.

The mutual relationship between society and technology works in the domain of governance and institutional settings, which consists of various stakeholders involved in the smart city ecosystem. These stakeholders include government entities, private companies (start-ups), research communities, universities, and local communities. The domain also recognizes both formal and informal actors that often intertwine with each other in the real world. This is important because even though most smart city ecosystems are under the regulatory formal settings, they also work with informal sector actors. For example, most startups should be registered at and adhere to the formal regulations under the Ministry of Communication and Information. At the same time, these startups also involve informal actors as well, such as street vendors, MSMEs, farmers, and many more.

Along with the understanding on how to center the human dimension in a smart ecosystem, there are also four core principles that should be the underlying values in making a more inclusive smart city.

1. **Equity** is the key to make everyone, especially marginalized communities, have the right to say, participate, and contribute in the making of a smart city. This is also a partial attempt to narrow the socioeconomic gap of the digital divide by encouraging the communities to co-design the smart city. However, it is also important to note that the marginalized and vulnerable communities might not be able to participate fully due to their constraints. Therefore, the smart city ecosystem and digital platform should be able to recognize their specific needs and create smart solutions to ensure their participation regardless of their limitations.
2. **Accessibility** is enhancement of access of the society to the digital world through provision of hard and soft ICT infrastructure. ICT infrastructure plays a major role in

ensuring digital connectivity, including to access various economic opportunities in the digital economy. In addition, improving digital literacy in urban society is as equally important as the provision of hard infrastructure. Digital literacy empowers the user of technology services and ICT infrastructure to get the full benefits of the digital ecosystem in smart cities.

3. **Security** is the principle of guaranteeing personal data protection stored in the various digital platforms safely. This also includes protection from the potential cybersecurity threats and attacks that may cause data leakage to the public. Securing data should also prevent the misuse of data for certain profit motives without prior consent. As a consumer, the role of human dimension in this principle is to demand ICT providers to strengthen data security mechanisms and to urge the government to protect citizen's privacy.
4. **Capacity** is the empowerment of the human side in order to be more productive and to improve the quality of life. Technological advancement undoubtedly brings significant changes in people's lives. However, not all of these changes contribute to improving quality of life. Many people have not been able to utilize the full potential of ICT services and platforms to increase their productivity, enhance economic opportunities, and generate more profit.

All four principles are interrelated, particularly in the effort of centering the human dimension at the smart city ecosystem. In many cases, the effort of improving equity to the digital ecosystem will go hand in hand with the provision of inclusive ICT infrastructure. Enhancing data security will also require adequate and reliable human resources to do so. These pillars laid the foundation for making smart initiatives more inclusive by focusing on the needs of the society that technology can address. ICT and technology as enablers can help to ease the everyday's challenges faced by many people and drive the improvement of overall quality and efficiency of the smart city ecosystem.

MAKING THE APPROACH WORKS IN NUSANTARA NEW CAPITAL CITY

Implementing a smart city in Nusantara should address various urban challenges in a more effective and efficient manner through the utilization of technology. As previously stated, even though the newest capital will be built in a relatively vacant land, there are still a number of socio-economic issues that may arise during the development process. One of the emerging developmental challenges is related to indigenous land as it could potentially displace local communities. Issues on social inclusion also become increasingly important because the indigenous communities have not been able to exercise their right to participate in the development process in a more meaningful way. These are just examples on how existing problems faced by Nusantara can be solved by smart approach but without undermining the root cause of the problem.

The Nusantara Smart City concept should also be used as an enabler to achieve the ambitious development targets for Nusantara, such as net zero emission, circular economy, and so on. For instance, in an attempt to achieve net zero emission targets, the government can adopt the smart and green building technology which allow less emission produced. Smart city ecosystems are also expected to accelerate the achievement of those KPIs through efficient processes as well as an open and participatory approach. To do so, there should be a safe digital space and platform for people to take part in the development processes of Nusantara.

While the Nusantara Smart City attempted to focus on every phase of the development process, the concept still has limited attention to human dimension. Lack of acknowledgement

on how human perspective plays a role in co-designing a smart city in Nusantara can be an early indication that the underlying problems may not be solved with just technology. Even though the concept also proposes an e-governance model as a way to encourage digital participation, the implementation remains vague and rather challenging as this platform may not be able to reach the voices of indigenous and other marginalized communities.

Our proposed approach on integrating human dimension into the smart city ecosystem can be implemented in making smart and inclusive Nusantara. While the focus on building the smart infrastructure has been in line with the principle of accessibility, there are still a number of improvements in making the Nusantara Smart City centers the human dimension. First, in order to ensure the principle of digital equity, the Nusantara Smart City concept should identify the local communities within and surrounding the development area, including indigenous people, to better understand their specific needs that can be addressed through smart initiatives. Realizing that not all local communities have access to ICT infrastructure and services is also key and thus will require policy interventions in connecting them to the digital world.

The second recommended action is to align community empowerment strategy with digital literacy program. Developing a strong and empowered digital community in Nusantara may not be an issue for the public officials as they may be well versed in using technology, both in working conditions or for daily life. However, this may not be the case with the indigenous communities surrounding the area of Nusantara. While the initiatives of smart villages have been put out in several locations, these efforts are not sufficient to improve digital literacy of these people. Connecting people to the digital world requires further measures to ensure that they get the most benefit out of it. In the case of Nusantara, efforts towards community empowerment, one of which is smart villages, should primarily focus on building human capacity to leverage the positive impacts of the smart city ecosystem.

The third recommendation is to improve digital security and data protection to guarantee personal privacy. This effort is essential to secure people's trust for the digital ecosystem offered by the Nusantara Smart City. Based on the Masterplan, Nusantara develops SSOC (Special Security Operation Centre) and CSIRT (Computer Security Incident Response Team) as implementation of digital and cyber security. In doing so, a secured data center is planned to be built nearby the city center and equally important as the implementation of Law No. 27/2002 of Personal Data Protection. To bolster the service of smart cities, as well as the digital security system, a smart city command center is also going to be built and integrated in the city hall.

CONCLUSION

The concept of smart cities has been continuously evolving and adapting to the actual condition of the urban ecosystem, including the human aspect of the city. In its earlier development, this aspect was not viewed as an essential element of smart city development. Developers merely focused on building a complex IT system to solve as well as prevent urban problems without involving city dwellers more than as technology users. These circumstances create several social impacts that increase inequalities and privatization, as well as the inability to utilize the ICT system to improve their quality of life.

While there have been considerable attempts to develop smart cities in Indonesia, technology is still seen as the ultimate solution to address the diversity of urban complexity. This conventional approach, in return, has only widened existing socioeconomic gaps and inequalities amongst and within Indonesian cities, including in the newly built Nusantara. The lack of human dimension in the Nusantara smart city concept may hinder the ambitious vision of making a sustainable and inclusive new capital of Indonesia.

This paper proposed approaches to strengthen the integration of human dimension into smart cities, which consists of four principles: equity, accessibility, security and capacity. These four principles are the underlying values to make a smart city more inclusive and should be applied in the three components: society, technology and government/institution. This approach was later brought into the implementation plan of smart city in Nusantara through three recommendations: improving equal access to ICT infrastructure, building digital literacy and capacity, and improving data security and protection efforts.

Limitations and Future Studies

The study also faces several limitations, mainly related to the number of literature reviewed that may not be sufficient to capture the ongoing debate on smart city discourses. As smart city becomes the new buzzword in many developmental practitioners, the literature focusing on such issues is also growing rapidly. The discussions of smart cities are not only coming from the field of technology, urban planning, and public policy, but also from the point of view of sociology, human rights, business, and so on. This shows that this study may not be able to cover all perspectives of smart city definition and conceptualization.

In addition, the planning of Nusantara Smart City, which is still in the conceptual phase, also limits our attempt to strategically put human perspectives in their smart city ecosystem. The plan to build Nusantara as smart and sustainable cities have been widely acknowledged and stated in formal documents, such as masterplan and laws. However, the actual smart city concept for Nusantara is still under development and we do not have sufficient information and updates for this matter.

Drawing from our study limitations, we strongly suggest and recommend to further elaborate the scope of the future study by reviewing recent literature on smart city from different perspectives and fields of study. Therefore, we can actually learn what are the things needed to enhance the smart city implementation. Other possible studies are to explore various means of implementation in making human-centered Nusantara Smart City into a reality as well as to assess to what extent does the smart city implementation in other Indonesian cities put human dimension as the forefront of the initiative. The proposed approach in this study might be beneficial for assessing the existing state of human perspectives in smart cities.

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