*Amnesti: Jurnal Hukum*
Vol. 6 No. 1 (2024) pp. 1-24
p-ISSN: 2656-3029 | e-ISSN: 2775 - 0604

# Transforming Indonesian Law: Paving the Way for Smart City Development

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**DOI:** https://doi.org/10.37729/amnesti.v6i1.3418

*Submitted: Desember 2023* *Revision: Januari 2024* *Accepted: Februari 2024*

**Keywords:**
*Regulations, Internet of Things, Smart City, Technology*

**ABSTRACT**

In the current digital revolution, the Internet of Things (IoT) plays a pivotal role as a vast network connecting every aspect of daily life. Within this context, the concept of Smart City emerges, where the potential of IoT is harnessed to integrate with urban environmental aspects, creating an intelligent and harmonious ecosystem. However, a notable drawback in this significant innovation is the absence of comprehensive positive laws capable of encompassing all aspects of Smart City in Indonesia. The objective of this research is to delve deeper into the specific legal framework requirements, exploring whether existing legal regulations adequately cover the components of Smart City formation or if there is a need for the establishment of new laws specifically addressing Smart City aspects. This normative research employs a comparative approach, examining several countries that have successfully implemented the Smart City concept. Secondary data and qualitative analysis are utilized in this study. The findings reveal that Indonesia faces challenges due to the absence of a national legal framework specifically addressing Smart City issues. There is a need for specific and precise regulations regarding Smart City to serve as a benchmark for its development across Indonesia and enhance the country's reputation.

***ABSTRAK***

**Kata Kunci:**
*Aturan hukum, Internet of Things, Smart City, Teknologi*

*Dalam revolusi digital ini, terdapat Internet of Things (IoT) yang merupakan sebuah jaringan luas yang menghubungkan setiap aspek dalam kehidupan sehari-hari. Dalam hal ini, terdapat pula Smart City, di mana potensi IoT dipersatukan dengan aspek lingkungan perkotaan untuk membentuk suatu ekosistem cerdas dan harmonis. Namun masih terdapat sebuah kekurangan terhadap inovasi besar ini, yakni belum ada hukum positif yang secara komprehensif mampu mencakup keseluruhan aspek Smart City di Indonesia. Tujuan penelitian ini adalah untuk menelusuri lebih lanjut terkait dengan kebutuhan angka kerangka hukum secara khusus, apakah aturan hukum yang telah ada sekarang dapat mencakup aspek pembentuk Smart City, atau diperlukannya pengadaan aturan hukum yang secara khusus mengatur tentang Smart City. Penelitian ini bersifat normatif dengan pendekatan secara komparatif, dengan menelaah beberapa negara yang telah berhasil menerapkan konsep Smart City. Penelitian ini menggunakan data sekunder dan menggunakan analisis kualitatif. Hasil penelitian ini menunjukan bahwa Indonesia menghadapi tantangan terkait belum adanya kerangka hukum tingkat nasional yang khusus menangani Smart City. Dibutuhkan pengaturan yang spesifik dan tepat mengenai Smart City untuk menjadi tolok ukur bagi pengembangan Smart City di seluruh Indonesia, dan meningkatkan reputasi negara.*

## 1. INTRODUCTION

According to Frost & Sullivan, there are eight forming elementhes of Smart City: Smart Governance, Smart Mobility, Smart Energy, Smart Building, Smart Infrastructure, Smart Healthcare, Smart Technology, and Smart Citizen (Liliweri & Lada, 2021). Frost & Sullivan said that Smart City can be formed by the smart government functionally. Smart City has been used on various countries in Europe (Cantuarias-Villessuzanne et al., 2021), America (Golubchikov & Thornbush, 2020), and Asia (Shafiullah et al., 2023). In Europe, one city as a sample where the Smart City scheme has been applied is Barcelona in Spain. Retrieved from "Smart City Index Report 2022", Barcelona is one of the globally high ranked Smart Cities, along with New York and Seoul, by the perspective of healthcare, and public service innovation (Lee et al., 2022). In Indonesia, there is a plan "Gerakan Menuju 100 Smart City", a program which initiated by Indonesian Ministry of Communications and Informatics (Hidayat et al., 2021). Smart City existences on several areas in Indonesia could be an indication that Indonesia can also adapt the technology for city development and so on (Evita & Mukhaer, 2022).

Indonesia is one of the development countries. In order to support Smart City development, Indonesia within the big population and rapid urban growth, is faced with the challenge of building and implementing the digital infrastructure needed to achieve Smart City goals (Rosalina et al., 2014). Initiation of "Gerakan Menuju 100 Smart City" is kind of a scheme of Smart City implementation on various locations (Lokantara et al., 2019). Moreover, Nusantara, Ibu Kota Negara Indonesia (reffered to as IKN), planned as a Smart City. As the substance of Article 3 Paragraph (2) of Law Number 3 of 2022 on Ibu Kota Negara (reffered to as Law Number 3 of 2022), it is said 'Smart City' as one principal on IKN establishment. It indicates that Indonesia intensively participated in development flow of Smart City. On the top of that, making it as the principle of the new capital city in the future (Rifaid et al., 2023).

Futhermore, adequate legal certainty is an important aspect in realizing sustainable and safe Smart City development. Referred to Article 1 Paragraph (3) of The 1945 Constitution of The Republic of Indonesia (reffered to as Constitution) stated Indonesia as a state of law. Smart City is a large object that requires positive legal protection. The protection of Smart City through positive law can take the form of creating new laws or utilizing existing legal frameworks that are relevant to Frost & Sullivan's Smart City elements. This could be a challenge since there is still no legislation that clearly regulates Smart City. The existing legal rules only regulate the forming elements, with the consequence that each legal rule is probably not necessarily in line with the Smart City trend in the future.

There have been many studies that raise the Smart City topic by the perspective on brief legal concept on Smart City (Micozzi & Yigitcanlar, 2022), Smart City policy on one location (Handayani et al., 2021), Smart City by the perspective of IoT (Syed et al., 2021), and the brief discussion about urgency of legal protection on Smart City (Faidati & Khozin, 2018). There was also a study which using the other forming elements of Smart City instead of Frost & Sullivan's, such as Smart Government, Smart Economy, Smart Environment, Smart Living, Smart People, and Smart Mobility (Sari et al., 2020). Yet there is still no research that discusses specifically pertaining to Frost & Sullivan's eight forming elements of Smart City. Therefore, this research emphasizes the readiness of Indonesian legal protection on facing the Smart Cities establishment. This research will focus on analyzing whether Indonesia has an adequate legal framework to support the implementation of Smart City, as well

as to identify challenges and opportunities in the development of more complete and effective regulations based on the orientation towards the Frost & Sullivan's forming elements of Smart City. The results of this research are expected to provide a comprehensive understanding of the readiness of legal protection in Indonesia in facing Smart City development. The findings of this research are expected to be an input for the government, legislative institutions, and other stakeholders in improving and developing the necessary regulations, as well as formulating appropriate strategies to achieve the goal of sustainable Smart City development in Indonesia. In addition, this research is expected to provide a better understanding of the challenges and opportunities in developing positive legal readiness in Indonesia in order to welcome Smart City development.

## 2. RESEARCH METHODS

This study uses normative legal research, which focuses on analysis and interpretation of existing legal norms (Soekanto & Mamudji, 2001). This method is used due to the analyzing the readiness of Indonesian legal protection on Smart City development by legal certainty, justice, and expediency (Disemadi, 2022). The research data used is secondary data or data obtained indirectly through library research. The library research involved collecting and analyzing legal documents related to Smart City development in Indonesia, such as laws and regulations, government regulations, and other relevant documents to analyze the extent to which the existing legal framework supports Smart City implementation and identify potential legal deficiencies or gaps. This study uses a statutory approach by examining positive laws relevant to the elements that form Smart City.

## 3. RESULTS AND DISCCUSION

### 3.1 Smart City Concept

Smart City is a concept that combines information and communication technology with the aim of improving the quality of life, efficiency, sustainability, and connectedness in cities. Smart City uses technology and data to improve the management of city infrastructure, public services, transportation, environment, and community participation (Izzuddin, 2022). In a Smart City, various aspects of city life are controlled and managed in an integrated manner with the help of ICT. Example of Smart City includes

Internet of Things (IoT) (Prastyo et al., 2020), smart sensors (Ardiani, 2018), data analysis (Ratama & Munawaroh, 2019), artificial intelligent (Ardinata et al., 2022), geographic information system (Taufiq et al., 2020), and digital platform (Fitra et al., 2021). Some examples of Smart City applications include smart traffic management to reduce congestion (Putra & Satwika, 2022), usage of sensors and data to monitor and optimize energy and resource use (Ahmad & Solihin, 2018), and the usage of digital applications and platforms to provide efficient and affordable public services (Sauda & Agustini, 2020). The main goal of the Smart City concept is to create a more efficient, sustainable and convenient city for its citizens. By utilizing technology and data, Smart Cities can increase the efficiency of resource use, reduce environmental impacts, increase safety, improve quality of life, and increase citizen participation in decision-making and public service delivery (Wibowo, 2018).

Furthermore, Smart city can be designed as two different schemes. The first scheme is a smart city in the sense that a city that already exists and is still standing, then a scheme or IoT system is widely applied to the city. An example of the first scheme is the implementation of IoT in several regions. The second scheme has the meaning of building a smart city from the first step, which means that a technology-integrated city development is designed on an empty land, so it is not in an existing city, but the city development in the second concept, really starts from building the initial frame on an empty land. An example of the second one is Nusantara as the new capital city of Indonesia, as it is written on Article 3 Paragraph (2) letter g Law Number 3 of 2022 and it said 'Smart City' as the one principle of Nusantara establishment (Ibrahim, 2022).

The Smart City concept is based on several key principles that underpin this approach to holistically improving urban life. These principles include connectedness, data utilization, sustainability, public services, and community engagement. First, connectedness is a key principle in Smart City. Connectedness includes connected information and communication technology infrastructure, strong connectivity, and the use of sensor-based technology to collect and transmit data in real-time. With good connectivity, cities can increase operational efficiency, improve transportation management, and provide better accessibility to citizens (Bonde et al., 2020). Second, the use of data is an important cornerstone of the Smart City concept. Data collected from various sources is used to understand patterns, identify problems, and optimize the use of city resources. Through smart data analysis, better decisions can be

made in infrastructure management, transportation planning, and public service development (Kurniawan & Andiyan, 2021). Third, sustainability is also a key principle in Smart City. This concept emphasizes the importance of building cities that are economically, socially, and environmentally sustainable. Eco-friendly solutions, energy efficiency, and wise resource management are implemented to create a sustainable environment for future generations (Wahyudi et al., 2022). Fourth, better public services are also a focus in Smart City. Through the use of technology, health, education, transportation, and public administration services can be improved. Mobile applications, digital platforms, and integrated information systems are used to provide services that are more efficient, accessible, and responsive to community needs (Julians & Sitokdana, 2022). Fifth, citizen involvement is an important principle in the Smart City concept. Active participation of citizens in decision-making and urban planning is sought through technology. Citizens can interact with the government, provide input, and obtain relevant information. This principle creates a more inclusive, responsive city and encourages collaboration between the government and the society (Arafah & Winarso, 2020).

Regarding the five principles that underlie the Smart City concept, there are four orientations for the establishment of a smart city. *First*, Community Welfare. The welfare of the community can be assessed through the level of health, economic conditions, happiness levels, and a good quality of life (Mulia & Saputra, 2020). In the Smart City scheme, a smart city is one that can support people's standard of living through providing proper health facilities and ensuring the availability of employment as a source of income (Dewi, 2017). So that through these two things everyone can ensure that his life remains prosperous and quality (Albayan, 2019).

*Second*, Technology and Information. The distinguishing element of Smart City from cities in general is the application of technology in Smart City with the aim of creating harmony and convenience in community activities. In this case, technology and information have a connection to improving the standard of living of the community, through easy access and openness of information (Kurnia et al., 2020). The technology that will be used to fulfill the elements that make up Smart City, which means that this technology becomes a bridge in the form of information systems connected to government information schemes, mobilization, energy, buildings, infrastructure, and health. In addition, because the public has access to services in Smart City, it is also necessary to pay

attention to aspects of personal data protection, anticipation of cybercrime, and parties who can be given responsibility for overseeing the security of access by the public.

*Third*, Effectiveness and Efficiency. Smart City has smart elements in it. The understanding of the 'smart' terminology in this case means that there are responsive facilities and applications that make it easier for everyone to complete their activities (Bitjoli et al., 2017). Through responsive facilities and applications, everyone can complete work quickly and efficiently (Sofa et al., 2020).

*Fourth*, Green and Sustainable Development Schemes. Smart City still pays attention to the design of greening schemes (Widodo & Syamsiah, 2021). In the Smart City concept, all types of pollution should be minimized through the development of green open spaces. This scheme still presents the city in a modern form but still takes into account the existence of green open space with the intention of creating a healthy urban environment. This can be realized by the availability of urban green parks that are also integrated with IoT as a manifestation of green open space (Ramadhan, 2019). In addition, Smart City is not just a city concept in the short term. Indeed, the benefits of Smart City must be created for long-term and consistent purposes. The Smart City concept needs to be considered so that the establishment of this city can survive and encourage other sustainable development (Caesarina & Saubari, 2019).

### 3.2 Navigating the Legal Landscape: Paving the Way for Smart Cities in Indonesia

When assessing the availability of Smart City legal products, it is important to consider the forming elements outlined by Frost & Sullivan, who are pioneers in the concept. These elements are elaborated in eight concepts, and a minimum of five out of the eight elements, along with clear placement, need to be fulfilled. Furthermore, the compatibility of Indonesian law with Smart City initiatives can be evaluated by examining relevant legislation's considerations regarding public welfare, technology and information, effectiveness and efficiency, as well as green and sustainable development schemes.

**a. Smart Governance**

This element is relevant to government performance in providing maximum service to the public (Nursetiawan & Putra, 2021). In the Smart City

scheme, it means that the maximum service element to the public uses the use of electronic media. The maximum service so far that has a real form is the provision of a container in the form of a site that can be accessed via the internet. Then the community in the area covered by the Smart Governance area can see information about regional apparatus, data related to the area where they live, and other information that is updated periodically (Nandyasari & Rahayu, 2019). One example is the conversion of Banda Aceh into a Smart City. There has even been a Banda Aceh Mayor Regulation Number 18 of 2020 which is explicitly entitled Smart City Kota Banda Aceh (Seftyana et al., 2022). This rule of law prioritizes the application of information and communication technology in more depth along with the provision of hardware to support the development of the Smart City concept in Banda Aceh. In addition, this law also emphasizes the concept of Smart Governance through the development of e-government. The regulation mentions an official domain for the Banda Aceh Municipal Government, namely www.bandaacehkota.go.id.

Smart Governance relies on e-government as its primary developmental axis, necessitating explicit legal regulations. Currently, the prevailing rule of law in this context is Presidential Instruction Number 3 of 2003, titled "National Policy and Strategy for E-Government Development" (referred to as Presidential Instruction Number 3 of 2003). This instruction considers the rapid advancement of communication and information technology, emphasizing the potential for quick and accurate access, management, and utilization of vast amounts of information. It also recognizes that implementing e-government can enhance government administration's efficiency, effectiveness, transparency, and accountability, ultimately contributing to good governance and improved public services. In light of its focus on public welfare, technology and information, effectiveness and efficiency, and sustainable development, Presidential Instruction Number 3 of 2003 remains relevant as a legal reference for Smart City regulations.

**b. Smart Mobility**

Smart City requires time efficiency, which means there is a fast movement that affects people's lives in Smart City (Hidayat et al., 2021). The mobilization referred to in the study of Smart Mobility is the movement from one place to another. Smooth mobilization can be achieved in two ways, namely pedestrian-friendly facilities and barrier-free public transportation. A Smart City that

promotes a smart and healthy environment certainly supports a healthier community life, one of which is to create a situation where people do not use too many motorized vehicles for short distances (Safitry et al., 2020). This pedestrianized road must also be based on the criteria of being barrier-free and having a quality security system.

Barrier-free means that a path built specifically for pedestrians is intended for pedestrians only. Motorized vehicles cannot pass through for any purpose or reason. These pedestrian-only paths can be in the form of sidewalks, crosswalks (either in the form of zebra crossings, or crossing facilities in the form of overpasses and underground paths). Apart from its pedestrian-only function, barrier-free means that the pedestrian path is always in a well-maintained condition. These pedestrian-only paths must also be constantly maintained. In this case, some officers are also needed who are devoted to overseeing the feasibility of the path. In addition to pedestrian-only paths, consideration should also be given to paths intended for non-motorized vehicle users. One of the most widely used non-motorized vehicles is the bicycle (Firdaus & Kurniawan, 2019), so it is also necessary to design and build special lanes for cyclists or other non-motorized vehicle drivers. This special bicycle lane needs to be given a sign or color that is different from the motorized vehicle lane.

Both pedestrian and non-motorized vehicle lanes must be supported by a sufficient security system to uphold the role of Smart City in terms of security (Amrullah, 2021). To ensure safety and security, surveillance cameras are installed and monitored periodically in special lanes for pedestrians and non-motorized vehicle users. These cameras should have sufficient coverage, complemented by an automated lighting system that illuminates the area at night. This integration between surveillance cameras and the lighting system creates a secure environment, especially for pedestrians moving around after dark. Additionally, prioritizing the use of public transportation is a fundamental principle in transportation planning. Smart Mobility in Indonesia is governed by Law Number 22 of 2009 on "Road Traffic and Transportation. This law recognizes the strategic role of traffic in national development and integration, as well as its contribution to general welfare as mandated by the constitution. It emphasizes the need for traffic to promote security, safety, order, and smoothness, supporting economic and regional development. The law was enacted to replace an outdated regulation and align with evolving

conditions, science and technology advancements, and regional autonomy. It upholds principles of transparency, accountability, and sustainability in road traffic and transportation. Overall, Law Number 22 of 2009 aligns with the goals of Smart City, emphasizing public welfare, security, safety, and regional development, while promoting sustainable traffic schemes.

**c. Smart Energy**

Motor vehicles use fuel oil as energy to move. To be precise, people are still dependent on fossil fuels. Fossil fuels include petroleum, coal and natural gas. The impact of using fossil fuels is an increase in carbon dioxide (CO2) emission levels. Of course, these emissions can have a negative impact on environmental health (Nugrahayu et al., 2017). So, the way to reduce or even stop the impact of these emissions is to replace fossil fuels with renewable energy sources. This replacement can be done gradually. Indonesia itself has great renewable energy potential (Azhar & Satriawan, 2018). Renewable energy owned by Indonesia such as power derived from water, wind, biofuels (Hakim, 2020). One example of using water as renewable energy is the application of Hydroelectric Power Plant (PLTA).

Indonesia's energy regulation is governed by Law Number 30 of 2007 on "Energy" (referred to as Law Number 30 of 2007). The Energy Law considers the following factors: (a) energy resources, classified as natural resources under Article 33 of the Indonesian Constitution, are controlled by the state and utilized for the people's maximum welfare; (b) energy plays a crucial role in promoting economic activity and national resilience, requiring equitable, sustainable, rational, optimized, and integrated energy management encompassing supply, utilization, and exploitation; (c) recognizing the limited reserves of non-renewable energy resources, diversification of energy resources is essential to ensure availability; and (d) considering the aforementioned factors, the Energy Law was enacted.

Energy is a state-controlled natural resource intended for the people's prosperity, as stated in the state constitution (Article 33). It plays a crucial role in improving the economy and national security. Therefore, energy should be provided, utilized, and exploited in a just, rational, integrated, optimal, and sustainable manner. The law emphasizes two orientations: Smart City development for public welfare and sustainable development. Efficiency is also highlighted, as energy management prioritizes usefulness, rationality, equitable

efficiency, added value, sustainability, community welfare, environmental preservation, national resilience, and integration. Article 21 Paragraph (1) further emphasizes the use of technology in energy utilization, considering various aspects and prioritizing community needs and economic activities in energy-producing areas. Overall, Law Number 30 of 2007 aligns with the goals of establishing Smart Cities.

**d. Smart Building**

IoT utilization is also applied to buildings that will be built in the Smart City scheme. This IoT can be applied at the same time to the construction of buildings, or applied to existing buildings. IoT applied to a building makes the building categorized as a Smart Building. The building itself has a development that was originally a building with the concept of energy saving, then a building with a sustainable concept, a building with a greening concept, until finally a building in the 'smart' category. Building Institute of the United States illustrates that Smart Buildings provide a productive and cost-effective environment through the optimization of structures, systems, services and management, as well as the reciprocal relation between these elements. European Intelligent Building Group defines Smart Building as a building that provides a maximally effective environment for its occupants, while at the same time maintaining efficient and cost-effective management of my resources (Khalil et al., 2018). The European Commission states Smart Buildings as buildings empowered by ICT in the context of combining Ubiquitous Computing and the Internet of Things for the generalization of building instruments through sensors, actuators, chips, micro, microsystems that enable their functions to collect, filter, and generate more information for. In modern concepts, Smart Buildings use principal of sustainable greening. At the same time, Smart Buildings are also buildings that conceptually minimize emissions. So far, these emissions come from building materials. A smart logistics approach is needed in order to minimize these emissions (Ansori & Wahyudin, 2020).

The regulation on building construction is governed by Law Number 28 of 2002 on "Buildings" (referred to as Law Number 28 of 2002). This law considers the importance of buildings in achieving national development goals, the need for orderly organization and compliance with administrative and technical requirements, and the role of society and guidance efforts. Therefore, the

Building Law was established based on these considerations. The first point emphasizes the development of a just and prosperous society based on Pancasila and the state constitution. Buildings play a crucial role in achieving national development goals. They should be built to serve their intended purpose and contribute to the prosperity of the people. Incorporating IoT schemes can enhance the functionality of buildings and promote the advancement of the city environment. The second point highlights the importance of efficient building functions to achieve desired outcomes. Clear descriptions of building functions, such as residential, public facilities, or production sites, facilitate faster completion of activities. The law recognizes the need for a balanced application of technology and architecture, considering socio-cultural values and architectural and environmental characteristics, including contextual, traditional, specific, and historic values. While the law acknowledges the impact of technological advancements, including information technology, on building construction, its emphasis lies more on preserving socio-cultural values. The orientation towards technology and information is not the main focus of this law, according to the author.

**e. Smart Infrastructure**

Infrastructure is about the availability of facilities and infrastructure. Infrastructure is related with buildings. While Smart Building is a physical appearance, Smart Infrastructure is the basic foundation of Smart Building and also a form of constant scheme integrated with Smart Building. Infrastructure is presented to support the structural network so that the economy and social in society can run properly (Kurniawan & Andiyan, 2021). Smart Infrastructure is the basis for Smart Mobility with Smart Buildings. This is because Smart Infrastructure underlies the integration between buildings and roads that connect each building in a Smart City, both roads for transportation and the way for pedestrians.

Moreover, in the context of Smart Cities, the infrastructure also involves the installation and integration of IoT systems. IoT infrastructure involves all kinds of hardware and software that accompany the daily activities of Smart City communities. The hardware includes the form of chips, physical computers that can fulfill the performance. Meanwhile, software involves applications in devices connected to physical infrastructure facilities - installed in Smart Buildings and Smart Mobility lanes and other public service facilities -

to assist human performance (Ramdani & Habibi, 2017). Software activities also enable functions so that people can gain easier access and barrier-free, which also applies when people will access Smart Governance programs. Since infrastructure involves roads and buildings, it is necessary to examine the laws and regulations concerning the construction of roads and the construction of a building. This means that the form of legislation is similar to the Smart Mobility and Smart Building sections. However, the infrastructure section is more focused on the process of building roads and buildings.

**f. Smart Healthcare**

Smart City development includes an important aspect of healthcare, aligning with its function to support community welfare. Smart Healthcare utilizes IoT technology to provide affordable and efficient health services. Implementing IoT applications in healthcare facilities like posyandu, puskesmas, and hospitals is appropriate. Despite the IoT theme, Smart Healthcare still prioritizes physical conditions and sanitation. In Indonesia, Law Number 36 of 2009 on "Health" recognizes health as a human right and an element of welfare stated in Pancasila and the Constitution. The law emphasizes nondiscrimination, participation, and sustainability in maintaining and improving public health to enhance national resilience and competitiveness for development.

Law Number 36 of 2009 encompasses the objectives of establishing a Smart City, particularly in the Smart Healthcare aspect. It emphasizes public welfare and sustainable activities to enhance public health quality. Article 168 of the law promotes effectiveness and efficiency in healthcare by emphasizing the need for health information through an information system. This aligns with the Smart City's focus on information dissemination. The dissemination of health information is facilitated through information systems, as stated in Paragraph (2) of the article. Additionally, Government Regulation Number 47 of 2016 complements the Health Law by providing guidelines for health service facilities and emphasizing the utilization of technology to improve the quality of healthcare services. This regulation reflects a revolutionary step in integrating technological skills into the health sector.

**g. Smart Technology**

Technology is the main basis for Smart City development. This technology underlies the integration mechanism between the internet dimension and daily

activities (Widiyastuti, 2019). Moreover, the technology carried in terms of Smart City development is "information technology". This information technology has functions that include various roles related to the process, use of hardware and software, manipulation and management of information (Pramesti et al., 2020). The predicate of a city to be worthy of being a Smart City is assessed based on the technology that is the basis for accessing information (Darmawan, 2018). In this case, the technology means supporting aspects in terms of seamless access to information, security aspects, aspects of economic growth, the banking sector, the transportation sector, the infrastructure and development sector, and environmental aspects (Rachmawati, 2018).

Indonesian technology regulation is primarily governed by Law Number 19 of 2016 on the Amendment to Law Number 11 of 2008 on Electronic Information and Transactions. This law includes definitions for electronic information, hardware, software, and access. It also addresses criminal offenses related to technology misuse and electronic transactions. The considerations behind this law emphasize the importance of national development, globalization of information, and the need to regulate information technology for the benefit of society, trade, and economic growth. The law aims to support the safe and responsible utilization of information technology, while promoting national unity and considering religious and socio-cultural values. Furthermore, the law emphasizes the role of technology in enhancing the effectiveness and efficiency of public services, as stated in Article 4.

**h. Smart Citizen**

Humans have control over the technology that underlies Smart City development. A technology can be an appropriate benefit if humans as controllers direct the technology for the sake of progress and the lives of many people. The technology that has been created will be useless, if the human does not understand how it works at all. In other cases, the human misuses the existing technology, so that the benefits of technology that should be obtained are deflected for the benefit of irresponsible parties. Technology that should be used to achieve the goals of the establishment of Smart City does not get positive impacts. The way that humans can create appropriate technology, which will later become a Smart Technology so that in the future it will become the axis of the establishment of a Smart City is through education. This

education is certainly intended to find the interests and talents of everyone who is taking this education.

In addition, these humans are also the legal subjects of all laws and regulations that are relevant to other Smart City elements. This means that humans who then become a group of people of Smart City must comply with all forms of existing legal substance. Such compliance starts from public awareness of the applicable law. In a broad sense, this compliance comes from the heart of every human being to follow the law substantively (Lubis & Fahmi, 2021).

The written sanctions that exist as a form of anticipation of violations that might occur. So that there are also several people who have a function as supervisors of legal order. These people are law enforcers who must provide preventive and repressive legal protection. Preventive protection in the form of regular supervision of community compliance with applicable laws in the context of Smart City, and strictly sanctioning people who violate Smart City law as a repressive protection (Nina, 2017).

### 3.3 Navigating the Legal Maze: Overcoming Smart City Implementation Hurdles in Indonesia

In terms of legal factors, the challenge of establishing Smart City is the availability of laws that can cover Smart City as a whole. The choice of law to be used still needs to be considered, whether it is enough to utilize the rules of law that are relevant to the elements that form Smart City, whether it is necessary to create a law so that later the law can be applied nationally, or each region is given its own authority in determining policies related to Smart City. This rule of law must also include various objects relevant to electronic information, such as personal data, intellectual property rights arrangements, and stakeholders in Smart City development.

Substantially, the availability of regulations to accommodate the establishment of Smart City should also consider cyberspace security. Because the reach of cyberspace is so wide. This security is also related to the protection of personal data, because access to cyberspace media certainly requires personal data. Internet users from the same country, or from other countries can visit the same sites that users from other countries visit, so there is the potential for cybercrime that can create distractions in the sustainability of Smart City.

In addition to the elements that make up Smart City and cyberspace security, it is also necessary to consider stakeholders who are authorized to take care of the sustainability of Smart City. In Indonesia, the National Capital Authority can be a clear example that there is a need for institutions or parties devoted to taking care of Smart City. Issues related to Smart City funding are the next challenge. The implementation of Smart City is certainly costly, so it is necessary to consider who are the parties who can be given responsibility for the funding. With funds transparently channeled for Smart City, the implementation can be directed and in accordance with the objectives.

The society readiness is also a challenge for Smart City development. *First*, Smart City, which has a digitalization concept, implies that people must be skilled in operating software and hardware. At the same time, not everyone has sophisticated devices and it takes time to educate the public on the use of devices connected to Smart City. *Secondly*, the transition to a digital form certainly cannot be completed in a short time considering that building a connection and internet access that is smooth and barrier-free in different areas requires a lot of time and money; so it is possible that it can trigger pros and cons in the community. There are people who agree with the implementation of Smart City for the sake of the pace of development in their area, and people who disagree because of the digitalization. Hence, it could be difficult for some people who are not accustomed to using technology for daily purposes.

### 3.4 Empowering Smart Cities: Paving the Way for Futuristic Regulations

After reviewing all relevant laws and regulations on the eight elements of Smart City by Frost & Sullivan, it can be interpreted that the entire rule of law has provided points of consideration that refer to public welfare or public welfare, effectiveness and efficiency, national development schemes that pay attention to greening and sustainability. In addition to considerations, some of these points are contained in the principles in the rule of law. Furthermore, these various legal instruments can be used as legal rules for the establishment of Smart City, but it is necessary to pay attention to their respective advantages and disadvantages. The advantages of using existing laws are time and cost savings. Because each rule of law can technically cover the elements of Smart City, the establishment of Smart City is simply regulated by these rules. However, because of the scattered rules of law, it can also be a drawback even

though it does not have a significant impact. The scattered rules of law result in the absence of specificity, in this case the Smart City.

Another alternative is the creation of new laws. But keep in mind that there is a potential for massive smart city development in every region of Indonesia, which means that the rule of law on smart cities needs to be made on a national scale. The two most common types of national laws are in the form of Laws and Government Regulations as implementing regulations. Although some areas such as Banda Aceh already have their own laws and even use the term 'Smart City' in the title of their laws, there is still a need for regulations that are national in scope, with the aim of legal certainty and specificity of rules for smart cities. In addition, the creation of laws that are national in scope has an anticipation of Smart City development that can be implemented in every region in Indonesia.

There are some of the advantages that will be obtained if Smart City has its own legal rules. *Firstly*, advantage of creating Smart City legal rules is specificity. This specificity refers to Smart City as something that needs its own rules, because Smart City is a giant scheme with complicated intricacies, as it needs to pay attention to the harmony of its eight constituent elements. Using different laws-even though they may cover each element-will lead to overlapping situations that are less efficient. A separate rule of law for Smart City will make it easier for those involved in the development of Smart City, as all the important points have been placed in one place, and there is no need to search for all forms of relevant rules. The existing rule of law should be considered for the formation of Smart City law and become a reference for its suitability with the eight elements. An example is the Smart City policy in China, which has a positive impact on reducing carbon emissions and reducing the greenhouse effect (Fan et al., 2021).

*Secondly*, with the issuance of a specific law for Smart City, every Smart City development in the territory of Indonesia has a benchmark or standard to what extent the city built can be indicated in the Smart City category. With a benchmark, the development of a Smart City or a city that will later be upgraded to a Smart City will have a clear direction so that the development can run faster and more efficiently. If you stick to considerations that are scattered in several laws and regulations, then there is no main legal axis, which can affect the pace of Smart City development. A study entitled "Multiple Smart Cities: The Case of the Eco Delta City in South Korea" states that policy making

on Smart City can be used as a benchmark for things that are specifically needed in the establishment of Smart City, so that the substance of the policy does not deviate from the main study (Han & Kim, 2022).

*Thirdly*, another advantage if Smart City has its own legal rules is the prestige of Indonesia in welcoming Smart City developments in the future. Indonesia will become one of the countries that is considered ready to welcome a big concept in the future, and this will improve the quality of Indonesia alongside the other countries the world. On an international scale, one example of a country that already has its own law on smart cities is South Korea, through the improvement of the Law on Information and Communication in South Korea and also the Land Use Law (Choongik et al., 2020). To ensure a future where Indonesia thrives in the realm of Smart Cities, it is imperative to establish comprehensive legal regulations encompassing the following key aspects: (a) Prioritizing the well-being of Indonesian citizens residing in Smart Cities, ensuring their welfare remains at the forefront; (b) Individual rule chapters dedicated to each integral component that constitutes a Smart City, ensuring a systematic approach to their development; (c) The establishment of a supervisory institution specifically dedicated to overseeing Smart City initiatives, guaranteeing effective governance and accountability; (d) Stringent criminal and administrative penalties to deter and address any violations of the Smart City regulations, ensuring adherence and upholding standards; (e) The formulation of meticulous Smart City masterplans, meticulously crafted to guide future developments in a cohesive manner; (f) Implementing copyright protection measures for Smart City masterplans, safeguarding intellectual property and encouraging innovation; (g) Tailoring Smart City development strategies to harmonize with the unique geographical conditions of each Indonesian region, allowing for localized progress and sustainable growth.

## 4. CONCLUSION

The implementation of Smart City, integrating information and communication technology into urban development, has been observed in various countries, including Indonesia. However, Indonesia faces a challenge regarding the absence of a national-level legal framework specifically addressing Smart City. Existing laws relevant to the elements of Smart City identified by Frost & Sullivan can serve as a basis, but they lack specificity and are separate legal provisions. Alternatively, creating new laws would offer

advantages such as more precise regulations, serving as benchmarks for Smart City development across Indonesia, and enhancing the country's reputation in this field. However, the creation of new laws requires complex considerations and considerable time. Ultimately, the choice of a legal framework depends on weighing the ongoing advantages and disadvantages.

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