

MECHANISM OF CREATING HAPPINESS IN LIFE: A POLICY EVALUATION OF SMART CITY DEVELOPMENT IN DKI JAKARTA

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Abstract

The smart city development policy carried out by the DKI Jakarta Provincial Government since 2014 aims to improve the quality of life. Theoretically, the achievement of improving the quality of life can be described through happiness indicators. Based on data from the Central Bureau of Statistics (BPS), the value and ranking of the happiness index for the civil of DKI Jakarta in 2021 are worse than the achievements in 2017. Therefore, this study aims to evaluate the mechanism for creating life happiness in the smart city of DKI Jakarta according to the characteristics of the Happiness Driven Smart City (HDSC). The data collection method is through document tracing and utilization of secondary data. The data analysis is carried out descriptively by using HDSC characteristics criteria. The study shows that the mechanism for creating happiness through developing a smart city by the government of DKI Jakarta is generally under the HDSC characteristic criteria. Therefore, the authors recommend several improvements to create a happy life in this city according to the HDSC characteristic criteria.

Keywords: DKI Jakarta, smart city, evaluation, happiness, HDSC.

Introduction

The study of smart cities has been a popular topic in the last decade, along with the demands for sustainable development in various countries (Kozłowski & Suwar, 2021); (Mundada & Mukkamala, 2020). A smart city is an ideal and sustainable city planning concept in dealing with various problems that arise in urban areas due to increased urbanization phenomena (Trindade et al., 2017); (Kim, 2022); (Yigitcanlar et al., 2019); (Myeong et al., 2022); (Zheng et al., 2020). These problems then impact urban communities' social, economic, and environmental life (Degrazia et al., 2018). Therefore, developing smart cities can improve people's lives and environmental sustainability (Liu et al., 2022).

The smart city concept is diverse and broad (Albino et al., 2015). This concept incorporates some characteristics, components, and dimensions that are considered to reflect the definition of a smart city (Desdemoustier et al., 2019) and its development goals (Kozłowski & Suwar, 2021). A city that is said to be smart can be characterized by using Information and Communication Technology (ICT) in its infrastructure and public services to improve the community's quality of life through good and participatory governance (Kozłowski & Suwar, 2021). Based on this definition, a bottom-up approach

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is needed in a smart city development strategy (Prakash & Chakrabarti, 2019). In addition, by developing a smart city, a city can also increase economic growth, create a sustainable urban order, and get a conducive environment (Yeh et al., 2017); (Lees et al., 2014).

DKI Jakarta is the pioneer of smart cities in Indonesia. The development policy for DKI Jakarta as a smart city has been initiated since 2014. Since then, the DKI Jakarta Government has carried out various innovations supported by Information and Communication Technology (ICT). The innovation goals are to improve public services, encourage sustainable development, and overcome emerging urban problems like congestion, flooding, and high population growth (Guerrero-Prado et al., 2020). Through developing a smart city that continues to grow until now, the Provincial Government of DKI Jakarta hopes to improve the quality of life for the people in the city.

The achievement of improving the quality of life in the development of smart city in DKI Jakarta can be evaluated based on indicators of happiness which are part of welfare measures (Kupiec & Wojtowicz, 2022); (Ballas, 2013). Happiness can be viewed objectively in evaluating policies for smart city development (L. Zhu et al., 2022). This evaluation attempts to see whether the policy implementation follows the objectives set (Ghazinoory et al., 2021). Therefore, through policy evaluation, it can be seen whether the policy outcome's value has been obtained (Dunn, 2018).

Based on data from the Central Statistics Agency (BPS), the happiness of the people of DKI Jakarta has decreased. This condition is reflected in the happiness index as a subjective measure of well-being towards objective conditions in various domains of human life (Gendler & Valenzuela, 2021). The index consists of life dimensions, namely the dimensions of life satisfaction, the dimensions of feelings, and the dimensions of the meaning of life.

In 2021, the value and ranking of the DKI Jakarta people's happiness index decreased compared to conditions in 2017. In 2017 the DKI Jakarta happiness index reached 71.33 and was in 19th position out of 34 provinces. Meanwhile, DKI Jakarta's happiness index for 2021 is 70.68 and is in 27th position out of 34 provinces.

The decline in the value and ranking of the DKI Jakarta happiness index in 2021 indicates that the goal of developing a smart city in DKI Jakarta still needs to be fully achieved. The Government of DKI Jakarta has made various innovations by developing digital infrastructure to change the city's order for the better (Syalianda & Kusumastuti, 2021). However, the development that the DKI Jakarta Government has carried out has not been able to create complete happiness for the community, so it is necessary to find out the causes by evaluating the implementation of this policy.

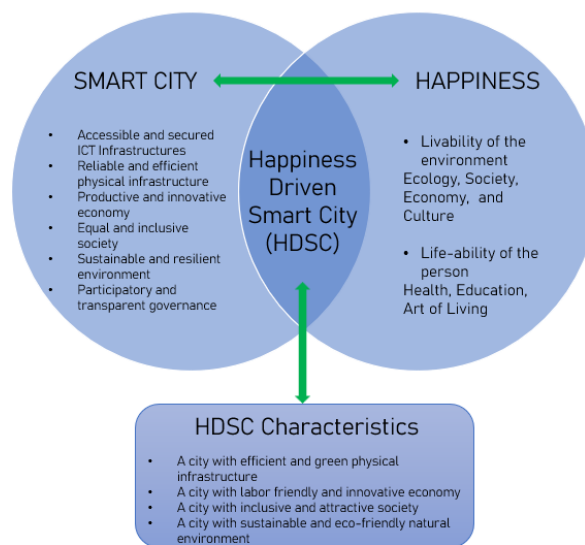
Evaluation of smart city development has only begun to become a topic of scholars in recent years (Y. Wang et al., 2021). Research evaluating the impact of smart city development on the social conditions of society still needs to be carried out (Sahi et al., 2020). The social impact can be in the form of community happiness as a value to be achieved in developing a smart city.

Several previous studies regarding the link between smart city development and people's happiness have been carried out by Zhu et al.(2022), Visvizi & Lytras (2021),

and Zakzak (2019). These studies emphasize that developing a smart city can increase people's happiness. Zhu et al. (2022) assessed smart city development to increase people's happiness in the City of Manchester by using the characteristics of the Happiness Driven Smart City (HDSC). The assessment was conducted by interviews with several informants and proved effective in assisting policymakers in understanding the status quo of smart city development in the City of Manchester. Meanwhile, Visvizi & Lytras (2021) researched sustainable smart cities and made happiness an essential agenda in future research. Other research has also been carried out by Zakzak (2019), who explores how the development of a smart city in Dubai can increase the happiness of the people in the city.

A happily smart city can be seen based on the criteria of the Happiness Driven Smart City (HDSC) perspective as proposed by Zhu et al. (2022). HDSC's perspective is built on the synthesis of the various dimensions of the smart city and the definition of happiness. The conceptualization of the development of the HDSC perspective is as follows in Figure 1.

Figure 1
Conceptualization of HDSC Perspective



Source: (L. Zhu et al., 2022)

Based on Figure 1, it can be shown that the criteria for a happily smart city according to HDSC characteristics are (L. Zhu et al., 2022):

1. A City with Efficient and Green Physical Infrastructure

There are 3 (three) factors considered to describe these characteristics, namely mobility, energy, and public utilities. The mobility factor refers to the convenience and comfort of the community in mobilizing because of the integration of the transportation system while still paying attention to environmental sustainability (Perras et al., 2017). This concept can be seen through the navigation system in

smart cities, efficient and sustainable transportation services, bike-sharing, and car-sharing services. Meanwhile, the energy factor refers to a management system equipped with ICT to control energy use reliably, efficiently, low carbon, and monitored in real-time (Batty, 2012). Furthermore, the public utilities factor refers to the existence of smart utilities in facilities that provide clean water, proper sanitation, and waste disposal equipped with ICT to improve environmental hygiene and public health (H. Wang et al., 2021); Lee et al (2020). Examples of these concepts are smart water management and smart sanitation systems.

2. A City with Labor Friendly and Innovative Economy

There are 3 (three) factors that are considered to describe these characteristics, namely employment, innovative spirit, and entrepreneurship. The employment factor refers to the availability of employment opportunities and protection of labor rights amidst the development of digital technology as it is today (Chen et al., 2020); (Healy & Barry, 2017). Meanwhile, the innovative spirit factor refers to the spirit of collaboration between the community, the private sector, and the government to make social changes in overcoming problems and increasing economic growth. Furthermore, the entrepreneurship factor refers to the existence of a driver for innovation and economic growth so that it can create new products, jobs, and companies (Huggins & Thompson, 2015); (Kuada, 2015).

3. A City with Inclusive and Attractive Society

There are 4 (four) factors considered to describe these characteristics, namely education, health, safety, and culture and leisure. The education factor refers to the opportunity to obtain an education that anyone can enjoy anytime and anywhere in technological developments (Burbules et al., 2020). Meanwhile, the health factor refers to providing health services for disease prevention and health promotion supported by ICT to make it more efficient (Teng et al., 2022). Furthermore, the safety factor refers to the availability of a safe environment for the community equipped with integrated and responsive security technology so that criminal acts and other crimes can be handled immediately (Hartmann et al., 2017). The culture and leisure factor refers to digitizing cultural content and recreational activities that are easily accessible and shared with anyone in the digital ecosystem (Fanea-Ivanovici & Pană, 2020); (Silk & Stern, 2016).

4. A City with Sustainable and Eco-Friendly Natural Environment

There are 2 (two) factors that are considered to describe these characteristics, namely air quality as well as pollution and waste treatment. The air quality factor refers to the existence of an air quality system equipped with ICT so that it can be monitored in real-time to control air pollution. Meanwhile, the pollution and waste treatment factor refer to the existence of a waste management system accompanied by ICT so that problems arising from waste pollution can be handled properly.

The strength of this research is evaluating smart city development policies in DKI Jakarta in creating people's happiness. The policy evaluation was carried out using the

criteria on HDSC characteristics as developed by Zhu et al. (2022). Through this research, policymakers can create even better strategies oriented to the community's interests in developing a smart city in DKI Jakarta. In addition, this research can also add to the body of knowledge in evaluating smart city development policies in other cities. Therefore, this study aims to evaluate the mechanism for creating happiness in life in the smart city of DKI Jakarta.

Research Method

This study uses a positivist approach. The reason for using the positivism approach is that the authors use the theory of HDSC characteristics as an analytical instrument in explaining the condition of a happily smart city. According to Neuman (2014), the positivism approach is closely related to using various social theories to explain a phenomenon.

The collection of research data was carried out through document tracing and the use of secondary data. Document tracking is carried out on various accredited government documents and scientific articles. Meanwhile, secondary data was collected from the Central Statistics Agency (BPS), DKI Jakarta Environment Agency, Numbeo, as well as social media content and official government websites related to smart cities in DKI Jakarta. After the data is collected and compiled, it is processed to be presented in tables and graphs.

Data analysis was carried out by describing the strategy and output of developing smart city in DKI Jakarta. The first thing to do in data analysis is to identify and describe the smart city development strategy in DKI Jakarta that is in the Regional Medium Term Development Plan (RPJMD) 2017-2022 according to the HDSC characteristic criteria. After that, the researcher described the innovative use of ICT to achieve the strategic objectives. The next step is for researchers to analyze the output of each strategy using secondary data. Based on the strategy analysis, ICT utilization innovation, and the resulting output achievements, the authors then provide an evaluation of the implementation of each smart city development strategy that has been carried out using criteria on HDSC characteristics.

Results and Discussions

A City with Efficient and Green Physical Infrastructure

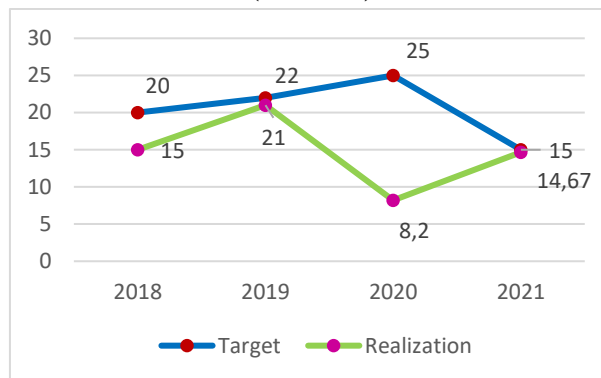
1. Mobility Factor

DKI Jakarta already has a strategy for developing an integrated transportation system facilitated by ICT to increase sustainable economic growth and the community's quality of life. This strategy is carried out to provide convenience and comfort for the community to mobilize. The implementation of this strategy is supported by JakLingko's innovations which have been developed since 2018 until now.

JakLingko's innovation is a transportation system that utilizes big data technology. This innovation can integrate payment systems, fares, and routes on

several types of public transportation modes in DKI Jakarta. The types of integrated transportation are trains provided by MRTJ, LRT (Jakpro), KCI, and Railing, Bus Rapid Transit (BRT), and microbus. The ease of use of integrated public transportation can increase the percentage of public transportation users in DKI Jakarta. This condition can be seen through the achievements of using public transportation by the people of DKI Jakarta to travel, based on Figure 2 below.

Figure 2
Target and Realization of People Traveling Using Public Motorized Vehicles (Percent)



Source: LPPD DKI Jakarta, 2021

In 2019 there was an increase in the percentage of public transportation users in DKI Jakarta compared to 2018. However, in 2020 the percentage of public transportation users in DKI Jakarta decreased drastically due to Large-Scale Social Restrictions (PSBB) to prevent the spread of the Covid-19 virus. Furthermore, in 2021 there will be another increase in the percentage of public transportation users in DKI Jakarta.

However, the achievement of using public transportation in DKI Jakarta is always below the predetermined target. One of the reasons is the lack of comfort and safety in public transportation. Only 72.87 percent of public transportation users feel safe and comfortable with the existing infrastructure (Agni et al., 2021). The need for more comfort and safety in public transportation has still become a challenge for DKI Jakarta to realize a happily smart city.

In addition, another challenge for DKI Jakarta in realizing a happily smart city through the mobility factor is the need for more availability of sustainable public transportation. Based on a survey conducted on public transportation users in DKI Jakarta, it can be seen that only 51.9 percent of public transportation is environmentally friendly (Agni et al., 2021). Most of the public transportation in DKI Jakarta still needs to use environmentally friendly gas fuel. Therefore, in realizing a "green" transportation system, the DKI Jakarta Government needs to increase the number of public transportation modes that use environmentally friendly fuels.

2. Energy Factor

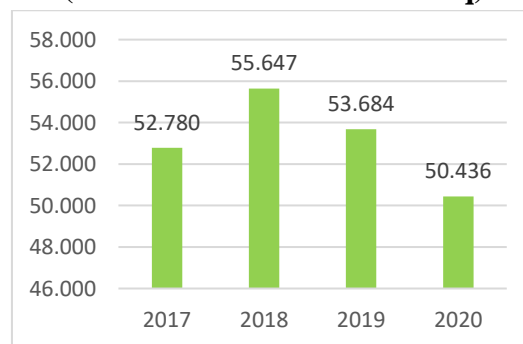
The DKI Jakarta Government already has a strategy to control energy so that it can be used reliably, efficiently, and low in carbon. This strategy is carried out by reducing the level of carbon emissions. Reducing carbon emissions is then carried out by encouraging low-carbon transport, optimizing emission tests, and energy efficiency.

In terms of using ICT to control energy use due to community activities, the DKI Jakarta government has been supported by JakEmisi's innovation. JakEmisi's innovation has so far been able to check emissions results, find locations for emission tests, and order emission tests for two-wheeled and four-wheeled vehicles. Through JakEmisi, the community can conduct emission tests for their vehicles.

However, JakEmisi's innovation is limited to providing information on controlling energy use in the transportation sector. The transportation sector is the primary energy user, with energy requirements of 47.4% of the total energy in DKI Jakarta in 2018 (DKI Jakarta Environment Agency, 2019). The high energy consumption in the transportation sector results in higher CO₂ emissions from fuel oil.

Efforts to control energy use through reducing carbon emissions by the Government of DKI Jakarta have shown promising results. Until 2020, the level of carbon emissions in DKI Jakarta has decreased from 2018. The development of the level of CO₂ carbon emissions produced is as follows in Figure 3 below.

Figure 3
Level of Carbon Emissions in DKI Jakarta 2017-2020
(Thousand Tonnes of CO₂-Eq)



Source : *DKI Jakarta Greenhouse Gas Emission Inventory, 2017-2020*

Even though CO₂ carbon emissions have decreased in 2019 and 2020, the DKI Jakarta Government needs to increase attention to controlling energy use to make it more efficient, reliable, and low carbon. The DKI Jakarta government needs to monitor the energy used in real-time through ICT so that control can be carried out as early as possible. This monitoring is in the transportation sector and various sectors such as power plants, manufacturing, commercial, household, and other sectors.

3. Public Utilities Factor

In providing public utilities such as clean water facilities and proper sanitation for the community, DKI Jakarta has carried out various strategies. DKI Jakarta already

has a strategy to improve proper sanitation, with one of the targets being to expand the scope of clean water services. This strategy is carried out to overcome the problem of the availability of clean water in DKI Jakarta so that all levels of society can enjoy it.

However, the entire population of DKI Jakarta has yet to be able to enjoy the clean water provided by the government. Based on table 1, most of the primary water sources for DKI Jakarta residents come from the borehole. Meanwhile, only 33-35 percent of people use piped water provided by the government as their primary water source.

Table 1
Primary Water Sources of DKI Jakarta Residents In 2018-2021

Main Sources Of Water	2018	2019	2020	2021
(1)	(2)	(3)	(4)	(5)
Refill Bottled Water	4.45	0	0.00	0.00
Tap Water	35.64	34.06	35.11	33.69
Borehole	57.81	61.47	62.70	64.67
Protected/Unprotected Well	1.94	4.46	2.17	1.64
Other	0.12	0.01	0.02	0.00

Source : BPS 2018-2021

The high use of boreholes as a primary source of water needs to be paid attention to by DKI Jakarta Government to realize sustainable development. The large withdrawal of groundwater by the DKI Jakarta residents has caused intensive scouring on the surface of the ground rock and subsequently caused subsidence in the soil surface in DKI Jakarta (Rahman et al., 2018). Therefore, the Government of DKI Jakarta needs to provide smart water management in fulfilling the community's water needs by using ICT, such as using artificial intelligence, to provide quality assurance and the availability of clean water for the community (Lee et al., 2013).

A City with Labor Friendly and Attractive Economy

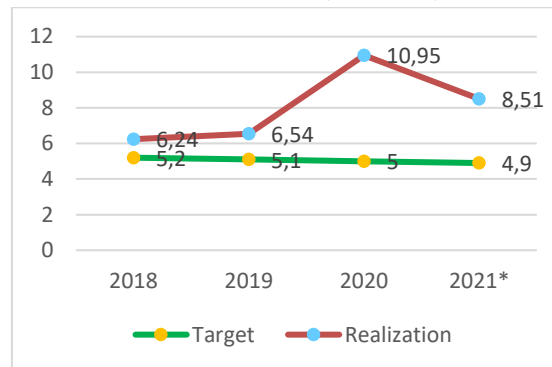
1. Employment Factor

The DKI Jakarta government has set a strategy to expand employment by developing a smart city. This strategy was carried out as an effort by the Government of DKI Jakarta to reduce unemployment by providing job opportunities for all its people. In realizing this strategy, the DKI Jakarta Government's efforts have been supported by ICT innovations.

The JakNaker innovation is an innovation that utilizes ICT to address unemployment problems. This innovation can prepare superior and competitive Human Resources (HR) in the industrial sector, improve DKI Jakarta's economy through Micro, Small, and Medium Enterprises (MSMEs), and create jobs. However, providing employment opportunities in DKI Jakarta, along with technological developments in the current era of disruption, still needs to be solved by the government. This condition can be seen based on the conditions in Figure 4. DKI

Jakarta's Open Unemployment Rate results from 2018 to 2021 have always been above the set target. Therefore the DKI Jakarta government needs to determine the right policy for people's job opportunities in this city despite the development of digital technology.

Figure 4
Target and Realization of the Open Unemployment Rate in DKI Jakarta in 2018-2021 (Percent)



Source: LKIP DKI Jakarta, 2020

Apart from that, the DKI Jakarta government also needs to protect labor rights which are often neglected in realizing a happily smart city. Advances in digital technology have resulted in no work-life balance and time limits for workers to do work (Noval et al., 2021). The absence of protection for the "digital" workforce can cause them to get high levels of stress in their life.

2. Innovative Spirit Factor

DKI Jakarta has planned to develop innovation for its people to increase the productivity level of various groups. This innovative spirit is realized through the government's collaboration with various elements of society and the private sector to overcome social problems and increase economic growth. The collaboration space is called Plus Jakarta. This collaboration space can also facilitate the community and the private sector to share information, ideas, and roles to collaborate in realizing DKI Jakarta as a happy city.

There are several forms of collaboration carried out by the DKI Jakarta Government with the private sector, including the following:

- a. Collaboration in calculating carbon emissions for daily activities as a form of education to the public to reduce emissions.
- b. Collaboration to digitize Micro, Small, and Medium Enterprises MSMEs.
- c. Collaboration in the distribution of aid to be faster, more precise, and efficient.
- d. Collaboration to improve mobility in Jakarta.
- e. Collaboration to improve city security.
- f. Collaboration in providing a wifi network.
- g. Collaboration in facilitating online schools.

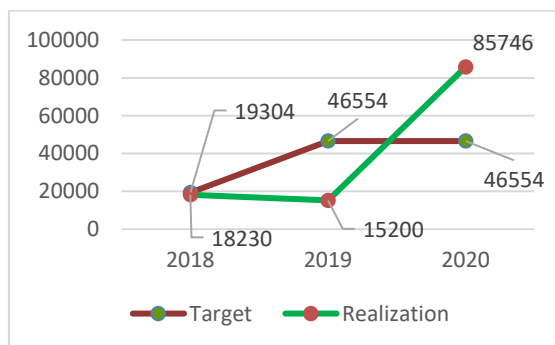
The Provincial Government of DKI Jakarta highly supports the spirit of collaboration by various groups of actors. In 2020, the provincial government established the identity of Jakarta as a Collaborative City through Governor Regulation 58 of 2020 concerning City Branding of Jakarta. Through this collaboration with various groups of people, the Government of DKI Jakarta seeks to present a developed city inhabited by happy people.

3. Entrepreneurship Factor

DKI Jakarta has planned a strategy for fostering entrepreneurship through business development for MSMEs. The entrepreneurship development strategy is supported by ICT innovation, namely JakPreneur. This innovation provides various services for the people of DKI Jakarta to do business. The services provided are business development training, business assistance from mentors, provision of capital assistance, information on the convenience of business licensing programs, and marketing of MSME products.

The achievements of MSME development by the DKI Jakarta government can be seen based on indicators of increased entrepreneurship, as shown in Figure 5 below. From 2018 to 2019, the achievement of increasing entrepreneurship was below the set target. However, in 2020, there will be a significant increase in entrepreneurship and exceed the set targets. This figure shows that entrepreneurship in DKI Jakarta is increasingly progressing amid the Covid-19 pandemic, as in Figure 5 below.

Figure 5
Targets and Realization of Entrepreneurship Improvement in DKI Jakarta in 2018-2020



Source: LKIP DKI Jakarta, 2020

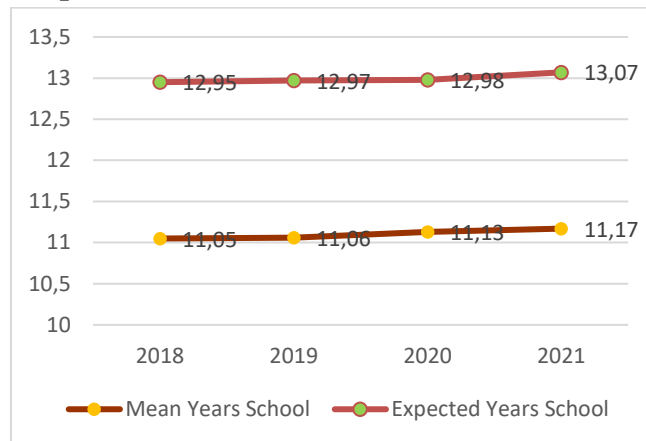
City with Inclusive and Attractive Society

1. Education Factor

DKI Jakarta has guaranteed access and quality education services for all its people. In realizing this goal, DKI Jakarta carries out various educational service programs. The educational service programs are the early childhood development program and community education, the 12-year compulsory education program, the education quality improvement program, the teacher and education staff development program, and the educational facilities and infrastructure development program. The

achievement of guaranteed access and quality education services for all people in DKI Jakarta can be seen in the indicators of average and expected years of schooling, as in Figure 6 below.

Figure 6
Mean and Expected Years School in DKI Jakarta in 2018-2021 (Years)



Source: LKIP DKI Jakarta, 2020

Based on Figure 6, it can be seen that the mean and expected years of school in DKI Jakarta have continuously increased from 2018 to 2021. In 2021, the mean years of school in DKI Jakarta reached 11.17 years, and the expected years of the school reached 13.07 years. The achievement of this means years of school can be interpreted that the population aged 25 years and over in DKI Jakarta has completed education up to grade 12 at Senior High School. Meanwhile, the achievement of expected years of school can be interpreted as the minimum education that 7-year-old children in DKI Jakarta will obtain is up to Diploma One (D-I).

In providing access and quality education services that can be accessed anywhere, anytime, and by anyone since the Covid-19 pandemic, DKI Jakarta has done various things. DKI Jakarta has innovated to collaborate with Sekolahmu in providing free access to students so that they can access educational content as learning media. In addition, DKI Jakarta has also built a Siap Belajar portal as a support system in implementing online learning during the Covid-19 pandemic.

Online learning support in Jakarta is not only carried out by the government. The private sector also supports providing access and quality educational services that can be accessed anywhere, anytime, and by anyone commercially. Therefore, online education opportunities in DKI Jakarta are wide open for various groups.

However, the quality of online education in DKI Jakarta is still challenging because it is considered ineffective. This ineffectiveness is caused by the lack of ability to understand learning materials, the ability to use ICT facilities, students' interest in taking lessons, and the background of parents who accompany the learning process (Nurlaela & Nopriana, 2022); (Supriyatin & Asih, 2021).

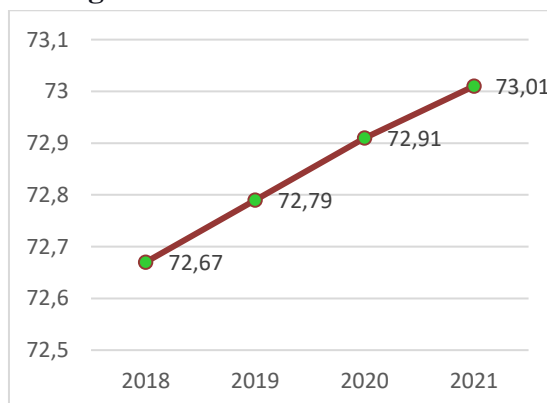
Therefore, on the education factor, it can be seen that DKI Jakarta has expanded access and quality education services for each of its citizens that is done conventionally. However, DKI Jakarta still has challenges that need improvement in providing quality online education. The provision of online education that can be accessed by anyone, anytime, and anywhere is currently still considered ineffective due to several inhibiting factors.

2. Health Factor

DKI Jakarta has established a strategy to provide health services to all its citizens in disease prevention and health promotion. Through this strategy, DKI Jakarta seeks to improve integrated, innovative, and sustainable health services to improve public health quality. The implementation of this strategy is supported by innovations that utilize ICT in delivering health services. The innovation made to address health sector problems in DKI Jakarta through the use of ICT is JakSehat.

The efforts of the DKI Jakarta government to improve the quality of health that can reach the entire community have shown promising results. This result can be seen in the life-expected age indicator for DKI Jakarta. The achievements of DKI Jakarta's life-expected has increased from 2018 to 2021 as seen in Figure 7 below.

Figure 7
The Life-Expected Age of DKI Jakarta Residents in 2018-2021 (Years)



Source : BPS, 2021

DKI Jakarta's life-expected age achievement cannot be separated from the health improvement program run by the DKI Jakarta Government.

3. Safety Factor

DKI Jakarta has set a strategy to become a livable city with ICT-based security facilities. This strategy is an effort to realize smart living in DKI Jakarta. In its development, DKI Jakarta realizes Jakarta Safe City by focusing on public safety, health services, the digital world, and infrastructure.

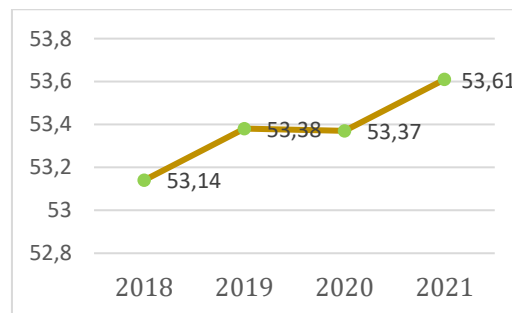
The DKI Jakarta government has made innovations in collaboration with the private sector to improve security for its people. The innovation is JakAman. This innovation is an emergency response application accompanied by ICT so that people

can report crimes or ask for help from the authorities.

An overview of the level of security in DKI Jakarta can be seen based on the city's crime rate figure, which Numbeo has released. This crime index describes the level of all crimes in a particular city or country. The index has a value from 0 to 100.

The crime rate category in DKI Jakarta is moderate and shows an increasing trend based on Figure 8. DKI Jakarta is a city with a low level of security. This condition is caused by the level of security for traveling at night in DKI Jakarta is still in the low category. From Numbeo data for 2022, the safety level for the people of DKI Jakarta for traveling at night is 34.73 (low category). Meanwhile, the level of security for the people of DKI Jakarta for traveling during the day is 65.70 (high category).

Figure 8
Crime Rate of DKI Jakarta in 2018-2022



Source : Numbeo, 2022

Compared to other cities in the world, DKI Jakarta's security ranking is in position 287 out of 422 cities in 2022. DKI Jakarta's security is still far behind compared to 286 other cities worldwide. Therefore, to realize a happily smart city in DKI Jakarta, the city's security needs to be improved by the Government of DKI Jakarta.

4. Culture and Leisure Factor

The DKI Jakarta government has facilitated its people to obtain tourism information that can be accessed by anyone so that it becomes a livable city. In its development, DKI Jakarta has set a strategy so that anyone can enjoy tourism in DKI Jakarta. One of these strategies is the application of Virtual Reality and Augmented Reality.

In developing this strategy, DKI Jakarta has made several innovations in realizing digital tourism. The innovation is to build the Jakarta Virtual Tour. In the Jakarta Virtual Tour, people can travel virtually to enjoy green open spaces in DKI Jakarta and explore the beauty of the Thousand Islands. People in DKI Jakarta can get this facility through the Jakarta Smart City website.

The Jakarta Virtual Tour is carried out through the 360⁰ Virtual Tour. However, the Jakarta Virtual Tour tourist destinations available on the Jakarta Smart City (JSC)

website are still limited. The destinations for the Jakarta Virtual Tour available on the JSC website are as follows:

- a. Small Tidung Island
- b. Pulau Bidadari
- c. Tebet Eco Park

Therefore, the DKI Jakarta Government needs to increase the number of Jakarta Virtual Tour locations both through the website and on social media so that the people of DKI Jakarta can use them in their spare time.

In addition to developing the Jakarta Virtual Tour, the DKI Jakarta government has digitized cultural content so that the public can use it to fill their spare time through a digital library. Digital library is one form of effort in digitizing culture (Fanea-Ivanovici & Pană, 2020). The digital library is known as JakLitera.

JakLitera is an application built to integrate various DKI Jakarta government libraries. Through this application, people can borrow library collections anywhere and anytime. Therefore, with JakLitera, it is hoped that the public's interest in reading the books provided by the DKI Jakarta library will increase. Based on BPS data, in 2018 and 2021, the percentage of people who visit the library still needs to be at least five percent. In 2018 there was 4.22 percent of the people of DKI Jakarta visited the library. Meanwhile, in 2021 only 2.02 percent of the people visited the library. The government's restrictions on community activities due to the Covid-19 pandemic caused a decline in library visitors in 2021

A City with Eco-Friendly and Natural Environment

1. Air Quality Factor

One of the goals of developing a smart city in DKI Jakarta is to improve the quality of the environment so that the city becomes livable and environmentally friendly. In achieving this goal, DKI Jakarta innovates to provide information on air quality through JakISPU. The public can monitor air quality conditions in 5 (five) administrative areas with the DKI Jakarta Environment Agency's air sensors.

Based on the air quality monitoring results in DKI Jakarta by the Jakarta Environment Agency in Table 3, the number of days in the unhealthy category was the highest in 2018 and 2019. However, in 2020 the number of days in this category has decreased. From 2020 to 2021, the number of air quality days in the moderate category is more dominant than the other categories. This figure shows that the air quality in DKI Jakarta has improved.

Table 2
Number of Days According to Air Quality Category in DKI Jakarta 2018-2021

Category	2018	2019	2020	2021
Good	11	2	29	6
Moderate	140	172	244	220
Unhealthy	187	183	90	139
Very Unhealthy	27	8	3	0
Dangerous	0	0	0	0

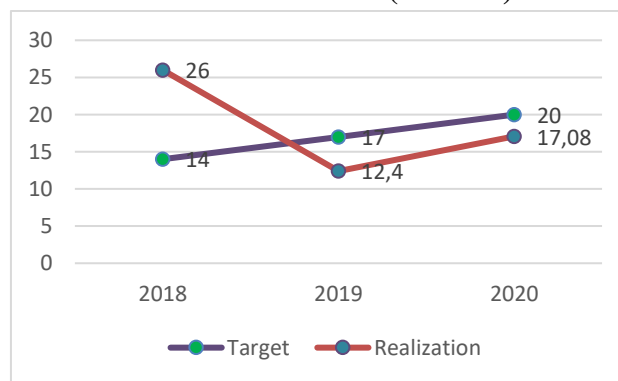
Source : *DKI Jakarta Environment Agency, 2022*

DKI Jakarta's air quality improvement since 2020 has also been affected by the government's restrictions on community activities due to the Covid-19 pandemic. However, in 2021 when the activity restriction policy was relaxed, the number of days with moderate category air quality decreased while the unhealthy category increased. This condition needs attention from the DKI Jakarta government so that air quality in this city continues to improve even though community activities have slowly returned to normal since 2021.

2. Pollution and Waste Treatment Factor

DKI Jakarta has a strategy to optimize waste management in an integrated and modern way. This strategy is part of the smart environment dimension. The realization of this strategy is carried out through the innovation of Digitalisasi Penanganan Sampah. As a new program running in early 2022, the innovation carried out by the DKI Jakarta Government is an effort to optimize waste management in an integrated, effective, and efficient manner based on ICT. In addition, the Digitalisasi Pengangan Sampah program can also be a forum for collaboration between various groups to overcome waste problems.

Figure 9
Targets and Realization for Reducing Waste Volume in 2018-2020 in DKI Jakarta (Percent)



Source : *LKIP DKI Jakarta, 2020*

Based on Figure 9, it can be seen that the achievement of reducing waste volume in DKI Jakarta in 2019-2020 is below the set target. The target of reducing waste has yet to be achieved, causing DKI Jakarta's pollution level to worsen. This condition is illustrated by the increase in the value of the pollution index sourced from Numbeo. The pollution index is compiled based on the level of air pollution, water pollution, and other pollution factors. Based on Numbeo data from 2018 to 2021, the DKI Jakarta pollution index has increased by 2.51 points. In 2021, DKI Jakarta's pollution index reached 84.32, while in 2018 the pollution index value was 81.81 points. Therefore, an effective policy on waste management by the Government of

DKI Jakarta is urgently needed to reduce the level of environmental pollution in this province.

Conclusion

In general, the smart city development mechanism that the Government of DKI Jakarta has carried out has yet to meet the HDSC characteristic criteria, so the happiness of living in this city cannot be fully created. Based on the evaluation, there are two criteria where all the supporting factors are not following the characteristics of HDSC. The criteria are "A City with Efficient and Green Physical Infrastructure" and "A City with Sustainable and Eco-Friendly Natural Environment." Meanwhile, in the criteria of "A City with Labor Friendly and Innovative Economy" and "A City with Inclusive and Attractive Society", at least one factor in each criterion under HDSC characteristics in realizing DKI Jakarta as a happy city.

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