JISDeP
The Journal of Indonesia Sustainable Development Planning

Vol. 4 No. 1
April 2023

The Journal of Indonesia Sustainable Development Planning

E-ISSN: 2722-0842
P-ISSN: 2721-8309

journal.pusbindiklatren.bappenas.go.id

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Cover

Design : Hafidh Aditama

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The Journal of Indonesia Sustainable Development Planning

VOL. 4 NO. 1 - APRIL 2023

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING (JISDeP)

Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/ National Development Planning Agency (Bappenas), Republic of Indonesia

Address : Jalan Proklamasi 70, Central Jakarta, Indonesia 10320

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Fax : +62 21 31928281

E-mail : journal.pusbindiklatren@bappenas.go.id

Available online at

journal.pusbindiklatren.bappenas.go.id

E-ISSN: 2722-0842 (online)
P-ISSN: 2721-8309 (print)

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JISDeP The Journal of Indonesia Sustainable Development Planning

Vol. 3 No. 3 - December 2022
E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Kementerian PPN/ Bappenas

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THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 – APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Editorial Note

Challenges for Sustainable Urban Transformation in ASEAN Countries

Bakti Setiawan

EDITOR

Although in this edition only one paper that specifically examines cities in the Southeast Asia region, I would like to frame this edition in the context of sustainable urban transformation in ASEAN. Cities in ASEAN countries are heading in the cross road. It is projected that urbanization level in ASEAN would be about 55,60 percent in 2030, and this means that about 405 million people will reside and depend their lives on urban environment. While the growth of cities across ASEAN has been broadly linked to increase in prosperity and economic progress, the region's rapid urbanization has also created many negative impacts. Several negative impacts have been documented such as: water and air pollutions, traffic congestions, urban heat islands, climate change, disasters, and social inequality.

The problems of urban water, especially, is addressed in quite detail in the first paper in this edition, entitled "**Assessment of Basin-scale Water Stress using Geographic Information Systems in Southeast Asian Countries with Megacities, by** Taishi Yazawa, Akito Morita, and Toshiyuki Shimizu. In Indonesia, several environmental issues also have been addressed by several papers including "**Village Development Sustainability Analysis: A case study in Cijeruk, Bogor Regency" by** Mujio, Rindiani Agustina Rahayu, Novida Waskitaningsih, and Edy Mulyadi. While issues related to education and happiness is examined in the paper by Hanifah Umi Haryati, on her paper entitled "**The Effect of Education on Happiness, Self-Acceptance, and Family Harmony (Empirical Evidence from Indonesia).** Futher, issue related to the development of the IKN or usantara Capital for Indonesia is also addressed.

Several urban problems in ASEAN including Indonesia cities as illustrated in several papers in this edition, represent challenges faced by urbanization and urban development in ASEAN cities. These problems must be addressed immediately and comprehensively as they are threatening the quality life of urban residents. Cities in ASEAN have an important position and role in the context of global urbanization and urban development. Ensuring sustainable urban transformation in ASEAN can serve as a model for

ARTICLE INFO

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/National Development Planning Agency (Bappenas), Republic of Indonesia

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other cities in different parts of the world. The SDGS and the New Urban Agenda have already provided guidelines for various actions for urban development in ASEAN, but a longer visions as well as collaborative and concrete actions among ASEAN cities are needed to ensure sustainable urban transformation for the whole ASEAN cities.

This edition shows evidences that we need to emphasizes the importance of paying more ***attention to the acceleration of urbanization and urban development in ASEAN. A more appropriate*** direction is needed so that the urbanization and urban development in ASEAN can speed up the achievement of the SDGs and the NUA targets. In this case, it becomes important to strengthen the alignment between urban policies and development strategies.

Furthermore, urbanization and urban development in ASEAN must also be framed into a much longer time frame – it should go beyond 2030. A more comprehensive and longer perspective in ensuring sustainable urban transformation, at least until 2050. In particular, ASEAN should pay more attention to the development of small and secondary cities that have an increasingly important role in ensuring the welfare and justice of all populations in ASEAN. Special attentions, mitigation and adaptation strategies for coastal cities under real threats of climate change and sea-water rise is also a must.

Finally, more effective collaborations in the field of urban development must be further exercised among ASEAAN members to ensure sustainable urban transformation in the region. ASEAN's success in ensuring sustainable urban transformation is important not only for ASEAN, but also for the whole global community. ASEAN must and can be one of the models for sustainable urban transformation, not only for ASIA, but for the entire world as well.

I do hope that several research papers and policy papers in this ediction provide significant contribution in ensuring sustainable urban transformation in ASEAN cities.

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VOL. 4 NO. 1 - APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Research Paper

Assessment of Basin-scale Water Stress using Geographic Information System in Southeast Asian Countries with Megacities

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Abstract

Southeast Asian countries are facing unstable water resource situations, experiencing high water stress as a result in their river basins, particularly around large population cities. This research has assessed basin-scale water stress by estimating the amount of water resources and water use for all river basins in Indonesia, Thailand, the Philippines, Vietnam, and Malaysia. A simple water stress assessment methodology using a Geographic Information System revealed the basins vulnerable to high water stress around the capital areas in all five countries. The population ratio was under high-moderate and high water stress at 29.3% in Indonesia, 41.8% in Thailand, 31.9% in the Philippines, 43.3% in Vietnam, and 19.9% in Malaysia. The results imply that large populations depend on limited water resources. The basin-scale assessment conducted in this research could be used in support of the water resources management planning at an inter-basin scale aiming to neutralize water stress.

Keywords: Geographic Information System (GIS); Megacity; Southeast Asia; Water Resources Management; Water Stress

ARTICLE INFO
Received: January 29, 2023
Received in revised form:
April 06, 2023
Accepted: April 25, 2023

doi: 10.46456/jisdep.v4i1.383

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/National Development Planning Agency (Bappenas), Republic of Indonesia

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Please cite this article in APA Style as:
Yazawa, T., Morita, A., & Shimizu, T. (2023). Assessment of Basin-scale Water Stress using Geographic Information System in Southeast Asian Countries with Megacities. *The Journal of Indonesia Sustainable Development Planning, 4*(1), 1—20. https://doi.org/10.46456/jisdep.v4i1.383

1. Introduction

Among all types of water in the hydrosphere, only about 2.5% is available as freshwater (Shiklomanov and Rodda, 2003). Approximately 70% of freshwater exists as the ice sheets of the Antarctic, the Arctic, and mountain glaciers. Thus, water usage by humans depends on surface water and groundwater resources. Since water resources are limited, managing water resources, including water provision and quality management, to fulfill the water demand has become a fundamental issue, particularly in countries with megacities. This is defined as a city with a population exceeding 10 million (Suzuki, 2019) with a population increase and/or concentration and rapid urbanization (Biswas et al., 2005). The concept expressing the balance between water resources and withdrawal/use has been called water scarcity (Oki and Kanae, 2006; Wada et al., 2011). In the concept of water scarcity, water stress is the indicator that is linked to difficulties in water use and it is expressed by the use-to-availability ratio (Rockström et al., 2009). Water stress occurs when the water use exceeds the available water resources, i.e., volume, during a certain period (Munia et al., 2016). Water stress is considered to be high when the use-to-availability ratio is larger than 40% (Rockström et al., 2009).

The previous studies on assessing water stress have been done at the global, grid/pixel, or country levels. The global- and grid/pixel-level assessments allow us to identify the wide-scale hotspots with social issues, such as poverty and undernutrition, that could be driven by high water stress considering the international migration of people and water (Rockström et al., 2009). Country-level water stress assessment has been mainly used to evaluate food self-sufficiency under climate change and population growth situations (Rockström et al., 2009). For water resource allocation and management, on the other hand, the assessment of water stress at a basin scale is important because the conflict due to water resources would be led by the unfairness of water use between a basin's upstream and downstream (Munia et al., 2016). Cooperation as part of integrated water resource management could be governed by the stakeholders in a basin (Molle, 2009).

In Southeast Asia, major cities such as Jakarta in Indonesia, Bangkok in Thailand, Metro Manila in the Philippines, Ho Chi Minh City in Vietnam, and Kuala Lumpur in Malaysia are already/expected to be megacities with rapid economic development (Suzuki, 2019). Their water resource situations are unstable, occasionally experiencing drought and water shortages because of the monsoonal climate variation and increasing withdrawal of water. High water stress situations have been observed in Southeast Asian countries. The causes of high water stress varied and were, for example, due to climate conditions, such as the El Niño-Southern Oscillation (ENSO) (Wada et al., 2011), high water withdrawal by irrigation (Gheewala et al., 2014), and the deterioration of the water infrastructure (Douglass, 2010).

The studies on basin-scale water stress assessment in Southeast Asia have mainly focused on irrigation and/or agricultural water. For example, Gheewala et al. (2014) assessed the water stress caused by irrigation by considering the irrigation water requirements of multiple crops from 25 river basins in Thailand. The results revealed that the eastern basins of Thailand were under high water stress. A water stress assessment of 13 sub-basins in the Srepok River Basin lying between Vietnam and Cambodia was done by Ty et al. (2012). The research found out the upstream sub-basins faced severe water stress during the dry season under the scenarios considering climate and land use changes as well as population growth. Hanafiah et al. (2019) conducted an estimation of the water used for rice cultivation in 16 watersheds of Peninsular Malaysia and found a high water-stressed area, the northwestern basin, because of the low water availability. In these studies, some suggestions for water resource management, such as an improvement in crop productivity through good agricultural practices (Gheewala et al., 2014), the development of irrigation systems through water storage implementation (Ty et al., 2012; Gheewala et al., 2014), and the enhancement of water conservation and protection by education and demand management (Ty et al., 2012; Hanafiah et al., 2019), were made based on the results of the water stress assessment. Thus, the assessment of water stress will be the nugget of information used to discuss the necessity of proper water resource management in the direction of reducing water stress.

This research estimated the amount of water resources and water use and assessed the basin-scale water stress for all basins in the five candidate countries in Southeast Asia, specifically Indonesia, Thailand, the Philippines, Vietnam, and Malaysia. These countries have large cities that are already or expected to

be megacities with rapid economic development. Water demand/use increases particularly in urban areas because of the population increase and economic activities. The water resource conditions vary because of the monsoon climate. Therefore, integrated water resource management, which considers the water environmental conditions in both the urban and surrounding areas, is needed to ensure a well-balanced, sustainable water supply as intended by Goal 6 of the Sustainable Development Goals (SDGs).

The novelty of this research was the use of the simple-as-possible method utilizing the Geographic Information System (GIS) to estimate the amount of water resources and water use so then water stress could be assessed in the data-scarce areas/basins in Southeast Asia. The previous studies reviewed above have used hydrological and climate models that require parameter calibration and bias correction for the models themselves alongside the local observation data. On the other hand, this research used only the GIS-based spatial information data and the functions packaged in the geoprocessing software. The comprehensive assessment of the basin-scale water stress revealed the basins vulnerable to water scarcity in each country. The methodology used in this research supports water resource management planning not only at a basin scale but at an interbasin scale, particularly around the urban river basins that are susceptible to the rapidly changing demand and varying water resources in Southeast Asia.

2. Study Area

The target area of this research consisted of five Southeast Asian countries, specifically Indonesia, Thailand, the Philippines, Vietnam, and Malaysia. These countries have a megacity or a large city that is expected to become a megacity. Ho Chi Minh City in Vietnam and Kuala Lumpur in Malaysia are projected to become megacities in 2026 and 2032, respectively (Suzuki, 2019; United Nations, 2019), in addition to the existing megacities of Jakarta in Indonesia, Bangkok in Thailand, and Metro Manila in the Philippines. In these areas, higher water stress situations are expected because of an increase in water demand/use under rapid economic development and unstable water resource conditions due to the monsoon climate.

Table 1 shows the general information including the demographic (population) and economic (gross domestic product (GDP)) statistics of the countries in the target areas. The populations have been increasing up to now as the population growth rate is positive across all countries. The urban population ratio has also been increasing. This means that the population has been concentrated in urban areas. The positive and almost constant GDP growth rates show that the economy of these countries is developing and expected to keep growing.

Table 1. Demographic and Economic Statistics of Indonesia, Thailand, the Philippines, Vietnam, and Malaysia

		Indonesia	Thailand	Philippines	Vietnam	Malaysia
Area (km^2)		1,910,931	513,140	300,000	331,236	330,621
Total population (*10^3, as of 2021)		276,362	69,951	111,047	98,169	32,776
Population density (per km^2, as of 2021)		152.6	136.9	372.4	316.6	99.8
Population growth rate (average annual %)	2010	1.3	0.5	1.7	1.0	1.9
	2015	1.3	0.4	1.7	1.0	1.4
	2021	1.1	0.3	1.4	1.0	1.3
Urban population (% of Total population)	2010	49.9	43.9	45.3	30.4	70.9
	2015	53.3	47.7	46.3	33.8	74.2
	2021	56.0	50.7	47.1	36.6	76.6
GDP: Gross domestic product (million US$)	2010	755,094	341,105	199,591	115,932	255,018
	2015	860,854	401,296	292,774	193,241	301,355
	2021	1,119,191	542,017	359,354	261,921	364,684
GDP growth rate (annual %, constant 2015 prices)	2010	6.2	7.5	7.6	6.4	7.4
	2015	4.9	3.1	6.1	6.7	5.1
	2021	5.0	2.4	5.9	7.0	4.3

Source: UNdata (http://data.un.org/)

3. Methods

3.1 Data Collection and Extraction

The data used for the basin-scale water stress assessment is listed in Table 2. In this research, the collected data for the assessment, the basin boundary, weather, and population, was on a global scale and able to be processed using the GIS. Therefore, the necessary data was extracted for the target area using the national border data. The data extraction and analysis in this research was conducted using the ArcMap 10.8 software. The national border information was obtained from the Global Administrative Area Database (GADM) Version 3.6. The GADM provided all country borders as polygon shapefiles. The country border information of the target areas, i.e., the five countries, was downloaded from the GADM website.

The information on the basin boundaries in each country was then extracted using the basin boundary and country border data. The Global Drainage Basin Database (GDBD) developed by the Center for Global Environmental Research at the National Institute for Environmental Studies in Japan was used as the basin boundary data of this research. The GDBD is comprised of six GIS-based data, that is, the drainage basin boundary, river network, discharge gauging station, natural lake, dam lake, and flow direction (Masutomi et al., 2009). For each basin extracted from the GDBD, the amount of water resources and water use were estimated to assess the water stress in the target area of this research.

This research set the year 2013 as the target assessment period for the case study due to the consideration of the comprehensive data availability. The rainfall and temperature data were obtained from the Climate Forecast System Reanalysis (CFSR) of the National Centers for Environmental Prediction (NCEP). The NCEP-CFSR has provided sub-daily weather data since 1979 (Fuka et al., 2013). This research collected daily rainfall and temperature data in 2013 using a 0.3125˚ spatial resolution and calculated the monthly and yearly values for each basin for use in the water stress assessment. The LandScan Global 2013 data provided by the Oak Ridge National Laboratory (Bright et al., 2014) was used to estimate the basin population in 2013. LandScan Global provided the global population distribution data representing the 24-hour average population with a spatial resolution of 30 arc-seconds (Oak Ridge National Laboratory, 2022). The whole data processing flow in this research is depicted in Figure 1. The details are explained in the following sections.

Table 2. Data Used in this Research

Data Type	Data Set	Source/Reference
National border	Database of Global Administrative Areas (GADM)	Global Administrative Areas
Basin boundary	Global Drainage Basin Database (GDBD)	Center for Global Environmental Research Masutomi et al. (2009)
Rainfall Temperature	Climate Forecast System Reanalysis (CFSR)	National Centers for Environmental Prediction (NCEP)
Population	LandScan Global 2013	Oak Ridge National Laboratory, Bright et al. (2014)

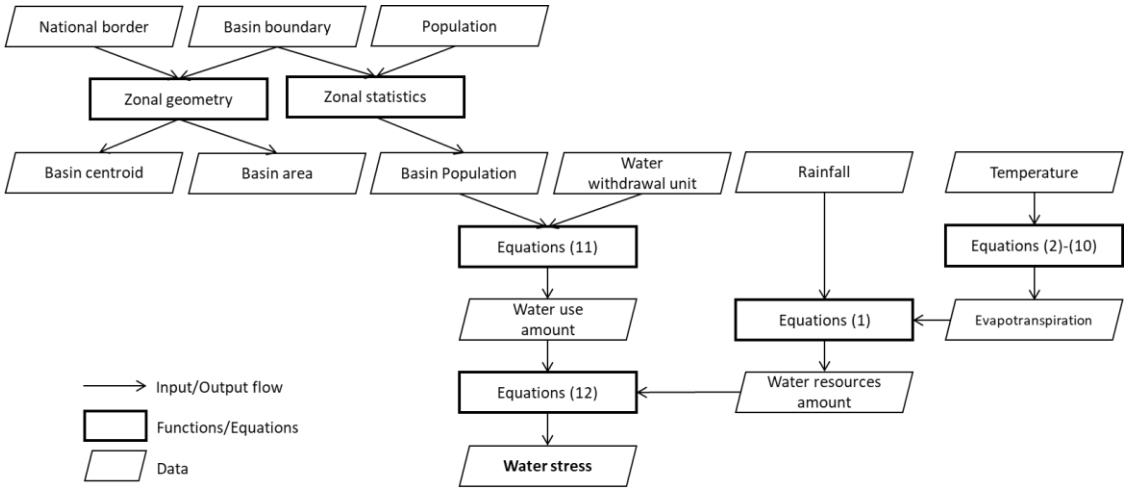

Figure 1. Data Processing Flow Chart of this Research

Source: Authors

3.2 Estimation of Basin-scale Water Resources Amount

3.2.1 Procedure for Water Resource Amount Estimation

This research used the concept of water resource amount as the theoretically available maximum water amount defined by the Japanese Ministry of Land, Infrastructure, Transport, and Tourism (2008). In this concept, the water resource amount is the maximum amount of water that can be used by humans. The water resource amount considers the precipitation/rainfall amount, evapotranspiration loss, and basin area and is estimated using Equation (1):

$$Wr = (P - E_{Ai}) \times Ba \times 1000 \quad (1)$$

Where Wr is the amount of water resources (m^3/year), P is the precipitation/rainfall amount (mm/year), E_{Ai} is the actual evapotranspiration amount (mm/year), and Ba is the basin area (km^2).

To follow Equation (1), the necessary data was drawn from the data shown in Table 2. The collected NCEP-CFSR global weather data, rainfall, and temperature, were set in an array with a 0.3125˚ spatial resolution covering the target area. In this research, the weather information was allocated to each basin based on the distance between the weather grids and the geometric centroid of each basin. The centroid of each basin was obtained from the GDBD boundary information. The nearest weather grid to the centroid of each basin was then calculated using the Near tool on ArcMap 10.8 before being selected as the representative weather station for the basin. The basin areas were calculated using the geoprocessing tool Zonal geometry, based on the GDBD. The estimation method of the actual evapotranspiration amount is explained in the next subsection.

3.2.2 Estimation of Potential and Actual Evapotranspiration Amounts

To estimate the amount of the actual evapotranspiration, the potential evapotranspiration amount was first calculated using the Thornthwaite method in this research (Thornthwaite, 1948). The Thornthwaite method employs empirical equations using temperature and possible sunshine duration as the variables. The Thornthwaite method is easier to apply than other estimation methods such as the Penman-Monteith equation and the Jensen equation (Jensen and Haise, 1963; Steele et al., 1997) for the estimation of the potential evapotranspiration amount in vast areas or data-scarce areas because it technically requires only the temperature data. It is suitable for this research because the target area covers five countries in Southeast Asia. This research first estimated the monthly potential

evapotranspiration amount using Equations (2)-(4) using the average monthly temperature as the input variable:

$$E_{pi} = 0.533 \times D_i \times \left(\frac{10t_i}{J}\right)^{\mathrm{a}} \times 30 \quad (2)$$

$$\mathrm{a} = 0.000000675J^3 - 0.0000771J^2 + 0.01792J + 0.49293 \quad (3)$$

$$J = \sum_{\mathrm{i}=1}^{12} \left(\frac{t_i}{5}\right)^{1.514} \quad (4)$$

Where E_{pi} denotes the potential evapotranspiration amount (mm/month) in month i, D_i is the possible sunshine duration index (12 hours/day is considered as 1) in month i, and t_i is the average monthly temperature (℃) in month i.

In this research, the average monthly temperature (t_i) in 2013 was calculated for each basin based on the temperature data of the NCEP-CFSR. Equation (2), which was used to estimate the monthly potential evapotranspiration amount, includes the possible sunshine duration index (D_i) variable. The Thornthwaite method uses the index (D_i) that considers 12 sunshine hours as 1. Therefore, the possible sunshine duration index (D_i) is calculated by dividing the possible sunshine duration by 12. The calculation of the possible sunshine duration index (D_i) is further explained by the following equations (Kousaka, 2013).

$$D_i = K_i = \sum_{\mathrm{i}=1}^{12} I_i \quad (5)$$

$$I = \frac{N}{12} \quad (6)$$

$$N = \frac{24}{\pi} \times \omega_s \quad (7)$$

$$\omega_s = \arccos(-\tan\Phi\tan\delta) \quad (8)$$

$$\delta = 0.4093 \times \sin\left(\frac{2\pi}{365} \times Ju - 1.405\right) \quad (9)$$

Where D_i is the possible sunshine duration index (/month) in month i, K_i is the sum of the possible sunshine duration (I) in month i, I is the possible sunshine duration index (/day), N is the daily possible sunshine duration (/day), ω_s is the sunset time angle (rad), Φ is latitude, δ is the declination of the sun, and Ju is the Julian day.

After estimating the potential evapotranspiration amount using Equations (2)-(9), the amount of actual evapotranspiration was calculated using Equation (10) which was developed and validated by Kousaka (2013):

$$E_{Ai} = 0.014 \times E_{pi} + 0.68 \times TN_i + 31.61 \times PN_i + 35.39 \quad (10)$$

Where E_{Ai} is the amount of monthly actual evapotranspiration (mm) in month i, E_{pi} is the amount of potential evapotranspiration (mm/month) in month i, TN_i is the standardized average monthly temperature in month i, and PN_i is the standardized average monthly rainfall in month i.

3.3 Estimation of Basin-scale Water Use Amount

3.3.1 Estimation of Basin Population

To estimate the amount of water used for each basin, this research first calculated the basin population using the Zonal statistics on ArcMap 10.8 based on the LandScan Global 2013 data and the GDBD boundary information. The Zonal statistics function is provided via the spatial analyst tool. The population distribution information stored in the LandScan Global 2013 data was masked by the basin boundary information of the GDBD. The gridded population distribution information was then summed for each basin in the target area.

3.3.2 Estimation of Water Use Amount

The amount of water use was estimated by multiplying the calculated basin population by the unit water withdrawal (m^3/capita) by sector i.e., agricultural, domestic, and industrial water withdrawal. The water withdrawal data for each sector was based on the AQUASTAT database provided by the Food and Agriculture Organization of the United Nations (Black, 2016). In this research, the amount of water used by each basin was estimated using Equation (11) (Okabayashi et al., 2020):

$$Wu = (Au + Du + Iu) \times Bp \quad (11)$$

Where Wu is the amount of water use (m^3/year), Au, Du, and Iu respectively denote the unit water withdrawal (m^3/capita/year) of agricultural, domestic, and industrial sectors, and Bp is the basin population.

The dataset for the units of water withdrawal is shown in Table 3. The amount of water withdrawal varies for each country. For example, the total unit water withdrawal in Vietnam and the Philippines is almost double that of Malaysia. In four countries in the target area, Indonesia, Thailand, the Philippines, and Vietnam, agricultural water withdrawal is dominant among the three water sectors.

Table 3. The Units of Water Withdrawn by Three Sectors (Agriculture, Domestic, and Industry) in Indonesia, Thailand, the Philippines, Vietnam, and Malaysia (Black, 2016)

	Indonesia	Thailand	Philippines	Vietnam	Malaysia
Total	526	867	843	948	418
Agriculture	431	784	694	898	93
Domestic	61	41	64	14	146
Industry	34	42	85	36	179

(m^3 per capita)

3.4 Assessment of Water Stress

In this research, water stress was used as an indicator to assess the sustainability of the balance between the amount of water resources and the water use of the basins. Water stress was calculated using Equation (12) based on the estimated amount of water resources and water use at each basin.

$$Ws = \frac{Wu}{Wr} \quad (12)$$

Where Ws is water stress, Wu is the amount of water use (m^3/year), and Wr is the amount of water resources (m^3/year).

By referring to the previous studies (Wada et al., 2011; Munia et al., 2016; Okabayashi et al., 2020), this research set the criteria that the basin shows low water stress if Ws is less than 0.1, low-moderate water stress if Ws is between 0.1 and 0.2, moderate water stress if Ws is between 0.2 and 0.3, high-

moderate water stress if Ws is between 0.3 and 0.4, and high water stress if Ws is more than 0.4. Further analyses were done based on the ratio of the number of basins and the water stress criterion for each country. The ratio of the population affected by each water stress criterion was also calculated for each country based on the LandScan Global 2013 data.

4. Results and Discussions

4.1 Extraction of Basin Information

The basin information in the target area of the selected five countries was extracted from the GDBD using the national border data obtained from the GADM as a mask. As a result of geoprocessing using the ArcMap 10.8 software, 943 basins in Indonesia, 313 basins in Thailand, 105 basins in the Philippines, 190 basins in Vietnam, and 218 basins in Malaysia were extracted as shown in Figure 2. This research estimated the amount of water resources and water use for all 1,769 basins to assess basin-scale water stress.

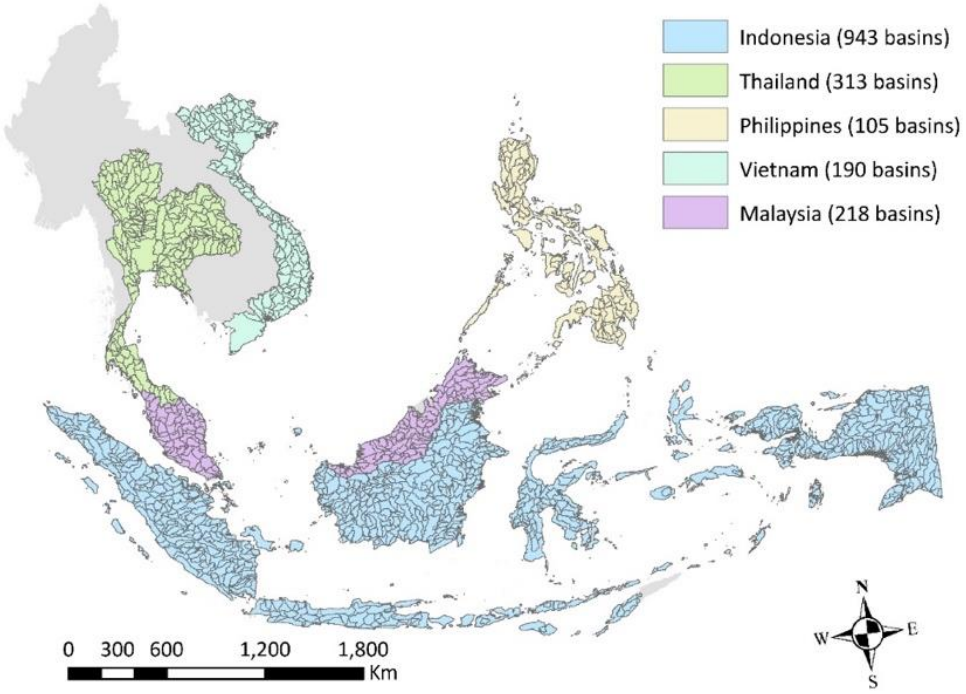

Figure 2. Extracted Basins in the Target Areas (Indonesia, Thailand, the Philippines, Vietnam, and Malaysia)

Source: Authors' Analysis

The basin population was then calculated using the Zonal statistics as shown in Figure 3. A high basin population was confirmed for the basins mainly where the capital cities are located. In Indonesia, for example, most of the basins on the island of Java, where Jakarta is located, showed a high population. In the same manner, the population was concentrated in the basins around Bangkok in Thailand, Metro Manila in the Philippines, Hanoi and Ho Chi Minh City in Vietnam, and Kuala Lumpur in Malaysia. This situation of the concentrated population in the capital areas affects the concentration of water usage and might cause high water stress in the capital areas.

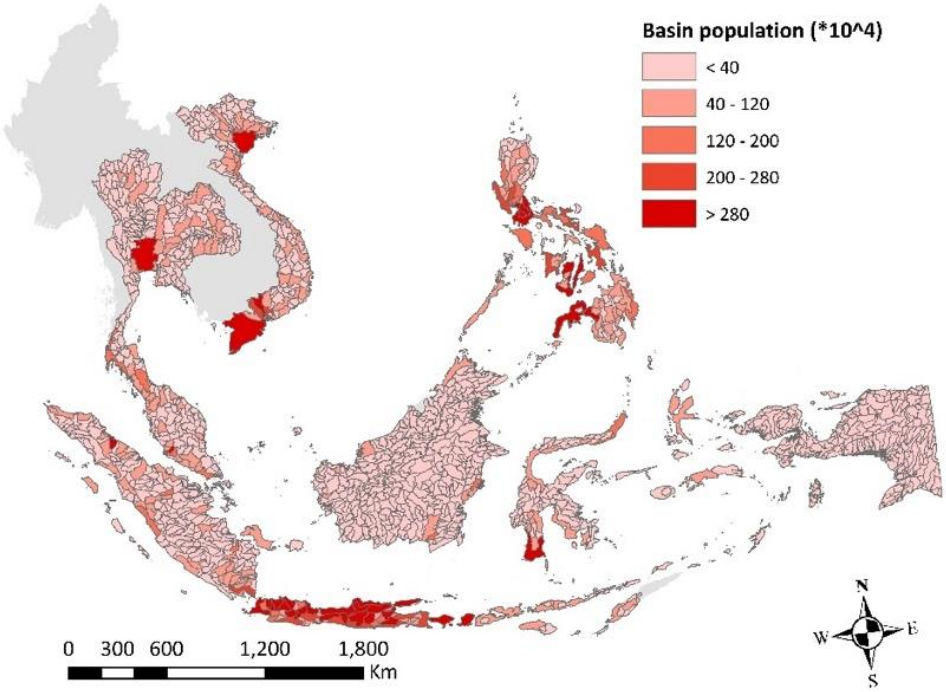

Figure 3. Basin Population in the Target Areas (Indonesia, Thailand, the Philippines, Vietnam, and Malaysia)

Source: Authors' Analysis

4.2 Estimation of the Water Resources Amount

The water resources amount was estimated based on the amount of rainfall and actual evapotranspiration. This research obtained the necessary weather data, specifically rainfall, and temperature, from the NCEP-CFSR and allocated a corresponding weather grid based on the nearest distance to the centroid of each basin. Figure 4 shows the spatial distribution of the total rainfall (mm/year) for the year 2013 in the target area. The annual rainfall amount in 2013 was relatively high near the equator in the target area. Some existing climatic conditions and weather systems, such as northeasterly winds (Chang et al., 2005), the Borneo Vortex (Tangang et al., 2008), and the easterly winds influenced by the Madden-Julien Oscillation around Java (Salahuddin and Curtis, 2011) affect the monsoonal rainfall in this area (Chen et al., 2013; Yazawa, 2017; Yazawa and Shimizu, 2020). In addition, the amount of total rainfall was high in the Philippines and Vietnam since there were some typhoons in the Pacific Ocean and South China Sea in 2013 as well. It should be noted here that the NCEP-CFSR tends to overestimate rainfall in some regions, for example, in Bolivia (Blacutt et al., 2015) and China (Zhu et al., 2016). Thus, the amount of rainfall and eventual water resources estimated in this research might be overestimated in the target area.

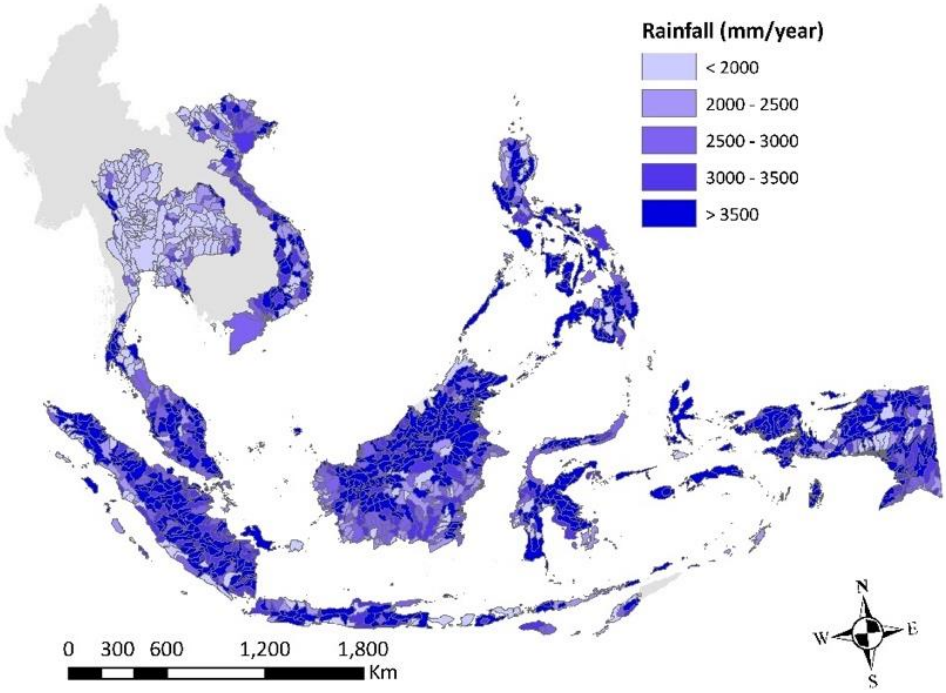

Figure 4. Annual Rainfall (mm/year) of the Year 2013 at Each Basin in the Target Area (Indonesia, Thailand, the Philippines, Vietnam, and Malaysia)

Source: Authors' Analysis

The spatial distribution of the amount of annual actual evapotranspiration is shown in Figure 5. More than 50% of the basins in Indonesia and Malaysia exceeded 1,000 mm/year of annual actual evapotranspiration. Based on Equations (2)-(9), the low-latitude areas had a longer possible sunshine duration and thus showed a higher amount of actual evapotranspiration. The results of the estimated actual evapotranspiration amounts in Indonesia and Malaysia showed relatively higher values than the other countries. In the northern middle of Thailand, i.e., around the Chao Phraya River Basin, the estimated actual evapotranspiration amount in the year 2013 was the highest in the target area because of the high average temperature.

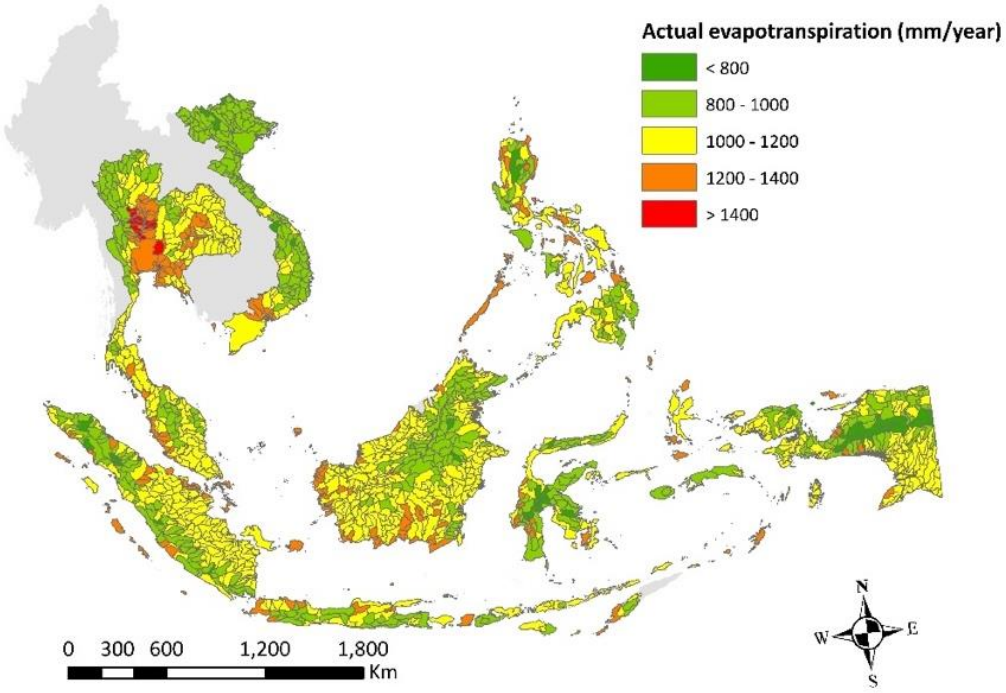

Figure 5. Annual Actual Evapotranspiration Amount (mm/year) for Each Basin in the Target Area (Indonesia, Thailand, the Philippines, Vietnam, and Malaysia)

Source: Authors' Analysis

Figure 6 shows the distribution of the water resources amount (m^3/year) in the target area. Although basins with relatively high amounts of actual evapotranspiration were dominant in Indonesia and Malaysia, a high amount of water resources was estimated because of the large rainfall amount as shown in Figure 4. The amount of water resources in northern Thailand was lower than in the southern area of the country. This is because of the low annual rainfall and high actual evapotranspiration in northern Thailand according to the results shown in Figures 4 and 5. Because of the high rainfall amount that might be caused by the typhoons in Southeast Asia in 2013, a high amount of water resources was estimated, particularly in the Philippines. In this research, the assumption of the water resources amount estimated by Equation (1) included the amount of water that could not be actually used because of the water discharged as floods caused by heavy rain and typhoons. As a limitation and in relation to the future work following this research, the water discharged by storm events should be separated to accurately estimate the available water resources.

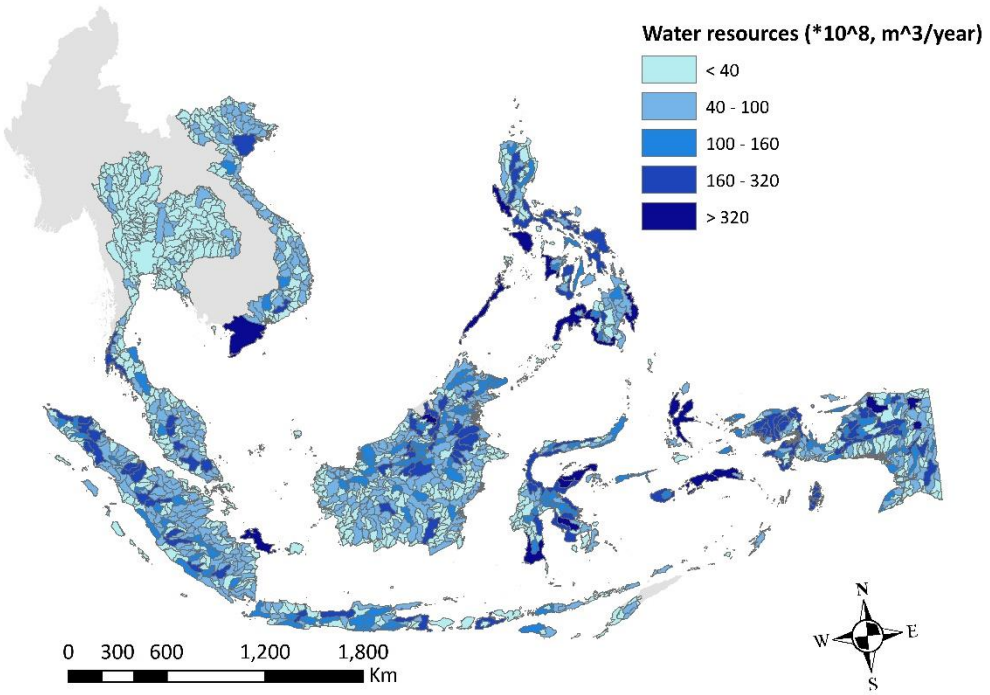

Figure 6. Water Resource Amount (m^3/year) Estimated For Each Basin in the Target Area (Indonesia, Thailand, the Philippines, Vietnam, and Malaysia)

Source: Authors' Analysis

4.3 Estimation of the Water Use Amount

The distribution of the estimated water use amount (m^3/year) in the target area is shown in Figure 7. Since the amount of water use was proportional to the basin population based on the assumption of Equation (11), the high amount of water use was estimated for the basins where the capital cities are located. The unit water withdrawal shown in Table 3 was comparatively high in Thailand, the Philippines, and Vietnam. There were high-population basins with high water use amount in these three countries. These countries had a high agricultural water use compared to Indonesia and Malaysia. This could be the result of the high consumption of water for rice cultivation and production (Tabbal et al., 2002; Gheewala et al., 2014). The total unit water withdrawal in Thailand was the second largest among the target five countries (Table 3). The population in Thailand was concentrated in the northern middle basins, i.e., around Bangkok. Therefore, the basins around Bangkok, such as the Chao Phraya River Basin, showed a high amount of water use as shown in Figure 7.

The amount of water use assumed using Equation (11) in this research, depending on the basin population only to simplify the estimation. However, in the countries in the target area, the water used for agriculture, e.g., crop production, has been dominant in terms of water consumption (Tabbal et al., 2002; Gheewala et al., 2014). Thus, the assumption of the estimation of water use amount could be the other limitation of this research. This needs to be updated since the estimation did not consider different land use situations.

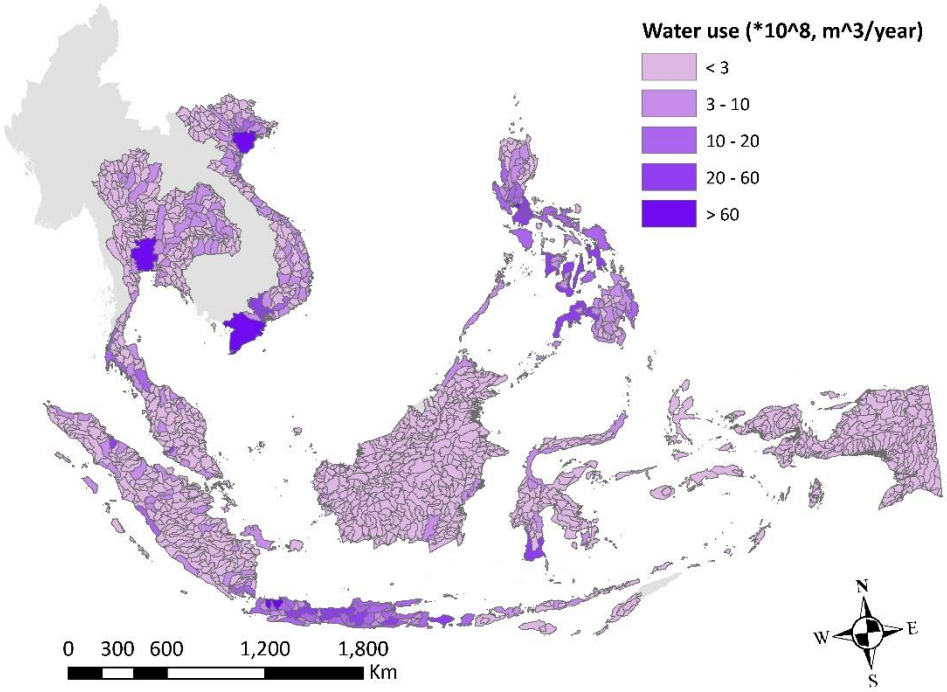

Figure 7. Water Use Amount (m^3/year) Estimated For Each Basin in the target Area (Indonesia, Thailand, the Philippines, Vietnam, and Malaysia)

Source: Authors' Analysis

4.4 Assessment of Water Stress

4.4.1 Spatial Distribution of Basin-scale Water Stress in Each Country

Water stress was assessed for all basins in the target area. Figures 8 to 12 show the results of the spatial distribution of water stress regarding basins in Indonesia, Thailand, the Philippines, Vietnam, and Malaysia. Figure (b) shows the water stress of the basins around the existing/expected megacities, i.e., Jakarta in Indonesia, Bangkok in Thailand, Metro Manila in the Philippines, Ho Chi Minh City in Vietnam, and Kuala Lumpur in Malaysia.

In Indonesia, the basins with high-moderate and high water stress were mainly concentrated on the island of Java where the capital of Jakarta is located, as shown in Figure 8. Since the amount of rainfall was high in Indonesia, the high water stress in Java was caused by the high amount of actual evapotranspiration, which was affected by latitude. The amount of water use was proportional to the basin population. Since Jakarta has become a megacity, water-related issues including groundwater depletion and water quality degradation have been raised through the rapid population increase (Douglass, 2010). Thus, the high water stress concentrated in the capital region, i.e., the results shown in Figure 8(b), has to be taken into consideration as part of the sustainable water management of Indonesia.

The basins in Thailand showed high water stress, particularly in the northern middle area of the country (Figure 9). Most of the basins with high water stress belong to the Chao Phraya River Basin. In said area, the low amount of water resources caused by the low annual rainfall and high actual evapotranspiration was confirmed in Figures 4, 5, and 6. Moreover, the population was concentrated on the basins around Bangkok as shown in Figure 3 since there is not only the capital area but also an industrial park. This caused a high amount of water use (Figure 7). Thus, high water stress was confirmed around Bangkok as shown in Figure 9(b). According to the previous study (Haddeland et al., 2006), the northwestern area of Thailand, i.e., basins belonging to the Mekong River Basin, showed the high irrigation water requirements and an incremental increase in evapotranspiration. Therefore, there is a possibility that the actual water stress around this area might be higher than the results of this research. Furthermore, a long-term assessment is needed since this research used data from only one year.

High water stress was confirmed in some of the basins on the islands of Luzon and Mindanao in the Philippines (Figure 10). Although the Philippines suffered from typhoons in 2013, the basins with high water stress showed a low amount of rainfall, a high amount of evapotranspiration, and eventually a low amount of water resources. On the other hand, the amount of water use was relatively high because of the large basin population. As shown in Figure 10(b), Metro Manila was at the center of the high water stress, while the surrounding regions showed moderate water stress. There is the possibility that the basins with moderate water stress will become high-water stress areas if the economy keeps developing and the urban area expands. There have been some discussions on the necessity of new water resources for Metro Manila from the surrounding regions with the response being to construct water infrastructures (Catindig-Reyes, 2019; Yazawa and Honda, 2021). This result also suggests preparing for additional water resources to neutralize the high water stress in the capital area.

The distribution of water stress in Vietnam (Figure 11) showed clear results for there being high basin water stress around the two large cities, Hanoi in the north and Ho Chi Minh City in the south. The amount of water resources in the basins around these cities was higher than in the other areas in Vietnam, as shown in Figure 6. However, the amount of estimated water use was also high because of the dense population. The basins around Hanoi are a part of the Red River Basin where both a city and an agricultural area are located. The current high water stress might deteriorate if the population increases or the economy develops without a management strategy in place. Ho Chi Minh City, as previously mentioned, has been expected to become a megacity with an increase in population. The basins around the city already show high water stress as shown in Figure 11(b). Thus, the water stress would be worsened if proper water resource management is not conducted.

The distribution of water stress in Malaysia is shown in Figure 12. The basins in the west of the Malay Peninsula, where Kuala Lumpur is located, show the only high water stress in the country. In Malaysia, the urban population accounts for more than 70% of the total population of the country, according to the 2010 Census (Department of Statistics Malaysia, 2011). The situation of having an urban dense population has caused a high amount of water use, thus the high water stress in the capital area [Figure 12(b)]. For the capital region of Malaysia, the inter-basin and interstate water transfer project, e.g., the Pahang-Selangor raw water transfer project, has been conducted to deal with the water shortage issue (Yazawa, 2017). This could be an example of good practice for urban basins with a high water stress in other countries.

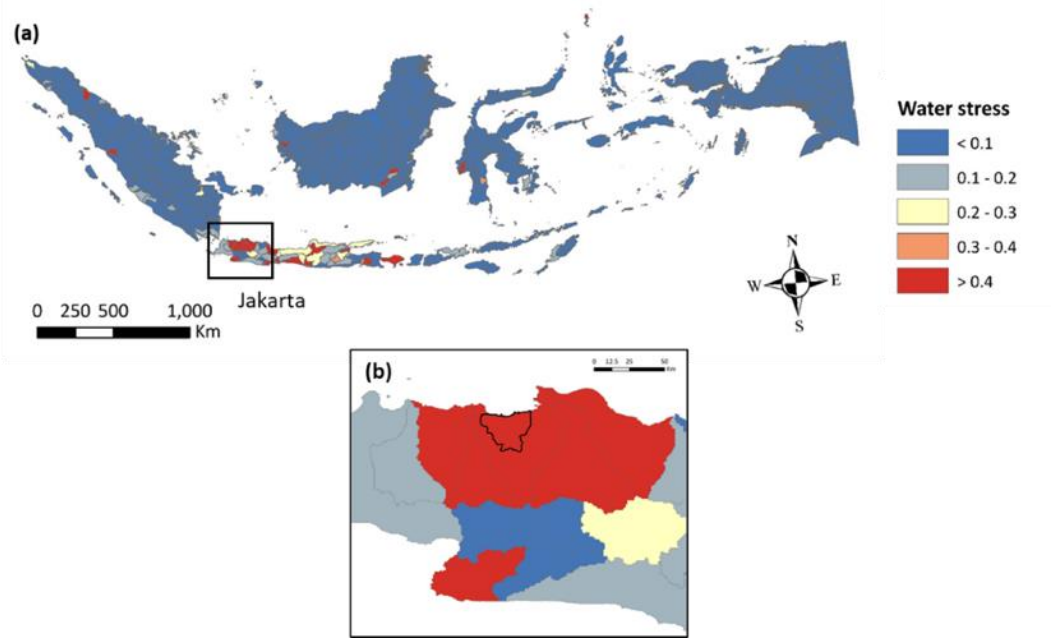

Figure 8. Water Stress (a) of Each Basin in Indonesia and (b) of the Basins Around Jakarta

Source: Authors' Analysis

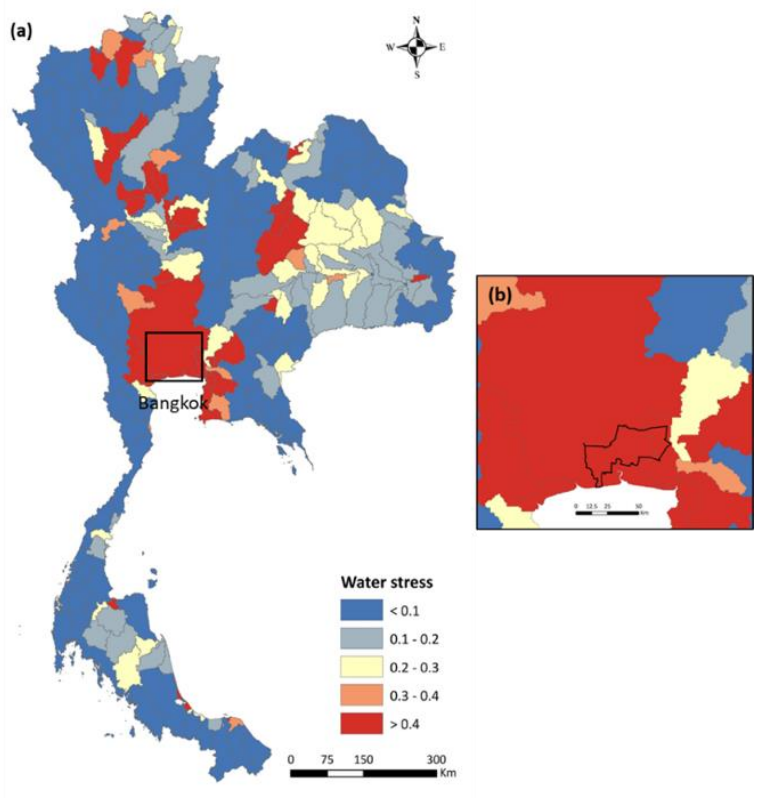

Figure 9. Water Stress (a) of Each Basin in Thailand and (b) of the Basins Around Bangkok

Source: Authors' Analysis

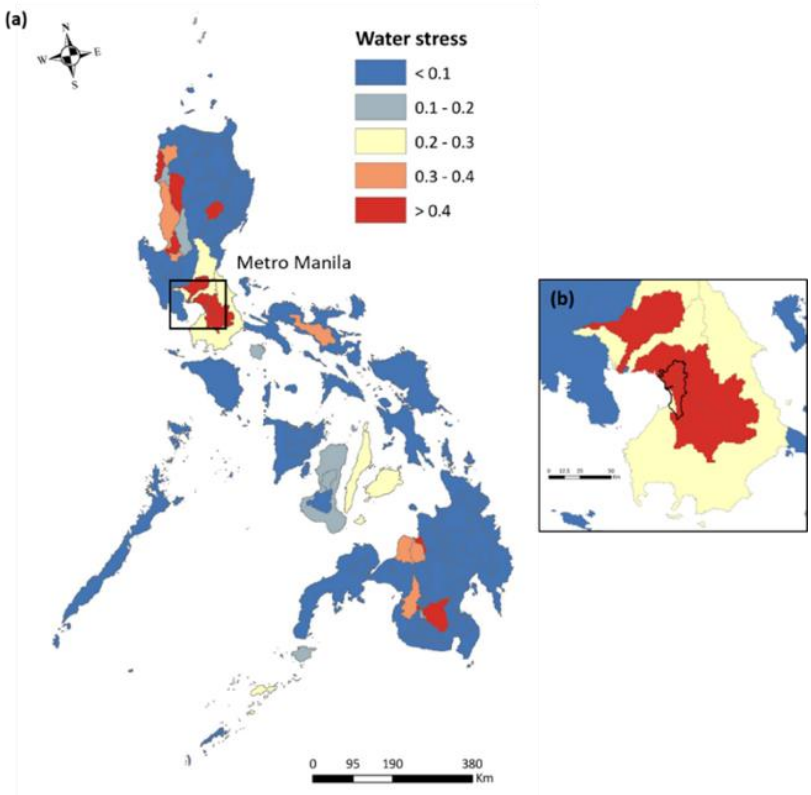

Figure 10. Water Stress (a) of Each Basin in the Philippines and (b) of the Basins Around Metro Manila

Source: Authors' Analysis

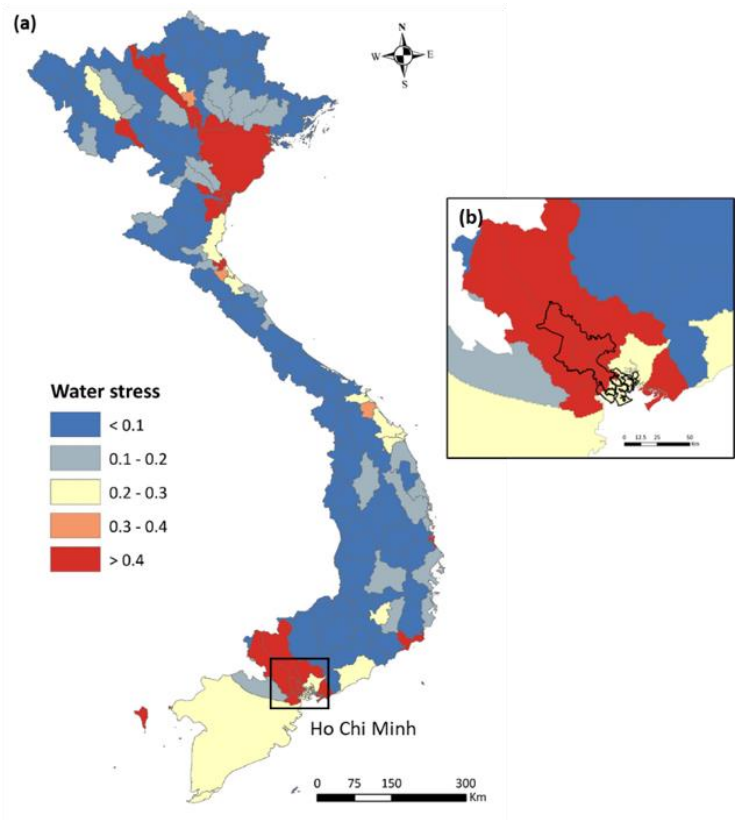

Figure 11. Water Stress (a) of Each Basin in Vietnam and (b) of the Basins Around Ho Chi Minh City

Source: Authors' Analysis

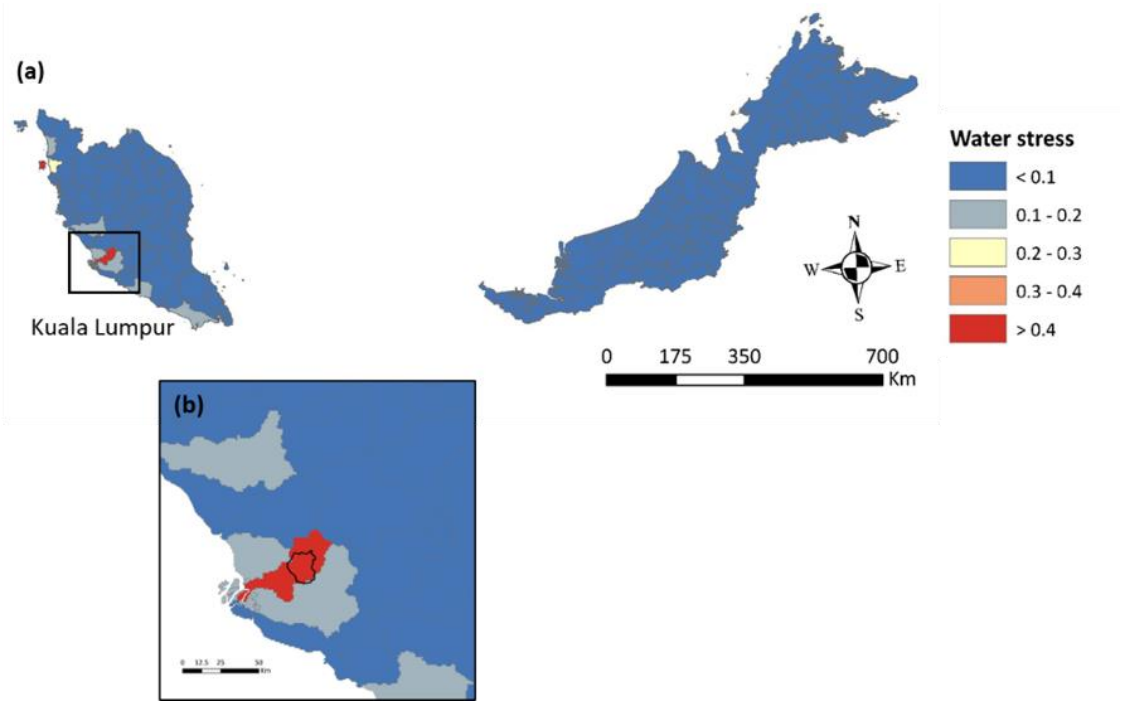

Figure 12. Water Stress (a) of Each Basin in Malaysia and (b) of the Basins Around Kuala Lumpur

Source: Authors' Analysis

4.4.2 Ratios of Basins and Populations under Water Stress

Figure 13 shows the ratio of the basins and populations under each water stress criterion. Based on the ratio of the basins, 96.9% of basins were under less than moderate water stress (i.e., Ws < 0.3) in Indonesia. The remaining 3.1% of basins in Indonesia showed high-moderate and high water stress (i.e., $Ws \geqq 0.3$). The ratio of the population in Indonesia under high-moderate and high water stress was 29.3%. In the same manner, the ratios of the basins under high-moderate and high water stress were 15.3% in Thailand, 19.0% in the Philippines, 15.3% in Vietnam, and 1.4% in Malaysia. The ratios of the population under high-moderate and high water stress were 41.8% in Thailand, 31.9% in the Philippines, 43.3% in Vietnam, and 19.9% in Malaysia. In all countries in the target area, the ratio of the population under high-moderate and high water stress became higher than the ratio based on the number of basins. These results indicate that a dense population causes a higher level of water stress because of the high amount of water use and concentration of the population around the high water stress basins, which are usually around a capital area. This implies that the high population depends on limited or specific water resources.

The basins with moderate water stress, particularly around the capitals, have the potential to be highly water stressed areas with a more affected population if the urban areas expand as part of economic development. In the target area, monsoonal rainfall brought with it high amounts of rainfall and thus high water resources in most of the basins. On the other hand, the amount of water use, which was mostly determined by basin population in this research, was also high in the basins around the cities. This caused high water stress in the basins around the capital areas of each country. To neutralize the water stress in the capital basins through the consideration of the population concentration in the capital areas and the impacts of climate change, water resources management plans, including infrastructure construction (e.g., water transfer, the addition of water resources, etc.) to increase the amount of water recourses available and technology development and education (e.g. water conservation, etc.) to change the water withdrawal, are needed.

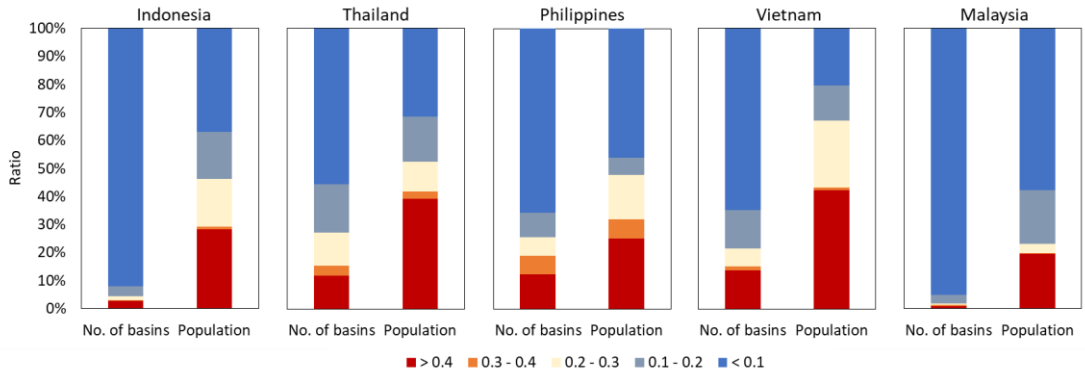

Figure 13. Ratio of Basins and Populations under Each Water Stress Criterion in Indonesia, Thailand, the Philippines, Vietnam, and Malaysia

Source: Authors' Analysis

Conclusions

This research assessed basin-scale water stress by estimating the amount of water resources and water use for all 1,769 basins in Indonesia, Thailand, the Philippines, Vietnam, and Malaysia. In all five countries, the basins around the capital areas showed high water stress as the amount of water use amount exceeded 40% of the amount of water resources available. The comparison between the ratios of the basins and the populations under high-moderate and high water stress revealed that the high population depends on limited or specific water resources. Proper water resources management plans are needed to neutralize the water stress while considering the developing economy and changing climate

in the capital basins. Overall, water balance analyses using basin-scale water stress enable water resource planning on a larger scale, considering multiple basins in a country.

This research used the Thornthwaite method to estimate the potential evapotranspiration amount and the empirical method to calculate the actual evapotranspiration amount without the consideration of land cover differences. Therefore, the validation of the estimated evapotranspiration amounts is needed in future work. In addition, the detailed water utilization/demand, such as virtual water, should be taken into consideration for use in a more accurate calculation since the estimation of the amount of water use depends on the basin population and the determined unit water withdrawal in this research. Finally, the assessment of the basin-scale water stress conducted in this research used only one year's worth of data. Further scenarios using long-term multiple data sets are important to investigate the uncertainties of the water stress assessment. Thus, the main data sets, such as the basin boundary, weather, and population information, must be updated in future analyses.

Acknowledgments

This research was supported by the AY2020 research promotion program of Ritsumeikan University. We would like to thank all supporters and reviewers for their valuable comments on this research.

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THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 - APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Research Paper

Nusantara Capital City (IKN): Threats and Defense Strategies for Indonesia's New Capital

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Abstract

Jakarta, as the current state capital of Indonesia, plays an important role as the center of government and economy. However, due to several problems in Jakarta, the government has considered relocating the capital city to other regions. The President of Indonesia, Jokowi, has expressed his intention to move the capital city to Kalimantan Island. This relocation has raised concerns about defense policy. This research aims to identify the threats that may arise in the proposed new capital city, Nusantara Capital City (IKN), and to propose strategies to overcome them. The methods used in this research include a qualitative approach based on documented perceptions, assumptions, and judgments among Indonesia's leaders and a quantitative approach to mapping the comparative postures of relevant defense figures. The results indicate that the highest threat in IKN comes from the air (combat, UAV, ICBM's), while the low-level threat is the location of IKN, which is near the borders, and FIR coincides with the IASL. The critical aspect of defending IKN would be to strengthen national defense diplomacy in the region. In conclusion, this research provides insight into the potential threats to the proposed new capital city and suggests strategies to mitigate them.

Keywords: Capital City; Defense; Nusantara Capital City (IKN); Policy; Threat

ARTICLE INFO
Received: March 21, 2023
Received in revised form: April 06, 2023
Accepted: April 25, 2023

doi: 10.46456/jisdep.v4i1.420

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/National Development Planning Agency (Bappenas), Republic of Indonesia

Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
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Supported by Indonesian Development Planners Association (PPPI)

Please cite this article in APA style as:
Praditya, E., Suprapto, F.A., Ali, Y., Surjaatmadja, S., & Duarte, R. (2023). Nusantara Capital City (IKN): Threats and Defense Strategies for Indonesia's New Capital. *The Journal of Indonesia Sustainable Development Planning*, *4*(1), *21—34*. https://doi.org/10.46456/jisdep.v4i1.420

1. Introduction

The capital city of Indonesia, Jakarta, has a crucial function as the center of government and economy, which is legally protected. (Hutasoit, 2018; Saraswati & Adi, 2022). This role of authority leads to an increased population in Jakarta. According to Badan Pusat Statistik [BPS] (2021), the population in Jakarta reached 10.64 million, but this surge in population has not been accompanied by environmental capabilities (Yahya, 2018). This has resulted in Jakarta being one of the most densely populated cities in the world, and its population is expected to reach 30 million by 2030 (Takagi et al., 2016).

Jakarta is facing significant environmental challenges that have emerged as a result of population growth and rapid development. Jakarta has been facing many urban development issues, for instance, land subsidence. The rate of land subsidence in Jakarta was reported at about 1-15 cm/year (Abidin et al., 2011). This, coupled with a sea level rise of 3.6 mm/year along the coastal areas, has led to predictions that Jakarta will sink by 2050. Several problems, mainly environmental issues, are still found in Jakarta, for instance, floods that have hit Jakarta since the 2000s, urban heat, and pollution (Gavrila & Rusdi, 2020; Hamdani, 2020; Pratiwi & Rahajoeningroem, 2020).

Furthermore, Jakarta has been burdened with numerous issues, ranging from traffic congestion to environmental concerns. In 2019, before the COVID-19 pandemic, TomTom Traffic ranked the most crowded city in the world based on each city's index, and Jakarta ranked 10th in the ranking, and in 2018, it was the 7th most crowded city. Nevertheless, traffic slowdown due to crowding in the capital has stagnated at 53% since 2018. This shows that there has been no improvement in the level of congestion in Jakarta. The Big Durian has been ranked Jakarta as the world's most environmentally vulnerable metropolitan due to climate change, pollution, heatwaves, earthquakes, and flooding posing significant risks to its residents and businesses (Indonesia Water Portal, 2021). The condition in Jakarta is not ideal for a capital city as the center of government and economy (Hafidz & Kurniawan, 2020). The intricacy of those several problems in Jakarta leads the government to relocate the role of Jakarta as the center of state government to another region. Relocation of the government is intended to realize a balance between regions in terms of their growth rate, strengthening the national economy, and maintaining national growth efficiency (Adinugroho et al., 2022).

Several parties initiated the idea of moving the capital city several years ago (Kurniawan et al., 2021). In 2019, the Government of the Republic of Indonesia decided to relocate the capital city to a new location outside of Java (Natasuwarna, 2019). During the National Day Speech before the Indonesian National Parliament (DPR) and The Senates (DPD) joint session on August 16, 2019, President Jokowi announced that he intended to move the capital city of Indonesia to Kalimantan Island. The President emphasized that the new capital would serve as a symbol of national identity and a representation of the nation's progress. It is hoped that the location of the new capital city in the middle of Indonesia can realize economic equity, justice, and development for the sake of the vision of an "*Indonesia Maju*." Indeed, the new capital city was intended not only as a national identity but as a demonstration of the nation's progress by implementing a modern, smart, and green city concept, using new and renewable energy, not depending on fossil energy. Relocation of the capital city will not absorb a large amount of the State Revenue and Expenditure Budget (APBN). The relocation is expected to be accomplished by encouraging participation from the private sector, state-owned enterprises (BUMN), as well as through the Public Private Partnership (PPP) scheme (Kementerian Sekretariat Negara Republik Indonesia, 2019; Mujiono & Sagena, 2020; Saputra & Halkis, 2021; Purnama & Chotib, 2023).

The new capital would be named Nusantara Capital City or Ibu Kota Nusantara (IKN), located in the Province of the East Kalimantan, at Makassar Street, in the part of Penajam Paser Utara Regency and Kutai Kartanegara Regency. The location and development of the IKN have been supported by two key policies, The New Capital IKN Act (2022) and The Details of the New Capital City Master Plan (IKN) Act (2022), which details the stages of the construction of IKN projected to be completed by 2045. The reason for the government to move the capital city to East Kalimantan is that, geologically, it is not included in the mount volcano route, so the disaster risk is decreased (Kurniadi, 2019; Kodir, 2021). According to The New Capital IKN Act (2022), at least there are two main reasons for moving the capital city from Jakarta to East Kalimantan. First, to change the development orientation from Java to outer Java. The economic, social, and infrastructure between Java and outer Java are enormous. As Java became the center of Indonesia, the national population and its productivity centralized in Java. The moving of the capital city from Java to Kalimantan is believed to make balance the development and its products and derivates among islands.

Therefore, the agenda for moving the nation's capital is to spread and make the nation's development equal (Kementerian Komunikasi dan Informatika Republik Indonesia, 2019). Second, to have a nation's capital that is environmentally healthier. Jakarta is also struggling under a huge environmental burden. Air quality in the city has plunged over the last few months.

According to The Details of the New Capital City Master Plan (IKN) Act (2022), the development of IKN is planned to be completed in five phases: phase I from 2022 to 2024, phase II from 2025 to 2029, phase III from 2030 to 2034, phase IV from 2035 to 2039, and phase V from 2040 to 2045, as illustrated in Figure 1. The nearest target –as President Jokowi's terms would be ended in October 2024—is to complete the first phase of the development. He also intends to celebrate the Independence Day anniversary on August 17, 2024, in the new capital city.

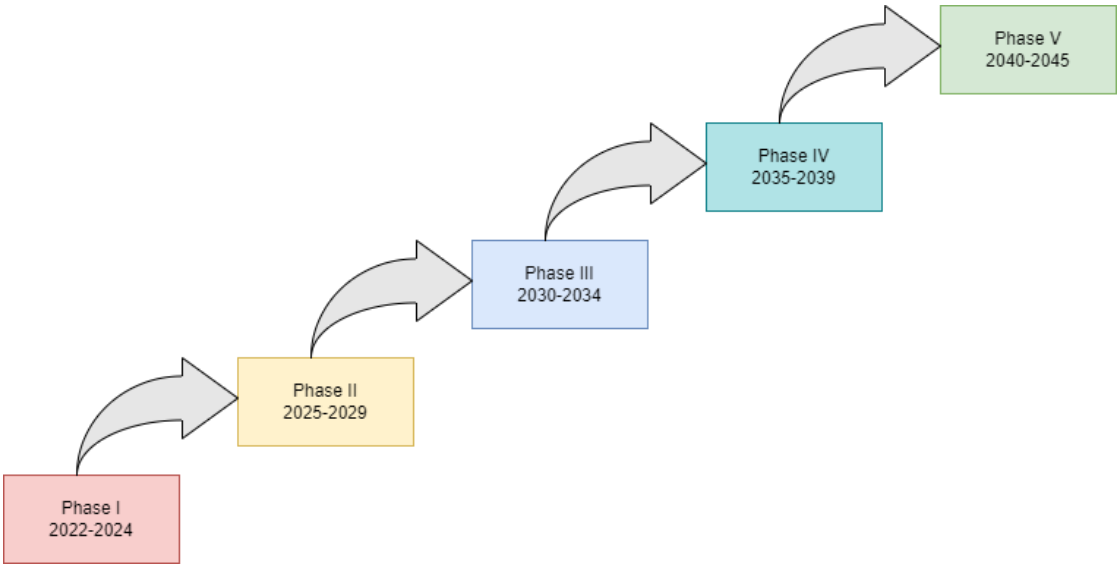

Figure 1. Phases of IKN's Development

In Phase 1, government office buildings, housing for the state civil apparatus (ASN), and the TNI and Polri will be built, including all necessary environmental infrastructure, public social facilities, and elements of defense and security for site security (based on the defense and security human resources and equipment/weaponry, nonmilitary or defense and combat infrastructure). The first group of people to move to the Archipelago Capital City in Stage 1 (in 2024) will include ASN ministries/agencies, employees of Independent State Institutions/Public Agencies, TNI, Polri, as well as other elements of defense and security, and their family members. Workers in various service sectors and other support (e.g., construction, accommodation, food, beverage, and retail) will also be part of the first group. The total population of the Archipelago Capital City and its existing citizens is projected to be around 488,409 people by 2024.

In Phase 2, the main infrastructure is targeted to be ready to connect to the new area. In Phase 3, several infrastructures are targeted to be completed, such as mass public transportation, wastewater treatment plants, drinking water treatment plants, and supporting facilities for Sponge City. This phase also targets the availability of waste processing and the addition of digital and urban amenities. In Phase 4, the development of education and health is expected to progress rapidly, while in Phase 5, it is hoped that the development of IKN will reach a peak marked by sustainable industrial development and stable population growth.

As the new capital city, IKN prioritizes a robust military defense agenda. The capital city represents two important roles, namely as a symbol of the nation's sovereignty and as the main strategic infrastructure since the leaders of the state work in the city. Therefore, managing the capital city's military defense is a clear and present agenda (Aldilla & Michael, 2022). Defense and security will play a crucial part in achieving the expectations set by IKN. Previous studies related to defense and security in the new capital city have been conducted, such as Sensuse et al.'s (2022) initial cybersecurity framework in IKN.

However, studies about military defense in the new capital city involving the perspectives of several actors from various agencies and institutions have not been widely implemented.

The relocation of Indonesia's capital city from Jakarta to East Kalimantan, as per the government's plan, has been outlined in The General Policy on State Defense (Jakumhaneg) (2021) for 2020-2024 Act. This decree stipulated that the institutional development of the national defense directed toward optimization, arrangement, and creation of an integrated military and nonmilitary defense system in the management of state defense through the arrangement of the integrated military defense system in the East Kalimantan as the province of the new capital city. The key questions that arise are the potential defense threats to the new capital, the defense strategy to counter these threats, the current quality of the defense capability, and the agenda to bridge the gap between the response plan and the existing capability.

The questions that have been raised are of utmost importance, given the critical nature of state sovereignty. Clausewitz (2008) argued that victory could be achieved by preventing the enemy from reaching their objectives and striking at their communications before they can reach their target. For instance, if the enemy's capital is their main objective and the defender has not taken up a position between the city and the attacker, the latter would be making a mistake if they advanced straight toward the city. Instead, they would be better off targeting the communication lines between the enemy army and its capital to achieve a victory that would lead them to the city (Clausewitz, 2008). Clausewitz suggested the following measures to defeat the enemy: (a) Devastate their army, if it is significant; (b) Seize their capital, if it is not only the center of administration but also that of social, professional, and political activity; and (c) Deliver an effective blow against their principal ally if that ally is more powerful than the enemy (Clausewitz, 2008). De Jomini expressed similar views, stating that all capitals are strategic points because they are not only centers of communication but also seats of power and government. The capital, considered the seat of power, becomes the primary objective point of defense, but there may be other points, such as the defense of a first line and the first base of operations (de Jomini, 2008). Therefore, the capital is generally the center of national power (de Jomini, 2008).

This study aims to observe and analyze the military defense of the new capital city and involve the perspectives of several actors from various agencies and institutions. The objectives of this research are to identify the real defense threats for the Nusantara Capital City, which will be located in East Kalimantan, to determine the defense strategy to respond to the threats, to assess the quality of the existing defense capability, and to identify the agenda to bridge the gap between the strategic response plan and the existing capability. Another objective of this research is to identify potential threats that may arise in Nusantara Capital City (IKN) and to develop a strategy to overcome them.

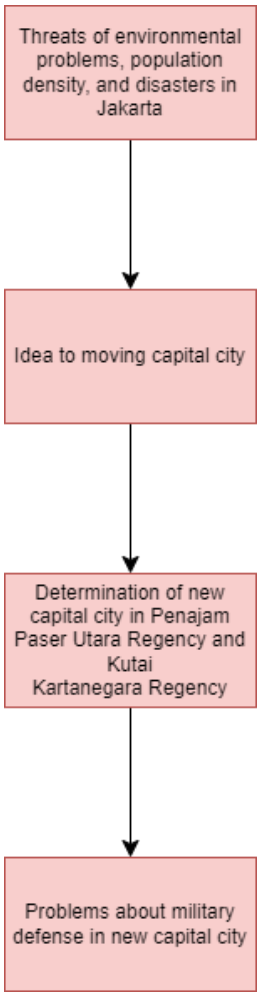

Figure 2. Research Framework

2. Methods

The paper used a qualitative approach since most of the data was based on documented perceptions, assumptions, and judgments among Indonesia's leaders and defense experts, such as the Ministry of Defense (MoD), Ministry of Foreign Affairs, Ministry of National Development Planning/Bappenas, National Resilience Institute (Lemhannas), National Parliament, and Experts (publics). Dey (1993) and Creswell (2008) define a qualitative approach as an approach or search to explore and understand a central symptom through interviewing other people to obtain textual or descriptive information. However, there was also some quantitative approach, particularly in terms of descriptive method, to map the comparative postures of the relevant defense figures. A quantitative approach is defined as the broad term used to denote research design and methods that yield numerical data (Gerrish & Lacey, 2010).

2.1 Analysis

The instrument of analysis was deployed as portrayed in the matrix on actors, threats, and responses. Table 1 is a matrix of actors' perceptions, assumptions, and judgments about the threats and their responses. The scores in Table 1 range from 0 to 5, with detailed explanations of each score provided in Table 2 and Table 3.

Table 1. Matrix on Actors, Threats, and Responses

Actors (perceptions, assumptions, and judgment)	The Threats		The Responses	
	Descriptions	Score	Descriptions	Score
Ministry of Defense (MoD)				
Ministry of Foreign Affairs				
Ministry of National Development Planning/Head of National Development Planning Agency/Bappenas (MNP)				
National Resilience Institute (Lemhannas) (NRI)				
National Parliament (NP)				
Experts (public) (E)				
	Total Threats		**Total Responses**	

The analysis involved the evaluation of total threats and their total score, as well as total responses and total score. There was an exercise toward the true threats and the relevant responses, according to the defense doctrine of Indonesia and the recent conflict toward Indonesia and its near future potencies. The adopted true threats were exercised toward the relevant responses. Prioritizing the relevant responses to the identified true threats is crucial for Indonesia's defense policy and the security of the new capital (IKN). The technics of measurement were determined by the instrument as developed below.

Table 2. Score of Threats Regarding Perceptions, Assumptions, and/or Judgement

Score	Level	Description
0	"Abstract"	Less-operating concept
1	Very low-level threats	Might be transferred into strength
2	Low-level threats	Might be neutralized
3	Medium level threat	Might be minimized
4	High-level threat	Need a special concern
5	Very high-level threat	A true endangered threat

The table presented above outlines a scoring system to assess the threat level. A score of 0 indicates that the threat level is "abstract" and lacks operational concepts. A score of 1 represents a very low-level threat, meaning that the threat might be transferred into strength. A score of 2 indicates a low level of threats that could be neutralized. A score of 3 indicates a medium threat level that could be minimized. A score of 4 is a high-level threat that needs special concern, while a score of 5 for a very high-level threat that threat is a true endangered threat.

Table 3. Score of Response Regarding the Perceptions, Assumptions, and/or Judgement

Score	Level	Description
0	No response	Inactive, or decreasing the defense capability to response
1	Very low-level response	Different or less relevant response
2	Low-level response	Status quo
3	Medium level response	Incremental strategy
4	Effective response	Aggressive defense strategy
5	Strong (active) response	Striking power

Based on the table above, a score of 0 indicates that the level of response is no response, which describes the response as inactive or decreasing defense capability to the response. A score of 1 indicates a very low response level and a different or less relevant response, while a score of 2 suggests a low-level response and means that the response is a status quo. A score of 3 is a medium-level response and means that the response is an incremental strategy. A score of 4 is an effective response meaning that the response is an aggressive defense strategy, and a score of 5 is for a strong (active) response, which means striking power.

The information regarding the actors' perceptions, assumptions, and judgments was collected through online research of prominent mass media sources, excluding social media. The data was then organized based on the actors' perceptions, assumptions, or relevant judgments.

3. Results and Discussions

National defense is constructed to defend the national sovereignty, territorial integrity of the Unitary State of the Republic of Indonesia, and the safety of the entire nation from threats to the nation and state's integrity (Amatullah et al., 2020). Defenses exist due to threats, and responses or strategies are required to react to the threats posed by a particular country or organization to the existence of the country, its territorial sovereignty, and the security of its people (Supriyanto, 2014).

The results of data collected from this research are presented in Tables 4 and 5. Table 4 shows the result of data analysis based on the perceptions, assumptions, and judgments of Indonesia's leaders and defense experts, such as the Ministry of Defense (MoD), Ministry of National Development Planning/Bappenas, National Resilience Institute (Lemhannas), National Parliament, and experts (public). The data were gathered through a literature study on perceptions, assumptions, and judgments. However, the perceptions, assumptions, and judgments of the Ministry of Foreign Affairs were not obtained. Table 5 presents the aggregate result based on the score of threats and their responses.

Table 4. Result of Data Analysis

Actors (perceptions, assumptions, and/or judgment)	The Threats		The Responses	
	Descriptions	Score	Descriptions	Score
Ministry of Defense (MoD)	Threats originating from the air	4	Proposing a budget to purchase the main weapon system	4
			Adding TNI personnel to the IKN	3
			Implementing smart defense	0
			Adjusting to the overall national defense strategy	0
			National Marine Defense Strategy	0
Ministry of Foreign Affairs	-	-	-	-
Ministry of National Development Planning/Head of National Development Planning Agency/Bappenas (MNP)	The land border with Malaysia	1		
	Coinciding with the IASL (ALKI) II	1		
	Nearby to the Flight Information Region to neighboring countries	1		
	Surrounded by defense alliances	2		
	In long-range strike threat	4		
	CBRNE attack	3		
	Route for trans-nation crime	2		
	Horizontal conflict	2		
	Cyber-warfare	3		
	Crimes	2		

Table 4. Continued...

Actors (perceptions, assumptions, and/or judgment)	The Threats		The Responses	
	Descriptions	Score	Descriptions	Score
National Resilience Institute (NRI)	Changing Indonesia's center of gravity	0	Air-centric defense strategy	4
	Forming of air combat by utilizing new technologies and tends to be hybrid	4	Latest technologies in the field of air and cyber defense	3
National Parliament (NP)	Adjacent to the IASL (ALKI) II	1	Adjusting the defense posture of the three dimensions	0
	Within range of icbms	4	Establishing a complete Regional Military Command	0
	Close to the FIR to neighboring countries	2	Forming a new sea base	3
	Close to the land borders of Malaysia and Brunei	1	Strengthening Air Defense at strategic locations	4
	Coinciding with the IASL (ALKI) II	1	A contingency plan or backup plan, including an evacuation plan in the event of an attack	0
	Hacking threat to critical infrastructure	0		
	Unmanned aerial vehicle (uav)	4		
	Long-range missiles /ICBM	4		
	Strategic data theft	0		
	Espionage	0		
	Posting the truth on social media,	0		
	Radicalization in cyberspace	0		
	Acts of terrorism	2		
Experts (public) (E)	Close to the land border	1		
	Coincides with the IASL (ALKI) II	1		
	Cruising radius of icbms	4		
	Close to the FIR of the neighboring countries	2		
	Route of trans-nation crime	2		
	Surrounded by defense alliances	2		

Table 5. Result of Aggregated Data

Score	Threat	Issued by	Response	Issued by
5	-	-		
4	Threats originating from the air: combat, UAV, ICBM's	MoD, NRI, MNP, NP, E	capable air-centric defense strategy	MoD, NRI
3	Cyber warfare	MNP	-	
	CBRNE attack		-	
	-		adding personnel	MoD
	-		forming a new sea base	
2	Defense alliances	MNP, E	-	
	Trans-nation crime		-	
1	Close borders	MNP, NP, E	-	
	Nearby FIR		-	
	coinciding with the IASL		-	

There are six actors that are expected to provide comprehensive and coherent findings regarding the defense challenges or threats to the new capital city, IKN. The first actor is the Ministry of Defense (MoD). At the Ministry of Defense Leadership Meeting on January 20, 2022, Defense Minister General (ret) Prabowo Subianto discussed the policy and strategy of IKN. However, the minister did not provide any further explanation regarding the threats and the defense strategy. In the TNI-Polri Leadership Meeting, which was chaired directly by Indonesian President Joko Widodo on February 8, 2023, the Defense Minister did not address the issue and agenda of IKN defense (Kementerian Pertahanan Republik Indonesia, 2023).

In relation to this, the Ministry of Defense has not denied the threats to IKN. The only statement that has been made was by the Commander of the Indonesian National Armed Forces (TNI), General (Army) Andika Perkasa. He stated that the Archipelago Capital City (IKN) has a high vulnerability, especially to threats originating from the air. The relocation of the capital city needs to be accompanied by a change in the defense paradigm. So far, Indonesian defense has tended to focus on land-based defense by relying on an in-depth defense strategy (Judhariksawan & Daud, 2022). General (Army) Andika Perkasa also stated that the TNI is currently preparing a defense system for IKN by proposing a budget to purchase the main weapon system (Alutsista) to maximize the defense system of the new capital city. Andika assessed that one of the ways to maximize the National Defense Institute's defense system is to equip and improve the TNI's main weapon system in the region. Apart from that, he also stated that TNI would add its personnel to IKN. He said, "For new tools that don't yet exist, we will also shift relocation from TNI assets to points that are there." General Perkasa said the biggest threat was air strikes because the TNI still had deficiencies in the main weaponry system. However, it was acknowledged that this shortage does not only occur in the air dimension (Air Force) but also in the land (Navy) and sea (Army) dimensions.

The new TNI Commander, Admiral Yudo Margono, stated that moving the capital city from Jakarta to IKN Nusantara is a strategic step that affects Indonesia's center of gravity. From a geostrategic perspective, the Capital City of the Archipelago is in a strategic position. Nevertheless, it still has vulnerabilities to threats. According to him, to protect the Archipelago's Capital City as the center of gravity for the Indonesian state, it is necessary to adjust the overall national defense strategy. The protection of the IKN area also requires the implementation of smart defense, which involves defending the capital using technology, diplomacy, and integrated local wisdom, as part of the National Marine Defense Strategy (Strategi Pertahanan Laut Nusantara, SPLN) by involving all components and national resources.

The second actor in defense of the IKN is the Ministry of Foreign Affairs (MFA). However, there has been no statement from the MFA regarding the agenda and issues surrounding the IKN defense threat and its defense diplomacy.

The actor who contributed most was the Ministry of National Development Planning/Head of National Development Planning Agency (Bappenas). Bappenas has identified that relocating the national capital to East Kalimantan could potentially create new geostrategic threats that pose a significant risk to the country's defense and security. These threats may come from various actors, including state actors, non-state actors, and hybrids, and could result in defense threats and security disturbances. The ministry has identified eight types of disturbances that could potentially pose defense and security threats to IKN. However, the number of potential threats has been increased to ten after reviewing the ongoing discussions.

1. The land border with Malaysia is 2,062 kilometers long.
2. The location overlaps with the Indonesian Archipelagic Sea Lanes (ALKI) II and the world's choke point or narrow point.
3. The IKN location is near the Flight Information Region (FIR), belonging to neighboring countries, such as Singapore, Kinabalu City (Malaysia), and the capital city of the Philippines, also known as Manila.
4. The site of the new nation's capital is enclosed by defense alliances, such as FPDA, Malaysia's Five Power Defense Arrangements, and the AUKUS Alliance of Australia, the UK, and the USA.
5. The location is in a long-range strike threat, as the location is within the range of ICBMs (Intercontinental Ballistic Missiles) and hypersonic missiles of certain countries.
6. A CBRNE (chemical, biological, radiological, and nuclear defense) attack is also possible.
7. Terrorism, as Kalimantan, is a location and route for transnational crime, such as the entry of goods illegally, from drugs to humans, and so on. IKN is a terrorist transit triangle in Sulu, Sabah, and Poso.
8. Horizontal conflict – societal conflict
9. Cyber warfare
10. Crime

Bappenas underlined that the government had promoted the development of smart defense, a combination of hard defense, which means developing advanced military weaponry, and soft defense, which means employing the local genius from Kalimantan.

The fourth actor is National Resilience Institute (Lemhannas). Governor of the National Defense Institute (Lemhannas), Dr. Andi Widjajanto, stated that the Nusantara Capital City (IKN) development would symbolize a paradigm shift in Indonesia's approach to development. He explained that the shift in the development paradigm in IKN includes Indonesia's move towards a smart, digital, and green economy and the establishment of the country as a regional and global hub. Moving Jakarta to IKN will change Indonesia's center of gravity, including requiring new military titles. As IKN becomes the new center of power, this will also entail a change in defense strategy, impacting how warfare approaches to protect IKN. Then there are sea titles that rely on two twin strategies, anti-access and area denial. Lemhannas has offered this strategy to the government. The initial defense battle that IKN is expected to face will likely involve air combat using advanced technologies, thus requiring an air-centric defense strategy. Moreover, there is a growing concern about cyber warfare as a significant defense challenge at IKN. Taking a cue from recent events in Russia and Ukraine, it is evident that cutting-edge technologies are being developed, with a strong focus on aerial capabilities, including hypersonic missiles and drones. Lemhannas suggested that Indonesia could immediately prepare to adopt the latest air and cyber defense technologies.

The fifth actor is the National Parliament (DPR). Chairman of Commission I of the Indonesian Parliament, Meutya Viada Hafid, reminded the government that IKN's geographical position poses several threats. First, IKN is situated next to the Indonesian Archipelago Sea Channels (ALKI), including the Lombok Strait, Makassar Strait, and the Sulawesi Sea. The IKN's position is also close to a potential conflict area in the South China Sea. Second, IKN is within range of Intercontinental Ballistic Missiles (ICBMs). For instance, North Korea previously launched a missile that passed over Japanese territory. Third, the IKN's position is close to the Flight Information Region (FIR), belonging to neighboring countries, such as Singapore, Kinabalu City (Malaysia), and the capital city of the Philippines, Manila. Specifically, This proximity has the potential to cause problems, especially regarding the FIR agreement signed by the governments of Singapore and Indonesia (Rmol, 2022).

Andreas Hugo Pareira, Member of Parliament (DPR RI) from the PDIP faction, has expressed concerns about potential threats to the defense of IKN from both a geostrategic and IT/communication technology development aspect. Despite being located in the middle of Indonesia, the relocation of the nation's capital to IKN creates potential geostrategic threats. First, it is close to the land borders of Malaysia and Brunei. This must be anticipated because the position of IKN is different from Jakarta. Second, the position of IKN overlaps with the Indonesian Archipelagic Sea Lanes II (ALKI II). The Indonesian Archipelagic Sea Lanes II (ALKI II) could face potential threats from passing submarines of other countries, which could directly threaten IKN. Third, the position of IKN is also near the neighboring Flight Information Region (FIR), especially regarding the Natuna Sea or LCS. Furthermore, regarding IT and communication technology development, he agreed that relocating IKN has the potential to make critical infrastructure vulnerable to hacking threats. Preparing for potential threats and risks in advance is crucial, particularly those related to unmanned aerial vehicles (UAVs), including suicide drones and the possibility of hacking critical infrastructure. The fourth potential threat to IKN includes various risks such as long-range missile attacks (ICBM), strategic data theft, espionage, spreading false information on social media, radicalization in cyberspace, and acts of terrorism (Pareira, 2022; Ismanto, 2022).

Dave Akbarshah Fikarno, a Member of Commission I of the DPR RI from the Golkar faction, has highlighted several potential defense threats. Firstly, Indonesia shares a lengthy land border of 2062 kilometers with Malaysia, and Kalimantan is positioned within the Indonesian Archipelagic Sea Lanes (ALKI) II. Secondly, the position of IKN is also near the Flight Information Region (FIR) belonging to neighboring countries, such as Singapore, Kinabalu City (Malaysia), and Manila City (Philippines), which requires further related coordination. The IKN's position is also within the range of the Intercontinental Ballistic Missile (ICBM). Third, IKN is close to the Triangle Terrorist Transit (Sulu, Sabah, Poso). Lastly, cyber threats are also a potential risk.

The TNI AD, TNI AL, and TNI AU must be prepared and ready to address these issues. Firstly, the defense posture of the three dimensions should be adjusted to facilitate the mobilization of military power and the deployment of forces in the new capital to counter various types of threats effectively. Secondly, to ensure effective land defense, it is crucial to set up a comprehensive Regional Military

Command (Kodam). Currently, only two Kodams are in operation, the VI/Mulawarman Regional Military Command and the XII/Tanjungpura Regional Military Command. It is necessary to add the Korem, Kodim, and the Koramil, or the Battalion, complete with Combat Units (Satpur), Combat Assistance Units (Satbanpur), and Administrative Assistance Units (Satbanmin), to ensure that everything goes well. Thirdly, to improve Marine Defense, it is suggested to establish a new sea base in both South Kalimantan and North Kalimantan (Kaltara). Fourthly, in terms of Air Defense, there is a need for more strength at strategic locations as there is currently only one squadron in Pontianak, Kalimantan. This is necessary to better handle potential attacks from foreign entities because there are plans to buy two squadrons of F-15 and Rafale. In addition, the three dimensions of the TNI also continue to hold Joint Exercises (Latgab) on a regular basis. To further enhance their preparedness and capabilities, the TNI also conducts Joint Exercises (Latma) with foreign troops. The purpose of these exercises is to increase the proficiency of TNI soldiers in combat techniques and to develop new strategies. Additionally, these exercises serve to anticipate and prepare for any potential developments related to the new capital. Lastly, since the new state capital is the Center of Gravity, the three military dimensions must prepare a contingency plan or backup plan, including an evacuation plan in the event of an attack (Fikrano, 2022; Ismanto, 2022).

The sixth actor is an expert and professor from the State University of Sebelas Maret (UNS), Lefri Mikhael. Mikhael (2022) found that the geographical position of IKN is close to the international boundary line. In this case, it is relatively close to the land border of the State of East Malaysia, which spans 2,062 kilometers. International boundaries have the potential to become a military meeting place between countries that are usually related to territorial disputes. In addition, the IKN's position also coincides with the Indonesian Archipelagic Sea Channels (ALKI) II, which comprises the Sunda Strait, Java Sea, Karimata Strait, Natuna Sea, and the South China Sea. The ALKI II area is relatively safe for shipping, but there is a potential danger due to the impact of the Ambalat Block conflict. There are concerns that the ALKI II area will be used for the military interests of other countries armed forces. Natural obstacles also benefit the location of IKN. Kalimantan generally consists of dense forests and numerous natural obstacles in the form of enormous rivers and mountains along the Indonesia-Malaysia land border. In addition, the military protecting the capital city from the sea will be easier and more measurable because the sea area around East Kalimantan is narrower, starting from the north and south ends of the Indonesian Archipelagic Sea Lanes (ALKI) II. However, the IKN area is not far from the coastal location. This can be a threat because the coastal area is usually used as a battle area or is within the range of enemy ships' fire. In terms of spatial relations, IKN is supported by several satellite cities such as Bontang, Samarinda, Balikpapan, and Tenggarong so that it can be projected as a resistance base/obstacle base for enemies who want to occupy the archipelago. The existence of satellite cities also supports the availability of supporting military installations around the national capital. Mikhael concluded that the location of the prospective IKN in the East Kalimantan region was a wise decision. He believed that the defense and security of the IKN area could still be safeguarded against possible threats from adversaries, provided that the government has a comprehensive plan for the defense of the new capital and invests in appropriate defense infrastructure.

Habibie (2022) emphasized that from a geostrategic perspective, relocating the IKN from Jakarta to East Kalimantan would give Indonesia a deeper 'strategic depth.' Not only because the area of Kalimantan Island is six times that of Java Island but because it allows for the development of integrated defense industry clusters. Therefore, it is crucial to carefully plan defense and security aspects that cover land, sea, and air domains, as well as the cyber field as a new defense and security area. The location of the IKN is from the aspect of land, sea, and air defense. The land border with Malaysia stretches for 2,062 km, which serves as a gateway for defense threats and security disturbances. Furthermore, IKN is within the cruising radius of Intercontinental Ballistic Missiles (ICBMs) and hypersonic missiles for certain countries. The location of IKN also coincides with the Indonesian Archipelagic Sea Channels (ALKI) II and choke points or world narrow points. In the air, the IKN location is close to the Flight Information Region (FIR), belonging to neighboring countries, such as Singapore, Kinabalu, Malaysia, and Manila, Philippines. This presents Indonesia with an opportunity to exert force in tightening security in the ALKI area and the waters bordering the Indo-Pacific region. Third, the island of Kalimantan is currently the location and route for cross-country crime, such as human trafficking and drugs. IKN is also within the terrorist transit triangle in Sulu, Sabah, and Poso. Finally, the position of IKN Nusantara is "surrounded" by defense alliances, such as Malaysia's Five Power Defense Arrangements (FPDA), Australia's AUKUS Alliance, UK, and USA, and is affected by One Belt One Road or OBOR BRI of China. The existence of FPDA, AUKUS, and OBOR or BRI China, even the presence of the powers of several NATO members in the region, further confirms that the

geopolitical power constellation of countries in the world is shifting to the Asia Pacific (Habibie, 2022; Ismanto, 2022).

Conclusions

The Nusantara Capital City is facing high-level defense threats, categorized as level four threats, primarily from the air, including combat, unmanned aerial vehicles (UAV), and intercontinental ballistic missiles (ICBMs). This issue has been highlighted by various entities such as MoD, NRI, MNP, NP, and Ep. To address this issue, there is a need to develop a robust air-centric defense strategy, which is being promoted by the MoD and NRI.

There are two threats categorized at the 3rd level of defense for the Nusantara Capital City, namely cyber warfare and CBRNE attacks. However, there is no response promoted by any of the actors to tackle these threats. In contrast, two responses have been put forward irrespective of the level of threat, namely increasing military personnel at the location and establishing a new sea base which was promoted by the MoD.

There are two threats classified at the 2nd level of defense: defense alliances and transnational crime, but no response has been promoted to address these threats. There are also three issues that are not actually threats but were classified at the 1st level of defense. These issues include being close to Malaysia and Brunei's border, the FIR's proximity, and coincidence with the IASL (ALKI). These issues were raised by MNP, NP, and E.

To summarize, the main threat to the IKN is currently only from aerial attacks, such as strikes, unmanned aerial vehicles (UAVs), and missiles. Therefore, the government should prioritize developing a robust air defense system at the IKN and enhancing the capabilities of the National Air Operations Command (Koopsudnas) to extend its reach to the borders of Malaysia, which is about 100 km away.

The issue of the nearby border, FIR, and ALKI should be addressed through defense diplomacy among neighboring countries, particularly within ASEAN and other surrounding defense cooperation. Therefore, the second critical aspect of defending IKN would be strengthening national defense diplomacy in the region to secure peace and prosperity among the participants, including ASEAN, Australia, China, and the US. This article is expected to be used as a basis and input for developing a military defense plan in the new capital city by observing several threats and the response from Indonesia's leaders and defense experts.

The study found that the main threats to national defense include external threats, such as territorial disputes and conflicts with neighboring countries, and non-traditional security threats, such as cyber-attacks and terrorism. The responses or strategies to these threats include strengthening the military's capabilities, enhancing diplomatic relations with neighboring countries, and increasing cooperation with international organizations to combat non-traditional security threats.

Additionally, the study identified gaps in the existing defense capability and emphasized the need for continued improvement and development of the defense sector to address the identified threats effectively. Overall, the findings suggest that a comprehensive and integrated approach to national defense is necessary to ensure the safety and security of the country and its citizens.

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THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 - APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Research Paper

The Effect of Education on Happiness, Self-Acceptance, and Family Harmony

Empirical Evidence from Indonesia

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Abstract

Education plays a crucial role in determining the quality of life through economic returns and subjective well-being. However, almost no previous research has examined how education affects subjective well-being indicators beyond happiness. To address this gap, this study used Ordinary Least Squares and the Ordered Probit technique to investigate the effect of education on happiness, self-acceptance, and family harmony. Using the recent microdata from Statistics Indonesia in 2021 the empirical results reveal that education positively affects happiness, self-acceptance, and family harmony. The effect of education remained statistically significant even after incorporating socioeconomic and individual characteristics such as income, gender, age, marital status, home ownership, household size, area classification, health status, and leisure time. The result of this study highlights that individuals with higher levels of education reported higher happiness, greater self-acceptance, and higher satisfaction with family harmony than those with lower levels of education. Although more than half of the magnitude of the education effect decreases after incorporating socioeconomic and individual characteristics variables, the direct effect of education remained significant on happiness, self-acceptance, and family harmony.

Keywords: Education; Happiness; Self-Acceptance; Family Harmony; Ordered Probit

ARTICLE INFO
Received: January 03, 2023
Received in revised form: February 08, 2023
Accepted: April 18, 2023

doi: 10.46456/jisdep.v4i1.371

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/National Development Planning Agency (Bappenas), Republic of Indonesia

Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
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E-mail: journal.pusbindiklatren@bappenas.go.id

Supported by Indonesian Development Planners Association (PPPI)

Please cite this article in APA style as:
Haryati, H.U. (2023). The Effect of Education on Happiness, Self-Acceptance, and Family Harmony (Empirical Evidence from Indonesia). *The Journal of Indonesia Sustainable Development Planning, 4*(1), *35—56*. https://doi.org/10.46456/jisdep.v4i1.371

1. Introduction

Numerous researchers have examined the connection between education and life satisfaction or subjective well-being (Clark & Oswald, 1996; Cuñado & de Gracia, 2012; Kristoffersen, 2018; Nikolaev, 2018; Powdthavee et al., 2015; Ruiu & Ruiu, 2019). Education, as broadly considered, plays a pivotal role in improving the quality of life. In general, a higher level of education can lead to a higher level of income, increasing personal life satisfaction or subjective well-being (Blanchflower & Oswald, 2004; Easterlin, 2001; Michalos, 2007). Chen (2012) and Oreopoulos & Salvanes (2011) contend that education is essential in several life factors, more than just monetary indicators represented by income.

A study conducted by Oreopoulos and Salvanes (2011) regarding nonpecuniary benefits of schooling found that education was a key predictor of employment status, health level, and becoming more attractive in a marriage market. These three indicators play an indispensable role in determining an individual's happiness. Beyond the aforementioned non-monetary benefits, Chen (2012) finds that higher education will create broader social networks and better employment opportunities. People have a higher chance of obtaining a sufficient income and potentially increasing their happiness through more extensive networking. In addition, higher education provides skills that could be useful in the labor market and thereby escape poverty by enhancing households' social, occupational, and economic mobility (Maclean et al., 2018; Tilak, 2007). Furthermore, providing quality education is one of the Sustainable Development Goals 2030 (SDGs) Agenda, related to goal 4 (United Nations, 2015).

In the case of Indonesia, people with a higher level of education (postgraduate degree) tend to have a higher happiness index than people with a lower level of education (Statistics Indonesia, 2021a). This condition consistently occurred in 2017 and 2021. According to data from Statistics Indonesia (2021a), individuals with postgraduate degrees, including master's and doctoral degrees, had a happiness index (measured on a scale of 0-100) that is 15.22 points higher than individuals who had never attended school. Meanwhile, the Happiness Index 2017 shows that the population with a postgraduate degree obtained 13.03 points higher than those who never attended school. According to this empirical evidence, higher levels of education seem to be associated with a higher happiness index because highly educated people value their personal satisfaction higher than social life satisfaction (Ibid, 2021a).

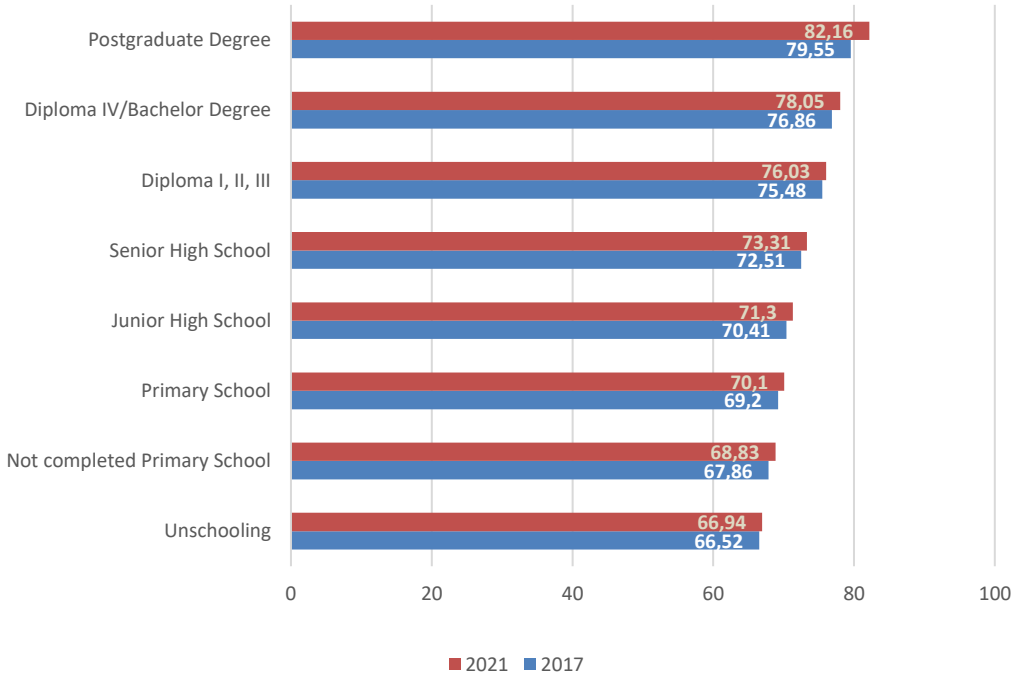

Figure 1. Happiness Index in 2017 and 2021, According to Education Background

Source: Statistics Indonesia (2021a)

However, prior studies that revealed the link between education and happiness level or life satisfaction varied extensively. It generated mixed results, either positive (*e.g.,* Chen, 2012 and Cuñado & de Gracia, 2012) or negative (*e.g.,* Clark & Oswald, 1996), and inconsistent depending on what mechanisms education affects happiness (*e.g.,* Kristoffersen, 2018 and Powdthavee et al., 2015). Therefore, this research aims to fill the gap by analyzing the effect of education on happiness based on empirical evidence from Indonesia.

When examining the relationship between education and happiness levels in Indonesia, there is a fundamental question about the extent to which education affects happiness or life satisfaction. However, life satisfaction is only one of the three dimensions measured in the Happiness Level Measurement Survey 2021 conducted by Statistics Indonesia. The other two dimensions examined by Statistics Indonesia were the meaning of life (eudaimonia) and family harmony. These two dimensions are interesting to to explore using quantitative methods with a large number of observations because they are typically investigated through a psychological approach (e.g., Deci & Ryan, 2008; Szentagotai & David, 2013). Ryff (1989) stated that out of the six dimensions of eudaimonia, self-acceptance is the primary factor in capturing how a person defines the meaning of life. Additionally, family harmony is one of the elements of subjective well-being that aims to acquire a happiness level based on family satisfaction (Statistics Indonesia, 2021a).

Over the past 40 years, considerable research has explored the determinant of happiness or subjective well-being. Most of these studies were related to education and happiness (Michalos, 2007; Chen, 2012; Cuñado & de Gracia, 2012; Powdthavee et al., 2015; Kristoffersen, 2018; Nikolaev, 2018). However, these studies did not look at how education affects self-acceptance and family harmony using rigorous econometric technique. Research regarding self-acceptance and family harmony was so scarce due to the limitation of literature review in prior studies, particularly examining the effect of education on self-acceptance and family harmony using quantitative methods with a large number of observations. Therefore, this study aimed to investigate the effect of education on happiness, self-acceptance, and family harmony in Indonesia in 2021, using high-quality microdata from Statistics Indonesia as a case study.

2. Data and Methods

2.1 Data Source

This paper employs data from the "Survey Pengukuran Tingkat Kebahagiaan (SPTK) 2021," which is a survey conducted to measure the level of happiness in Indonesia in 2021. This data comprises enrichment in various non-standard economic variables such as happiness, eudaimonia, affection, and family harmony, which have not been extensively investigated in prior studies. The survey was conducted by Statistics Indonesia, a cross-sectional data covering 34 Indonesian provinces with 75,000 households. Household samples in this survey were selected from 7,500 census blocks that became part of the National Socioeconomic Survey (SUSENAS) 2021 (Statistics Indonesia, 2021a).

2.2 Method

Using an ordinal scale, this research used the Ordinary Least Squares (OLS) regression followed by ordered probit regression to interpret the effect of education on the three dependent variables in the survey questionnaire (happiness, self-acceptance, and family harmony). SPTK 2021 measurement followed the Gallup World Poll approach that aimed to calculate the World Happiness Report, where the calculation used a ladder scale with categories ranging from 0 to 10. To analyze the effect of education on happiness level, self-acceptance, and family harmony in Indonesia, the regression equations using the OLS method, modified and developed from happiness studies by Blanchflower (2020) and Ngoo et al. (2015), can be expressed as follows:

$$HL_i = \alpha_0 + \alpha_1 Educ_i + \beta X_i + \gamma E_i + \delta H_i + \sigma L_i + \varepsilon_i \quad (1)$$

$$SA_i = \alpha_0 + \alpha_1 Educ_i + \beta X_i + \gamma E_i + \delta H_i + \sigma L_i + \varepsilon_i \quad (2)$$

$$FH_i = \alpha_0 + \alpha_1 Educ_i + \beta X_i + \gamma E_i + \delta H_i + \sigma L_i + \varepsilon_i \quad (3)$$

Where HL_i, SA_i, FH_i are the dependent variables in each regression equation denoting the happiness level for individual *i* in equation (1), self-acceptance for individual *i* in equation (2), and family harmony for individual *i* in equation (3). Meanwhile, the explanatory variables are $Educ_i$ demonstrates the highest education level completed by an individual. X denotes demographic characteristics consisting of gender, age, age squared, marital status, household size, and area classification. *E* indicates economic characteristics such as income and home ownership status. *H* depicts perceived health status and *L* indicates leisure time per week. All the variables were obtained from the questionnaire of the Happiness Level Measurement Survey 2021 (see Appendix 1).

This study also used an ordered probit regression to examine the effect of education and other explanatory variables on the probability of happiness, degree of self-acceptance, and family harmony. The dependent variables were originally ordinal, ranging from 0 to 10 but were divided into three categories for each dependent variable to simplify the interpretation of the regression results. The three threshold levels were determined to represent the group who perceived happiness, self-acceptance, and family harmony as lower than the average (score 0—7), the median group (score 8), and the group with subjective well-being above the average (score 9—10). These three categories also divided observations in this study into three equal proportions. According to Greene (2018), y_n^* is assumed unobserved. In this study, y_n^* is perceived happiness level, self-acceptance, and family harmony. Thus, the ordered probit of the observed choice y_n is:

$$\begin{aligned} y_n &= 1 \ if \quad y_n^* \leq \mu_1 \\ &= 2 \ if \ \mu_1 < y_n^* \leq \mu_2 \\ &= 3 \ if \ \mu_2 < y_n^* \leq \mu_3 \\ &\quad . \\ &= J \ \ if \quad \mu_{J-1} < y_n^* \end{aligned}$$

For j = {1,2,3}, there are two cutting points or threshold values, $\mu_1 \ and \ \mu_2$. Technically, these three dependent variables are divided into three categories as follows:

Table 1. Categorization of Each Dependent Variable

Score	Name of category		
	Happiness Level (HL_i)	**Self-Acceptance (SA_i)**	**Family Harmony (FH_i)**
0—7	"notsohappy"	""lowself-acceptance"	"lowestfamilyharmony"
8	"happy"	"goodself-acceptance"	"goodfamilyharmony"
9—10	"happiest"	"highestself-acceptance"	"highestfamilyharmony"

Source: Author's Calculation (2022)

Where: 1) The answer ranged from 0 (very unhappy) to 10 (extremely happy) for HL_i.
2) The answer ranged from 0 (very incapable) to 10 (very capable) for SA_i.
3) The answer ranged from 0 (not satisfied at all) to 10 (very satisfied) for FH_i.

2.3 Summary Statistics

The data consists of 74,684 respondents who were the head of the household or spouses of the household head. The respondents comprise 48.9 percent of males (36,540 people) and 51.1 percent of females (38,144 people) over 34 provinces in Indonesia scattered across 7,500 census blocks. Thus, Statistics Indonesia conducted systematic random sampling in this survey to overcome selection bias. The youngest respondent was 14 years old, and the oldest respondent was 98 years old, with a mean of 47.43 years. The mean of education was 4.007, indicating that, on average, the highest education level completed by the respondents was junior high school. This data is consistent with the mean years of

schooling for the whole population in Indonesia, which was 8.97 years in 2021 (Statistics Indonesia, 2021b).

This study divided marital status into three categories, single, married, and divorced. The dummy variables for marital status were married and divorced, while 'single' was the baseline category. In this data set, about 81.3 percent of the respondents were married (60,685 people), 16.3 percent were divorced (12,189 people), and the remaining were singles. On average, each household has 3.775 or almost four people. Meanwhile, the maximum number of household members who lived in the same house was 19 in 2021. The mean of the region variable is 0.431, indicating that 43.1 percent of the respondents (32,182 people) lived in urban areas, while the remaining 56.9 percent lived in rural areas.

Table 2. Summary Statistics of Variable Used in the Model

Variable	Obs	Mean	Std. Dev.	Min	Max
Happiness Level (HL)	74,684	7.761	1.333	0	10
Self-Acceptance (SA)	74,684	7.652	1.269	0	10
Family Harmony (FH)	74,684	8.326	1.242	0	10
gender	74,684	0.489	0.5	0	1
age	74,684	47.43	13.5	14	98
educ	74,684	4.007	1.956	1	10
married	74,684	0.813	0.39	0	1
divorced	74,684	0.163	0.37	0	1
householdsize	74,684	3.775	1.654	1	19
region	74,684	0.431	0.495	0	1
income	53,383	3.311	1.346	1	5
work	74,684	0.715	0.452	0	1
homestatus	74,684	0.847	0.36	0	1
healthstatus	74,684	7.651	1.496	0	10
leisure	74,684	26.467	16.12	0	98

Source: Happiness Level Measurement Survey 2021, Author's Calculation (2022)

The mean of the nominal income was 3.311, indicating that, on average, income earned by the respondents was between Rp 1.500,001 - Rp 2.500,000 (€96.5-€160.69) per month (category 3 income). The observations of the income variable only consisted of 53,383 respondents since 21,301 respondents reported being unemployed. The distribution of income earned by the respondents is presented in Table 3. To analyze happiness level, self-acceptance, and family harmony for all employed and unemployed respondents, a new category was made in the 'income' variable for unemployed respondents with no income as category 6. Thus, the observations of the income variable were reverted to 74,684 respondents.

Initially, the data set only consisted of five categories of income based on the respondent's wage range who reported being employed in the last week (question number 601). Income category 1 refers to respondents who earned more than Rp. 4,000,000 per month (> €257). Category 2 is for those who earned Rp 2.500,001-Rp 4.000,000/month (€160.7-€257). Category 3 includes those who earned Rp 1.500,001-Rp 2.500,000/month (€96.5-€160.69), and Category 4 includes those who earned Rp 1.000,001-Rp 1.500,000/month (€64.3-€95.49). Lastly, category 5 is for those who earned smaller or equal to Rp 1,000,000/month (≤64.3 per month). The income category was divided into five categories of dummy variables based on the questionnaire of the Happiness Level Measurement Survey 2021 (Appendix 1), and those who did not work and had no income were treated as the baseline category.

Table 3. Income Distribution in SPTK 2021

Income Categories	Freq.	Percent	Cum.
Income1	6,581	12.33	12.33
income2	9,447	17.70	30.02
income3	11,582	21.70	51.72
income4	12,325	23.09	74.81
income5	13,448	25.19	100.00
Total	**53,383**	**100.00**	

Source: Happiness Level Measurement Survey 2021, Author's Calculation (2022)

Based on Table 2, the mean of the home status variable is 0.847, demonstrating that 84.7 percent of respondents (63,284 people) occupied their own house, and the remaining 15.3 percent did not. The mean of the health status variable is 7.65, indicating that, on average, the respondents were quite satisfied with their health condition since the answers ranged from 0 (not satisfied at all) to 10 (very satisfied).

3. Results and Discussions

3.1 OLS Analysis

This paper compared the empirical results using two different methods: the ordinary least squares (OLS) and the ordered probit technique. Table 4 columns (1), (2), and (3) are the narrow specification that only uses education variables on the right-hand side. On the other hand, Table 5 columns (4), (5), and (6) use all control variables encompassing demographic and economic characteristics, perceived health status, and leisure time as the explanatory variables using OLS.

According to the results from Tables 4 and 5, all dummy variables for the level of education had positive and significant effects on happiness levels, self-acceptance, and family harmony. The higher the level of education completed by the respondents, the higher the magnitude of the education coefficients. This result is consistent with the studies conducted by Blanchflower & Oswald (2004), Chen (2012), and Dolan et al. (2008), who found that people with a higher level of education tended to have a higher happiness level compared to people with a lower level of education. Overall, the coefficient of education variables in the narrow specification was twice as high as in the broad specification. This trend was observed across all levels of education's coefficient. Therefore, more than half of the education effect on happiness was away, accounting for other control variables in the broad specification.

Table 4. OLS Regression (Narrow Specification: Only Education Variable in the Models)

Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value
	HL (1)		SA (2)		FH (3)	
notcompletedPS	0.192*** (0.026)	0.000	0.190*** (0.025)	0.000	0.202*** (0.024)	0.000
Primary School (PS)	0.315*** (0.024)	0.000	0.275*** (0.023)	0.000	0.365*** (0.022)	0.000
Junior High School (JHS)	0.404*** (0.025)	0.000	0.323*** (0.024)	0.000	0.442*** (0.023)	0.000
Senior High School (SHS)	0.546*** (0.024)	0.000	0.472*** (0.023)	0.000	0.603*** (0.023)	0.000
Diploma	0.772*** (0.039)	0.000	0.664*** (0.038)	0.000	0.769*** (0.037)	0.000
Bachelor	0.902*** (0.029)	0.000	0.792*** (0.027)	0.000	0.873*** (0.027)	0.000
Postgrad	1.203*** (0.068)	0.000	1.085*** (0.065)	0.000	1.048*** (0.064)	0.000
R-squared		0.026		0.021		0.028
N		74,684		74,684		74,684

Notes: Robust standard errors in parentheses; Dependent variable models: column (1) Happiness Level (HL), column (2) Self-Acceptance (SA), and column (3) Family Harmony (FH)
**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's Calculation (2022)

According to regression results in the broad specification (Table 5), the coefficient of the males is negative toward happiness levels. This suggests that, on average, females tended to be happier than males. This finding corresponds with the gender identity hypothesis developed by Akerlof and Kranton (2000), who emphasizes a self-concept that perceives males should avoid household chores and earn more money than females. This condition makes males feel burdened and, simultaneously, feel triggered to work outside their house to increase their life satisfaction. Furthermore, if a man is married and becomes a household head, it can lead to lower levels of happiness compared to women.

In addition, the minimum point of the happiness level was calculated based on 74,684 observations following the calculation technique from Blanchflower (2020). After dividing the age coefficient by the age squared coefficient (see Table 5 column 4) multiplied by two to calculate the minimum of the quadratic in age by differentiating with respect to age, the turning point at which the happiness age begins to rise again is around the age of 45. This evidence supports Blanchflower and Oswald (2004, 2008) and Blanchflower (2020), who found that well-being forms a U-shape curve in age and reaches a minimum point when people are in their 40s. At the age of 40s, most people might feel stressed due to the unachievable ambitions of their youth. However, at a certain point in their 40s, most of them might learn to adapt to their superiority and shortcomings and become wiser (Blanchflower & Oswald, 2008); hence, after these circumstances, their happiness level starts to increase again.

Table 5. OLS Regression (Broad Specification: Education and All Other Control Variables)

Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value
	HL (4)		SA (5)		FH (6)	
notcompletedPS	0.103*** (0.024)	0.000	0.113*** (0.023)	0.000	0.085*** (0.021)	0.000
PS	0.140*** (0.023)	0.000	0.150*** (0.022)	0.000	0.137*** (0.020)	0.000
JHS	0.174*** (0.024)	0.000	0.172*** (0.023)	0.000	0.142*** (0.021)	0.000
SHS	0.258*** (0.024)	0.000	0.258*** (0.023)	0.000	0.248*** (0.021)	0.000
Diploma	0.360*** (0.037)	0.000	0.347*** (0.036)	0.000	0.323*** (0.033)	0.000
Bachelor	0.426*** (0.028)	0.000	0.415*** (0.027)	0.000	0.379*** (0.025)	0.000
Postgrad	0.610*** (0.064)	0.000	0.568*** (0.062)	0.000	0.476*** (0.057)	0.000
male	-0.172*** (0.010)	0.000	0.051*** (0.010)	0.000	-0.102*** (0.009)	0.000
age	-0.009*** (0.002)	0.000	0.011*** (0.002)	0.000	-0.004** (0.002)	0.017
age_sq	.0001*** (0.000)	0.000	-.00002 (0.000)	0.323	.00008*** (0.000)	0.000
married	0.241*** (0.030)	0.000	0.046 (0.029)	0.012	0.384*** (0.027)	0.000
divorced	-0.052 (0.032)	0.109	-0.072** (0.031)	0.020	0.090*** (0.029)	0.002
householdsize	0.015*** (0.003)	0.000	0.011*** (0.003)	0.000	0.038*** (0.003)	0.000
urban	-0.074*** (0.010)	0.000	0.010 (0.009)	0.30	-0.043*** (0.009)	0.000
income1	0.262*** (0.019)	0.000	0.195*** (0.018)	0.000	0.101*** (0.017)	0.000
income2	0.155*** (0.016)	0.000	0.116*** (0.016)	0.000	0.036** (0.015)	0.013
income3	0.018 (0.015)	0.235	0.045*** (0.015)	0.002	0.012 (0.014)	0.382
income4	-0.083*** (0.015)	0.000	-0.006 (0.014)	0.693	-0.009 (0.013)	0.486
income5	-0.200*** (0.014)	0.000	0.064*** (0.013)	0.000	-0.046*** (0.012)	0.000
healthstatus7	0.419*** (0.015)	0.000	0.323*** (0.014)	0.000	0.298*** (0.013)	0.000
healthstatus8	0.813*** (0.014)	0.000	0.734*** (0.013)	0.000	0.775*** (0.012)	0.000
healthstatus9	1.233*** (0.016)	0.000	1.176*** (0.015)	0.000	1.338*** (0.014)	0.000
healthstatus10	1.751*** (0.019)	0.000	1.714*** (0.018)	0.000	1.924*** (0.017)	0.000
selfowned	0.162*** (0.013)	0.000	0.083*** (0.012)	0.000	0.035*** (0.012)	0.003
leisure	0.002*** (0.000)	0.000	0.003*** (0.000)	0.000	0.003*** (0.000)	0.000
R-squared		0.180		0.171		0.247
N		74,684		74,684		74,684

Notes: Robust standard errors in parentheses; Dependent variable models: column (4) Happiness Level (HL), column (5) Self Acceptance (SA), and column (6) Family Harmony (FH)

**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's Calculation (2022)

The results from columns (2) and (5) above indicate that all dummy variables for the level of education had positive and significant effects on self-acceptance. The data analysis showed that respondents who completed a higher level of education tended to have a higher degree of self-acceptance compared to the mean value of self-acceptance, which was 7.652, ceteris paribus. This result validates the previous study by Schinkel (2015) that emphasized education should enable learners with a wide range of activities that create purpose in life. In other words, education should be able to develop various skills to acknowledge the value and contribution and, in the end, increase perceived self-acceptance.

Similar to the regression results when happiness level is the dependent variable, the coefficient of education variables in the narrow specification (Table 4 column 2) was almost twice higher than the broad specification in Table 5 column (5). Based on these empirical results, we can conclude that more than half of the education effect on self-acceptance was away after incorporating other control variables in the broad specification. Based on the regression results from columns (3) and (6) reveal that all dummy variables for the level of education had positive and significant effects on family harmony. According to the empirical findings in Tables 4 and 5, the higher the level of education completed by the respondents, the higher the level of family harmony they perceived compared to the mean value of family harmony, which is already high at 8.326. This result supports the study conducted by Herawati et al. (2020), who pointed out that highly educated people tend to have a higher understanding of family functioning; thus, they are expected to undertake family functioning well to strengthen family harmony.

3.2 Ordered Probit Analysis

3.2.1 Happiness Level

Initially, the three dependent variables were ordinal variables ranging from 0 to 10. To simplify the interpretation of the regression results, they were divided into three categories for each dependent variable. Columns (7a), (7b), and (7c) show estimations of the effect of education variables on the probability of being not-so-happy, happy, and happiest, respectively. When respondents had a diploma degree, they were 21.7 percent less likely to be in the not-so-happy category, 3.1 percent less likely to be in the happy category, and 24.8 percent more likely in the happiest category compared to those who never went to school. Overall, the higher level of education, the higher the probability they were in the happiest category (column 7c) compared to the baseline category, as can be seen from the magnitude of the education dummy variable.

There is a noticeable difference in the magnitude of the education variables between the narrow specification (Table 6) and the broad specification (Table 7). In the narrow specification, particularly in the not-so-happy (column 7a) and the happiest category (column 7c), the coefficient of education variables was almost twice higher compared to the education variables in columns (8a) and (8c) in the broad specification. This condition was also observed in the coefficient of all education levels. For example, in the narrow specification, respondents with bachelor's degrees were 25.4 percent less likely to be in the not-so-happy category, while they were 29.6 percent more likely in the happiest category than those who never went to school. In the broad specification, respondents with bachelor's degrees were 15.1 percent less likely to be in the not-so-happy category, while they were 15.1 percent more likely in the happiest category than the respondents who never went to school.

Table 6. Marginal Effects After Ordered Probit (Y=Happiness Level: Narrow Specification)

Happiness Level (HL)	dy/dx Pr(HL==7) "notsohappy" (7a)	P>|z|	dy/dx Pr(HL==8) "happy" (7b)	P>|z|	dy/dx Pr(HL==10) "happiest" (7c)	P>|z|
notcompletedPS	-0.055*** (0.008)	0.000	0.006*** (0.001)	0.000	0.049*** (0.008)	0.000
PS	-0.088*** (0.008)	0.000	0.010*** (0.001)	0.000	0.079*** (0.007)	0.000
JHS	-0.117*** (0.008)	0.000	0.007*** (0.001)	0.000	0.110*** (0.008)	0.000
SHS	-0.162*** (0.007)	0.000	0.009*** (0.001)	0.000	0.153*** (0.008)	0.000
Diploma	-0.217*** (0.009)	0.000	-0.031*** (0.005)	0.000	0.248*** (0.013)	0.000
Bachelor	-0.254*** (0.006)	0.000	-0.041*** (0.004)	0.000	0.296*** (0.010)	0.000
Postgrad	-0.300*** (0.009)	0.000	-0.110*** (0.013)	0.000	0.410*** (0.022)	0.000

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Categorization: Pr(HL==7) "notsohappy", Pr(HL==8) "happy", Pr(HL==10) "happiest"

Source: Author's Calculation (2022)

After incorporating other control variables such as income, marital status, and health status (Table 7) using the ordered probit technique, almost half of the education variables' effect on happiness disappeared. This finding is similar to econometric results using the OLS method explained in the previous section. The comparison between respondents with bachelor's degrees and those at other levels of education was interpreted from the postgraduate coefficient in Table 7. People with a postgraduate degree were 20.3 percent less likely to be in the not-so-happy category, 2.9 percent less likely to be in the happy category, and 23.1 percent more likely to be in the happiest category compared to people who never went to school. The magnitude of the coefficient of each level of education suggests that education has a positive effect on happiness.

In terms of income, there was a basic threshold triggering people to be motivated to work with a certain income level. On average, the national minimum wage in Indonesia was Rp 2.672.371 per month (Statistics Indonesia, 2022). The province with the highest regional minimum wage was DKI Jakarta at Rp 4.276.350. In contrast, the province with the lowest regional minimum wage was DI Yogyakarta at Rp 1.704.608 (Ibid, 2022). According to the results in Table 7, there was a unique pattern plausible when explained and associated with the minimum wage. In detail, respondents in the income category 1 (>Rp 4.000.000) and income category 2 (Rp 2.500.001 – Rp 4.000.000) were 8.4 and 3.9 percent more likely to be in the happiest category compared to the baseline category (see Table 7 column 8c). Meanwhile, respondents in the income category 4 (Rp 1.000.001 – Rp 1.500.000) and category 5 (≤ Rp 1.000.000) were 3.4 and 4.8 percent less likely to be in the happiest category compared to unemployed respondents. These econometric results show that people who have a job and earn a monthly income are not necessarily always happier than those who do not work and have no income.

Table 7. Marginal Effects After Ordered Probit (Y=Happiness Level: Broad Specification)

Happiness Level (HL)	**dy/dx Pr(HL==7) "notsohappy" (8a)**	**P>|z|**	**dy/dx Pr(HL==8) "happy" (8b)**	**P>|z|**	**dy/dx Pr(HL==10) "happiest" (8c)**	**P>|z|**
notcompletedPS	-0.031*** (0.009)	0.000	0.005*** (0.001)	0.000	0.026*** (0.007)	0.000
PS	-0.040*** (0.008)	0.000	0.006*** (0.001)	0.000	0.034*** (0.007)	0.000
JHS	-0.054*** (0.008)	0.000	0.007*** (0.001)	0.000	0.046*** (0.008)	0.000
SHS	-0.084*** (0.008)	0.000	0.011*** (0.001)	0.000	0.073*** (0.008)	0.000
Diploma	-0.123*** (0.011)	0.000	0.002 (0.002)	0.254	0.121*** (0.013)	0.000
Bachelor	-0.151*** (0.008)	0.000	-0.000 (0.002)	0.971	0.151*** (0.010)	0.000
Postgrad	-0.203*** (0.016)	0.000	-0.029*** (0.009)	0.002	0.231*** (0.025)	0.000
male	0.054*** (0.004)	0.000	-0.010*** (0.001)	0.000	-0.044*** (0.003)	0.000
age	0.003*** (0.001)	0.000	-0.001*** (0.000)	0.000	-0.003*** (0.001)	0.000
age_sq	-0.000*** (0.000)	0.000	0.000*** (0.000)	0.000	0.000*** (0.000)	0.000
married	-0.082*** (0.011)	0.000	0.019*** (0.003)	0.000	0.063*** (0.008)	0.000
divorced	0.014 (0.012)	0.221	-0.003 (0.002)	0.247	-0.012 (0.009)	0.215
householdsize	-0.006*** (0.001)	0.000	0.001*** (0.000)	0.000	0.005*** (0.001)	0.000
urban	0.025*** (0.003)	0.000	-0.005*** (0.001)	0.000	-0.020*** (0.003)	0.000
income1	-0.091*** (0.006)	0.000	0.008*** (0.000)	0.000	0.084*** (0.006)	0.000
income2	-0.045*** (0.006)	0.000	0.006*** (0.001)	0.000	0.039*** (0.005)	0.000
income3	0.003 (0.005)	0.564	-0.001 (0.001)	0.569	-0.003 (0.004)	0.562
income4	0.043*** (0.005)	0.000	-0.009*** (0.001)	0.000	-0.034*** (0.004)	0.000
income5	0.062*** (0.005)	0.000	-0.014*** (0.001)	0.000	-0.048*** (0.004)	0.000
healthstatus7	-0.059*** (0.005)	0.000	0.008*** (0.001)	0.000	0.051*** (0.005)	0.000
healthstatus8	-0.216*** (0.005)	0.000	0.022*** (0.001)	0.000	0.195*** (0.004)	0.000
healthstatus9	-0.328*** (0.004)	0.000	-0.062*** (0.003)	0.000	0.391*** (0.006)	0.000
healthstatus10	-0.374*** (0.003)	0.000	-0.171*** (0.004)	0.000	0.546*** (0.006)	0.000
selfowned	-0.053*** (0.005)	0.000	0.012*** (0.001)	0.000	0.041*** (0.004)	0.000
leisure	-0.001*** (0.000)	0.000	0.000*** (0.000)	0.000	0.001*** (0.000)	0.000

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Categorization: Pr(HL==7) "notsohappy", Pr(HL==8) "happy", Pr(HL==10) "happiest"

Source: Author's Calculation (2022)

The results from columns (8a), (8b), and (8c) in Table 7 demonstrate that gender affects one's happiness level. Male respondents were 5.4 percent more likely to be not-so-happy with their life, 1 percent less likely to be in the happy category, and 4.4 percent less likely to be in the happiest category compared to females. The effect of gender differential on happiness levels varies extensively across countries. In Indonesian case, men are less likely to be happy than women due to Indonesia's religious and cultural values, where a man commonly leads a household. A man is also responsible for working and meeting the family's needs. Hence, as a household head, a man has a greater responsibility to fulfill his family's livelihood, negatively influencing his happiness (Rahayu, 2016). Furthermore, Ngoo et al. (2015) found that in South Asia, women are facilitated to be empowered and can access a supportive environment to increase gender equality; women in developing countries tend to have higher life contentment than men.

Regarding the health factor, the empirical finding of health status in this study is as expected. The higher the health status of the respondents, the more likely they were to be in the highest level of happiness category. This finding aligns with Dolan et al. (2008), who reported a significant positive connection between subjective well-being and psychological and physical health. Based on home ownership status, the ordered probit results in Table 7 reveal that the self-owned coefficient had positive effects and was statistically significant on the probability of being in the happy and happiest categories. Specifically, respondents who lived in their own houses were 5.3 percent less likely in the not-so-happy category, 1.2 percent more likely to be in the happy category, and 4.1 percent more likely to be in the happiest category compared to the baseline category. These findings are consistent with Hu and Ye's (2020) study, which found that home ownership positively affects happiness.

In addition, according to empirical findings in Table 7, leisure time positively affected the probability of being in the happiest category. Leisure time improves happiness because most people will enjoy and relax when they spend their leisure time. However, highly educated people are more likely to be involved in more demanding and stressful jobs (Kristoffersen, 2018). They tend to have a higher responsibility related to their duty and need more working hours. Therefore, the effect of education is negative on leisure time as the indirect channel to happiness (Ibid, 2018).

3.2.2 Self-Acceptance

Using the ordered probit analysis, Table 8 shows the effect of education on self-acceptance, divided into three categories. Columns (9a), (9b), and (9c) depict estimations of the effect of education variables on the probability of having low self-acceptance, good self-acceptance, and highest self-acceptance, respectively. However, there is a notable contrast in the magnitude of education variables on self-acceptance between the narrow specification (Table 8) and the broad specification (Table 9). In the narrow specification, particularly in the highest self-acceptance category (column 9c), the coefficient of education variables was two third higher compared to the education variables in column (10c) in the broad specification. This phenomenon was observed in the respondents who did not complete primary school to respondents that had a diploma coefficient. Meanwhile, the coefficient of bachelor and postgraduate in the narrow specification was almost twice as high as their magnitude in the broad specification. Keeping all other factors constant, this suggests that the higher the level of education, the greater the effect of increasing the likelihood of individuals having the highest self-acceptance.

Table 8. Marginal Effects After Ordered Probit (Y=Self-Acceptance: Narrow Specification)

Self-Acceptance (SA)	**dy/dx Pr(SA==7) "lowSA" (9a)**	**P>|z|**	**dy/dx Pr(SA==8) "goodSA" (9b)**	**P>|z|**	**dy/dx Pr(SA==10) "highestSA" (9c)**	**P>|z|**
notcompletedPS	-0.065*** (0.009)	0.000	0.015*** (0.002)	0.000	0.050*** (0.007)	0.000
PS	-0.086*** (0.008)	0.000	0.020*** (0.002)	0.000	0.065*** (0.006)	0.000
JHS	-0.100*** (0.008)	0.000	0.021*** (0.001)	0.000	0.079*** (0.007)	0.000

Table 8. Continued...

Self-Acceptance (SA)	dy/dx Pr(SA==7) "lowSA" (9a)	P>|z|	dy/dx Pr(SA==8) "goodSA" (9b)	P>|z|	dy/dx Pr(SA==10) "highestSA" (9c)	P>|z|
SHS	-0.147*** (0.008)	0.000	0.029*** (0.001)	0.000	0.119*** (0.007)	0.000
Diploma	-0.204*** (0.010)	0.000	0.008*** (0.003)	0.003	0.196*** (0.013)	0.000
Bachelor	-0.241*** (0.007)	0.000	0.005** (0.002)	0.027	0.236*** (0.010)	0.000
Postgrad	-0.303*** (0.012)	0.000	-0.048*** (0.011)	0.000	0.351*** (0.023)	0.000

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Categorization: Pr(SA==7) "lowself-acceptance", Pr(SA==8) "goodself-acceptance", Pr(SA==10) "highestself-acceptance"

Source: Author's Calculation (2022)

Column (9c) shows that the respondents with a bachelor's degree were 23.6 percent more likely to feel the highest self-acceptance than those in the baseline category in the narrow specification. Meanwhile, in column (10c), the respondents with bachelor's degrees were only 13.2 percent more likely to feel the highest self-acceptance than those who never went to school. Therefore, after incorporating demographic and socioeconomic variables (Table 9), almost half of the education variables' effect on self-acceptance disappeared.

Table 9. Marginal Effects After Ordered Probit (Y=Self-Acceptance: Broad Specification)

Self-Acceptance (SA)	dy/dx Pr(SA==7) "lowSA" (10a)	P>|z|	dy/dx Pr(SA==8) "goodSA" (10b)	P>|z|	dy/dx Pr(SA==10) "highestSA" (10c)	P>|z|
notcompletedPS	-0.048*** (0.009)	0.000	0.013*** (0.002)	0.000	0.034*** (0.007)	0.000
PS	-0.058*** (0.009)	0.000	0.017*** (0.002)	0.000	0.041*** (0.006)	0.000
JHS	-0.067*** (0.009)	0.000	0.018*** (0.002)	0.000	0.049*** (0.007)	0.000
SHS	-0.097*** (0.009)	0.000	0.026*** (0.002)	0.000	0.072*** (0.007)	0.000
Diploma	-0.133*** (0.012)	0.000	0.023*** (0.001)	0.000	0.110*** (0.012)	0.000
Bachelor	-0.158*** (0.009)	0.000	0.025*** (0.001)	0.000	0.132*** (0.009)	0.000
Postgrad	-0.207*** (0.018)	0.000	0.011* (0.006)	0.061	0.196*** (0.023)	0.000
male	0.014*** (0.004)	0.000	-0.004*** (0.001)	0.000	-0.010*** (0.003)	0.000
age	-0.003*** (0.001)	0.000	0.001*** (0.000)	0.000	0.002*** (0.001)	0.000
age_sq	0.000 (0.000)	0.875	-0.000 (0.000)	0.875	-0.000 (0.000)	0.875
married	-0.007 (0.011)	0.543	0.002 (0.004)	0.548	0.005 (0.008)	0.540
divorced	0.025** (0.012)	0.043	-0.008* (0.004)	0.053	-0.016** (0.008)	0.038
householdsize	-0.005*** (0.001)	0.000	0.002*** (0.000)	0.000	0.004*** (0.001)	0.000
urban	0.001 (0.004)	0.743	-0.000 (0.001)	0.743	-0.001 (0.002)	0.743
income1	-0.075*** (0.007)	0.000	0.019*** (0.001)	0.000	0.056*** (0.006)	0.000

Table 9. Continued...

Self-Acceptance (SA)	dy/dx Pr(SA==7) "lowSA" (10a)	P>|z|	dy/dx Pr(SA==8) "goodSA" (10b)	P>|z|	dy/dx Pr(SA==10) "highestSA" (10c)	P>|z|
income2	-0.032*** (0.006)	0.000	0.009*** (0.002)	0.000	0.023*** (0.004)	0.000
income3	-0.004 (0.006)	0.463	0.001 (0.002)	0.459	0.003 (0.004)	0.465
income4	0.012** (0.006)	0.028	-0.004** (0.002)	0.032	-0.008** (0.004)	0.026
income5	0.012** (0.005)	0.018	-0.004** (0.002)	0.020	-0.008** (0.004)	0.016
healthstatus7	-0.018*** (0.006)	0.001	0.006*** (0.002)	0.001	0.013*** (0.004)	0.002
healthstatus8	-0.194*** (0.005)	0.000	0.050*** (0.001)	0.000	0.144*** (0.004)	0.000
healthstatus9	-0.343*** (0.004)	0.000	-0.003 (0.002)	0.239	0.346*** (0.006)	0.000
healthstatus10	-0.413*** (0.003)	0.000	-0.118*** (0.004)	0.000	0.530*** (0.006)	0.000
selfowned	-0.028*** (0.005)	0.000	0.009*** (0.002)	0.000	0.019*** (0.003)	0.000
leisure	-0.001*** (0.000)	0.000	0.000*** (0.000)	0.000	0.001*** (0.000)	0.000

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Categorization: Pr(SA==7) "lowself-acceptance", Pr(SA==8) "goodself-acceptance", Pr(SA==10) "highestself-acceptance"

Source: Author's Calculation (2022)

Meanwhile, the respondents with a postgraduate degree were most likely to feel the highest self-acceptance compared to all other educational dummy variables. This finding is similar to the OLS results that the higher the level of education an individual completed, the more likely they had a higher self-acceptance than those in the baseline category. This result supports a study by Schinkel et al. (2016), who emphasized that the primary function of education is to stimulate curiosity and attentiveness. As a result, education helps people learn new knowledge, enhance capacities, and have a higher meaning of life and a higher degree of perceived self-acceptance.

According to the econometric result in Table 9, the most considerable magnitude comes from the coefficient of hs10. This finding suggests that individuals who perceive themselves as having better health are more likely to experience the highest level of self-acceptance. This finding reinforces Dolan et al. (2008), which underlined health's importance in enhancing happiness. In addition, Szentagotai and David (2013) emphasized that self-acceptance is an inseparable part of happiness.

3.2.3 Family Harmony

Table 10 demonstrates estimations of the effect of education variables on the probability of being in the lowest family harmony (column 11a), good family harmony (column 11b), and highest family harmony category (column 11c). All dummies of education variables in the models had positive effects and were statistically significant on the probability of possessing the highest family harmony, see columns (11c) and (12c).

Table 10. Marginal Effects After Ordered Probit (Y=Family Harmony: Narrow Specification)

Family Harmony (FH)	**dy/dx Pr(FH==7) "lowestFH" (11a)**	**P>|z|**	**dy/dx Pr(FH==8) "goodFH" (11b)**	**P>|z|**	**dy/dx Pr(FH==10) "highestFH" (11c)**	**P>|z|**
notcompletedPS	-0.054*** (0.005)	0.000	-0.027*** (0.003)	0.000	0.080*** (0.009)	0.000
PS	-0.090*** (0.005)	0.000	-0.044*** (0.003)	0.000	0.134*** (0.008)	0.000
JHS	-0.108*** (0.005)	0.000	-0.065*** (0.004)	0.000	0.173*** (0.008)	0.000
SHS	-0.144*** (0.004)	0.000	-0.086*** (0.004)	0.000	0.230*** (0.008)	0.000
Diploma	-0.153*** (0.004)	0.000	-0.147*** (0.008)	0.000	0.300*** (0.012)	0.000
Bachelor	-0.174*** (0.003)	0.000	-0.166*** (0.005)	0.000	0.340*** (0.008)	0.000
Postgrad	-0.178*** (0.004)	0.000	-0.218*** (0.013)	0.000	0.396*** (0.016)	0.000

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Categorization: Pr(FH==7) "lowestfamilyharmony", Pr(FH==8) "goodfamilyharmony", Pr(FH==10) "highestfamilyharmony"

Source: Author's Calculation (2022)

Similar to econometric results in happiness and self-acceptance, there was a noticeable discrepancy in the magnitude of the education variables between the narrow specification (Table 10) and the broad specification (Table 11). After incorporating demographic and socioeconomic variables, almost half of the education variables' effect on family harmony disappeared.

Take an example from the postgraduate coefficient to illustrate the difference between narrow and broad specifications. In the narrow specification, the postgraduate respondents were 39.6 percent more likely to be in the highest family harmony category. In contrast, in the broad specification, the probability of the respondents with a postgraduate degree being in the highest family harmony category was 26.3 percent higher than those who never went to school. These econometric results imply that education has an indirect effect on family harmony through other factors, income, health status, home ownership, leisure time, and other demographic variables in the broad specification.

The econometric results indicate that the higher the level of education, the higher the probability of the respondents being in the highest family harmony category compared to the baseline category. This is evident from the magnitude of the education dummy variable. This finding aligns with Sunarti's (2015) study, which highlighted that education positively affects family well-being and harmony through intermediaries like job and income stability. A higher level of education enables a person to enter wider labor market opportunities and is more likely to obtain permanent employment than a lower educated person; thus, they tend to have stable work and income certainty, which contributes to meeting the family's needs with ease. The effect of education on forming family harmony, however, may depend on cultural values and welfare systems (Mayer, 2001, as cited in Bordone, 2009). Patterson's (2002) research on family resilience also emphasizes that being involved in spirituality with family strengthens family resilience. This notion is relevant to the Indonesian case. This idea is relevant to Indonesia, where most families live in one household and participate in a cultural or spiritual activity with other family members' promoting greater family resilience and family harmony.

Table 11. Marginal Effects After Ordered Probit (Y=Family Harmony: Broad Specification)

Family Harmony (FH)	dy/dx Pr(FH==7) "lowestFH" (12a)	P>|z|	dy/dx Pr(FH==8) "goodFH" (12b)	P>|z|	dy/dx Pr(FH==10) "highestFH" (12c)	P>|z|
notcompletedPS	-0.027*** (0.005)	0.000	-0.019*** (0.004)	0.000	0.045*** (0.009)	0.000
PS	-0.038*** (0.005)	0.000	-0.026*** (0.004)	0.000	0.064*** (0.009)	0.000
JHS	-0.045*** (0.005)	0.000	-0.034*** (0.004)	0.000	0.079*** (0.009)	0.000
SHS	-0.070*** (0.005)	0.000	-0.054*** (0.004)	0.000	0.123*** (0.009)	0.000
Diploma	-0.085*** (0.005)	0.000	-0.089*** (0.009)	0.000	0.174*** (0.014)	0.000
Bachelor	-0.100*** (0.004)	0.000	-0.107*** (0.007)	0.000	0.207*** (0.011)	0.000
Postgrad	-0.113*** (0.007)	0.000	-0.150*** (0.018)	0.000	0.263*** (0.025)	0.000
male	0.022*** (0.002)	0.000	0.014*** (0.002)	0.000	-0.036*** (0.004)	0.000
age	0.001** (0.000)	0.035	0.001** (0.000)	0.035	-0.002** (0.001)	0.035
age_sq	-0.000*** (0.000)	0.000	-0.000*** (0.000)	0.000	0.000*** (0.000)	0.000
married	-0.122*** (0.009)	0.000	-0.046*** (0.002)	0.000	0.168*** (0.010)	0.000
divorced	-0.037*** (0.007)	0.000	-0.027*** (0.006)	0.000	0.065*** (0.012)	0.000
householdsize	-0.008*** (0.001)	0.000	-0.005*** (0.000)	0.000	0.013*** (0.001)	0.000
urban	0.010*** (0.002)	0.000	0.006*** (0.001)	0.000	-0.016*** (0.004)	0.000
income1	-0.027*** (0.004)	0.000	-0.019*** (0.003)	0.000	0.046*** (0.008)	0.000
income2	-0.007* (0.004)	0.052	-0.005* (0.003)	0.060	0.012* (0.006)	0.055
income3	-0.001 (0.004)	0.727	-0.001 (0.002)	0.728	0.002 (0.006)	0.727
income4	0.005 (0.004)	0.169	0.003 (0.002)	0.160	-0.008 (0.006)	0.165
income5	0.009** (0.003)	0.010	0.005** (0.002)	0.008	-0.014** (0.005)	0.009
healthstatus7	-0.032*** (0.003)	0.000	-0.022*** (0.002)	0.000	0.054*** (0.005)	0.000
healthstatus8	-0.159*** (0.003)	0.000	-0.125*** (0.003)	0.000	0.284*** (0.005)	0.000
healthstatus9	-0.212*** (0.002)	0.000	-0.310*** (0.003)	0.000	0.522*** (0.004)	0.000
healthstatus10	-0.203*** (0.002)	0.000	-0.381*** (0.003)	0.000	0.584*** (0.003)	0.000
selfowned	-0.010*** (0.003)	0.002	-0.006*** (0.002)	0.001	0.016*** (0.005)	0.001
leisure	-0.001*** (0.000)	0.000	-0.001*** (0.000)	0.000	0.001*** (0.000)	0.000

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Categorization: Pr(FH==7) "lowestfamilyharmony", Pr(FH==8) "goodfamilyharmony", Pr(FH==10) "highestfamilyharmony"

Source: Author's Calculation (2022)

Columns (12a), (12b), and (12c) reveal that income level affected the perceived family harmony. The respondents earning more than Rp 4,000,000 per month (income category 1) were about 2.7 percent less likely in the lowest family harmony category and 1.9 percentage points less likely in the good family harmony category. On the other hand, they were 4.6 percent more likely in the highest family harmony category compared to the baseline category. These findings suggest that people with higher income levels were more likely to be in the highest family harmony category. This result also supports Sunarti's (2015) study, which pointed out the connection between education, work and income stability, family well-being, and family harmony.

The regression analysis shows that household size has a positive effect on family harmony. Keeping all other variables constant, the increase of one family member in a household decreases the likelihood of this family being in the lowest family harmony by 0.8 percent and being in the good family harmony by 0.5 percent and increases the likelihood of this family being in the highest family category by 1.3 percent.

3.3 Discussion

Because education is inextricably linked to determining personal income, having a higher income would lead to greater happiness or subjective well-being. Education could alter not only economic indicators but also positively affect life satisfaction (Cuñado & de Gracia, 2012; Powdthavee et al., 2015). More profoundly, education affects happiness through various life domains. For example, several prior studies classified some aspects that determine happiness according to several life domains such as job opportunities, income, health, children, marital status, leisure time, and neighborhood (Blanchflower & Oswald, 2004; Kristoffersen, 2018; Nieboer et al., 2005; Nikolaev, 2018; Van Praag et al., 2003).

However, those prior studies found mixed evidence, either a positive or negative correlation between education and happiness. The mixed empirical findings on the correlation between education and individual happiness may be due to the common assumption that a higher level of education will lead to increased income. As a result, being unable to acquire these higher expectations could lead to a decline in subjective well-being (Clark & Oswald, 1996). The mixed results between the effect of education on subjective well-being could occur due to the difference in macro-level and individual-level determinants.

The econometric results in this study reveal that, on average, females are happier than males. This finding is consistent with the gender identity hypothesis proposed by Akerlof and Kranton (2000), which posits a self-concept that perceives males should avoid household chores and earn more money than females. This perspective makes males feel burdened and have a greater responsibility, making them less happy than females. The empirical findings also indicate that the effect of education and other control variables predispose happiness level, self-acceptance, and family harmony to approximately similar values. Specifically, the econometric results in this paper indicate that the two aspects of well-being, self-acceptance and family harmony, become derivatives of happiness. This finding is supported by prior studies that indicated a significant association between self-acceptance, positive emotions, and the essential element of happiness. Meanwhile, family harmony is associated with family resilience and family well-being. In the Indonesian context, being involved in a cultural or spiritual activity with other family members could increase family resilience and strengthen family harmony.

Conclusions

This study reveals that the effect of education on happiness, self-acceptance, and family harmony remained statistically significant even after incorporating socioeconomic and individual characteristics such as income, gender, marital status, home ownership, health status, and leisure time (the broad specification). Conversely, in the narrow specification model, only education variables were used to examine its effect on three dependent variables. Based on econometric results, highly educated people reported higher levels of happiness, self-acceptance, and satisfaction with family harmony than lower-educated people using OLS estimations and ordered probit techniques.

The findings highlight that the coefficient of education variables in the narrow specification was almost twice higher compared to the broad specification in all three dependent variables. Based on econometric results, more than half the magnitude of the education effect was away after incorporating

other control variables, yet the direct effect of education remained significant. This trend was also observed in all levels of education's coefficient. The indirect effect of education extended through the other control variables used in the broad specification. Additionally, married couples, household size, living in rural areas, having higher income, home ownership, better health status, and more leisure time reported a higher level of happiness, self-acceptance, and family harmony.

The findings also demonstrate that the effect of education on monetary variables such as income and home ownership does not necessarily have a significant effect on happiness, self-acceptance, and family harmony. Interestingly, the higher perception of health status has a greater effect on the likelihood of individuals experiencing high levels of happiness, self-acceptance, and family harmony. This finding reinforces Dolan et al.'s (2008) study, highlighting health's importance in enhancing happiness.

To reduce the educational gap among underprivileged children, the Indonesian government should implement policies that ensure they receive sufficient educational support from primary to tertiary levels. Thus, when the average years of schooling of the Indonesian population increase, it positively affects subjective well-being (non-monetary benefits) comprising happiness, self-acceptance, and family harmony as well as monetary benefits such as reducing income inequality.

Despite the large size of observations and the credibility of the data, the empirical findings from this study could not comprehensively capture happiness, self-acceptance, and family harmony over time because this study used a cross-section data set. The literature review on the relationship between education and self-acceptance and family harmony was also limited. Therefore, future research in this field should use panel data to solve the endogeneity problem and investigate the effect of education on happiness, self-acceptance, family harmony, and other subjective well-being dimensions over time.

Acknowledgements

This paper was part of the Master in Development Studies thesis at the International Institute of Social Studies, Erasmus University. The program was funded by Pusbindiklatren of the Ministry of National Development Planning/Bappenas. The author would like to express her sincerest gratitude to Prof. Arjun Singh Bedi and Dr Elissaios Papyrakis. The author thanks them for their guidance, support, and valuable input on improving this research. The contents of the paper do not necessarily represent the official perspectives or policies of the organizations.

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Appendix

Appendix 1. List of Questions in the Questionnaire of Happiness Level Measurement Survey 2021 for Each Variable Used in this Study

Dependent Variables	Question Numbers and Question Wording (Measurements and units at each answer)
EQUATION (1): HAPPINESS LEVEL (HL)	
Happiness Level	**1501**. Part XV. Happiness of Life **"How happy is (name) with life as a whole?"** Answer: Score 0 (very unhappy) up to 10 (extremely happy) Ordered probit categories: "notsohappy" (score 0-7), "happy" (score 8), and "happiest" (score 9-10)
EQUATION (2): SELF-ACCEPTANCE (SA)	
Self-Acceptance	**1412**. Part XIV. Eudaimonia: Self-Acceptance **"How capable (name) accept any conditions you are experienced?"** Answer: Score 0 (very incapable) up to 10 (very capable) Ordered probit categories: "lowself-acceptance" (score 0-7), "goodself-acceptance" (score 8), and "highestself-acceptance" (score 9-10)
EQUATION (3): FAMILY HARMONY (FH)	
Family Harmony	**802**. Part VIII. Family Harmony **"How satisfied is (name) with family harmony?"** Answer: Score 0 (not satisfied at all) up to 10 (very satisfied) Ordered probit categories: "lowestfamilyharmony" (score 0-7), "goodfamilyharmony" (score 8), and "highestfamilyharmony" (score 9-10)
Explanatory Variables	**Questions in the Questionnaire (Measurements and units at each answer)**
MAIN VARIABLE:	
Education	**501**. Part V. Education **"What is the highest education completed by (name)?"** Answer: Schooling completed by the respondent, using seven dummy variables, no school as the baseline category. (0=no school, 1=not completed primary school, 2= primary school, 3=junior high, 4=senior high, 5=one up to three years of diploma, 6=bachelor, and 7=postgraduate)
DEMOGRAPHIC CHARACTERISTICS:	
Gender	**B4K4**. Gender of the respondent (1=male, 0=female)
Age	**B4K5**. Age of the respondent (years)
Marital status	**B4K6**. Marital status of the respondent (1=single, 2=married, and 3=divorced), single as the baseline.
Household size	**201**. Total family members in one household (number of people living in one house)
Area classification	**105**. Area classification where the respondent lives (1=urban, 0=rural)
ECONOMIC CHARACTERISTICS:	
Income	**603**. Personal income that earned monthly, using five dummy variables, for those who not working as the baseline category. **"How much the average monthly income of (name) from all occupations/businesses in the past year?"** Income category 1: >Rp 4.000.000 (> €257)[1] Income 2: Rp 2.500.001 – Rp 4.000.000 (€160.7-€257) Income 3: Rp 1.500.001 – Rp 2.500.000 (€96.5-€160.69) Income 4: Rp 1.000.001 – Rp 1.500.000 (€64.3-€95.49) Income 5: ≤ Rp 1.000.000 (≤64.3 per month)
Home Ownership	**1201**. Residential building status/house status **"What is ownership status of the residential building which (name) is occupying?"** (1=own house, 0=otherwise)

[1] According to Bank Indonesia (2022), foreign exchange rates on transaction on June 16th 2022, 1 Euro is equal to 15,550 Indonesian Rupiah (Rp).

HEALTH INDICATOR:	
Health status	**708**. **"How satisfied is (name) with health?"** Perceived health status (scale 0-10) Answer: Score 0 (not satisfied at all) up to 10 (very satisfied)
LEISURE:	
Leisure time	**902A**. **"How many hours of free time does (name) usually have in one week?"** Answer: Leisure time in hour(s)

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 – APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Research Paper

Village Development Sustainability Analysis: A Case Study in Cijeruk, Bogor Regency

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Abstract

Having abundant natural resources, the village is the foundation of the city. Villages have the potential to develop various natural, physical, social, demographic, and cultural resources that have not been optimally utilized. Therefore, sustainable village development is necessary to improve villagers' welfare and quality of life. This study aims to identify the status of village sustainability and sensitive attributes in village development through a case study in Cijeruk Village, Cijeruk District, Bogor Regency. The study examined four aspects of sustainability, ecology, economy, socio-culture, and legal and institutional dimensions using a Multidimensional Scaling (MDS) analysis called Rap-BUSAJI (Rapid Appraisal of Cijeruk Village Development). The study found that Cijeruk Village has a relatively sustainable status, with an overall index of 53.29%. The study also identified ten sensitive attributes that could be used to evaluate development. These ten attributes include three ecological dimension attributes (clean water sources for communal MCK, availability of clean water, and availability of MCK in every house); 3 attributes of the economic dimension (marketing range of main commodities, types of main commodities, and availability of supporting industries for main commodities); 3 attributes of the socio-cultural dimension (average community education level, number of agricultural workforces, and number of unemployment); and one attribute of legal and institutional dimensions (maps of disaster-prone areas availability).

Keywords: Village; Development; Multidimensional Scaling (MDS); Sustainability

ARTICLE INFO
Received: March 05, 2023
Received in revised form: April 09, 2023
Accepted: April 27, 2023

doi: 10.46456/jisdep.v4i1.413

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/ National Development Planning Agency (Bappenas), Republic of Indonesia

Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
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Supported by Indonesian Development Planners Association (PPPI)

Please cite this article in APA style as:
Mujio,Rahayu, R.A.,Waskitaningsih,N.,& Mulyadi, E. (2023). Village Development Sustainability Analysis: A Case Study in Cijeruk, Bogor Regency. *The Journal of Indonesia Sustainable Development Planning, 4*(1), 57—68. https://doi.org/10.46456/jisdep.v4i1.413

1. Introduction

According to The World Bank (2022), middle-income countries are home to 75% of the world's population and 62% of the world's poor. Poverty is influenced by uneven development between urban and rural areas due to urbanization, which risks the production economy in the village (Junaenah, 2018). Indonesia is a developing country with a large rural area. BPS data from 2022 showed that 12.36% of people living in rural areas are considered indigent, compared to 7.53% in urban areas. This condition is considered ironic because the village has abundant natural resources. Villages have the potential to develop various natural, physical, social, demographic, and cultural resources. However, this potential has not been optimally utilized, which has hindered village development (Ariadi, 2019).

According to the Minister of Home Affairs Regulation Number 114 of 2014 concerning Village Development Guidelines, village development is an attempt to improve the quality of life and livelihoods for the benefit of the villagers as much as possible (Kementerian Dalam Negeri, 2014). Increasing village development could be done by empowering the local economy, creating local transportation access to growth areas, and accelerating the fulfillment of basic infrastructure. Village development is directed at advancing the economy and strengthening rural communities as the subject of development to address the national development gap (Adisasmita, 2018).

The village's development is based on its potential for natural resources, humans, the economy, society, and the culture of the community (Novi & Ella, 2019). The sustainable rural development approach is a holistic development approach in which the basic daily needs of rural residents can be met by public utilities with the support of technical, socio-economic, and environmental conditions (Mihai & Latu, 2020). Village development aims at improving the welfare of villagers and their quality of life, as well as overcoming poverty by meeting basic needs, building facilities and infrastructure of the village, developing local economic potential, and using natural resources and the environment sustainably.

In relation to a city, a village has an important role. A village functions as a food supplier area for a city. In addition, a village is also a barn for raw materials and productive labor (Suparmini & Wijayanti, 2015). Even though it has an important role in a city, the potential of a village has not been optimally utilized. Therefore, it is necessary to develop sustainable villages by utilizing the available resources with due regard to aspects of sustainable development, specifically environmental, social, and economic aspects, along with the village community institution (Parlupi, 2020).

Cijeruk Village is one of the villages in Cijeruk District, Bogor Regency, which had a population of 10.483 people in 2021 or 11,23% of the total population (Badan Pusat Statistik Kabupaten Bogor, 2022). This village plays a crucial economic center in Cijeruk District and has experienced rapid economic growth thanks to its abundant natural resources. Based on interviews with the village secretary and the head of economics and development of Cijeruk Subdistrict in 2022, these natural resources in Cijeruk Village have been explored by its villagers and investors to develop tourist attractions. The increasing number of tourist attractions in Cijeruk Village could certainly cause a problem for the local economic structure and the environment. Based on the results of land use digitized in 2015 and 2022, there have been significant changes, especially in agricultural fields. The conversion of agricultural land to tourist attractions is already happening, as shown by the significant decrease in agricultural fields, from 301.50 ha in 2015 to 292.887 ha in 2022. The Cijeruk villagers will lose their jobs as a farmer if the conversion of agricultural land continues to occur. It would also have an impact on socio-cultural conditions and community institutions.

Conducting a sustainability analysis is crucial to ensure sustainable development in Cijeruk Village. This analysis helps determine the current status of sustainability in the village development and provides valuable insights for evaluating the progress of village development.

A considerable number of studies have been conducted on village and village sustainability. Research conducted by Hardini et al. (2022) focused on the assessment of the economic sustainability level of the industrial villages based on sustainable production indicator factors using fuzzy methods. Marhesa et al. (2022) analyzed the sustainability of a tourism village based on five dimensions of sustainability (ecology, economy, social, infrastructure, and institution), using Multidimensional Scaling Rappish that was modified into Rap-Tourism, leverage analysis, and Monte Carlo analysis. Meanwhile, Hafidah et al. (2019) concentrated on analyzing the sustainability of a tourism village based on dimensions of ecology, economy, and social sustainability using a modified Multidimensional Scaling Rapfish and leverage

analysis. However, no research has been conducted on the sustainability of village development based on ecological, economic, socio-cultural, legal, and institutional dimensions using a Multidimensional Scaling (MDS) analysis called the Rap-BUSAJI approach.

2. Methods

2.1 Variables

To assess the sustainability status of Cijeruk Village's development, a multidimensional analysis was conducted, which included ecological, economic, socio-cultural, legal, and institutional dimensions combining all the attributes in the development of Cijeruk Village. The attributes in the study consist of 24 attributes, as shown in Table 3. The attributes were obtained based on various literature related to village development. The criteria for selecting attributes were adjusted to suit the characteristics of villages in Indonesia.

Table 1. Variables in Each Dimension of Cijeruk Village Development

Dimension	Attributes	Sources
Ecology	Paddy fields area	Persada (2015)
	Carrying capacity of the settlement area	Dwikorawati (2012), Putera et al. (2013) and Persada (2015)
	Availability of clean water	Persada (2015), Putra et al. (2021), and Neksidin et al. (2021)
	Clean water sources for communal MCK (*Mandi, Cuci, Kakus*)/ public bathing, washing, and latrine facilities	
	Availability of latrine in every house	Rahayu (2012)
	Local government's ability to manage waste	Dewi (2011) and Dwikorawati (2012)
	Frequency of occurrence of natural disasters	Thamrin et al. (2007) and Dwikorawati (2012)
Economy	Type of the main commodity	Thamrin et al. (2007)
	Market availability	Thamrin et al. (2007), Rahayu (2012), and Supardi et al. (2017)
	Marketing range of the main commodity	
	Availability of supporting industries for main commodities	Thamrin et al. (2007)
	Road condition	Supardi et al. (2017)
	Availability of public transport	Thamrin et al. (2007), Dewi (2011) and Rahayu (2012)
	Number of households subscribed to PLN	Dewi (2011) and Putra et al. (2021)
Socio-culture	Level of community participation	Thamrin et al. (2007), Dewi (2011), and Putera et al. (2013)
	Average community educational level	Thamrin et al. (2007), Dewi (2011), and Dwikorawati (2012)
	Number of the agricultural workforce	Thamrin et al. (2007), Dewi (2011) and Rahayu (2012)
	Local wisdom level	Putera et al. (2013)
	Number of unemployment	Persada (2015) and Putra et al. (2021)
	Availability of public facilities	Thamrin et al. (2007)
Legal and institutions	Availability of spatial regulation	Thamrin et al. (2007), Persada (2015), and Supardi (2017)
	Availability of maps of disaster-prone areas	Supardi (2017)
	Availability of social institutions	Thamrin et al. (2007), Dwikorawati (2012), and Putera et al. (2013)
	The level of the role of social institutions	Putera et al. (2013)

2.2 Method of Collecting Data

This research used secondary and primary data. Secondary data were obtained from the Regional Development Planning, Research and Development Agency (Bappeda) of Bogor Regency, Central Bureau District (BPS), and Cijeruk Village Office. For more details regarding the secondary data used, see Table 2.

Table 2. Secondary Data

Data	Institution
- Bogor Regency Thematic Map 1. Paddy fields were in 2022 2. Carrying capacity of settlement area in 2022 3. Availability of clean water	Regional Development Planning, Research and Development Agency of Bogor Regency
Frequency of occurrence of natural disasters in 2021	Bogor Regency Regional Disaster Management Agency
- Village Potential Documents for 2021 1. Source of clean water for MCK (*Mandi, Cuci, Kakus*)/ public bathing, washing, and latrine facilities 2. Availability of latrine in every house 3. Main commodity types 4. Availability of supporting industries for main commodities 5. Availability of social institutions - Bogor Regency in Figures 1. Local government's ability to manage waste - Cijeruk District in Figures 1. Availability of public transport 2. Number of households subscribing to PLN 3. Availability of public facilities (number)	Central Bureau of Statistics
- Village Profile Document 1. Average community educational level 2. Number of the agricultural workforce 3. Number of unemployment 4. Availability of public facilities (number) 5. Good road conditions	Cijeruk Village Office

Primary data, on the other hand, were collected through interviews and Focus Group Discussions (FGDs). The interviews were conducted with resource persons related to the development of Cijeruk Village using purposive sampling methods as suggested by Hermawan & Amirullah (2016). FGDs were held with village apparatus, farmers, ranchers, entrepreneurs, and community institutions at the Cijeruk Village Office to discuss the village's potential and problems. Table 3 provides more information on the primary data, and Figure 1 depicts the administrative area of Cijeruk Village.

Table 3. Primary Data

Data	Sources
- Availability of spatial regulation - Availability of maps of disaster-prone areas	Interview with government Staff
- Marketing range of the main commodity	Interview with farmers, ranchers, entrepreneurs, and government staff
- The level of the role of social institutions - Local wisdom level - Level of community participation	FGD with village apparatus and village communities consisting of farmers, ranchers, entrepreneurs, and community institutions

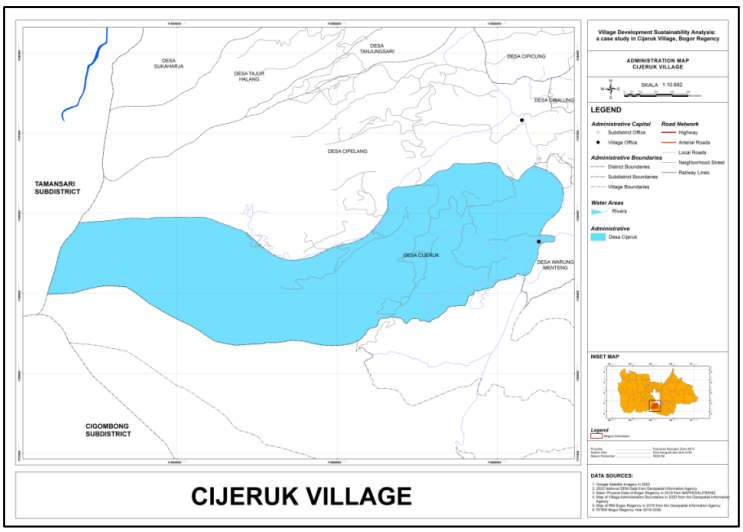

Figure 1. Cijeruk Village

2.3 Analysis Method

This research used a Multidimensional Scaling (MDS) analysis technique called the Rap-BUSAJI (Rapid Appraisal Pembangunan Desa Cijeruk) to determine the status of sustainable development of Cijeruk Village. The MDS analysis is a statistical technique that tries to carry out multidimensional transformations into lower dimensions (Mulyana et al., 2014). The MDS analysis aims to determine the sustainability status of each dimension so that it can be identified if there is an imbalance in the dimension (Pratama & Umar, 2020). The data consisted of sustainability aspects, including ecological, economic, socio-cultural, legal, and institutional dimensions. This multidimensional analysis was carried out by combining all the attributes to get the results of the sustainable development of Cijeruk Village. The data used for MDS calculation are primary and secondary, as shown in Table 1.

The stages of sustainability analysis of Cijeruk Village development involved several steps: 1) identifying the attributes to be assessed; 2) assigning scores or values to each attribute; 3) conducting multidimensional scale analysis with RAPFISH software for each dimension that will produce MDS values and voltage values and coefficients of determination; 4) conducting Monte Carlo analysis as a comparison of MDS values; and 5) leverage analysis to determine the sensitivity of variables that affect sustainability.

a. *Multidimensional Scaling (MDS)*

The MDS technique visualizes the position of the sustainability point through the horizontal and vertical axes with sustainability index values of 0% (bad) and 100% (good). If the system has a sustainability index value of 50%, it is said to be sustainable, whereas if it is <50%, it is categorized as unsustainable (Supardi et al., 2017). The ordination method (distance determination) in MDS was based on the Euclidean Distance, which can be written in n dimension using equation 1. The ordination of objects or the points in MDS was confirmed by regression of the Euclidean Distance from point *i* to *j* with the origin of equation 2 (Fauzi & Anna, 2002).

$$d = \sqrt{(|x_1 - x_1|^2 + |y_1 - y_2|^2 |y_1 - y_2|^2)} \quad (1)$$

$$d_{ij} = a + \beta\delta_{ij} + \varepsilon \quad (2)$$

Information:

d	= Distance	β	= slope
x, y	= Attribute	ε	= error
d_{ij}	= Euclidean Distance from *i* to *j*	δ_{ij}	= Origin/ Euclidean Distance
a	= intercept		

The sustainable status obtained was projected onto the horizontal line of the ordinate scale between the two extremes from bad (0) to good (100), as shown in Figure 2. The sustainability status of Cijeruk Village development in each dimension was stated with a sustainability index scale. The sustainability index scale lies between 0-100, as shown in Table 4.

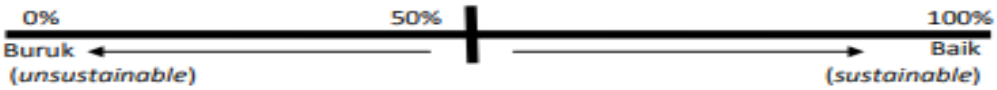

Figure 2. Sustainability Point Position

Source: Fauzi (2019)

Table 4. Sustainability Index Value

Index Value	Category
0,00—25,00	bad: unsustainable
25,01—50,00	less: less sustainable
50,01—75,00	quite: quite sustainable
75,01—100,00	good: very sustainable

Source: Thamrin et al. (2017)

b. Stress Value and Determination Coefficient Value (R2)

The ALSCAL technique optimizes the squared distance of squared data (origin =o_{ijk}), that is, in three dimensions (i, j, k). The S-Stress value formula was calculated by equation 3. The low-stress value indicates good compatibility, whereas the high S value indicates the opposite (Supardi et al., 2017).

$$S = \sqrt{\frac{1}{m}\sum_{k-1}^{m}\left[\frac{\sum_i \sum_j (d^2_{ijk} - o^2_{ijk})^2}{\sum_i \sum_j o^4_{ijk}}\right]} \quad (3)$$

$$d^2_{ijk} = \sum_{a=1}^{i} W_{ka}(x_{ia} - x_{ja})^2 \quad (4)$$

c. Leverage Analysis

Leverage analysis is sensitive to the value of sustainability and is used to identify sensitive attributes (Supardi, 2017). Attributes or leverage factors are attributes with sensitive values that influence the sustainability status. The higher the RMS value, the higher the attribute's influence on sustainability status sensitivity (Kavanagh & Pitcher, 2004). The RMS equation can be seen in equation 12.

$$RMS = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(X_{red} - X_{flip})^2} \quad (12)$$

Information:

X_{red} = attribute reduction ordinate results ($V_{flip-remove}$)

X_{flip} = results of ordination without reduction of attributes (V_{flip})

N = the number of objects analyzed

3. Results and Discussions

3.1 The Sustainability Status of Cijeruk Village Development in the Ecological Dimension

Based on Table 1, seven attributes are influencing the sustainability of the development Village on the ecological dimension, namely the paddy fields area, the carrying capacity of the settlement area, the availability of clean water, clean water sources for Mandi, Cuci, Kakus/public bathing, washing, and latrine facilities, the availability of latrine in every house, the local government's ability to manage waste, and frequency of occurrence of natural disasters. Based on these attribute data and MDS analysis using Rap-BUSAJI, it was found that the sustainability index value of the ecological dimensions of Cijeruk Village development was 54.57% and was categorized as moderate/quite sustainable. The results of the leverage analysis produced three sensitive attributes that affected the sustainability index value of the ecological dimension: 1) clean water sources for communal public bathing, washing, and latrine facilities, 2) availability of clean water, and 3) availability of latrine in every house. Sustainability index values and sensitive attributes from the results of the ecological dimension analysis are shown in Figure 3.

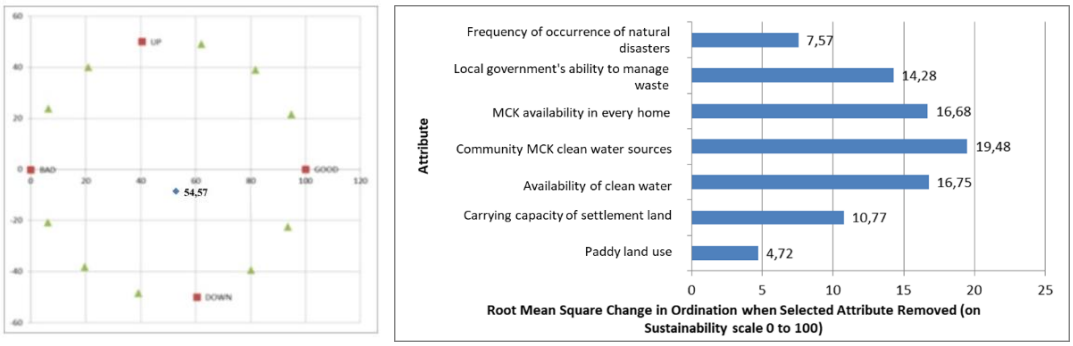

Figure 3. Sustainability Index Values and Ecological Dimension Sensitive Attributes, 2022

Source: Author's Analysis (2022)

Those three sensitive attributes in Cijeruk Village are of good quality, except for the clean water source. The villagers still use rivers/ponds as clean water sources for public bathing, washing, and latrine facilities (Badan Pusat Statistik [BPS], 2021a). On the other hand, Cijeruk Village has several springs that are being used by regional drinking water companies. It is located in RW 04 and RW 05 Cijeruk Village and causes harm to the community neighborhood (Setiawan, 2012). As for the other attributes, based on the previous analysis, the availability of clean water in Cijeruk Village in 2022 was 91%. Sanitation facilities in Cijeruk Village consist of public bathing, washing, latrine, and private latrine facilities. Currently, most of Cijeruk Village communities already have private latrines, but the village still provides public bathing, washing, and latrine facilities for the community to use (Badan Pusat Statistik Kabupaten Bogor, 2022).

3.2 The Sustainability Status of Cijeruk Village Development in the Economic Dimension

Seven attributes were influencing the development sustainability of the village on the economic dimension, the types of main commodities, the market availability, the marketing range of main commodities, the availability of supporting industries for main commodities, the road condition, the availability of public transportation, and the number of households subscribed to PLN. The attributes influencing the development sustainability of the Village on the economic dimension were obtained based on the results of analysis of literary studies as shown in Table 2. The results of the MDS analysis using Rap-BUSAJI indicates that the index value of the development sustainability of the economic dimension of Cijeruk Village was 74,35% and categorized as moderate/ quite sustainable. The results of the leverage analysis show that three sensitive attributes affected the value of the economic dimension of the sustainability index: 1) the marketing range of the main commodities, 2) the types of main commodities, and 3) the availability of supporting industries for main commodities. Sustainability index values and sensitive attributes from the results of the economic dimension analysis are shown in Figure 4.

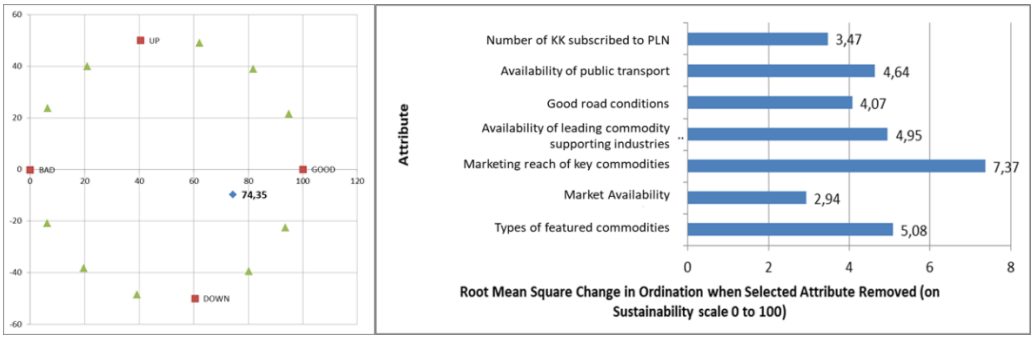

Figure 4. Sustainability Index Value and Sensitive Attributes of the Economic Dimension, 2022

Source: Author's Analysis (2022)

Those three sensitive attributes had a high RMS value. Based on the results of interviews and FGD, sheep farming, one of the main commodities in Cijeruk Village, had reached the national market, such as Bogor, Jakarta, Bandung, and Bekasi. In contrast, the rice commodity was only marketed within the Cijeruk District, while natural tourism attracted tourists from nearby areas around Cijeruk village. In addition, Cijeruk Village had three rice mill houses, four inns, and a slaughterhouse as supporting industries for main commodities (Badan Pusat Statistik, 2021a).

3.3 The Sustainability Status of Cijeruk Village Development in the Socio-cultural Dimension

Six attributes were influencing the development sustainability of the village on the socio-cultural dimension, the level of community participation, the average community education level, the number of agricultural workforces, the local wisdom level, the number of unemployed, and the availability of public facilities. The results of the MDS analysis using Rap-BUSAJI shows that the sustainability index value of the sociocultural dimensions of the Cijeruk Village development was 61,16% and categorized as moderate/quite sustainable. Based on the leverage analysis, it was found that three sensitive attributes were influencing the value of the socio-cultural dimension of the sustainability index: 1) the average community educational level, 2) the number of agricultural workforce, and 3) the number of unemployment. Sustainability index values and sensitive attributes resulting from the analysis of the sociocultural dimensions are shown in Figure 5.

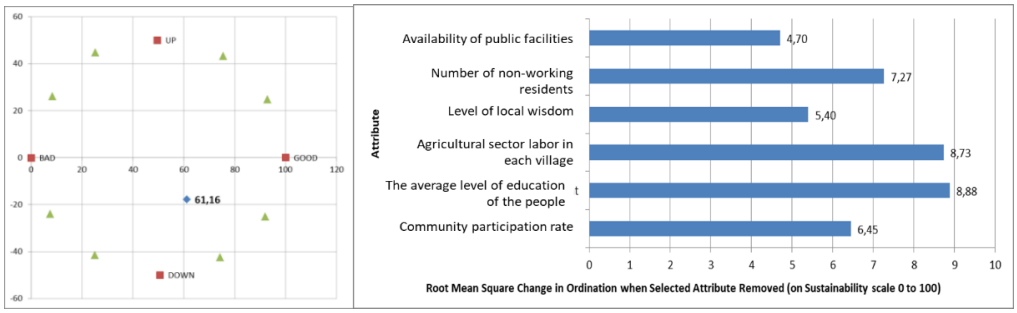

Figure 4. Sustainability Index Value and Sensitive Attributes of Socio-Cultural Dimensions, 2022

Source: Author's Analysis (2022)

Those three sensitive attributes had a high RMS value. In 2021, the average education level of the villagers was in elementary school and junior high school levels, while the educational facilities in Cijeruk Village were quite adequate. Based on Village Potential data in 2021, Cijeruk Village had adequate educational facilities, ranging from kindergarten to high school/vocational high school (Badan Pusat Statistik, 2021b). Some villagers in Cijeruk Village also studied at Islamic boarding schools, which created a strong religious environment. Furthermore, the agricultural workforce in Cijeruk Village was 54,4%,

meaning that more than half of working-age villagers were farmers (Badan Pusat Statistik, 2021b). This is aligned with Bogor Regency Spatial Plan (RTRW) in 2016–2036, which stated that Cijeruk Village is directed at developing agricultural areas such as plantations and dry land (Pemerintah Kabupaten Bogor, 2016). The number of unemployment in Cijeruk Village was 3,7% (Badan Pusat Statistik, 2021b), which is below the percentage of open unemployment in rural areas (4.17%) (Badan Pusat Statistik, 2023).

3.4 The Sustainability Status of Cijeruk Village Development in Legal and Institutional Dimensions

Six attributes were influencing the development sustainability of Cijeruk Village in the legal and institutional dimension, consisting of the availability of spatial regulation legal products, the availability of maps of disaster-prone areas, the social institutions' availability (Neighbourhood, Hamlet, and Youth Organizations), and the level of the role of social institutions. The results of the MDS analysis using Rap-BUSAJI found that the sustainability index value of the legal and institutional dimension of the Cijeruk Village development was 41,24% and categorized as less sustainable. Based on the leverage analysis, it shows that there was only one sensitive attribute that influenced the value of the legal and institutional dimension of the sustainability index, the availability of maps of disaster-prone areas. Sustainability index values and sensitive attributes resulting from the analysis of legal and institutional dimensions are shown in Figure 6.

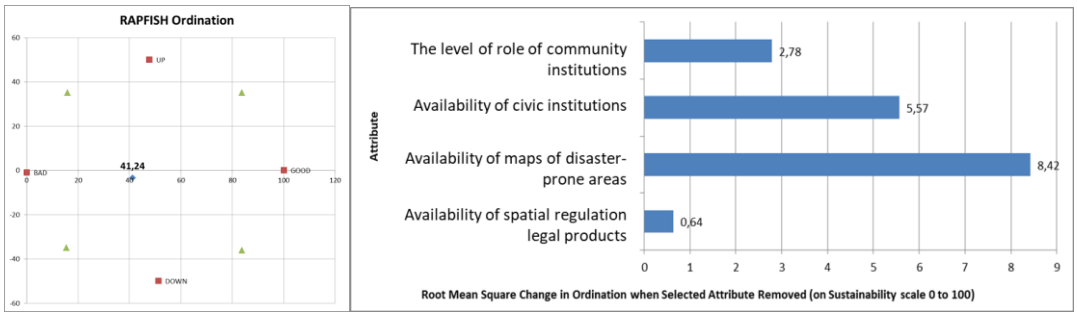

Figure 6. Sustainability Index Value and Legal and Institutional Dimension Sensitive Attributes, 2022

Source: Author's Analysis (2022)

The availability of disaster-prone maps had a high RMS value. Cijeruk Village did not have a map of disaster-prone areas. Based on data from Badan Perencanaan Pembangunan dan Penelitian Pengembangan Daerah Kabupaten Bogor (2020), Cijeruk Village had a moderately disaster-prone area of 19% and a high landslide-prone area of 81%. In 2021, there were seven events of landslides in Cijeruk Village (Badan Penanggulangan Bencana Daerah Kabupaten Bogor, 2022). Furthermore, the total built-up area in landslide-prone areas was 74,59 ha, whereas the largest built-up area was in high landslide-prone areas at 67,28 ha.

3.5 The Sustainability Status of Multidimensional Cijeruk Village Development

The MDS analysis using Rap-BUSAJI revealed that the multidimensional sustainability index value for the development of Cijeruk Village is 53.29%, indicating a reasonably sustainable status. Figure 7 shows the multidimensional sustainability index value for the Cijeruk Village development. The other four interrelated dimensions formed the multidimensional development sustainability status index. Figure 7 indicates that there was no integration between those four dimensions because there was no balance between them. The ecological, economic, and socio-cultural dimensions had fairly sustainable status, while the legal and institutional dimensions were less sustainable. Therefore, it is important to maintain the ecological, economic, and socio-cultural dimensions while improving the legal and institutional dimensions to ensure the long-term sustainability of Cijeruk Village development.

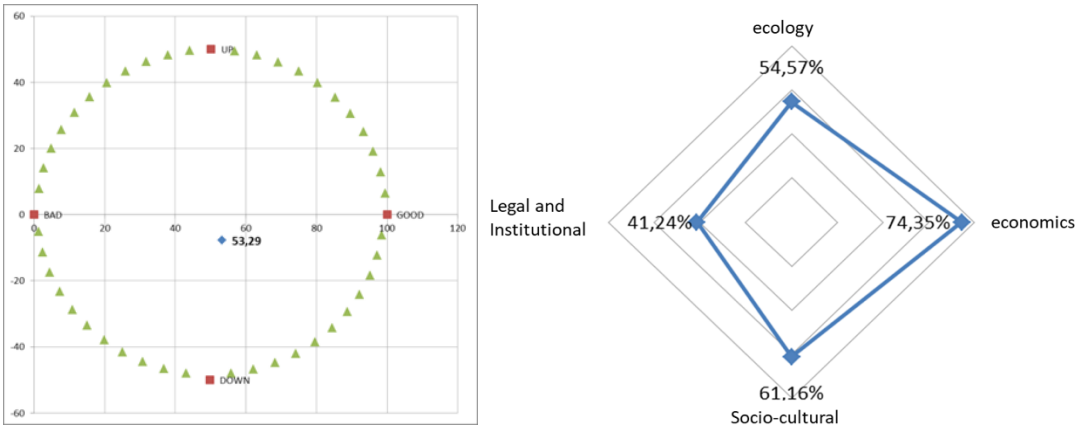

Figure 5. Multidimensional Sustainability Index Value and Sustainability Status Index Diagram, 2022

Source: Author's Analysis (2022)

Conclusions

This research aims to analyze the status of sustainable development in Cijeruk Village and identify the attributes that influence its development. The findings indicate that three dimensions, namely the economic (74.35%), ecological (54.57%), and socio-cultural (61.16%) dimensions, have a relatively sustainable status. However, the legal and institutional dimensions get less sustainable status with an index of 41,24%. Although the multidimensional analysis shows a relatively sustainable status at 53.29%, there is a lack of integration among the four dimensions. Therefore, it is necessary to enhance the legal and institutional dimensions while maintaining the sustainability of the other three dimensions for the sustainable development of Cijeruk Village.

There are ten sensitive attributes in the development of Cijeruk Village, consisting of 3 attributes on each of the economic, ecological, and socio-cultural dimensions and one attribute on the legal and institutional dimensions. The ecological dimension consists of clean water sources for communal MCK, clean water availability, and MCK availability in every house. The economic dimension consists of the marketing range of the main commodities, the types of main commodities, and the availability of supporting industries for main commodities. The socio-cultural dimension is sensitive to the average community education level, the number of agricultural workforces, and the number of unemployed individuals. Finally, the availability of maps indicating areas prone to disasters impacts the legal and institutional dimension.

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THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 - APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Policy Paper

Synergy of the Development Planning Regulatory Framework with the National Legislation Program

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Abstract

The preparation of regulatory framework in the Government Work Plan/National Medium Term Development Plan has not been fully aligned with the preparation of laws and regulations in the National Legislation Plan and or Program for Preparation of Government Regulations and Presidential Regulations. The main objective of this paper is to investigate the factors that hinder the coordination mechanism for drafting regulations and emphasize the importance of realizing synergies, focusing on achieving a coordinated approach in drafting regulations. This policy research paper adopted a normative juridical analysis and a qualitative approach based on empirical data. The findings suggest that the coordination mechanism for preparing regulations is not functioning optimally due to inhibiting factors. The inhibiting factors are the lack of awareness regarding of the importance in meeting the indicators for proposing a regulatory framework and the absence of regulations that mandated sector directorates and KL (ministries/agencies) to comply with these indicators. Also there was a lack of synergy in coordinating the drafting of regulations.

Keywords: Synergy; Regulation; Legislation.

ARTICLE INFO
Received: December 25, 2022
Received in revised form: April 06, 2023
Accepted: April 19, 2023

doi: 10.46456/jisdep.v4i1.369

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/ National Development Planning Agency (Bappenas), Republic of Indonesia

Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
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Supported by Indonesian Development Planners Association (PPPI)

Please cite this article in APA style as:
Nasution, M.S. (2023). Synergy of the Development Planning Regulatory Framework with the National Legislation Program. *The Journal of Indonesia Sustainable Development Planning, 4*(1), 69—85. https://doi.org/10.46456/jisdep.v4i1.369

1. Introduction

Regulatory Framework is one of the delivery mechanisms for development policy planning in addition to the Funding Framework and Institutional Framework, as mandated in Law Number 25 of 2004 concerning the National Development Planning System. Properly drafting the Regulatory framework is essential to ensure efficiency and effectiveness in policy implementation. Integrating the Regulatory framework into planning documents is importance as it role to guides the planning process for forming laws and regulations according to the needs of development (Fourie, 2018) and can significantly influence the development planning process and its outcomes (Adhvaryu, 2011). The Regulatory framework serves as a guidance and regulation for conducting state administration and development activities, and it contains indications and policy directives for proposed draft laws and regulations within a specific timeframe (short term and medium term).

The Regulatory framework plays a critical role in supporting the implementation of sustainable development planning (Ellis & Lundy, 2016). For example, a study in China has demonstrated how policies and regulations have been altered and adjusted between 1993 and 2012 to encourage sustainable development in the country (Heilmann & Melton, 2013). Previous research has demonstrated that the Regulatory framework is a crucial component of effective development planning, as evidenced by studies conducted in Tanzania which indicate that the Regulatory framework can help prevent unforeseen or unplanned developments in development programs (Kironde, 2006). Another study suggests that an efficient Regulatory framework for planning the development of a site with specific characteristics and meeting the requirements of the local community should consider various significant aspects, including the involvement of the community, a collaboration between different parties, and the constant assessment of the strategy (Untaru, 2010). This study also pointed out that the regulatory framework must be flexible and able to adapt to the needs of local communities. Later research demonstrated that for complex and inclusive cultural strategies, an effective Regulatory framework must consider several critical factors, such as extensive community participation, a collaboration between different stakeholders, and ongoing assessment of strategies (Sacco & Crociata, 2012). The authors proposed a Regulatory framework consisting of four stages: situation analysis, strategy development, strategy implementation, and strategy evaluation. A case study conducted in Norway demonstrated how implementing policies and regulations through Regulatory framework and powers can shape the behavior of market actors and urban planning practices, leading to adopting sustainable planning practices (Rosnes, 2006).

During the planning process, the implementation of the prepared policy and regulatory framework is often met with challenges and obstacles. Some difficulties related to implementing policy and Regulatory framework include insufficient comprehension of policies and inadequate local capacity, as Heum et al. (2011) suggested. Several factors hinder the successful implementation of policies and regulatory frameworks, such as insufficient human resources, poor coordination, political interference (Ahmad & Anjum, 2012; Bergamini & Perez, 2022; Cao, 2014), and inadequate regulations (Alam et al., 2020). These challenges and obstacles can be overcome if the government focuses on the important factors that determine the effectiveness of the Regulatory framework planning. Important factors that can affect the effectiveness of Regulatory framework in planning include compliance, openness or participation, consistency, capacity and resources (Hasan et al., 2019; Werbeloff & Brown, 2016; Xu et al., 2017), stakeholder involvement, the role of government, supervision (Linke & Zerfass, 2012; Waiti & Lorrenij, 2017; Wu & Zhang, 2007), the existence of clear and consistent national policies (Gboney, 2011; Sauvant & Chen, 2014; Verhoest et al., 2014) and coordination and cooperation between agencies and stakeholders (Naidoo & Maré, 2016; Payne, 2010).

Article 18 of Law Number 12 of 2011 concerning the Formation of Legislation has emphasized the importance of aligning regulatory framework with development policies and the national legal system. It is a significant development from the previous law and highlights the efforts to align the National Legislative Program (NLP or *Prolegnas* in Indonesian) with national development plans such as the National Long Term Development Plan (RPJPN), National Medium Term Development Plan (RPJMN), and Government Work Plan (RKP) as short term plan. To achieve this goal, the preparation of legislative plans involves collaboration with various stakeholders, not only the House of Representatives (DPR) but also the government, including all ministries and institutions, such as the Ministry of National Development Planning/National Development Planning Agency (Bappenas).

Bappenas has the authority to propose legislative plans in Prolegnas and Drafting Program (Progsun) through National Legal Development Agency (BPHN). Additionally, Bappenas has the authority to develop the RKP/RPJMN, which contains proposals for legislation, including the formation and amendment of laws, government regulations, presidential regulations, and ministerial regulations. Instead of having a separate legislative plan, the RKP/RPJMN is recognized by the Formation of Legislation Law under Article 18 as one of the references for preparing the National Legislation Program. Therefore, it is appropriate for Bappenas to draft legislation plans through RKP/RPJMN products that have legal force and serve as a basis for drafting legislation plans in Prolegnas/Progsun.

To effectively carry out its role, Bappenas considers the proposed regulatory framework submitted by Ministries/Institutions through the Sector Directorate, but sometimes they do not adequately address the needs of national development planning. One of the factors inhibiting the synergy between RKP/RPJMN and Prolegnas/Progsun is a lack of understanding about the urgency of fulfilling indicators for proposing a regulatory framework that can be integrated into the National Legislation Plan of Prolegnas/Progsun. Additionally, no provisions require sector directorates and ministries or agencies (K/L) to comply with the proposed indicators for the regulation. As a result, the proposed Regulatory framework in the RKP cannot be followed up and included in the Prolegnas/Progsun.

The weak coordination mechanism for drafting regulations can be exemplified by the lack of full synergy between the preparation of the Regulatory framework in the RKP/RPJMN and Prolegnas/Progsun. The Ministry of National Development Planning/Bappenas supervises the implementation of the proposed Regulatory framework for the RKP/RPJMN, but the proposing Ministries/Institutions have not given sufficient attention to the urgency of proposing regulations as mandated by the Law. As stated in the Explanation and Appendix I of Law Number 13 of 2022 concerning the Second Amendment to Law Number 12 of 2011:

> *"This study is supported by analysis using certain methods, including the Regulatory Impact Analysis (RIA) method and the Rule, Opportunity, Capacity, Communication, Interest, Process and Ideology (ROCCIPI) method."*

The lack of attention to the urgency of proposing regulations using certain methods during the drafting process can have further implications for Bappenas' role in coordinating the preparation of RKP/RPJMN with Prolegnas/Progsun, as mandated by the law. The Directorate of Law and Regulation plays a crucial role in exploring the urgency of regulatory needs proposed by the Sector Directorate at Bappenas in coordination with K/L. To address this issue, Bappenas is currently using the regulatory Simplification Instrument (ISR) to deepen and sharpen the urgency of the need for a regulatory framework. This involves creating indicators/criteria as touchstones for proposing a regulatory framework, which will be followed up and considered in the preparation of the legislation plan in the Prolegnas/Progsun.

The proposed regulatory framework K/L lacks a review of the urgency of regulatory needs, which is one of several indicators for proposing a regulatory Framework. As a result, it is difficult to explore the urgency of the proposed regulatory requirements fully. This issue leads to a more complex problem: the absence of a binding regulation that requires sector directorates and K/L to fulfill the proposed indicators for the regulation. Consequently, the proposed regulatory framework in the RKP cannot be followed up and included in the Prolegnas/Progsun. Given the background above, the main challenge addressed in this research is how to achieve synergy in the coordination mechanism for drafting RKP/RPJMN regulations with Prolegnas/Progsun, leading to a planned, directed, integrated, and systematic national legal system.

2. Methods

This study used a normative juridical analysis method, which is an approach based on legal material by examining theories, opinions of legal experts, and laws and regulations related to the writing of this policy paper. Additionally, this study also utilized qualitative analysis of literature studies by tracing empirical data from various sources related to coordination issues in the preparation of the RKP/RPJMN regulations with the Prolegnas/Progsun involving various parties such as academics, practitioners, and relevant authorities.

3. Results and Discussions

3.1 Preparation of the Regulatory Framework in the RKP/RPJMN

The regulatory framework is one of the delivery mechanisms for development policy planning, in addition to the Funding Framework and Institutional Framework, as mandated by Law Number 25 of 2004 concerning the National Development Planning System (SPPN). As one of the delivery mechanisms, the regulatory framework is a significant instrument that must be properly drafted to achieve efficiency and effectiveness in policy implementation. The urgency of integrating the regulatory framework into planning documents is very high because the regulatory framework aims to:

a. direct the planning process for the formation of laws and regulations according to development needs;
b. improve the quality of laws and regulations to support the achievement of development priorities; and
c. improve the efficiency of budget allocation to establish laws and regulations.

The regulatory framework is designed to provide guidance and a regulatory foundation for carrying out state administration and development activities. It contains indications or policy directives regarding proposed draft laws and regulations within a certain period of time (RPJMN or RKP). The SPPN Law explicitly mandates the regulatory framework to be part of the national development planning document. This is stated in Article 4 paragraph (2), Article 4 paragraph (3), and Article 5 paragraph (2). Article 4, paragraph (2) states that:

> *"The National RPJM is an elaboration of the President's vision, mission, and Program which formulation is guided by the national RPJP, which contains the national development strategy, general policies, ministerial/agential and cross-ministerial/agential, regional and cross-regional programs, and a macroeconomic framework that includes an overall picture of the economy including the direction of fiscal policy in the work plan in the form of a regulatory framework and a funding framework."*

Article 4 paragraph (3):

> *"The RKP is an elaboration of the national RPJM and contains development priorities, a draft of macroeconomic framework, an overall picture of the economy and the direction of fiscal policy and ministerial/Institutional, cross-ministerial/Institutional, and regional programs in the form of regulatory framework and indicative funding frameworks."*

As a crucial aspect of state administration activities, the quality and quantity of regulations need to be managed appropriately to ensure the production of simple and orderly regulations. "Simple" refers to the proportional and easy-to-understand and comply with regulations, while "orderly" means that the regulations formed take into account the applicable regulatory system's rules. By adhering to the principles applied in creating regulations, simple and orderly regulations can be issued, which can be fully integrated into the national regulatory plan. The plan, in turn, supports the effective and efficient functioning of regulations.

To comply with these directives and mandates, the Directorate of Law and Regulation is responsible for creating and maintaining the regulatory framework in the RPJMN and RKP, ensuring consistency and sustainability in the process. The mechanism generally consists of several steps, such as proposals submitted by the sector directorate of Bappenas in collaboration with relevant ministry/agency partners, the assessment of the urgency of regulatory proposals, detailed discussions and meetings, and joint discussions with the respective sector directorates. This process also involves debottlenecking, which is an effort to identify and discuss the reasons, constraints, or factors that prevent the person in charge of National Priority from proposing a regulatory framework in the RKP. Before carrying out the activities of deepening and sharpening the regulatory framework for the RKP, internal and external coordination was carried out as follows:

a. Internal coordination involves working with the Sector Directorate of Bappenas to identify the urgency of the proposed regulatory framework and with the Deputy for Development Monitoring, Evaluation, and Control (PEPP) to ensure the proper RKP preparation procedure.

b. External coordination is conducted with the Ministry of Law and Human Rights and BPHN to align the regulatory framework plan for the RKP with the legislation plans in Prolegnas and the Progsun of Government Regulations (PP) and Presidential Regulations (Perpres).
c. After the Sector Directorate of Bappenas submits a list of urgencies and needs for proposed regulatory framework, the Directorate of Law and Regulation conducts an in-depth analysis using the regulatory ISR. Additionally, the Directorate of Law and Regulation carries out various other tasks, such as:
    1) participating in the agenda for the Judicial Review of Laws initiated by Bappenas;
    2) being involved in Inter-Ministerial Committee (PAK);
    3) attending meetings for the formulation and deepening of laws and regulations initiated by the Sectoral Directorate of Bappenas and other K/L;
    4) compiling the Background Study of the RPJMN and RPJPN regulatory framework;
    5) monitoring and evaluating regulations in the RPJMN and RKP;
    6) mapping scientific works/theses/dissertations of legal academics from various universities in Indonesia.

In 2022, the Directorate of Law and Regulation established a coordination with the BPHN, as demonstrated by aligning the criteria or indicators for proposing regulations in the RKP and the Prolegnas/Progsun legislation plan. This coordination represents a tangible effort to fulfill the mandate of Article 18 of Law Number 12 of 2011 regarding the Formation of Legislation.

In the process of preparing the RPJMN background study (BS), the Directorate of Law and Regulation compiled a study on the Law and regulatory Framework. The aim of the BS is to plan legal and regulatory policies for the national medium-term development. The BS agenda is carried out through focus group discussions with experts, practitioners, academics, and certain authorities and through in-depth studies by the Directorate of Law and Regulation in coordination with those in charge of national priorities. The main purpose of the background study of the regulatory framework is to identify strategic regulatory framework issues that support national priorities and to identify the regulatory framework needed to support national medium-term development. The indicators used to identify the regulatory framework in the RPJMN are aligned with the regulatory indicators included in the Prolegnas legislation plan. The followings are the indicators/criteria used for proposing a regulatory framework in the RKP.

Table 1. Indicators for Proposing Regulatory Framework in RKP

1. Legality Aspect	1.1. Higher regulatory mandate and/or other regulations
	1.2. Regulations are in conflict with other regulations.
	1.3. Regulations create disharmony and are inconsistent with other regulations.
	1.4. Regulations give rise to multiple interpretations (raise different understandings).
2. Needs Aspects	2.1. Regulations are urgent to be enacted.
	2.2. Regulations provide benefits to society.
	2.3. Regulations provide convenience to the community.
	2.4. Regulations have the potential to hinder the achievement of national development goals and targets.
3. Expense Incurred Aspects	3.1. Regulations will burden the State Budget (APBN) and/or Regioal Budget (APBD)
	3.2. Regulation will provide benefits greater than the costs to be incurred (Cost and Benefit Analysis)
4. Regulatory Planning Aspects	4.1. Regulations are included in the RPJMN
	4.2. Regulations have never been stated in Chapter 5.2 of RKP
	4.3. Regulations are proposed by the Government
	4.4. Have academic papers, studies, draft regulations and/or cost and benefit analysis studies
	4.5. Support National Priority/Major Projects in RKP

Table 1. Continued...

	4.6 Regulation is completed within one year
	4.7 Regulations have not been listed in the Proleg/Progsun
5. Regulatory Substance Analysis Aspects	5.1. ISR (Regulatory Simplification Instrument) Analysis
	5.2. eCLIS (Electronic Codification and Information System) Analysis
	5.3. Analysis of the AE BPHN results

3.2 The Formulation of Regulations in Prolegnas/Progsun

The Prolegnas serve as a priority scale for developing laws that aim to establish a comprehensive national legal framework. It is based on eight priority scales that take into account various factors, such as the 1945 Constitution of the Republic of Indonesia and the aspiration and legal requirements of the community. The Prolegnas is established for a period of five years and annually. Annual Prolegnas must be prepared and approved before the Draft Bill on the State Budget is enacted. The medium-term Prolegnas is prepared and established at the beginning of the DPR's membership period, and an annual evaluation is conducted before the annual Prolegnas is established.

The Law on the Formation of Legislation explains that the Prolegnas is a planning tool for creating laws that are developed in a systematic, integrated, and planned manner. According to Article 1 point 9 of Law Number 12 of 2011 in conjunction with Law Number 15 of 2019 in conjunction with Law Number 13 of 2022 regarding the Formation of Legislation, the National Legislation Program is an instrument or mechanism as described in the article:

"The National Legislation Program is an instrument for planning and developing the formation of laws and is prepared in a planned, integrated, and systematic manner."

Therefore, Prolegnas is a continuous process that starts from the "pre-legislation formation." Planned is defined as being prepared with the intention of guiding the formation of laws, while integrated means it is coordinated between the DPR and the government, and systematic means utilizing specific mechanisms and requirements. Prolegnas is a component of Indonesia's national legal system that serves as a planning tool for the creation of regional laws or regulations (Perda). In its evolution, the objectives of developing this Prolegnas include the following:

a. Accelerating the process of creating legal regulations in order to build the national legal system;
b. Developing laws and regulations that serve as the foundation for other sectors of development and actualizing the law as a tool for social engineering/development, a means for resolving and preventing disputes, a regulator of the behavior of community members, and a means of unifying the nation under the Unitary State of the Republic of Indonesia;
c. Supporting efforts to establish the rule of law, particularly by replacing colonial-era regulations and national laws that are no longer in step with societal changes;
d. Improving existing laws and regulations that do not meet the demands and needs of the community; and
e. Creating new laws and regulations that respond to the demands and needs of the community.

Furthermore, in practical terms, the Prolegnas is frequently used to refer to the content or substance of plans for the creation of laws and regulations. In this context, Prolegnas is a catalog of plans for the formation of laws and other legal regulations that are developed based on specific methods and parameters and are imbued with the vision and mission of advancing national law. The proposed legislation in question is

"Proposals for the formation of laws and regulations in the long, medium, and short term are submitted by initiating institutions such as Ministries and agencies in the form of plans that are prepared or drafted."

It is important to highlight the difference between the Prolegnas's understanding as an instrument and substance. The prevalent understanding of the legislation program often emphasizes its material or substance, resulting in some individuals thinking that the program is insignificant because it is merely a

"wish list" submitted by K/L. However, it should be emphasized that the Prolegnas should be regarded as an instrument or mechanism that plays a crucial role in the process of forming laws and regulations.

Prolegnas is a collaborative effort between the government and the DPR, with coordination by the DPR. A dedicated division in the DPR, along with the Minister responsible for legal affairs in the President's cabinet, prepares and coordinates Prolegnas. Prolegnas is established by the DPR through a Plenary Meeting, where a decision is made, and an open cumulative list is compiled. The list includes plans for the formation of laws and regulations that are based on various factors, such as the need to ratify international agreements, decisions made by the Constitutional Court, the state budget (APBN), the creation or merging of provinces, regencies, or cities, and the stipulation or revocation of Government Regulation in Lieu of Law. In special circumstances, the DPR and the President can propose bills outside the National Legislation Program, such as during conflicts, natural disasters, or other national emergencies. To simplify the understanding of the legislative function, the following are the stages involved:

a. Planning: The formulation of a list of bills that will be prepared for five years and every year by the DPR, DPD, and the government.
b. Preparation: The preparation of academic texts, bill drafts, and the harmonization, unification, and consolidation of conceptions.
c. Discussion: The discussion of the Bill's Problem Inventory List (DIM) including level one and level two talks.
d. Ratification: The President's signature on the mutually agreed draft of the bill between the DPR and the President.
e. Promulgation: The placement of the ratified laws in the State Gazette.

Prolegnas serve as a technical instrument in the planning stage of creating laws and usually involve five stages, which include the following:

a. Input gathering stage: The DPR, DPD, and the Government/President gather a list of bills from state institutions and citizens.
b. Input screening stage: The DPR, DPD, and the Government/President filter the input for the bills.
c. Initial determination stage: The DPR, DPD, and the Government/President determine the list of bills to be submitted to the DPR.
d. Joint discussion stage: The DPR, DPD, and the Government/President discuss the list of bills together to compile the National Legislation Program.
e. Prolegnas enactment stage through DPR Decree: The DPR enacted the bills to be included in the National Legislation Program as agreed in the joint discussion forum between the DPR, DPD, and the Government/President.

The Prolegnas plays a crucial role in the development of national law as it systematically prioritizes bills for discussion by the DPR and the government. The process of creating laws and regulations begins with planning, which involves legislation programs at the national and regional levels. Thus, Prolegnas and Regional Legislation Program (Prolegda) are intended to serve as guidelines and oversight mechanisms for the formulation of legally binding regulations by all institutions authorized to create such regulations.

The Minister of Law and Human Rights through BPHN, coordinates the preparation of Prolegnas within the government. The process of drafting Prolegnas in the government is regulated by Presidential Regulation Number 61 of 2005, which outlines the National Legislation Program. To collect information on legislation plans, the BPHN monitors K/L. This data is then analyzed and verified as material for harmonizing, unifying, and consolidating the concept in the legislative plan. The development of the Prolegnas starts with each Ministry/Institution preparing a "legislative plan," accompanied by an explanation of:

a. The main materials to be regulated and their relation to other laws and regulations;
b. The main material to be regulated includes the background, purpose, targets to be achieved, main ideas, the object or scope to be regulated, the direction of regulation, and its relationship to other laws and regulations.

Once the legislation plan is prepared, the next step in the Prolegnas process is the Annual Prolegnas Discussion Meeting. This meeting is held to coordinate the preparation of laws and regulations that are either in the process of being drafted or will be drafted by all Ministries/Institutions. The meeting is also responsible for deciding which legislation plans should be given priority. At the meeting, the government proposes Bills to be submitted to the DPR with an explanation of why they are urgent. These bills must meet certain technical requirements, such as having academic papers, draft bills, and being harmonized at the Directorate General of Legislation, Ministry of Law and Human Rights.

The Minister of Law and Human Rights later informs the President of the outcomes of the Annual Discussion Meeting on National Legislation, specifically the bills that have been prioritized, and seeks approval from the President. Upon approval, the proposed legislation will be brought to a coordination forum with the DPR to synchronize and harmonize the Prolegnas. The next step is to jointly prepare the Prolegnas between the DPR and the government in a coordination meeting, where the Chairman and Deputy Head of Legislation Agency (Baleg) and the Minister of Law and Human Rights will sign the ratified results. Baleg will then communicate the results to the chairman of the parliament, while the Minister of Law and Human Rights will report to the President after a joint agreement has been reached between the DPR and the Government.

In the government environment, the "legislative plan" encompasses all plans for the creation of laws and regulations, including those that are still in the form of "whish-lists" to make laws and regulations and those that are more concrete, draft laws and regulations that are in the process of being drafted, or those that have been completed and are ready to be submitted to the DPR. Thus, the legislative plan includes:

a. Legislative plans that are not yet concrete, consisting of titles of statutory regulations which are in a tentative stage;
b. Legislative plans that are in the process of concretization, such as plans for enacting laws that are still undergoing preparation through study and research activities;
c. Legislative plans that are currently being drafted as academic texts, such as research results that have been prepared in the form of academic texts;
d. Legislative plans that have reached the stage of drafting bills within K/L;
e. Legislative plans in the form of a Draft Law, which have been fully prepared and undergone a harmonization process through inter-Ministry discussions.

Although still in the planning stage, each Ministry/Institution's proposed legislation must have clear content. When submitted to the Prolegnas coordinator, it should come with an explanation on:

a. The primary materials to be regulated and their connection to other laws and regulations;
b. The main material to be regulated, along with its relationship to other laws and regulations, should provide a comprehensive explanation of the Draft Law's concept, which includes: a. the background and purpose of preparation; b. the goals to be achieved; c. the main ideas, scope, or object to be regulated; and d. the range and direction setting.

If a Ministry or Institution has produced an Academic Document (NA) for a Draft Law, it must be included when submitting the plan for the Draft Law formation. The information about each Ministry or Institution's legislative plans are obtained through regular monitoring activities conducted by BPHN at the beginning and middle of each fiscal year. The monitoring serves the following purposes:

a. Updating the legislative plans by recording any new plans proposed by K/L;
b. Evaluating the progress of each legislative plan that was submitted in the previous year by K/L;
c. Identifying obstacles encountered in implementing the legislative plan, such as obstacles arising due to overlap with the authority of other Ministries/Institutions, which results in objections from the concerned Ministries/Institutions.

Next, the information gathered from all K/L regarding their legislative plans is collated and checked for consistency, uniformity, and consolidation of ideas. This process is carried out through a consultation forum led by the Minister. This forum is known as the Prolegnas Annual Discussion Meeting, which takes place once a year. In addition to representatives from all K/L, the meeting also includes experts from universities, representatives from various socio-political organizations, professional bodies, religious organizations, youth/student groups, and non-governmental organizations.

3.3 The synergy of Coordination Mechanisms in Formulating RKP/RPJMN Regulations with Prolegnas/Progsun

3.3.1 Factors Inhibiting the Synergy of Regulation Formulation in RKP/RPJMN with Prolegnas/Progsun

The provisions of Article 18 of Law Number 12 of 2011 concerning the Formation of Legislation emphasize the importance of aligning the regulatory framework with national development policies and the national legal system. This article is a significant breakthrough in the law as it aims to coordinate the National Legislation Program (Prolegnas) with national development planning in RPJPN, RPJMN, and RKP. To achieve this goal, many parties are involved in the coordination of the drafting of legislation plans, including not only the DPR but also the government, particularly all K/L, including the Ministry of National Development Planning/Bappenas.

As previously mentioned, Bappenas can propose plans for laws and regulations for Prolegnas through BPHN. However, Bappenas also has the authority to create the RKP/RPJMN, which contains proposals for legislation to create or amend laws, government regulations, presidential regulations, and ministerial regulations. Rather than being a separate legislative plan, the RKP/RPJMN is recognized by the Drafting of Legislation Law in Article 18 as one of the resources used to create the National Legislation Program. As a result, it is appropriate for the drafting of legislation plans by Bappenas through the RKP/RPJMN to have legal force.

When fulfilling its responsibilities, Bappenas sometimes finds that proposals for regulatory framework submitted by Ministries/Institutions through Sector Directorates at Bappenas are not in line with the needs of national development planning. An example of a proposed regulatory framework in an RKP that falls under this category is as follows.

Table 2. Example of the Proposed Regulatory Framework in RKP

GOVERNMENT WORK PLAN PRIORITY FOR 2019												
No	**National Priority**	**Priority Program**	**Priority Activities**	**Priority Project**	**K/L Output in the Workplan**	**Draft Proposed Regulations**	**New Proposal**	**Revision/ Change**	**Revocation**	**Considerations/ urgency**	**Related K/L**	**Initiator Unit (Echelon II)**
Directorate General of Pharmaceuticals and Medical Equipment, Ministry of Health												
1	Human development through poverty reduction and improvement of basic services	Improving community health and nutrition services	Improving Access and Quality of Health Services	Providing and improving the quality of pharmaceuticals and medical devices	Hospitals and health centers that carry out pharmaceutical services according to standards	Regulation of the Minister of Health concerning Pharmaceutical Service Standards in Clinics	√			Improving pharmaceutical services in clinics to comply with the standards	Ministry of Internal Affairs	Directorate of Pharmaceutical Services
2	Human development through poverty reduction and improvement of basic services	Improving community health and nutrition services	Improving Access and Quality of Health Services	Providing and improving the quality of pharmaceuticals and medical devices	Hospitals and health centers that carry out pharmaceutical services according to standards	Regulation of the Minister of Health concerning Pharmaceutical Service Standards at Drug Stores	√			Improving pharmaceutical services in drugstores to comply with the standards	Ministry of Internal Affairs	Directorate of Pharmaceutical Services
3	Human development through poverty reduction and improvement of basic services	Improving community health and nutrition services	Improving Access and Quality of Health Services	Providing and improving the quality of pharmaceuticals and medical devices	Hospitals and health centers that carry out pharmaceutical services according to standards	Regulation of the Minister of Health concerning Guidelines for Pharmaceutical Services in Kidney Diseases	√			Patients with kidney disease have a higher risk of using drugs, so more attention is needed from the pharmacy to ensure the safety of drugs		Directorate of Pharmaceutical Services

Table 2 indicates that the proposed regulatory framework submitted by Ministries/Institutions through the Sector Directorate of Bappenas lacks comprehensive information in the consideration/urgency column. This results in a failure to fulfill the indicators for proposing regulations that have been stipulated in Table 2, including the legality, need/urgency, burden incurred, regulatory planning, and substance analysis. Consequently, the legislative plans prepared by Bappenas in the RKP cannot be included in the National Legislation/Progsun national legislation plans, making it difficult for sector directorates or Ministries/Institutions to complete academic papers or regulatory drafts. As a result, the regulatory planning in the RKP/RPJMN cannot be integrated into the Prolegnas/Progsun legislation plans. Thus, it can be concluded that the factors inhibiting synergy in the preparation of regulations by Bappenas and BPHN can be arranged as follows.

Table 3. Factors Inhibiting the Synergy of Regulation Formulation in RKP/RPJMN with Prolegnas/Progsun

No.	Inhibiting Factors	Impacts
1.	The Sectoral Directorates and K/L have limited understanding of Bappenas' role in developing legislative plans in the RKP/RPJMN, which subsequently serve as the foundation for drafting Prolegnas/Progsun legislation plans. This could be due to a lack of legal awareness on their part.	The DPR cannot pursue the establishment, amendment, or issuance of legislative plans outlined in the RKP/RPJMN since they do not fulfill the Prolegnas/Progsun indicators.
2.	Although the regulatory framework proposed in the RKP will be integrated into the Prolegnas/Progsun legislation plan, Sectoral Directorates and K/L often fail to understand the importance of meeting the indicators/criteria for proposing such a framework.	Numerous proposed regulatory frameworks have not made any progress, despite being included in the RKP/RPJMN, and are repeatedly passed down to the next RKP period. This inefficiency has resulted in ineffective and inefficient budgeting for regulation preparation. This inefficiency has resulted in ineffective and inefficient budgeting for regulation preparation.
3.	Although the indicators for proposing the regulatory framework (which are in line with the indicators for proposing the Prolegnas/Progsun legislation plan) have been communicated to all sector directorates of Bappenas and K/L, there is currently no obligation for them to adhere to these indicators when proposing regulations. Thus, the proposed regulatory framework in the RKP cannot be followed up and included in the Prolegnas/Progsun.	The effectiveness and efficiency of the coordination between the Directorate of Law and Regulation, the Sectoral Directorate of Bappenas and K/L in drafting legislation plans for the RKP/RPJMN decreased.

The table suggests that a lack of understanding about the importance of meeting the indicators for proposing a regulatory framework is hindering the coordination of drafting regulations in the RKP/RPJMN. These indicators are essential for integrating the proposed framework into the National Legislation Plan for Prolegnas/Progsun. Additionally, there are no regulations requiring sector directorates and K/L to comply with these indicators. Consequently, the proposed regulatory framework in the RKP cannot be followed up or included in the Prolegnas/Progsun.

3.3.2 Conditions of Coordination Synergy in the Preparation of RKP/RPJMN Regulations with Prolegnas/Progsun

To indicate the achievement of synergistic coordination in drafting regulations in the RKP/RPJMN with the Prolegnas/Progsun, the following can be considered:

a. Promulgation of Regulations Proposed through RKP/RPJMN

During the 2020-2024 RPJMN and RKP periods, a number of laws, government regulations, and presidential regulations have been promulgated, including:

Laws

1) Law Number 11 of 2020 concerning Job Creation
2) Law Number 3 of 2022

3) Law Number 2 of 2021 concerning the Second Amendment to Law Number 21 of 2001 concerning Special Autonomy for Papua Province
4) Law Number 11 of 2022 concerning Sports
5) Law Number 15 of 2019 concerning Amendments to Law Number 12 of 2011 concerning the Formation of Legislation

Government Regulations

1) Government Regulation Number 20 of 2021 concerning the Management of Abandoned Areas and Lands
2) Government Regulation Number 20 of 2021 concerning the Management of Abandoned Areas and Lands
3) Government Regulation of the Republic of Indonesia Number 2 of 2021 concerning the Implementation of Topographical Names
4) Government Regulation Number 21 of 2021 concerning the Implementation of Spatial Planning
5) Government Regulation Number 11 of 2019 concerning the Second Amendment to Government Regulation Number 43 of 2014 concerning Regulations for Implementing Law Number 6 of 2014 concerning Villages
6) Government Regulation Number 82 of 2019 concerning Amendments to Government Regulation Number 44 of 2015 concerning the Implementation of Work Accident and Death Insurance Programs
7) Government Regulation Number 60 of 2015 concerning Amendments to Government Regulation Number 46 of 2015 concerning the Implementation of Old Age Security Programs
8) Government Regulation Number 7 of 2020 concerning Amendments to Government Regulation Number 17 of 2007 concerning Organizing Sports Weeks and League
9) Government Regulation Number 25 of 2020 concerning the Implementation of Public Housing Savings
10) Government Regulation Number 1 of 2018 concerning the Second Amendment to Government Regulation Number 5 of 2009 concerning Financial Assistance to Political Parties

Presidential Regulation

1) Presidential Regulation Number 62 of 2022 concerning the Archipelago Capital Authority
2) Presidential Regulation Number 64 of 2022 concerning Spatial Planning for the National Capital City of the Archipelago National Strategic Area for 2022-2024
3) Presidential Regulation Number 105 of 2021 concerning the National Strategy for Accelerating the Development of Underdeveloped Regions 2020-2024
4) Regulation of the President of the Republic of Indonesia Number 63 of 2020 concerning the Designation of Underdeveloped Regions for 2020-2024
5) Presidential Regulation Number 60 of 2020 concerning Spatial Plans for Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak, and Cianjur Urban Areas
6) Presidential Regulation Number 66 of 2022 concerning Spatial Plans for National Strategic Areas for Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo, and Lamongan Urban Areas
7) Presidential Regulation 8 of 2022 concerning the National Council, Secretary General, Regional Council, and KEK Administrator
8) Presidential Regulation 8 of 2022 concerning the National Council, Secretary General, Regional Council, and KEK Administrator
9) Presidential Regulation Number 76 of 2020 concerning Amendments to Presidential Regulation Number 36 of 2020 concerning the Development of Work Competence through the Pre-Employment Card Program
10) Presidential Regulation Number 70 of 2021 concerning Amendments to Presidential Regulation Number 104 of 2007 concerning the Provision, Distribution, and Pricing of 3 Kilogram Liquefied Petroleum Gas Cylinders
11) Presidential Regulation Number 71 of 2021 concerning Amendments to Presidential Regulation Number 38 of 2019 concerning the Provision, Distribution, and Pricing of Liquefied Petroleum Gas for Fishing Vessels for Target Fishermen and Water Pumping Machines for Target Farmers

12) Presidential Regulation No. 1 of 2022 concerning the National General Plan for Road Traffic and Transportation Safety
13) Presidential Regulation Number 98 of 2021 concerning the Implementation of Carbon Economic Value to Achieve Nationally Determined Contribution Targets and Control of Greenhouse Gas Emissions in National Development
14) Presidential Decree No. 81 of 2010 concerning the Grand Design of Bureaucratic Reform 2010–2025

b. The Regulatory Framework in The RKP Integrated with the Legislative Plan in The Prolegnas/Progsun

The following is a comparison of the promulgation of RKP regulations with the 2021 Priority Prolegnas.

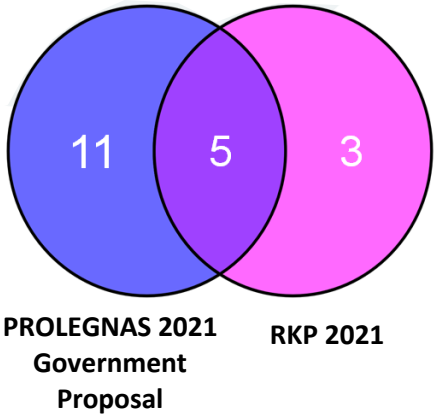

Figure 1. Comparison and intersection of the government proposals on Prolegnas 2021 and the RKP 2021

Among the eight proposed laws in the 2021 RKP and 16 proposed laws in the 2021 Priority Prolegnas proposed by the government, five laws in the 2021 RKP intersected with the 2021 National Legislation Program. These laws were the Draft Law on the Criminal Code (KUHP), Plague, Narcotics, IKN, and Civil Procedure Code.

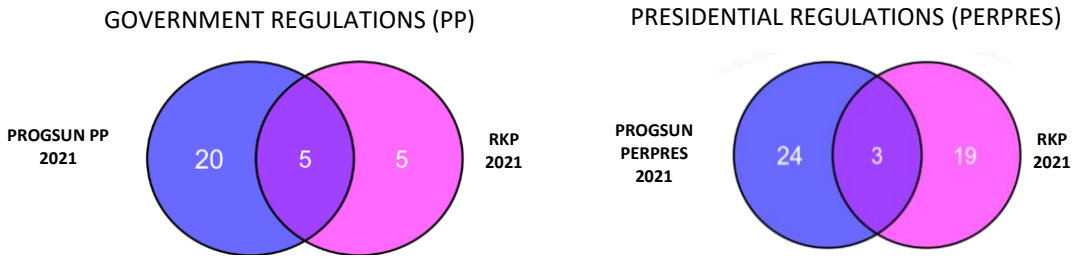

Figure 2. Comparison and intersection of the government proposals on Progsun government regulations and presidential regulations and the RKP 2021

Of the 10 PP proposals in the 2021 RKP and the 25 PP proposals in the PP 2021 Progsun for government regulations, only 5 of them intersected. These were the RPP on PP Draft on Intellectual Property Rights (HKI) Based Financing Schemes for Creative Economy Actors, RPP on Recipients of Social Security Contribution Assistance (2 KR combined from Health and Employment Sector), RPP on Irrigation, RPP on Drinking Water Supply Systems (SPAM).

For Perpres, only 3 out of 22 proposals in the 2021 RKP and 27 proposals in the 2021 Presidential Regulation Progsun overlapped with each other. These were the Presidential Regulation on Spatial Plans (RTR) for the Banjarmasin-Banjarbaru-Banjar-Barito Kuala-Metropolitan Urban Area, the Presidential Regulation on Strengthening Development Assistance, and the Draft Presidential Decree on the Development and Utilization of *Jamu* (traditional health drink).

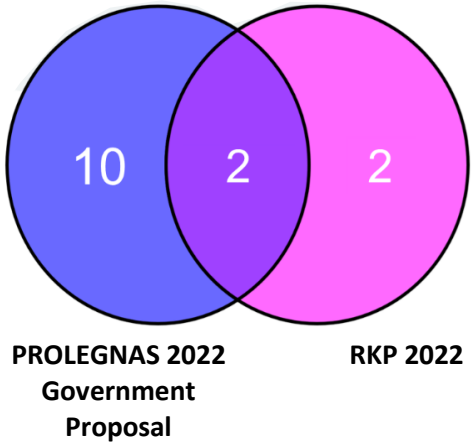

Figure 3. Comparison and intersection of the government proposals on Prolegnas 2022 and the RKP 2022

Two out of four proposed laws in the 2022 RKP and 12 proposed laws in the 2022 Priority Prolegnas by the government intersected with each other. These laws were the Draft Law on Civil Procedure Code and the Draft Law on the Criminal Code

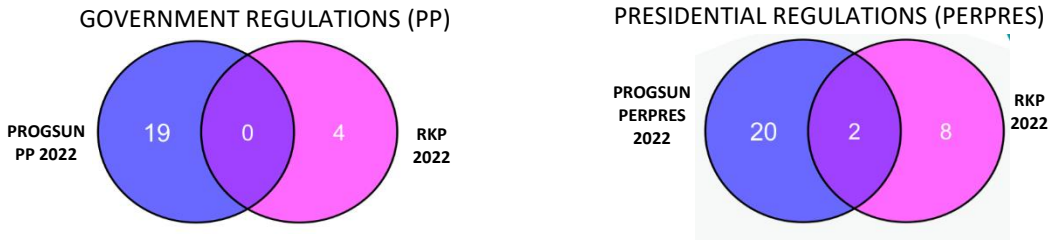

Figure 4. Comparison and intersection of the government proposals on progsun government regulations and presidential regulations and the RKP 2022

None of the 4 PP proposals in the 2022 RKP and 19 PP proposals in the 2022 PP Sun Program overlapped. However, out of the 10 Perpres proposals in the 2022 RKP and 22 Perpres proposals in the 2022 Perpres Progsun, there were two proposals that intersect. These were the Draft Presidential Regulation on Enhancing the Competitiveness of National Consultancy Services and the Draft Presidential Regulation on the National Strategy for Accelerating the Implementation of Gender Mainstreaming (PUG).

c. *National Legal System Integrated with The Regulatory Framework in Accordance with The Needs of National Priorities (PN), Priority Programs (PP), Priority Activities (KP), and Strategic Projects (Major Projects) in National Development Planning*.

In contrast to the legislative plan formulated by BPHN, the regulatory framework suggested by Bappenas through the RKP/RPJMN planning documents is determined based on the priority needs, programs, activities, and strategic projects in the national development agenda. In essence, the regulatory framework originating from the RKP/RPJMN aims to achieve the national development planning set forth

in the RKP/RPJMN, whereas the legislative plans developed by BPHN serve the national interests in various aspects.

Conclusions

Based on the synergy issues of coordinating the preparation of RKP/RPJMN regulations with the Prolegnas/Progsun, the following conclusions can be drawn as follows. First, the lack of understanding regarding the urgency of fulfilling the indicators for proposing a regulatory framework inhibits synergy in the preparation of regulations by Bappenas and BPHN. Moreover, no provisions require sector directorates and K/L to comply with the indicators for proposing regulations, which are intended to be integrated into the National Legislative Prolegnas/Progsun national legislation plan. As a result, the regulatory framework proposed in the RKP cannot be followed up and included in the Prolegnas/Progsun. And second, to achieve effective coordination between the RKP/RPJMN and the Prolegnas/Progsun in drafting regulations, several indicators can be used, such as the promulgation of proposed regulations through the RKP/RPJMN, an integrated regulatory Framework, and a national legal system that caters to the needs of National Priorities (PN), Priority Programs (PP), Priority Activities (KP), and Strategic Projects (Major Projects) in national development planning. However, despite these indicators, a thorough analysis shows that the coordination in preparing regulations between the RKP/RPJMN and the National Legislation/Progsun has not been fully optimized.

Recommendation

Based on the analysis and conclusions, it is important to establish certain regulations that require the sector directorates and K/L of Bappenas to adhere to certain requirements. These requirements may include the following. First, the proposed regulatory framework in the RKP/RPJMN must meet the indicators/criteria for the proposed regulatory framework so that it can be integrated into the Prolegnas/Progsun legislation plan. Second, the RKP/RPJMN should include regulations that specify the timeframe for their drafting and the consequences if they cannot be completed within the given timeframe, such as reduced funding or budgetary constraints. Third, strengthen coordination and synergy between institutions and stakeholders to establish the necessary regulatory framework as a supportive element for achieving development programs. And fourth, improve the knowledge and awareness about the urgency of regulations and the skills required to prepare academic papers and regulation drafts through human resource capacity building.

The recommendations presented in this policy paper could be utilized as inputs for the amendment of the SPPN law to make it a legally robust guideline for formulating an effective and efficient regulatory framework in development planning documents. It is also important to consider enhancing the capacity of human resources or experts involved in the preparation of regulatory and policy frameworks. Previous literature has emphasized the significance of human resources as a critical factor in developing effective regulations during the development planning and implementation phases.

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THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 – APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Policy Paper

The Concept of Electronic-Based THIS Planning in the Ministry of Transportation

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Abstract

Synchronization of planning and budgeting is a common problem that is often experienced by public organizations in Indonesia, especially in the Ministry of Transportation. The gap in planning and implementation due to this problem is a symptom that the THIS (Thematic, Holistic, Integrative, Spatial) concept has not been able to run optimally and could be optimized through e-government, which does actually not yet reflect the interoperability aspects between each planning application such as e-planning & budgeting; e-performance; e-monitoring & reporting; up to AP2KP (Aplication for Appraisal of Achievement and Calculation of Empoyee Performance). This study uses a qualitative approach with a case study method strengthened by an Analytical Hierarchy Process to examine the application of the electronic-based THIS concept. The results of this study provide policy advices for the preparation of a new ministerial regulation about integrated planning and develop a business process related to the planning flow within the Ministry of Transportation which accommodates the THIS concept.

Keywords: Interoperability; E-Government; Integrative; Performance

ARTICLE INFO
Received: October 20, 2022
Received in revised form: January 31, 2023
Accepted: April 19, 2023

doi: 10.46456/jisdep.v4i1.349

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/ National Development Planning Agency (Bappenas), Republic of Indonesia

Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
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Supported by Indonesian Development Planners Association (PPPI)

Please cite this article in APA style as:
Dharmawan, I. (2023). The Concept of Electronic-Based THIS Planning in the Ministry of Transportation. *The journal of Indonesia Sustainable Development Planning, 4*(1), 86—98. https://doi.org/10.46456/jisdep.v4i1.349

1. Introduction

There are many studies in the environment of public organizations which examine strategic planning (Haq, 2014; Komariah, 2020; Permatasari, 2017). However, it is infrequent for research to review the concept of Thematic, Holistic, Integrative, and Spatial (THIS) based planning, especially by integrating it with technological developments and information in an electronic-based government system. Within the Ministry of Transportation, it is important to study the application of electronic-based planning, considering that the transportation sector has a vital role in encouraging various government strategic plans. Especially, since the development of the world wide web, the attention of public organizations has also led to adaptation efforts based on web technology in carrying out government affairs such as in the form of Government to Citizen (G2C), Government to Government (G2G), Government to Business (G2B), and Government to Employee (G2E) (Davison et al., 2005). This concept is a consequence of the implementation of Government Regulation Number 17 of 2017 on Synchronization of National Development Planning and Budgeting Processes which implies the application of the money follow program principle by using the THIS concept as an answer to the non-optimal application of the money follow function principle in planning and budgeting of public organizations.

The implementation of performance-based budgeting with the money follow function approach has not yet encouraged the achievement of optimal policy outputs and has resolved problems in development planning in Indonesia, one of which is related to the disconnection of planning and budgeting. The introduction of performance-based budgeting provides an opportunity to improve the quality of planning and to develop budget plans that link strategic planning objectives with resource processes in the medium term (Blazely, 2018). One of the drawbacks of implementing this approach is the lack of coordination, synergy, and integration between work units, both vertical and horizontal relationships (Kurniawan, 2019). The money follow function approach requires each work unit to carry out its duties according to its respective functions based on the existence and formation of the work unit. In the end, every public organization and work unit only focuses on their respective duties and functions. Meanwhile, public issues are multisectoral and multiregional, not mono-sectoral or mono-regional. The application of the money follow function approach, although it is an important element of implementing performance-based budgeting, is not without its drawbacks. One of the drawbacks of implementing this approach is the lack of coordination, synergy, and integration between sectors. This is because with the money follow function approach, each institution or sector operates independently and only focuses on their duties and functions. This then made the central government start thinking about changing the budgeting approach from the money follow function to the money follow program.

The transportation sector has a vital role in encouraging a country's economic activity, especially the development of transportation infrastructure, such as trains, ports, and airports, which has multi-sectoral and multi-regional issues (Yulia & Ningsih, 2020). The role of these various transportation facilities as nodes is to connect one region with another (Prideaux, 2000). Of course, the effectiveness of transportation as a driver of economic activity requires an optimal transportation sector planning effort. The Ministry of Transportation in its planning has carried out various innovations through the application of electronic-based planning.

The current application system related to the planning system within the Ministry of Transportation includes e-budgeting; e-performance; e-monitoring and reporting; and ap2kp (Application for Appraisal of Achievement and Calculation of Employee Performance). As a series of systems that are cyclical and related to one another, these applications are still running partially and are not integrated with one another. The absence of interoperability between one planning application and other planning applications is one of the obstacles to the money follow program approach with the THIS principle which is held within the Ministry of Transportation. As a result, planning through the application is still running partially and could not run optimally as an electronic planning system. In the practice of planning implementation, there are often multiple input jobs related to the same data, eventually creating inefficiencies in both time and human resources in planning activities within the Ministry of Transportation. Under these conditions, there must be an effort to optimize planning within the Ministry of Transportation through an in-depth study of the implementation of planning with the electronic-based THIS concept.

This concept ensures that the implementation of public organizations is carried out by prioritizing the principles of collaboration, coordination, and synergism, especially because the current government's

focus is not on the vision and mission of each Ministry. Currently, each Ministry does not have to have its own vision and mission. The President only needs to prepare, so the task of the Ministry is to realize the President's vision and mission. So, the money follow program approach at the Ministry of Transportation must focus on achieving national priority programs listed in the strategic targets in the national mid-term planning document.

According to Wasono and Maulana (2018), the main problems with development planning in Indonesia are the disconnection of planning and budgeting; synergies between central and regional planning; discrepancies in the discussion schedule between the central government and the regional governments; and planning and budgeting are not yet evidence-based. At the very least, it is hoped that this problem can be resolved by optimizing the optimal money follow program principle through the THIS concept by adopting technology and information. In the era of disruption, with the development of technology and information, the public sector is also required to innovate in solving public affairs. This condition is increasingly interesting to study the application of planning with the THIS concept to answer the problems of planning based on e-government implementation in the context of planning at the Ministry of Transportation.

In general, studies on planning in public organizations cover more on strategic planning topics, and very limited studies review the THIS concept in electronic-based planning in public organizations in Indonesia. This study tries to examine the application of the electronic-based THIS concept in the Ministry of Transportation. The obstacles that arise in encouraging the optimization of the application of THIS concept are studied by also examining the issue of planning regulations within the Ministry of Transportation. Currently, planning within the Ministry of Transportation relies on Ministerial Regulation No. 112 of 2017 concerning guidelines and planning processes within the Ministry of Transportation. Public policy analysis through regulatory impact assessment is carried out to assess whether the regulation is still relevant to be applied or needs to be changed to optimize the implementation of electronic-based planning with the THIS concept.

2. Methods

2.1 Data Collection Methods

This research uses a qualitative approach to assessing the problem of applying the electronic-based THIS concept in implementing planning within the Ministry of Transportation. The inductive mindset explores the issues related to the research topic under study. The study used is a case study of THIS-based planning activities electronically at the Ministry of Transportation. Research using the case study method requires a detailed, in-depth, thorough study of a particular object, in this case the application of the THIS concept in planning at the Ministry of Transportation. Case study studies can strengthen issues in research by knowing patterns from the data obtained (Denzin & Lincoln, 2010). Studies through the case study method have a detailed, in-depth, thorough study pattern of an object over a certain period (Umar, 2004). Case studies were carried out using data triangulation techniques to test the validity of the data obtained. Triangulate different data resource of information by examining evidence from the source and using it to build a coherent justification for themes and use rich, thick description to convey the findings.

Primary and secondary data were used to look for actual tendencies to obtain valid data and comprehensive studies. Primary data were obtained from field records and interviews with informants relating to electronic THIS-based planning at the Ministry of Transportation. The informants in this study were all key persons in the planning divisions in each sub-sector, namely in the land transportation, sea transportation, air transportation, and rail transportation sub-sectors. Meanwhile, secondary data were obtained by conducting documents, studies through literature data and other studies related to the concept of THIS, and by implementing electronic-based planning in public organizations, such as regulations related to planning process and several policy papers related to planning policies in Ministry of Transportation.

In addition, this study also uses an Analytical Hierarchy Process (AHP), using an expert choice application to give weight to a more qualitative cost and benefit analysis. To determine the most optimal alternative action options based on the cost and benefit analysis, the Analytical Hierarchy Process method is a general theory of measurement developed by Thomas L. Saaty. AHP is used in the regulatory impact

assessment in order to derive the ratio scale through three pairwise comparisons. Pairwise comparisons can be prepared by means of actual measurements or relative measurements of the degree of liking or interest or feelings. Therefore, the AHP method is very helpful for getting the ratio scale of things, such as alternative action options in regulatory impact assessment documents which are difficult to measure quantitatively and even very difficult to monetize by measuring through opinions, feelings, behaviors, and beliefs.

2.2 Data Processing

Several stages are carried out in processing research data, namely through data reduction, data presentation, data discussion, and data conclusions. Data reduction is carried out by collecting appropriate factual data and then summarizing the main things relevant to the research topic. Data reduction is carried out by categorizing data related to the problems of applying the THIS concept electronically within the Ministry of Transportation. The summarized data is presented in a thinking framework through tables and diagrams, which is continued with the discussion. Empirical tendencies that arise and are further studied are concluded to provide common threads and policy recommendations from the studies carried out. The regulatory impact assessment by AHP method is conducted by several steps to provide three alternative options as follows:

a. Each sub-sector within the Ministry of Transportation is distributed a policy choice questionnaire to provide an assessment of three alternative options for action related to the costs and benefits generated qualitatively.
b. Each sub-sector fills in the weights based on the Saaty scale with three pairwise comparisons, namely:
    1) Which is better, the status quo/do nothing option and the Ministerial Regulation No. 112 of 2017 revision.
    2) Which is better, the status quo/do nothing option and the drafting of the New Ministerial Regulation.
    3) Which is better between the revised PM 112/2017 option and the drafting of the New Ministerial Regulation.
c. Then it is concluded and given a weighting, which one is better between the three alternative action options analyzed through the expert choice program.

2.3 Data Analysis

This study conducted a data validity test to obtain data that can be accounted for academically. In quality research, with compound and dynamic research, it is scarce to find repeated consistency over the reality under study as it was. Therefore, to validate the data, qualitative studies are carried out through the following stages: 1) triangulation of data sources that differ from information by examining evidence from sources and using them to build coherent justifications for themes; 2) researchers applying member checking, namely by showing descriptions, research data, and study results in front of participants to check whether they feel that the report/description/theme is accurate; 3) carried out the creation of a rich, dense, in-depth, and precise description related to the results of the study; 4) clarifying the biases that the researchers may bring to the study; 5) presenting different or damaging information to try to give another view of an unavoidable reality in the study; researched and poured it out in detail about the units analyzed in a dense narrative (Creswell & Creswell, 2017). The AHP analysis method is certainly different from the descriptive and inferential quantitative methods, which by the rule of thumb, there are certain standards for generalization. The AHP method is more of an effort to help key persons to formulate which policies from the available alternatives are the most ideal choices compared to others on the basis of indicators that are both qualitative and quantitative.

2. Results and Discussions

Synchronization of planning and budgeting is a problem for various public organizations in Indonesia, as revealed by Wasono and Maulana (2018). Fadillah et al. (2020) said that more synchronous planning and budgeting are directly proportional to the improving performance of the organization. The planning and budgeting synchronization is required to use the THIS concept as one of the consequences of implementing the money follow function. The THIS concept is encouraged to create further synchronization between national planning and budgeting, where the synchronization aspect is one of the weaknesses of implementing the money follow function. Although the money follow program approach has been implemented with the THIS concept, it is necessary to optimize good internalization within the Ministry of Transportation. Currently, the obstacle to implementing this concept is the weak integration between work units within the planning scope at the Ministry of Transportation. Therefore, efforts are needed to optimize the THIS concept by optimally running an electronic-based government system.

The scramble of planning and policy in the transportation sector is multiregional, considering that it relates to mobility and connectivity. Related to its multisectoral nature, the construction of these transportation facilities also requires collaboration with other sectors such as public works, agrarian and spatial planning, as well as other sectors. Therefore, it takes a collaborative effort that must have been reflected in the planning and budgeting process. In transportation, constructing airports, ports, railway stations, and terminals also requires synergism with other ministries or institutions such as the Ministry of Public Works, the National Land Agency, the National Development Planning Agency, and others. As a first step to creating collaboration with external parties, the main thing that needs to be done first is to build synergism and collaboration within the Ministry of Transportation. Collaboration and synergism in implementing public policies will not necessarily arise without these values being truly internalized starting from the planning process. Ansell and Gash (2008) identify a series of factors that are crucial within the collaborative process itself, that consist of three factors include face-to-face dialogue, trust building, and the development of commitment and shared understanding. While Emerson et al. (2012) see collaboration as not only a formal series initiated by public bodies but also a hybrid process in which in practice, the public, private, and civil society sectors merge into one and establish mutually beneficial partnership governance based on common goals.

The planning process, indeed, cannot be separated from budgeting activities. The two things are different but become one unit in the planning activity. The performance-based budgets aim to encourage the creation of effectiveness and efficiency in public spending by linking public sector organizations' funding with the results achieved through the systematic use of performance information (Bastian, 2006; Last & Robinson, 2009; Sulistio, 2010).

The principle of interoperability should not be ignored by encouraging the optimal application of the THIS concept through implementing an electronic-based government system. This principle can be implemented if integration is created between every planning application owned by the Ministry of Transportation, such as e-planning & budgeting; e-performance; e-monitoring & reporting; up to ap2kp (Application for Appraisal of Achievement and Calculation of Employee Performance). However, implementing planning through an electronic-based government system has not run optimally, especially in embodying the concept of THIS as a mandatory Government Regulation Number 17 of 2017 concerning Synchronization of the National Development Planning and Budgeting Process. Therefore, by encouraging the application of interoperability in the use of planning applications, it is expected that planning and budgeting can carry out thematic, holistic, integrative, and spatial concepts.

Interoperability is a necessary condition for inter- and intra-departmental sharing and a common interface for citizens, which will precede data management (and therefore knowledge management (Hodgkinson, 2002). Indeed, this interoperability problem is a common problem related to data exchange between different systems or applications, especially in e-government. Therefore, when each stage in the planning cycle can exchange data, the implementation of e-government can reach the maturity stage, and the concept of THIS can be carried out more optimally. In Law Number 25 of 2004 concerning the National Development Planning System, it is stated that the planning stages include the preparation of plans, the determination of plans, the control of the implementation plan, and the evaluation of the implementation of the plan (Winarni et al., 2021). Integrating the planning system is needed to simplify and prevent repeated data input for each application ranging from e-planning & budgeting, e-performance, e-

monitoring & reporting, up to ap2kp. However, by exchanging data between these applications, planning and budgeting can be carried out more optimally, and the concept of THIS can be better organized. These principles, namely thematic, holistic, integrative, and spatial principles based on Government Regulation Number 17 of 2017, have the following meanings: 1) Thematic, which is interpreted as the focus of detailed planning up to priority programs; 2) Holistic, which is interpreted as a comprehensive approach from upstream to downstream; 3) Integrative, that is, it is interpreted as integration in who does what to the integration of funding sources; and 4) Spatial, which is interpreted as the interrelationship of the location function of various integrated activities.

With the demands of changing approaches or paradigms related to planning and budgeting in Indonesia, which previously applied the concept of money follow function to become a money follow program, the government must apply the concept of THIS. The synchronization is needed to encourage the integration of planning and budgeting in achieving the President's vision and mission as outlined in the National Medium-Term Development Plan (RPJMN) and RKP through the concept of THIS (GOI, 2017). The money follow program is a holistic, integrative, thematic, and spatial development planning approach to various Priority Programs that aligns with the President's vision and mission. It is also stated that the purpose of implementing the money follow program is to realize the results of the implementation of development that the wider community can directly feel. The THIS principle elaborates the theme of Development Priorities into comprehensive planning starting from upstream to downstream of a series of activities carried out in the integration of stakeholders and funding, as well as in a unified region and interrelationships between regions.

The application of a performance-based budget uses the principle of the money follow function. However, with the Government Regulation Number 17 of 2017 concerning Synchronization of the National Development Planning and Budgeting Process, in the end, the principle of implementing a performance-based budget is directed at the application of money follow programs. By emphasizing more integrative and synergistic aspects, each sector does not run independently in national priority programs. With the preparation of a Ministerial Regulation on integrated planning, the principles used are the principles that also become guidelines in Government Regulation Number 17 of 2017 concerning Synchronization of the National Development Planning and Budgeting Process.

In the practice of performance-based budgeting, goal orientation is an important issue that needs to be considered according to various studies conducted by Cholifah (2013), Puspitasari (2013), and Siagian (2014). Technology and information according to various studies also have an important role and are the main factors in encouraging the success of performance-based budgeting (De Jong et al., 2013; Sullivan, 2016; Zinyama & Nhema, 2016). The importance of implementing integrated planning using the THIS principle is one of the important efforts in encouraging the successful implementation of performance-based budgeting.

Performance-based budgets have become more flexible than traditional budgeting system which emphasizes costs rather than results or performance, and the use of budgets focuses on achieving outcomes. In general, performance-based budgets emphasize achieving results and outputs from programs/activities by increasing the efficiency and effectiveness of using limited resources. Then, a performance-based budget that prioritizes more efficient budget allocations encourages spending efforts by allocating resources at the highest priority to achieve the expected results. In general, the logic used is that considering the budget is limited, strategic steps are needed to determine development priorities in planning documents, considering that all things cannot be done due to budget constraints. Preparing the priority list ultimately helps to optimize the resulting outcomes further, considering and seeing the urgency of the public needs that are priorities to be resolved immediately through the preparation of planning documents, especially in transportation matters. In implementing the concept of allocative efficiency in the planning and budgeting system, several things must be met first, namely: 1) The existence of a medium-term target framework (related to fiscal discipline); 2) There are well-designed priorities in achieving development goals both nationally and sectorially; 3) There is the authority to spend, change, and save allocations to budget users; 4) The government encourages reallocation to improve the effectiveness of the program. Budget users are obliged to evaluate activities and report on the resulting performance and outcomes; 5) A cabinet review that focuses on changing existing policies or new policies exists.

In general, implementing the planning process within the Ministry of Transportation is expected to refer to the concept of THIS while still being compiled systematically, directed, integrated, comprehensive, and responsive to changes in transportation affairs. Other principles that are also covered in the draft Ministerial Regulation on the Integrated Planning Process within the Ministry of Transportation also apply the principles in the implementation of an electronic-based government system (SPBE), with reference to the following principles: 1) Effectiveness, namely optimizing the utilization of resources that support successful SPBE to suit needs; 2) Integration, namely the integration of resources that support SPBE; 3) Sustainability, namely the sustainability of SPBE in a planned, gradual, and continuous manner in accordance with its development; 4) Efficiency, namely the optimization of resource utilization that supports appropriate SPBE; 5) Accountability, namely clarity of function and accountability of the SPBE; 6) Interoperability, namely coordination and collaboration between Business Processes and between electronic systems, in the context of exchanging data, information, or SPBE Services; and 7) Security, namely the confidentiality, integrity, availability, authenticity, and nonrepudiation of resources that support SPBE.

The process of accelerating the implementation of performance-based budgets with the principle of money follow programs cannot be optimal only by compiling new regulations as guidelines but also requires application development through the preparation of business processes related to integrated planning. Therefore, with the application of planning with an electronic-based THIS concept, the integration process, spatial mapping, and thematic can be more easily realized. In the end, planning can be more holistically created.

In the analytical hierarchy process, the weighting steps are carried out on three alternative options. From the results of the expert choice analysis, it is concluded that the policy option for the preparation of a new Ministerial Regulation is preferred over other alternative action options, with the weights of each option, namely:

a. Status Quo or do nothing (8.4%)
b. Revised Ministerial Regulation No. 112 of 2017 (26.8%)
c. Preparation of New Ministerial Regulation (64.8%)

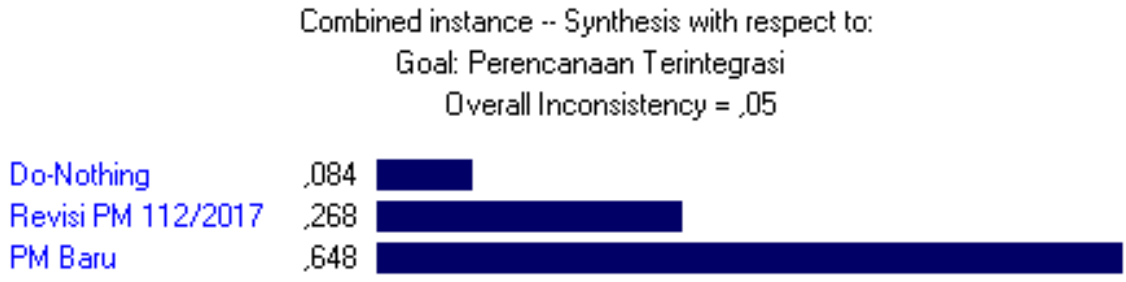

Figure 1. Final Weight for Preparing a New Minesterial Regulation

The assessment was obtained from 18 key persons from each sub-sector within the Ministry of Transportation who had filled out the AHP questionnaire which was distributed to all sub-sectors. There are at least some notes that need to be considered in the preparation of a new Ministerial Regulation,

a. There needs to be stages that become mandatory, such as a feasibility study to determine the location, DED to calculate the technical design, and funding requirements as well as environmental documents.
b. It is necessary to add the preparation of planning documents (feasibility studies, OBC, FBC) to KBPU Solicited, considering that there is APBN funding allocated. This is necessary considering the state's limited financial condition.
c. It is necessary to consider the addition of route planning, especially the pioneering route. Considering that there is no basis that is used as a basis for proposals from the regions every

year that can be accommodated in the medium-term route planning document in line with the Strategic Plan.

d. It is necessary to re-elaborate the position of the rolling plan in planning.

e. There needs to be an initiative clause to accommodate proposals that are initiative in nature, so that they can be adjusted to the rolling plan document.

In addition to these points being considered, of course, the spirit of the new Ministerial Regulation which is expected in general by every sub-sector within the Ministry of Transportation will certainly be able to regulate more comprehensive planning matters. Then, in more substantive terms, the regulation related to the new integrated planning is expected to create a more effective and efficient planning in terms of time, personnel, and cost by prioritizing the THIS principle. The application of existing planning regulations does not guarantee the creation of an integrated planning process, nor does it regulate planning mechanisms in a comprehensive manner. Therefore, it is felt that compiling regulations related to integrated planning is the most relevant option to answer the problem of demands for presenting integrated and comprehensive planning.

In implementing new policies, mapping strengths and weaknesses is needed. The advantage of drafting new regulations related to integrated planning and preparing business processes for electronic-based planning guidelines by applying the THIS principle is that it can accelerate more measurable planning work within the Ministry of Transportation. However, of course, some weaknesses need to be mitigated. These weaknesses are related to building a collective or shared understanding that existing issues related to the principles of THIS-based planning need to be considered and resolved through the preparation of new Ministerial regulations accompanied by the preparation of business processes. Moreover, optimization initiatives that come not from the leadership often require more efforts to convince all work units considering that later the new Ministerial regulation policy will become a guideline for all units within the Ministry of Transportation in carrying out activities related to planning.

It is necessary to encourage the use of technology and information. Adopting how to work in electronic-based planning becomes a thing that can be realized. The policies offered by preparing new regulations on planning governance within the Ministry of Transportation are more of this pattern. It is aimed at institutionalizing how this planning works in planning activities within the Ministry of Transportation. Institutional, in this case, is not defined as a physical institution in the form of an organization but as a series of rules and regulations that ensure that the THIS concept's internalization in planning activities within the Ministry of Transportation can run optimally.

In preparing for adopting technology and information, it is necessary to prepare business processes related to the planning flow within the Ministry of Transportation. Business processes are essential to structure, considering that they contain a series of interrelated steps assigned to each stakeholder for the planning work. With business processes, each stakeholder performs a specific task that is their specialty to achieve concrete goals. Business processes present standard stages or steps that become guidelines. However, future standards can also be optimized according to development needs related to the planning process and stages.

Preparing a new ministerial regulation is expected to review and make the concept of THIS a guideline or principle in every planning process within the Ministry of Transportation. It is a form of affirmation that every stage and planning process within the Ministry of Transportation must be principled and emphasize integrative aspects, then prioritize spatial, thematic, and holistic elements. Therefore later, it can be mapped out that one of the planned programs and activities targets of specific national strategic programs or other priority programs that are the vision and mission of the President.

None of the programs and policies are mono-regional. Under the current conditions, what is built in one region also has an impact on other regions. The construction of an airport or port in a city can have an economic impact on other regions, and this spatial principle needs to be considered, especially in planning documents that are nodes, such as in the construction of railway networks, as well as toll roads. In the integrative aspect, no programs or activities in the public sector are mono-sectoral, so integration is needed while still paying attention to integration with other sectors. For example, in the construction of irrigation, although it looks like simple physical work, it involves many elements that must be integrated or synergized. It deals with public works, spatial planning and gardening, transportation, electricity, drinking water, and others.

Integration is not only sectoral but also related to the principle of financing in implementing public affairs. In development planning, the government may cooperate with the government of other countries, the private sector, and civil society. It is related to the application of governance principles, so the implementation of public affairs may be planned with the concept of Business to Business, Government to Government, Government to Business, and others. The terms solicited and unsolicited in the scheme of the construction financing of physical projects are also known. Solicited is an infrastructure project initiated by the government and offered to Business Entities for cooperation. The initiation is based on government planning documents, but is sought to be funded by the private sector. These things began to be thought of and became solutions considering that the government's budget was limited. At the same time, the public's need for transportation facilities such as ports, airports, stations, and others was very urgent.

Furthermore, it is known as the unsolicited scheme, where the project's initiation comes from the private sector and must be accompanied by a feasibility study with precise planning. Then, the government will discuss whether the project is accepted or not. The discussion among government institutions is harmonizing the planning documents with guidelines in carrying out development, such as medium-term planning documents, spatial planning documents, environmental planning documents, and others, such as spatial plans and national and regional planning documents, detailed spatial planning plans, and others.

The key actor in implementing planning that puts forward the concept of THIS based on electronics is the Planning Bureau, which is indeed in charge of the coordinator of specialized work units related to planning within the Ministry of Transportation. The Center for Technology and Communication of the Ministry of Transportation has a role as a technology and communication development manager, especially in planning applications ranging from e-planning & budgeting, e-performance, e-monitoring & reporting to ap2kp (staffing information system).

It is expected that the preparation of the new ministerial regulation will later review and make THIS concept a guide or principle in every planning process within the Ministry of Transportation. It is a form of affirmation that every stage and process of planning within the Ministry of Transportation must be principled and emphasize the integrative aspect, then prioritize spatial, thematic, and holistic elements. Therefore later, it can be mapped out one of the planned programs or activities targets of specific national strategic programs or other priority programs that become the President's vision and mission.

Planning within the Ministry of Transportation is currently not optimally integrated, so it is still partial between units. Creating synchronization between planning documents requires intensive communication efforts to create strong coordination. Such conditions often create inefficiencies in time. Dunn (2017) says that the more actors involved in the planning process tend to be, the more difficult it is to create deals. It is coupled with the absence of a legal umbrella that provides guidelines for an integrated planning process within the Ministry of Transportation.

Although it has been mandated in Government Regulation Number 17 of 2017 concerning Synchronization of Processes and Budgeting for National Development, planning by applying THIS concept has not run optimally within the Ministry of Transportation. It is evidenced by the absence of integration in every planning step, especially physical planning. In preparing the physical plan document, the understanding of the feasibility study document, the master plan document, and the DED differs in content between each sub-sector. This has become quite difficult to encourage integration in transportation planning considering that currently transit-oriented development is also being encouraged, which requires integration between modes. The aim of developing the area with the TOD concept is to reduce dependency on the use of private vehicles by increasing the use of mass public transportation and promoting development without creating sprawl (Adhianti et al., 2020; Anissa et al., 2020). Although each sub-sector has different characteristics, in terms of planning concept, it certainly requires an understanding of the arrangement of the content of the planning documents that must be included.

It is expected that the application of the THIS concept, which has not been running optimally, considering that the existing planning is still spatial, can be more effectively run. Planning needs are integrative internally within the Ministry of Transportation and integration between ministries and institutions. It is considered that in constructing infrastructure facilities and infrastructures such as ports, terminals, airports, and stations, they must be coordinated and integrated with cross-institutions and

ministries. As has happened before in practice, the construction of airports and ports also requires other supporting infrastructure, such as public roads and toll roads. Therefore, after it is built, the community is also easier to access existing transportation facilities, so that the function of the presence of transportation facilities such as ports and airports can function more optimally.

The construction of new ports and airports is often in peripheral areas. Thus, in general, access roads are needed to support community accessibility, logistics network (railways, toll roads, conveyors), and other superstructures such as adequate length of wharves and other port facilities which, in this case, are important factors in the port business (Ahmadi et al., 2016; Haris & Takdi, 2017; Rionaldi, 2014). Moreover, there are currently many developments, transportation facilities, and infrastructure, which are priority programs of the central government. With the principle of money follow programs that focus on national development activities or activities referring to strategic priorities based on the vision and mission of the President-elect, the next issue is related to collaboration and coordination between each Ministry and Institution. Because there are no mono-sectoral or mono-regional public issues, the principle of THIS becomes a demand that must be carried out correctly.

"Thematic" in Government Regulation No. 17 of 2017 is the determination of priority themes in a planning period. Then what is meant by "holistic" is the thematic elaboration of the President's program into comprehensive planning starting from upstream to downstream of a series of activities. Furthermore, what is meant by "integrative" is an effort to integrate the implementation of the President's program planning which is seen from the role of ministries/institutions/regions/other stakeholders and efforts to integrate various sources of funding. Meanwhile, "spatial" elaborates the President's program in one unified region and the interrelationship between regions. The concept needs to be applied to improve the quality of money follow programs. In short, thematic is a detailed planning focus up to priority programs, holistic as a comprehensive and comprehensive approach (upstream-downstream), integrative is the integration of who does what and the integration of funding sources, and spatial is defined as the linkage of the location functions of various integrated activities.

The integration process, which has been an obstacle and has not been optimal within the Ministry of Transportation, certainly impacts the coordination process in the outer scope with other institutions or ministries. To optimize the planning process integrated with budgeting, it is undoubtedly necessary to optimize the use of THIS method in the planning process within the Ministry of Transportation. Ways that can be done include creating planning governance that focuses more on accommodating planning with thematic, integrative, holistic, and spatial work patterns.

The planning mechanism with the THIS model must be carried out because it is the mandatary of a planning system based on money follow programs. In contrast, government priority programs cannot be run by mono-sectoral or mono-regional alone. Meanwhile, money follow function-based planning tends to make public organizations and existing work units work partially and be more sectoral egos and regional egos.

Several alternative policies can be proposed in preparing planning guidelines within the Ministry of Transportation, including 1) Preparation of new regulations regarding planning governance with THIS concept within the Ministry of Transportation; 2) Developing a business process related to the planning flow within the Ministry of Transportation which accommodates the THIS concept.

So far, the backbone of planning governance within the Ministry of Transportation is using Ministerial Regulation 112 of 2017 concerning Guidelines and Planning Processes. However, in some implementation practices, the regulation has not been able to guarantee thematic, holistic, integrative, and spatial planning. Although THIS approach has been mandated in Government Regulation Number 17 of 2017, the concept has not been spelled out, so it is pervasive in how planning works within the Ministry of Transportation through a Ministerial Regulation that regulates the planning process at the Ministry of Transportation.

Currently, because the rules or regulations regarding planning are partial and go hand in hand with the implementation of Ministerial Regulation 59 of 2011, Ministerial Regulation 112 of 2017, Ministerial Regulation 9 of 2019, Ministerial Regulation 41 of 2019, and Ministerial Regulation 85 of 2020, respectively, it will involve many separate stakeholders as well, so that there may be inconsistencies. It is more difficult to reach agreements in planning practices within the Ministry of Transportation. Meanwhile, it would be nice if the arrangements regarding planning within the Ministry of Transportation

were integrated so as not to create loopholes in the inconsistency of planning documents, so that the arrangements could be one breath away, especially in the interest of encouraging the application of the THIS concept.

The preparation of planning documents has not been well integrated between several technical directorates, and the technical planning process takes a very long time. There are several planning studies whose scope of work overlaps with other studies. Therefore, repetitive work causes time and cost losses, and these empirical practices should certainly not be allowed to drag on. The principle of planning the concept of THIS is on the understanding related to integration. It is the primary thing and needs to be realized first. Then afterward, thematic, holistic, and spatial can follow and be easier to achieve, so the current homework is to improve planning within the Ministry of Transportation to make it more THIS patterned, namely by ensuring integration between each stage of planning. Basically, this is done to improve the administrative system, which according to Jumame et al. (2015); Mubar (2013); Muryati (2015) improvements in terms of the administrative system have a positive influence on performance-based budgeting, which is certainly related to optimizing the implementation of the plans that have been prepared. Meanwhile, planning and budgeting are two things that cannot be separated.

With the arrangements related to integrated planning, it is expected that the concept of THIS-based planning within the Ministry of Transportation can be adequately realized. It is because integrating all planning stages makes it possible to directly implement spatial and thematic-based planning in achieving optimal implementation of the President's vision and mission or strategic goals. Planning aimed at supporting the targets of national strategic programs, as well as related to the development of special economic zones, as well as related to national tourism strategic areas, can be easily measured by encouraging more integrated planning work between each stage, each work unit to between or across ministries and institutions.

Conclusions

The results of studies that have been prepared with various existing analyses to realize more optimal THIS-based planning require the adoption of technology and information in it. So far, planning within the Ministry of Transportation is still running partially. Therefore, stronger and clearer guidelines are needed to regulate the stages of planning that are more integrated by paying attention to the implementation of electronic-based planning. By prioritizing the integration aspect as a first step, it is hoped that efforts to realize more spatial, thematic, and holistic planning can be more easily embodied and appreciated by all sub-sectors and work units within the Ministry of Transportation.

Recommendation

It is necessary to prepare a business process as a standard guideline to simplify and provide an overview related to operational standards in THIS-based planning. Therefore, there is no doubt and confusion in planning by each work unit, and it creates more uniformity for more optimal integration efforts in every planning activity carried out. Two policy suggestions must be implemented to encourage synchronization of planning and budgeting and ultimately encourage organizational performance. First, through the preparation of new regulations related to integrated planning that are more comprehensive, covering all stages of development planning, starting from planning, determination of the plan, controlling the implementation of the plan, and evaluation of the implementation of the plan. Second, the Ministry of Transportation needs to arrange business processes related to the information management system or application sub-systems used in every planning stage. Therefore, they are well integrated and able to apply THIS concept, so that national priority programs can be implemented optimally to encourage the central government's vision and mission in the implementation of development, especially in the transportation sector.

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THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 – APRIL 2023

E-ISSN: 2722-082 | P-ISSN: 2721-809

Available online at
journal.pusbindiklatren.bappenas.go.id

Commentary

Game Theory of Universal Health Coverage for Sustainable Development

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1. Introduction

According to our-world data in 2019, eight out of ten ASEAN countries have achieved a Universal Health Coverage (UHC) index higher than the UHC index in lower-middle-income countries. This index measures how well these countries have implemented the concept, which is considered a powerful concept in public health by Margaret Chan, the former Director-General of WHO. Chan defined UHC as a concept that guarantees access to needed health services like promotive, preventive, curative, and rehabilitative, complete with adequate and effective quality, while ensuring that accessing these services does not cause financial difficulties for anyone.

Margaret's concept of UHC faces challenges during its implementation, as several countries had unsatisfactory achievements before the pandemic (World Health Organization [WHO], 2021). The pandemic increased the demand for health services from vulnerable communities resulting in slower access and exclusive quality care. Financial risk protection was also inconsistent and unfair. It became even harder to achieve when UHC's broad community target was the entire community. However, successfully implementing UHC in certain communities, such as Muslim pilgrims with diverse backgrounds dominated by the elderly who require health services (promotive, preventive, curative, and rehabilitative), can create a positive image and reflect the state's resilience in the health sector.

The government is responsible for finding effective ways to ensure access to high-quality healthcare and address complex challenges fairly to make UHC a viable health system platform and reform. This paper aims to provide a perspective on how to contribute to Indonesia's UHC achievements by examining the successful implementation of UHC in some ASEAN countries. For many countries, achieving UHC

ARTICLE INFO
Received: March 03, 2023
Received in revised form: April 16, 2023
Accepted: April 28, 2023

doi: 10.46456/jisdep.v4i1.406

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/ National Development Planning Agency (Bappenas), Republic of Indonesia

Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
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Supported by Indonesian Development Planners Association (PPPI)

Please cite this article in APA style as:
Mulyanti. (2023). Game Theory of Universal Health Coverage for Sustainable Development. *The Journal of Indonesia Sustainable Development Planning, 4*(1), 99—103. https://doi.org/10.46456/jisdep.v4i1.406

requires improvements to their health financing systems to ensure people have financial protection and access to quality healthcare. As UHC is a key target of the Sustainable Development Goals (SGD), the declaration has likely affected health financing reforms making it important to learn from the methods and outcomes of those reforms to promote intercountry learning.

2. UHC index in the ASEAN countries

The UHC index was obtained from our world data website and measured through health indicators on a scale ranging from a score of 0 (worst) to 100 (best) based on the average coverage of essential health services such as infectious diseases, non-communicable diseases, including reproductive health services such as mothers, newborn and children health and capacity and access to services.

The UHC index during and after the COVID-19 pandemic is crucial for assessing a country's health resilience in dealing with infectious disease outbreaks. However, implementing UHC as a global agenda during the COVID-19 pandemic has been challenging, and disparities in quality, access, fairness, integrity, and financial risk protection have become more evident.

The UHC achievements of ASEAN countries have been measured since 2017, and in 2019, eight countries had an index higher than that of low-income countries (Global Change Data Lab, 2023). These countries include Indonesia, Myanmar, Cambodia, Vietnam, Malaysia, Brunei, Thailand, and Singapore, as shown in Figure 1.

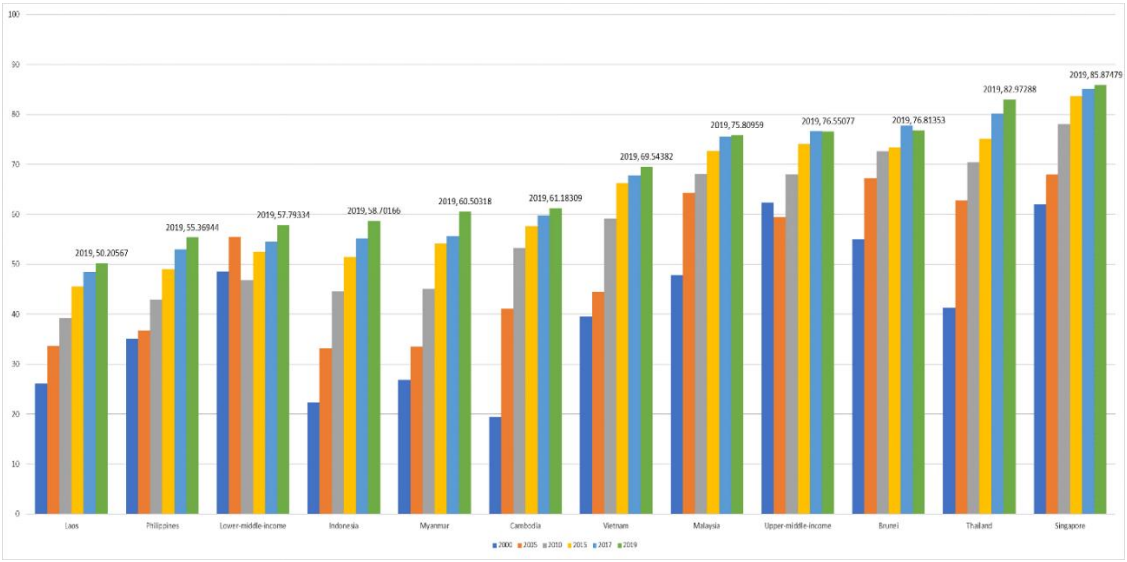

Figure 1. UHC Index in ASEAN Countries

Source: www.ourworld-data.com

Figure 1 indicates that The Philippines' healthcare program needs improvement, particularly in governance management and accountability, as the UHC index is still lower than that of lower middle-income countries (Venkateswaran et al., 2022). The Indonesian Ministry of Health (MOH) has maintained the categorization of sources of pooled funds for the UHC program to identify the population fraction that must be paid for through tax revenue. In addition, remittance has significantly increased from self-enrolled members to the national health insurance (NHI) framework.

Thailand has significantly improved its healthcare services since 2016, as evidenced by the increase in its UHC index (Sabiruzzaman & Golam, 2021). This has been achieved, in part, by ensuring the equal distribution of high coverage in reproductive health services. However, some disparities in outcomes still exist, mainly due to socio-economic factors, particularly differences in the education level of mothers or

caregivers. On the other hand, Singapore has consistently performed well UHC index in the last six years due to strong commitment from the government and better achievement on socio-economic factors.

According to Brady's article published on November 2020, to improve health services and achieve UHC, an innovative approach through the concept of "Networks of Care" (NOC). This approach is being codified to become an option for implementation. NOC involves developing support from authorities, healthcare resources (including healthcare workers, hospitals, pharmaceuticals, and financing), and a health system reformed to improve the quality of care (Brady, 2020). These factors are essential to increase access to health services and reduce financial risk for vulnerable communities.

To set the UHC agenda within regional discussions, legislation plays a vital role in producing regulations that support health financing and budgets and updating or revising national health (financing) policies and plans (International Centre for Diarrhoeal Disease Research [ICDDR], 2011). Japan played a crucial role in advocating for UHC during the 2019 G20 Summit, resulting in an increased international commitment to UHC at the UN High-Level Meeting on UHC. This reflects the growing importance of global health as a priority agenda and emphasizes the efforts to promote universal health coverage (UHC). International partnerships, particularly UHC2030, have been strengthened as part of this endeavor (Orjingene et al., 2022).

The connection between UHC and other SDGs, particularly SDG 8 (decent work) and its Target 8.8 (promoting worker rights and safe working environments), is essential in ensuring healthy lives and well-being for all individuals. This requires a focus on occupational safety and health measures implemented domestically in each country. To achieve this, inter-sectoral collaboration and cooperation are crucial, particularly when addressing vulnerable communities and ensuring no one is left behind.

3. Game Theory of UHC on ASEAN Countries

Game theory is an effort to solve strategic situations that result in players (decision-makers) implementation (Chang et al., 2020). The aim is to reach an equilibrium condition where the players can successfully make decisions and achieve their goals. Game theory modeling is applied in UHC improvement, particularly in prevention, health promotion, and behavior change efforts to access health care.

Badia and Marchioro (2022) mentioned from their book that the participants in game theory can be individuals, communities, organizations, or health programs, and their goal is usually to optimize their welfare or utility (p.115-117). Each 'player' typically tries to optimize their welfare, known as the 'pay-off' or 'utility' of a player. To do so, each player will take an activity of action among available movements, termed 'strategies.' Typically, the selection of the best activity of action for mind mapping of players will decide to actions as model strategy. The modeling of strategy can be classified into (Bai, 2016):

a. Modeling structure
b. Game frequency
c. Types of strategy adoption

Game Theory aims to develop profiles of the players, the utility of functions, and various combinations of action attempts. Comparing groups and integrating tools and/or game theory into the process will uncover the variables that can affect the healthcare process in the community. Game Theory considers the variables that must be considered to improve cooperation and the ability to implement policies to improve UHC (Agwu et al., 2021). The UHC concept, a common hope for quality health services, can be developed through four efforts, as shown in Figure 2 below.

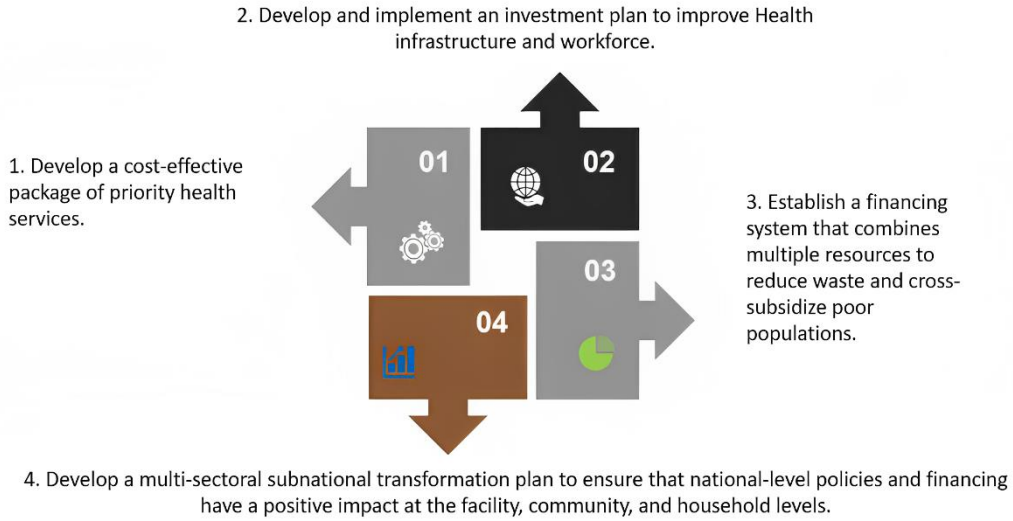

Figure 2. UHC Development Efforts

Brady (2020) proposed a strategy that encourages decision-makers to maximize their results at the end of the game. Moving forward, there are several recommended approaches to explore, such as changing resource parameters and assessing their impact on decision-makers, examining the long-term player pay-off condition and its effect on the game, and experimenting with different actor types in UHC improvement scenarios to develop new models of actions and outcomes. Game theory can be used with stakeholder theory and behavioral economics in microeconomics.

The game allows for reflection on topics such as balancing health, well-being, and sustainable development at the country or regional level. The world is interrelated, even if it seems otherwise; each country is a principal piece of the global puzzle, and steps taken now may conduct to a different future. The SDGs framework, which is structured around the "5 Ps" of People, Planet, Prosperity, Peace, and Partnerships, reflects the fundamental idea of the SDGs. The current economic model of production and consumption pursued by humans must consider the social needs of today's development objectives, such as employment, income, and quality of life, as well as the way economic activities depend on various factors and eventually cause environmental adversity.

Conclusion

UHC, as an idea rooted in human rights of social justice, with health as a main factor, requires the participation of every citizen and stakeholder. Government commitments and policies must be aligned with a clear path to address perceived challenges that play a role in building a better social contract. UHC's achievements reflect the well-being of a country and the nation's health security. A region with a high UHC index indicates a good quality of life, which enhances the country's positive branding on the international stage. This potential can be an economic opportunity for the country and its citizens. UHC can achieve equilibrium within the region if inter-regional countries develop cooperation in terms of political support, knowledge, or grants. Implementing UHC in ASEAN countries has proven that this is not just a concept but a practical approach with support systems, which requires the support of health services, including human resources. The Southeast Asian region, through ASEAN, can maximize various potential cooperation between regional countries in the fields of education, health, economy, and trade to the military.

Indicators for achieving UHC are the condition of basic health services that are at least not constrained by financing and increasing coverage when resources improve and reach individual health. This includes health promotion, provision of clean water, source control of disease, leading to equilibrium, prioritized development, and social inclusion and cohesion.

All endeavors should be made to improve UHC, such as investing in human resources and enabling them to perform their work professionally, even when resources are limited. In this digital era, national health insurance requires human resources who are technology literate to intensify services not only at the center but also at the nearest community service level. Some professional organizations are contributing to the implementation of national health insurance.

The sustainable development agenda affects good health and people's well-being in two ways: keeping health reform on the national agenda and strengthening national health policies to accelerate national health security achievement.

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THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING

VOL. 4 NO. 1 - APRIL 2023

E-ISSN: 2722-0842 | P-ISSN: 2721-8309

Available online at
journal.pusbindiklatren.bappenas.go.id

Book Review

Maintaining a Critical yet Hopeful Worldview in Achieving Sustainable Development

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Introduction

If someone asked you whether the world was getting better, worse, or stagnant, what would your answer be? According to Hans Rosling, most people would answer that things are becoming worse. In 2017, Rosling and his peers at Gapminder collaborated with Ipsos MORI and Novus to test 12,000 people in 14 countries about how they thought the world was progressing. The test contained 13 factual questions which were about topics such as the percentage of girls who finish primary school in low-income countries, the proportion of the world population living in extreme poverty, and more. To Rosling's surprise, most of his respondents only got 3 out of 13 questions right, including those who worked as scientists, investment bankers, and senior political decision makers (Rosling et al., 2018, pp. 3—9). The results of the test concerned Rosling, because having a wrong understanding of factual conditions in the world could also lead to faulty decision-making. This was the primary reason why Rosling decided to write the book titled *Factfulness* with Ola Rosling and Anna Rosling Rönnlund.

Factfulness was published by Flatiron Books (US) and Sceptre (UK) in 2018. The book contains a total of 342 pages, which includes eleven chapters of contents as well as notes and sources the authors relied on to write the book. The cover of the book is a plain white background with the title printed in capitalized, orange letters. Overall, the authors tried to explain why humans have the tendency to view the world negatively and how we can be more "factful".

This book review will include a recap of three important chapters in the book, critiques to consider, as well as a brief conclusion and book rating.

ARTICLE INFO
Received: March 04, 2023
Received in revised form:
April 06, 2023
Accepted: April 25. 2023

doi: 10.46456/jisdep.v4i1.411

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING
Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/ National Development Planning Agency (Bappenas), Republic of Indonesia

Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
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E-mail: journal.pusbindiklatren@bappenas.go.id

Supported by Indonesian Development Planners Association (PPPI)

Please cite this article in APA style as:
Arifin, A.R. (2023). Maintaining a Critical yet Hopeful Worldview in Achieving Sustainable Development. *The journal of Indonesia Sustainable Development Planning, 4* (1), 104—108. https://doi.org/10.46456/jisdep.v4i1.411

Fallacies which affect our "factful" worldview

The authors of *Factfulness* wrote that there are ten human "instincts" which cause most of us to believe that the world is becoming worse even though evidence suggests otherwise. After detailing each of those instincts in separate chapters, the authors dedicated the last one to reflect on what society can do to improve the way we review global facts objectively. This section of the book review will cover three out of those eleven chapters.

The "Gap" Instinct

The first chapter is about the "gap" instinct, which the authors described as our tendency to categorize the world into two different extremes which are separated by an impossibly large gap. Such examples include "west vs. the rest" and "developing and developed". The authors explained how people living in western countries may think the rest of the world lives in poverty because they all belong to the same category of "developing". In reality, most of the earth's population lies in between those who are extremely poor and rich. Hans Rosling claimed that he spent years trying to convince the World Bank to stop using their categorization of "developed" and "developing", as it splits the world into two without actually telling people much about the economic conditions in countries. In 2016, the World Bank finally adopted Hans Rosling's suggestion to create four income groups instead (World Bank, n.d.). Research conducted by the authors show that when we use this measurement, people would see that most of the population are in the second and third categories, and are progressively making their way up.

On this, Rosling et al. wrote "… we should do is stop dividing countries into two groups. It doesn't make sense anymore. It doesn't help us to understand the world in a practical way. It doesn't help businesses find opportunities, and it doesn't help aid money to find the poorest people" (Rosling et al., 2018, p. 32). In other words, dividing the world in two opposite ends doesn't allow us to accomplish anything productive. Hans Rosling detailed cases in which he encountered investment bankers who refused to invest in promising countries outside the west because they believed that all the other countries were not worth the effort. Not only does splitting the world into two fail to consider those who are in the middle, it may also lead to resources being misplaced when they could be allocated to better places or groups of people.

The "Urgency" Instinct

The authors described the "urgency" instinct as our tendency to act on problems as if the only time we have left is now. The authors acknowledged that there are important issues which require our action, such as climate change. However, they also described the consequences that could arise when we act on fear and little preparation.

In the book, Hans Rosling described his experience working with the Ministry of Health in Liberia to curb the Ebola outbreak in West Africa. Wanting to track progress on the policy they implemented as a response to the outbreak, Hans and Ola Rosling analysed the number of cases. Afterwards, they realized that the number of confirmed cases was dropping and people were abiding to the health protocol the government enforced (Rosling et al., 2018, p. 235). This story illustrates how we may sometimes get carried away in trying to resolve "urgent" issues, that we forget to step back and analyse whether what we're doing is working or not. In the long run, this would lead to resources being exhausted and negative decision-making affected by fear and a lack of evidence.

Practicing Factfulness

This chapter outlined the authors' suggestions on how to integrate "factfulness" in our daily life. This includes educational institutions sharing updated information on important global facts instead of relying on general assumptions and cultural stereotypes to learn about other countries, businesses looking beyond the richest countries and looking for potential investment opportunities elsewhere, and for organizations around the world to encourage factful thinking on a country-level, just as the book has done on a global scale.

Aside from those, other notable chapters include "The 'Straight Line' Instinct and "The Negativity Instinct". The authors refer to the "straight line instinct" as our tendency to assume trends will progressively follow a straight curve without actually understanding the trends from one data to the next. Meanwhile, the chapter on The Negativity Instinct is interesting because it provides graphs on improvements we tend to have negative perceptions on, such as crime rates.

Critiques and Caveats to Consider

Despite the book's well-intended message and its usage of easy-to-understand language, there are a few critiques and caveats to consider, both in regard to the content and style.

Firstly, the book's cited sources are mainly from the United Nations. While the United Nations could be considered a credible source of information, this may mean that the authors potentially missed out on details which were included in regionally or nationally-sourced databases. Furthermore, even though the book displays many graphs and numbers which indicate the world is improving in some aspects, it doesn't explain how we were able to achieve that progress. For instance, it displays data that access to education for girls has improved, but the strategies, policies, and efforts which contributed to that success are not explained by the authors. Thirdly, the cultural biases that the authors referenced in the book are more relevant to readers living in the west, drawing from the authors' own backgrounds. Lastly, the book doesn't provide detailed information on specific topics. Other critiques include the book employing an over-simplistic worldview and not discussing serious challenges enough (Berggren, 2018). Even though the authors wrote that there are problems which we need to address, the book emphasizes heavily on good aspects, which could lead readers to think that the book promotes a positivity bias.

In terms of writing style, the authors' tone could be perceived as forceful to some readers. Furthermore, even though the contents are divided into different parts, some of the messages are redundantly repeated across the chapters. On the other hand, the part of the book which explained urgent issues that deserve our special attention was considerably brief. In that section, the authors described their problem analysis and suggested solutions briefly based on their personal opinions, even though it would have been interesting for them to provide a more in-depth analysis.

Despite these caveats, the book provides an interesting framework on how we can process information more critically when we are surrounded by news and social media updates which constantly relay the message that the world is worsening. The book's simple language also makes this accessible for the public, and it's particularly well-suited for individuals looking for a fresh perspective that is supported by well-sourced evidence.

Conclusion

In conclusion, the main message of Factfulness is that there's a lot we still need to do to make the world better for everyone, but it would be wrong to say that we have not made progress. In fact, it should give us hope to know that the little and big things we've done have led us to important contributions being brought to the world. A key takeaway from the book is that we should be both critical yet hopeful, because we are able to make more accurate and meaningful contributions when we're not acting on personal biases, negativity, and fear.

In terms of practicality, this book is better suited for the general public. However, it also invites experts, activists, and other people whose works influence the field of policy to consider these important questions: are we really viewing the world objectively, or have we been so used to consuming negative news that we are clouded by our pessimism? Are we causing unnecessary panic to raise urgency about certain matters instead of educating the public about the proper facts? Have we taken the time to review what does and doesn't work so that our progress can be sustainable?

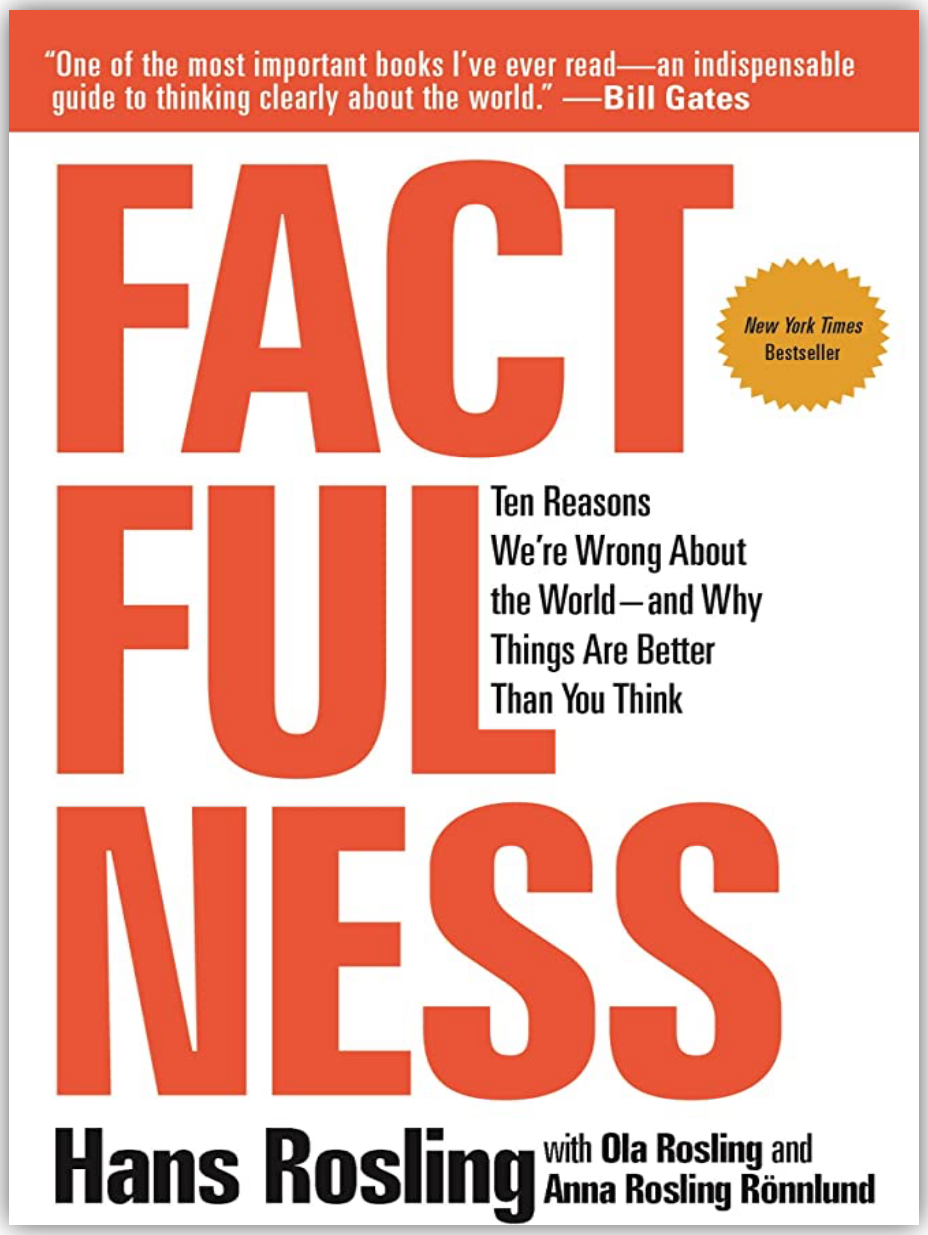
Book Rating

With all its positive aspects and critiques combined, I would give this book a 7 out of 10. The book provides a refreshing point of view which we are not frequently exposed to, which the authors supported

through test results, data, and personal experience. Nevertheless, readers should still conduct their own additional research and conduct fact checks to cross-reference whether the data in the book is still relevant.

For additional reference, readers could also check the Gapminder platform which the authors co-founded. Even though Factfulness has already been published, the Gapminder website is frequently updated, and they have a special segment dedicated to providing data about the 17 sustainable development goals (Gapminder, 2023).

Book Cover



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E-ISSN: 2722-0842 | P-ISSN: 2721-8309

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The Journal of Indonesia Sustainable Development Planning (JISDeP) is a journal published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/National Development Planning Agency Republic of Indonesia (Bappenas) and supported by Indonesian Development Planners Association (PPPI).

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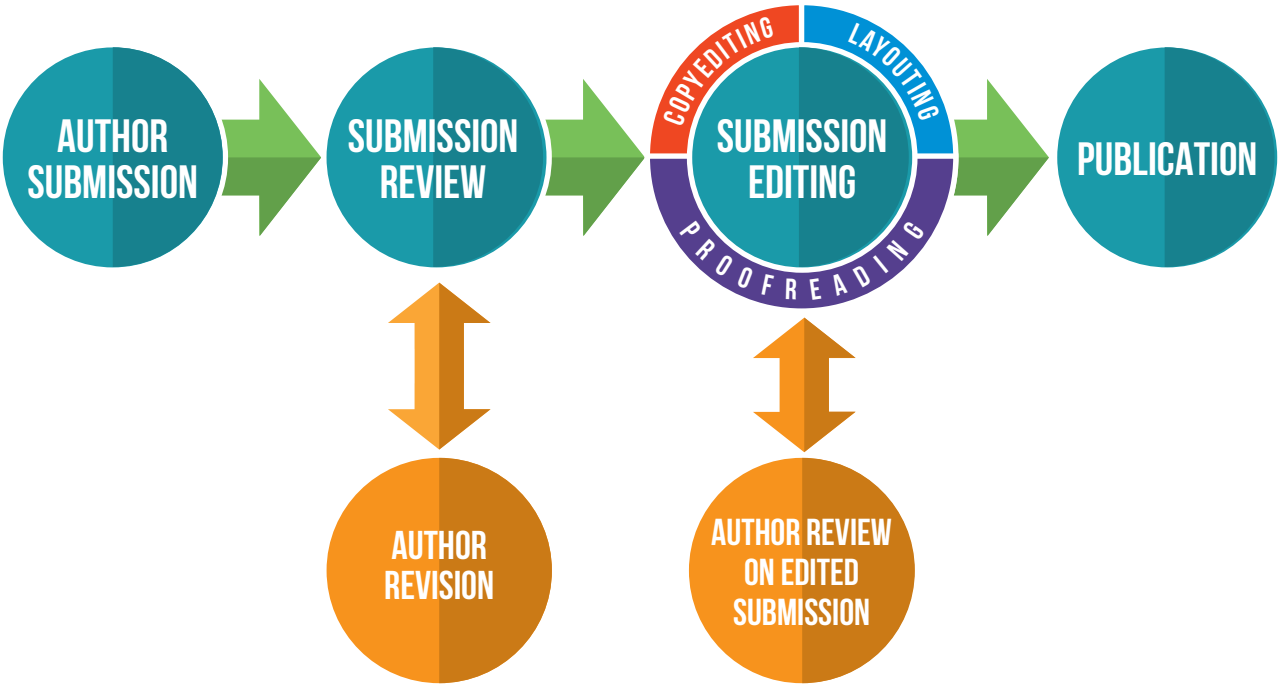

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Published by Centre for Planners' Development, Education, and Training (Pusbindiklatren), Ministry of National Development Planning/National Development Planning Agency (Bappenas), Republic of Indonesia
Address : Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
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E-mail : journal.pusbindiklatren@bappenas.go.id

Available online at journal.pusbindiklatren.bappenas.go.id

E-ISSN (online)
9 772722 084002

P-ISSN (print)
9 772721 830006

THE JOURNAL OF INDONESIA SUSTAINABLE DEVELOPMENT PLANNING (JISDeP)
VOL. 4 NO. 1 - APRIL 2023