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EDUMAP WEBGIS: OPTIMIZING GEOSPATIAL TECHNOLOGY BASED EDUCATION TO SUPPORT EQUITABLE DEVELOPMENT IN DKI JAKARTA TOWARDS GOLDEN INDONESIA 2045

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ABSTRACT

Education plays a vital role in national development by enhancing the quality of human resources. However, DKI Jakarta continues to face a high school dropout rate influenced by poverty, population density, and unequal access to education. This study aims to model school dropout risk factors using spatial analysis and visualize the results through a GIS-based website to support equitable education policy. Key indicators include student population, population density, and Nighttime Light data as a proxy for economic conditions. Simple linear regression is applied to examine temporal trends in student numbers and population density, while the Empirical Best Linear Unbiased Prediction (EBLUP) method estimates per capita income. These variables are integrated using Multi-Criteria Decision Analysis (MCDA) and validated with official dropout statistics. The results project that Pademangan, Cilincing, Tambora, Penjaringan, and Pulogadung will remain high-risk districts by 2045, providing strategic insights for policymakers to reduce educational inequality and promote sustainable urban development.

A. INTRODUCTION

Education plays a crucial role in national development by contributing to the formation of high-quality and competitive human resources. Beyond knowledge transfer, education also supports character development, moral values, and the cultivation of individual potential that are essential for future generations (Frisnoiry et al., 2024). In Indonesia, the importance of education is formally emphasized in the National Education System Law No. 20 of 2003, which states that education aims to develop human capabilities and build a dignified national civilization. Therefore, strengthening the education system is considered a key element in supporting the realization of the Golden Indonesia 2045 vision.

To achieve this vision, Indonesia faces numerous challenges in the education sector, posing a serious threat to sustainable development, particularly in the DKI Jakarta Province. As the largest metropolitan city in Indonesia, Jakarta is experiencing rapid

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development and functions as a central hub for government, industry, and the economy (Putri et al., 2023). However, Jakarta still faces significant educational issues, one of which is the high dropout rate. According to the Central Bureau of Statistics (2023), the dropout rates in Jakarta are 0.13% for primary school, 1.06% for junior high school, and 1.38% for senior high school, excluding vocational schools and pre-primary education. A similar condition was recorded in the previous year by the Ministry of Education, Culture, Research, and Technology (2022), which reported that 75,303 children in DKI Jakarta dropped out of school, with the dropout rate increasing with the level of education.

This high dropout rate is mainly caused by poverty or insufficient economic conditions that force students to leave school prematurely Sa'adah et al., 2022). Additionally, population density affects dropout rates, as the increasing population makes it difficult for children from low-income families to access free public schools due to limited capacity. Student participation in learning is also low, particularly in highly populated areas (Harmain, 2021). The rise in dropout rates has serious consequences for individuals and society. Individuals with low educational attainment often struggle to find employment and face limited opportunities, contributing to higher unemployment and poverty rates (Alifa, 2023). Previous studies, such as Chowdhury (2019), have shown that school dropout has a significant impact on the Human Development Index, and that reducing dropout rates can directly improve human development outcomes.

Previous studies have examined school dropout rates using various analytical approaches. Pratiwi et al. (2018), modeled compulsory school-age dropout rates in East Java using a spatial regression approach. Alfariz and Purhadi (2019), analyzed the number of school dropouts in Bali Province using a Semi-Parametric Geographically Weighted Poisson Regression method. Meanwhile, Purba et al. (2021) investigated the socio-economic factors influencing school dropout rates. However, these studies generally focused on identifying and modeling the factors associated with dropout rates and have not extended the analysis to long-term prediction or WebGIS-based spatial visualization.

Therefore, this study proposes an integrated analytical framework that combines statistical methods and spatial analysis to model school dropout risk in DKI Jakarta. Nighttime Light data are utilized as a proxy for regional economic conditions, while the Empirical Best Linear Unbiased Prediction (EBLUP) method is applied to estimate per capita income at a small-area scale. Key indicators, including student population, population density, and economic conditions, are integrated using a Multi-Criteria Decision Analysis (MCDA) approach to map the spatial distribution of dropout risk. Temporal trends are analyzed using linear regression to support dropout risk predictions up to 2045, and the results are visualized through a WebGIS platform. This approach aims to generate a spatial model of school dropout risk and provide geospatial information through WebGIS to support more targeted education policy formulation in DKI Jakarta.

B. METHOD

The research location is DKI Jakarta Province, which serves as the capital city of Indonesia and is situated on the northwest coast of Java Island. DKI Jakarta is administratively divided into five cities and one regency, namely Central Jakarta, West Jakarta, South Jakarta, East Jakarta, North Jakarta, and the Thousand Islands Regency. Geographically, DKI Jakarta is located between 106°33’ East Longitude to 106°58’ East Longitude and 5°19’ South Latitude to 6°23’ South Latitude. The total area of Jakarta Province is approximately 661.52 square kilometers.

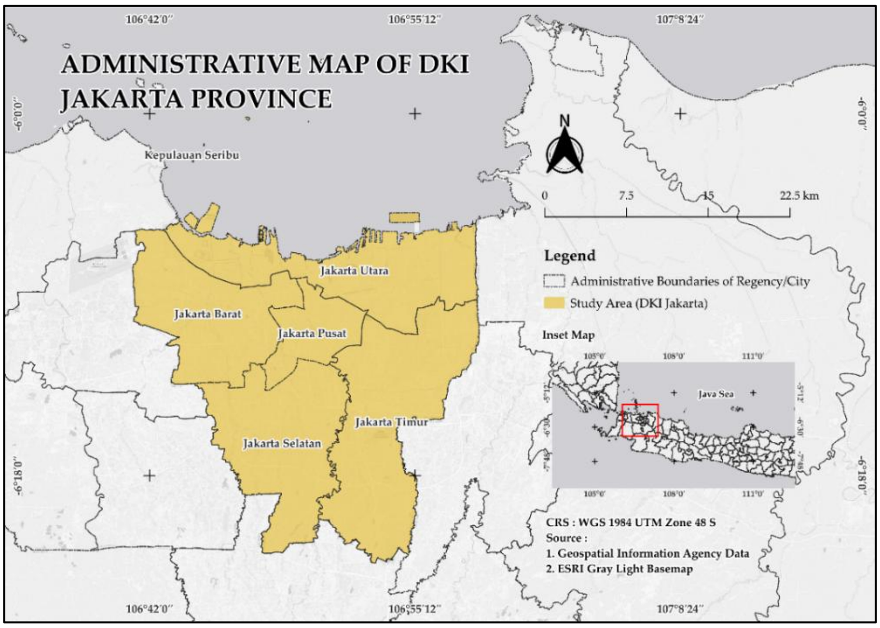

Figure 1. DKI Jakarta Province Map

(Source: Processed by the author, 2026)

This research began with identifying the main theme and issue, followed by data specification and processing based on the selected topic. The processed data was then visualized through a website and GIS-based platform. The design stage included the development of the website interface, dashboard, and GIS display. After completing the design, a final review and evaluation of the website and GIS outputs were conducted. The data used in this study are presented in Table 1.

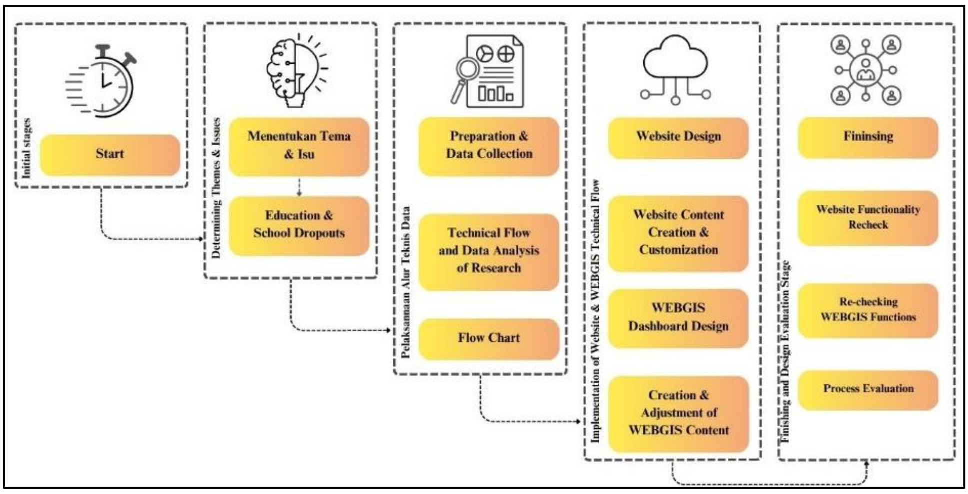

Figure 2. Edu Map WebGIS Creation Flow

(Source: Processed by the author, 2026)

Table 1. Research Data

Data	Format and Resulation	Temporal	Source
Provincial boundary	Vector – 1:25,000	2025	(BIG, 2025)
City boundary	Vector – 1:25,000	2025	(BIG, 2025)
District boundary	Vector – 1:25,000	2025	(BIG, 2025)
School location distribution (SD, SMP, SMA/SMK)	Vector	2024	(JakartaSatu, 2025)
Special needs school location	Tabular	2024	(Kemdikbud, 2024)
Population density	Tabular	2010, 2017, 2024	(JakartaSatu. n,d)
Number of students per district	Raster – 50 km	2014, 2017, 2024	(BPS. n,d)
Nighttime light	Tabular	2017, 2019, 2024	(NOAA. n,d)
Economic Index		2010, 2017, 2024	https://github.com/khairularul/NTL-Pengeluaranperkapita

(Source: data source, 2026)

The technical workflow for preparing the data to be analyzed begins with data installation. The primary datasets in this study include four main variables: the number of students, population density, Nighttime Light data, and school dropout rates. These datasets are further processed using statistical analysis techniques, including simple linear regression. The Nighttime Light data is analyzed using the Empirical Best Linear Unbiased Prediction (EBLUP) method to estimate relative per capita income. The processed data is then analyzed temporally over three years: 2017, 2019, and 2023. Following the temporal analysis, an overlay is performed using a weighted matrix technique through Multi-Criteria Decision Analysis (MCDA). The overlay results in a predictive output of school dropout rates for the year 2045. A correlation test is then conducted to validate the prediction, comparing the results use official dropout data provided by the Ministry of Education, Culture, Research, and Technology (Kemdikti).

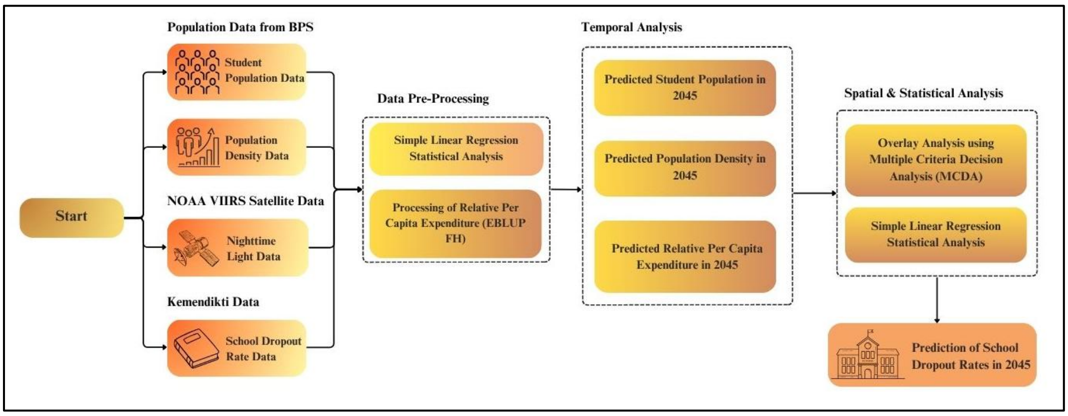

Figure 3. Data Processing Stages
(Source: Processed by the author, 2026)

Empirical Best Linier Unbiased Prediction (EBLUP)

EBLUP is a mixed-effects model that has the advantage of estimating a linear combination of fixed and random effects. The goal of solving this mixed-effects model is to obtain the Best Linear Unbiased Prediction (BLUP). The BLUP parameter estimation is obtained by minimizing the Mean Squared Error (MSE) among various classes of other linear unbiased estimators (Ghosh, as cited in Ikhsan et al., 2017). The EBLUP model can transform Nighttime Light (NTL) data using a Small Area Estimation (SAE) area-level model (Rao et al., 2015). This model aims to estimate the mean or total per capita expenditure in small-scale areas (Oktaviani, 2019).

Multi-Criteria Decision Analysis (MCDA)

Multi-Criteria Decision Analysis (MCDA) was applied to integrate multiple spatial indicators that influence the risk of school dropout. The MCDA approach enables the combination of different variables into a single composite index through a weighted overlay technique (Malczewski, 2006).

In this study, three main criteria were used to represent the socio-economic and demographic conditions that potentially influence school dropout risk in DKI Jakarta. These criteria include student population, population density, and estimated economic condition derived from Nighttime Light data. Each variable was processed through a normalization procedure to standardize the value range and ensure comparability among indicators. The normalization process was conducted using Equation (1).

$$x_{norm} = \frac{x - x_{min}}{x_{max} - x_{min}} \quad \ldots\ldots\ldots\ldots\ldots(1)$$

(Source : Malczewski, 2006)

This standardization ensures that variables with different units and ranges can be integrated within the MCDA framework.

After normalization, each criterion was assigned a weight reflecting its relative importance in influencing school dropout risk. The weighting scheme was determined based on theoretical considerations and findings from previous studies related to demographic pressure and socio-economic inequality in urban education systems. The criteria weights used in this study are presented in Table 2.

Table 2. Weight MCDA Criteria

Criteria	Weight
Student population	0.4
Population density	0.3
Economic condition	0.3

(Source: data source, 2026)

Following the weighting process, the criteria layers were integrated using a weighted linear combination (WLC) method to produce a composite dropout risk index. The index was calculated using Equation (2).

$$DRI = w_1X_1 + w_2X_2 \ldots + w_nX_n \quad \ldots\ldots.(2)$$

Where:

DRI = Dropout Risk Index

W_n = weight of criterion

X_n= normalized value of criterion

(Source : Malczewski, 2006)

The final output of the MCDA process is a spatial map representing the distribution of school dropout risk levels across districts in DKI Jakarta. This map serves as a decision-support tool for identifying priority areas that require targeted educational interventions.

Simpe Linear Regression

Simple linear regression analysis is an approach used to model the relationship between one independent variable and one dependent variable. In simple regression, the relationship between variables is assumed to be linear, meaning that a change in variable X will result in a consistent change in variable Y (Muhartini et al., 2021). The general model of simple linear regression is as follows:

$$Y = a + bx \ldots\ldots\ldots\ldots\ldots\ldots(3)$$

Information:

Y : Dependen variable

a : Constant

b : Regression Coefficient

(Source : Muhartani et al, 2021)

In simple linear regression, *a* and *b* are estimated by the least squares method:

$$b = n\frac{(\Sigma\,\mathrm{XY}) - (\Sigma\,\mathrm{X})(\Sigma\,Y)}{n(\Sigma\,X2) - (\Sigma X)2}$$

$$a = \frac{\Sigma\,Y - b.\Sigma X}{N}$$

The linear regression method consists of several systematic steps. First, datasets for each parameter are constructed to ensure the availability of variables required for the analysis. Afterward, a linear regression model is developed to describe the relationship between the independent and dependent variables.

The model-building process involves several detailed stages: calculating the values of X2X^2X2, Y2Y^2Y2, XYXYXY, and the totals of each component; computing the intercept aaa using Equation (2) and the slope bbb using Equation (3); and then forming the simple linear regression equation. Once the model is established, it is used to make predictions or forecasts either on the causal (independent) variables or the resulting (dependent) variables, depending on the analytical objective.

C. RESULT AND DISCUSSION

C.1. RESULT

Distribution of Actual School Dropout Students in 2024

The spatial analysis of actual school dropout data in DKI Jakarta for 2024 (Figure 2, left) reveals a complex and uneven distribution across sub-districts. The findings show that the highest concentrations of students dropping out of school were observed in Kalideres, Cengkareng, Tambora, and Cilincing, with figures ranging from 27 to 44 students per district. These areas are characterized by high urban density, limited infrastructure, and prevalent poverty, which significantly increase the risk of school discontinuation.

In contrast, centrally located sub-districts such as Menteng, Gambir, and

Sawah Besar recorded considerably lower dropout rates, between 1 and 8 students. These areas benefit from a combination of factors such as higher socio-economic status, better access to educational facilities, and lower population pressures. The disparity between peripheral an central regions highlights the ongoing spatial inequalities within the city.

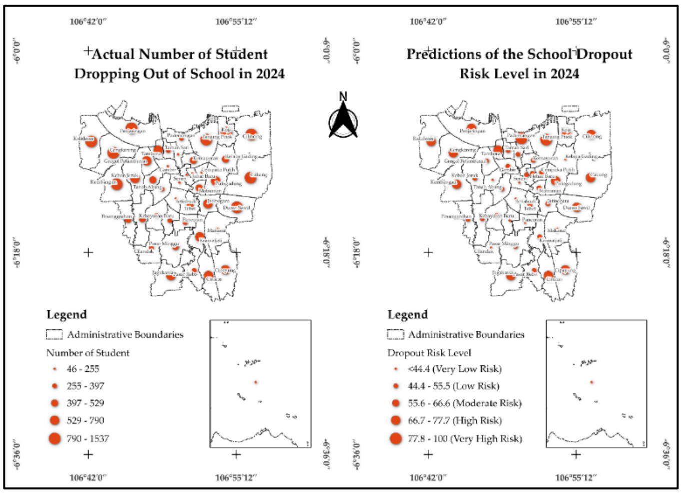

Figure 4. Comparison Map of 2024 Prediction Results and Actual BPS Data
(Source: Processed by the author, 2026)

The spatial pattern of dropout rates strongly suggests the influence of multi-dimensional factors including socio-economic vulnerability, household income, household size, and the availability of nearby schools. Coastal areas and districts with high proportions of informal settlements also display higher dropout rates, which further supports the hypothesis that poverty and urban marginalization are primary drivers of educational discontinuity in the Jakarta metropolitan area.

This detailed mapping provides essential baseline data for policymakers and education authorities to identify critical zones requiring urgent intervention. Prioritizing these high-risk areas for targeted educational policies, social programs, and infrastructure improvements is expected to contribute to a reduction in dropout rates and promote more equitable access to education across the province.

Prediction of School Dropout Risk Level in 2045

The school dropout risk prediction for 2045 (Figure 1 and Figure 2, right) shows a consistent yet more classified risk pattern. The overlay of student population, population density, and nighttime light intensity, analyzed using Multi-Criteria Decision Analysis

(MCDA), identified five districts at Critical Risk / Priority Intervention level: Pademangan, Cilincing, Tambora, Penjaringan, and Pulogadung. The prediction map shows that coastal areas and highly populated districts remain the primary risk hotspots. Pademangan and Penjaringan, which are dominated by port areas and dense informal settlements, reveal strong correlations between poverty, overpopulation, and low school participation rates. Tambora, with the highest residential density in Southeast Asia, remains a projected dropout hotspot. Pulogadung, as an industrial zone, indicates potential challenges for educational continuity due to economic and social factors.

Meanwhile, districts such as Menteng, Kebayoran Baru, and Cilandak are classified as Safe from Dropout Risk due to higher per capita income levels, lower residential density, and better access to educational infrastructure.

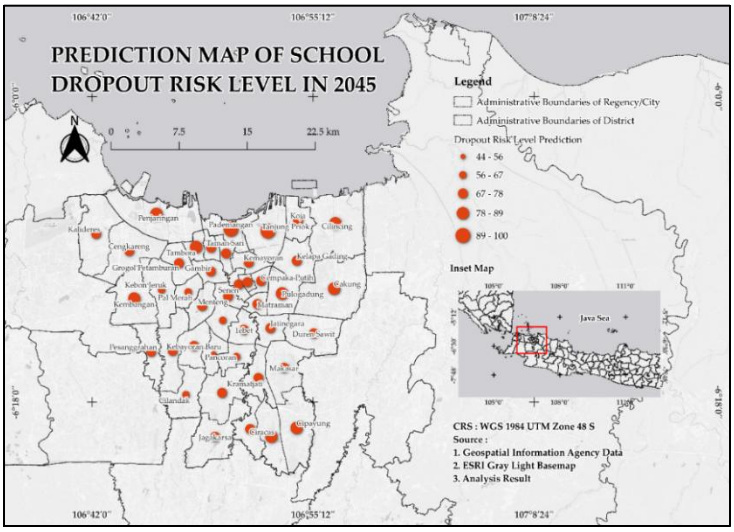

Figure 5. Map of Predicted School Dropout Rates in DKI Jakarta, 2045
(Source: Processed by the author, 2026)

This prediction aims to guide local governments and stakeholders in formulating more targeted education policies, such as improving school access, providing social assistance, and implementing community-based interventions to reduce school dropout rates in critical areas. The use of the Empirical Best Linear Unbiased Prediction (EBLUP) method, which estimates per capita income based on Nighttime Light data, adds substantial value for accurate spatial prioritization.

WebGIS EDUMAP Jakarta Development and Visualization

As part of this research, an interactive WebGIS platform called EDUMAP Jakarta was developed to visualize and disseminate the spatial analysis results. The main interface of EDUMAP Jakarta consists of several key components, as shown in the screenshots (Figures 6–8). The homepage (Figure 6) provides users with an intuitive entry point featuring a thematic map of educational distribution in Jakarta and a welcome banner encouraging exploration of educational data. This page is designed to enhance public engagement with geospatial data.

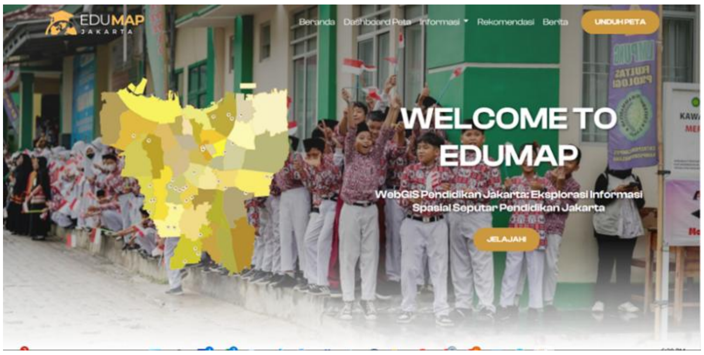

Figure 6. WebGIS EduMap Homepage
(Source: Processed by the author, 2026)

The Dashboard page (Figure 7 and 8) displays district-level administrative data, including the number of sub-districts, villages, and total area for each city/region of DKI Jakarta. A thematic map is also presented showing education-related data per district, including the number of schools at various educational levels (PAUD, SD/MI, SMP/MTs, SMA/SMK/MA, SLB, PKBM), as well as student enrollment growth from 2010 to 2024 and the Literacy Development Index (IPLM). These visualizations provide stakeholders with valuable information to monitor educational infrastructure and population dynamics.

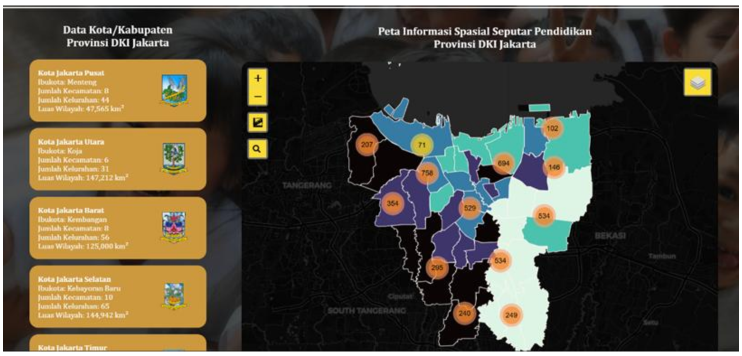

Figure 7. WebGIS EduMap Dashboard Page
(Source: Processed by the author, 2026)

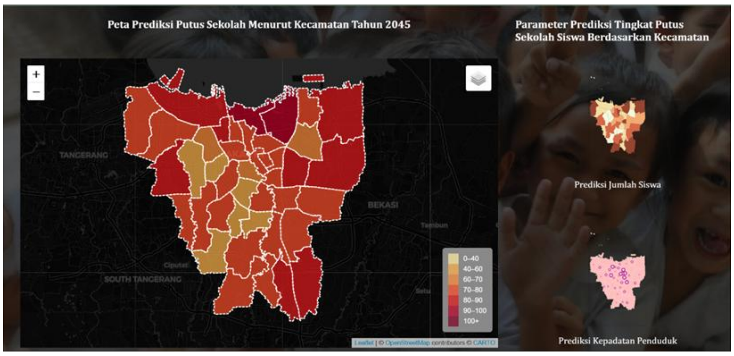

Figure 8. WebGIS EduMap Dashboard Page
(Source: Processed by the author, 2026)

In addition, the platform provides interactive thematic maps (Figure 8), including school dropout risk prediction maps per sub-district for 2045 and the predictive parameters used (student population and population density). This feature allows users to explore areas with higher predicted school dropout risks and understand the spatial patterns that influence educational inequality.

C.2. DISCUSSION

The results of this study provide insights into the spatial dynamics of school dropout risk in DKI Jakarta, both in the current context and future projections. The consistently high dropout risk observed in several northern and western sub-districts reflects persistent urban inequalities, where poverty, high population density, and uneven urban infrastructure contribute to limited educational access. Similar findings have been reported in previous studies indicating that disparities in urban services and infrastructure significantly influence educational accessibility in rapidly growing metropolitan areas (Telambanua et al., 2024).

The prediction for 2045 suggests that these high-risk zones are likely to persist if targeted policy interventions are not implemented. The vulnerability of industrial and coastal areas is consistent with studies highlighting that coastal regions of Jakarta experience complex socio-environmental pressures such as rapid urbanization, land subsidence, and climate-related hazards (Yusuf et al., 2025). These conditions may indirectly affect community welfare and access to education, thereby increasing the risk of school dropout.

This study also highlights the potential of WebGIS platforms to support dynamic visualization of spatial risk patterns and facilitate evidence-based decision-making among government agencies and other stakeholders. The integration of multi-source geospatial data with the MCDA approach provides a practical framework for analyzing spatial inequalities in large metropolitan regions.

Furthermore, the use of Nighttime Light (NTL) data as a proxy for regional economic conditions offers an efficient approach to enhance spatial analysis in data-limited contexts. Previous studies have demonstrated that NTL intensity strongly correlates with economic activity and regional development, making it a useful indicator for examining socioeconomic disparities (Andries et al., 2023).

Despite these contributions, several limitations should be noted. The MCDA weighting scheme relies on expert judgment, which may introduce subjectivity. In addition, Nighttime Light data may not fully represent household-level economic conditions in dense urban environments. The prediction model also assumes relatively stable spatial relationships between variables toward 2045, which may not fully capture future socio-economic or policy changes. Future research should incorporate additional variables such as transportation accessibility, parental education, and school quality indicators to improve model robustness and prediction accuracy.

D. CONCLUSION

This study successfully designed and developed an educational WebGIS platform for DKI Jakarta that provides integrated spatial information on the region's educational conditions. EduMap WebGIS displays data including the distribution of schools by level, the number of students and teachers, as well as indicators of educational accessibility across districts. By incorporating a predictive map of school dropout risk in 2045, the research offers a comprehensive perspective for policymakers to identify areas requiring further educational intervention. Districts such as Pademangan, Cilincing, Tambora, Penjaringan, and Pulogadung, which show the highest projected dropout risks, can be prioritized in efforts to enhance educational quality and participation in the future. This spatial data–based analysis has the potential to support the achievement of equitable education and sustainable development in DKI Jakarta.

BIBLIOGRAPHY

Alifa, V. N. (2023). Analisis Faktor Penyebab Meningkatnya Angka Putus Sekolah di Indonesia pada Tahun 2022. Jurnal Pendidikan Sultan Agung, 3(2), 175.

Alfariz, F. N., & Purhadi, P. (2020). Pemodelan Jumlah Anak Putus Sekolah Usia Wajib Belajar dan Jumlah Wanita Menikah Dini di Jawa Timur dengan Pendekatan Geographically Weighted Bivariate Negative Binomial Regression. Jurnal Sains Dan Seni ITS, 8(2).

Anisah, A., & Soesilowati, E. (2018).

Efektivitas Program Kartu Jakarta Pintar Tingkat Sekolah Menengah Atas Negeri di Kecamatan Pesanggrahan. Efficient: Indonesian Journal of Development Economics, 1(1), 44–50.

Andries, A., Morse, S., Murphy, R. J., Sadhukhan, J., Martinez-Hernandez, E., Amezcua-Allieri, M. A., & Aburto, J. (2023). Potential of Using Night-Time Light to Proxy Social Indicators for Sustainable Development. Remote Sensing, 15(5), 1–34.

Ayuni, G. N., & Fitrianah, D. (2020). Penerapan Metode Regresi Linear Untuk Prediksi Penjualan Properti pada PT XYZ. Jurnal Telematika, 14(2), 79–86.

Hakim, A. (2020). Faktor Penyebab Anak Putus Sekolah. Jurnal Pendidikan, 21(2), 122–132.

Ilham, M. I., & Hidayat, D. N. (2019). Pemodelan empirical best linear unbiased prediction (EBLUP) dalam pendugaan area kecil: Studi kasus estimasi rata-rata pengeluaran per kapita menurut kelurahan/desa di Kabupaten Sukamara, Kalimantan Tengah. Seminar Nasional Official Statistics, 117–123.

Ita Rahmawati. (2018). Tingginya Angka Putus Sekolah di Indonesia. Pendidikan.Id, 2206656, 1.

Journal, D., Education, O., Farianti, W. O., & Robbani, H. (2024). Analisis Lingkungan Sosial dan Ekonomi Keluarga Anak Putus Sekolah Kasus Warga Harapan Jaya Cibinong Kabupaten Bogor. Research and Development Journal Of Education, 10(1), 276–285.

Maghfirah, D. A. (2019). The Determinant Factors of Dop Out Students at High School/Vocational School Level in Mataram City. Jurnal Kebijakan Pendidikan, 8(3), 215–222.

Malczewski, J. (2006). GIS-based multicriteria decision analysis: a survey of the literature. *International Journal of Geographical Information Science*, 20, 703 - 726.

Pengkajian, B., Pertanian, T., Teknologi, P., Pertanian, H., Syiah, U., & Darussalam, K. (2020). Implementasi Multi Criteria Decision Making (Mcdm) Pada Agroindustri: Suatu Telaah Literatur. Jurnal Teknologi Industri Pertanian, 30(2), 234–343.

Purba, M., & Ekaria, E. (2023). Faktor Internal dan Eksternal yang Memengaruhi Status Putus Sekolah di Provinsi DKI Jakarta Tahun 2021. Seminar Nasional Official Statistics, 2023(1), 705–716.

Putri, A. H. C., Wijaya, G., Isnaini, S., & Septiani, D. (2023). Branding kota DKI jakarta sebagai kota kreatif bidang sastra. Jurnal Ilmiah Wahana Pendidikan, 9(14), 17–24.

Putu, L., Pratiwi, S., Hanief, S., Suniantara, I. K. P., Studi, P., Informasi, S., & Bali, S. S. (2018). Pemodelan Menggunakan Metode Spasial Durbin Model untuk Data

Angka Putus Sekolah Usia Pendidikan Dasar. Jurnal Varian, 2(1), 1–12.

Sa'adah, F., Sarifah, I., & Imaningtyas, I. (2022). Efektivitas Program Kartu Jakarta Pintar di Sekolah Dasar Sebagai Upaya Mengurangi Putus Sekolah di DKI Jakarta. Edukatif : Jurnal Ilmu Pendidikan, 4(5), 6617–6624.

Sebayang, W. B. (2022). Adolescent Childbirth with Asphyxia Neonatorum. Jurnal Aisyah : Jurnal Ilmu Kesehatan, 7(2), 669–672.

Surya, A., Indahwati, & Erfiani. (2024). Study of Small Area Estimation when Nighttime Lights as an Auxiliary Information is Measured with Error. Indonesian Journal of Statistics and Its Applications, 8(1), 47–57.

Suryana, T. E. (2012). Analisis Terhadap Tingginya Angka Putus Sekolah Siswa Smp Terbuka. Empowerment: Jurnal Ilmiah Program Studi Pendidikan Luar Sekolah, 1(1), 69–88.

Telaumbanua, E., Harsono, I., & Soegiarto, I. (2024). Urbanisation in Indonesia: The Relationship between Income Inequality, Urban Infrastructure, Access to Education, and Population Growth with Social Cohesion, Environmental Resilience, and Housing Quality to look at Urbanisation in Indonesia. International Journal of Business, Law, and Education, 5(1), 603–614.

Utami, W. N., & Rosyid, A. (2020). Identifikasi faktor penyebab siswa putus sekolah. Jurnal Pendidikan Dasar, 5.

Widiasanti, I., Abdul, A. V., Nirwana, A., & Arlita, A. Della. (2023). Ancaman Melawan Putus Sekolah Dengan Dilema Kualitas Pendidikan Indonesia. 7(3), 2118–2126.

Yaneri, A., Suviani, V., & Vonika, N. (2022). Analisis Penyebab Anak Putus Sekolah Bagi Keluarga Miskin. Jurnal Ilmiah Perlindungan Dan Pemberdayaan Sosial (Lindayasos), 4(1), 76–89.

Yusuf, Y. B. M., Karlinasari, L., Alinda Fitriany, M., Panuju, D. R., & Jati, R. (2025). Identifying coastal area resilience through ecological integration and disaster risk approaches case study: north jakarta, indonesia. IOP Conference Series: Earth and Environmental Science, 1557(1), 012019.

Zilvana, Z., & Nurwati, N. (2021). Pengaruh Keluarga Pada Anak Putus Sekolah Jenjang Sekolah Menengah. Jurnal Penelitian Dan Pengabdian Kepada Masyarakat (JPPM), 2(2), 173.