

The Effect of the Existence of Sustainable Green Open Space on the Community's Economy in Big Cities

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Abstract

Urbanization in Indonesia is characterized by high population density in big cities. So far, urban areas in Indonesia tend to experience typical problems due to urbanization, namely, the use of green open space functions still seems to have a complementary meaning for urban areas, so that land use for green open space is considered as an addition to environmental aesthetics. Errors in mindset often arise regarding public open spaces which are considered a reserve for future land use, resulting in the emergence of a paradigm that, at any time, green open spaces could be replaced with other uses that are felt to be more profitable economically. This study aims to examine the variables related to green open spaces and determine their influence on the economic conditions of the community. This study uses a quantitative method called multivariable linear regression. Data collection used an online questionnaire, focusing on people who had visited green open spaces in five big cities, namely Jakarta, Bandung, Yogyakarta, Semarang, and Surabaya. The results of the multivariable linear regression analysis indicated that the existence of a quality green open space for an area is considered economically profitable, both direct and indirect.

Keywords: multivariate regression, green open space, sustainability, economic aspects

1. Introduction

Currently, more than half of the global population lives in urban areas because of the advantages and opportunities to obtain jobs, and better facilities (Amegnaglo, 2018; Brockerhoff & Nations, 1998; Sodri & Garniwa, 2016). In Indonesia alone, by 2025, 60% of the population is predicted to live in urban areas. Urbanization in Indonesia is characterized by high population density in big cities, especially on the island of Java. The pattern of urbanization is also accompanied by inter-city disparities between big cities and small towns (Rustiadi et al., 2021).

Urbanization causes the unplanned and uncontrolled expansion of cities, which results in the continuous displacement of open spaces, vegetation, and water bodies (Kumari et al., 2019), thereby affecting the city microclimate (Meshram et al., n.d.). So far, urban areas in Indonesia tend to experience typical problems, namely, the utilization of green

open space functions still seems to have a complementary meaning for urban areas, so land use for green open space is considered as an addition to environmental aesthetics. Even worse, there are many misconceptions regarding public open spaces that are considered reserves for future land use (Problematika Pembangunan Ruang Terbuka Hijau | Dinas Lingkungan Hidup Dan Kehutanan DIY, n.d.). This has resulted in the emergence of a paradigm wherein green open spaces are perceived as replaceable with other uses deemed more economically profitable.

According to experts, green open spaces yield positive effects on the economy of urban communities. Among them is the image of green open space. This open space image supports the success of city branding by considering the position of green open spaces on regional, national, and international scales (Bruni & Porta, 2016; Žlender & Gemin, 2020). To improve the quality and suitability of the green open space theme, the public needs to understand the theme of the

green open space (Gertner & Kotler, 2004; Kotler Haider, Donald H., Rein, Irving J., 1993). The suitability of the theme of green open space that is trying to be formed with the reality of green open space that has to be made simply, not making it up and not being forced, makes visitors want to come back (Kotler, 2000, 2004). Unique green open spaces in the form of things that are not found in other green open spaces have visual symbols that are the main characteristics of green open spaces and are part of a cultural heritage. By developing an image that can adapt to the green open space theme that is trying to be promoted and able to communicate, it can strengthen the position of green open spaces to attract visitors (Carmona *et al.*, 2003).

The next factor with a positive effect on the economy of urban communities is the management of green open space. The key to the success of green open space management is measured using the Key Performance Index regularly. The management of green open spaces aims to empower the community through community participation in managing green open spaces (Noguera & Riera, 2021; Rasoolimanesh *et al.*, 2019). This participation has the goal of empowering residents and actively involving all stakeholders in decision-making throughout the design, planning, and maintenance of open spaces (Yoong *et al.*, 2017). Government participation plays a crucial role in the management of green open space. With the participation of the government, accountability processes from local governments regarding procurement, publication, and dissemination of policies, plans, etc., can enhance inclusive policies from local governments (Cohen *et al.*, 2019; Steiniger *et al.*, 2020). The delivery of information that is effective, clear, targeted, and delivered in the most effective manner could enable horizontal channels of communication between the key actors of the urban planning process ("Planning and Design Strategies for Sustainable Urban Development," 2015; Serdar, 2019; Vollmer *et al.*, 2018). The utilization of the private sector is also a crucial part of the management of green open spaces. With the participation of the private sector in the management of green open spaces, a bottom-linked approach will be established to foster the collaboration between government and stakeholders/ private sectors (Rasoolimanesh *et al.*, 2019; Vollmer *et al.*, 2018). In addition, there is collaboration between the two regarding development funding and the management of green open spaces (Victoria, 2017).

The next factor that positively affects the economy of urban communities is informal activity. The informal sector also creates jobs for people who need them, so it is necessary to maintain the quality of informal activities in green open spaces. Among them are providing locations for the development of the informal business sector and street vendors in areas with limitations in terms of both area and time and maintaining the quality of goods and services from

informal activities with regular checks (Geppert & Colini, 2015).

Many studies have mentioned aspects of green open spaces that have an economic impact on society, either directly or indirectly. However, no research has discussed how significant this influence is on the community's economy. This study aims to examine the variables associated with green open spaces such as: appropriate green open space design with the city's slogan, clarity of public open space theme/design concept, unique public open space, government's active role in maintaining or improving the quality of green open space, the active role of the community in maintaining or improving the quality of green open space, public open space is fairly well maintained, orderliness in informal activities in public open space, and knowing how much influence these variables have on community economic conditions. Data were collected using an online questionnaire. The distribution of the questionnaire focused on people who had visited green open spaces in five big cities on Java Island with different typologies: Jakarta, Bandung, Yogyakarta, Semarang, and Surabaya. Primary data were collected through public perceptions. The results can be presented to decision makers, planners, and other professionals related to area design for further action or corporate into development plans, as well as to evaluate existing areas.

2. Research Methods

This study was conducted from October 2020 to October 2022. This research was conducted in five major cities on the island of Java: Jakarta, Bandung, Semarang, Yogyakarta, and Surabaya. This study uses the quantitative multivariate regression method, which is a method used to test certain theories by examining the causal relationships between variables (Creswell, 2016). Multivariable linear regression analysis is a method used to measure the causal effect between one variable and another and aims to determine the form of a cause-and-effect relationship between variables from known data, where there is more than one causal variable (Yarnold & Grimm, 2017).

Data were obtained from the results of a questionnaire survey distributed online to the public. The questions in the questionnaire use closed questions to collect public opinion regarding the positive influence of the existence of green open space on the community's economy. The questionnaire results were completed by 371 respondents, with an age range of 17-69 years. From this age range, it is expected to be able to provide various answers and be able to provide more objective answers to the positive impact of the existence of green open spaces on the economy of urban communities represented by the cities of Jakarta, Bandung, Yogyakarta, Semarang, and Surabaya. The respondents' backgrounds were predominantly composed of students and employees who regularly visited public open spaces.

The data collected were analyzed using Analysis of Variance (ANOVA). ANOVA is a statistical technique for analyzing variations in response variables (continuous random variables) measured under conditions determined by discrete factors (classified variables, often with nominal levels) (Larson, 2008). At this stage, the ANOVA aims to determine the significant effect between the variables.

The next step was to perform a regression analysis. Regression analysis describes the relationship between the dependent and independent variables about how the dependent variable changes when one or more independent variables change due to factors (Schneider et al., 2010). In many cases, the contribution of one independent variable alone is inadequate to explain the dependent variable Y. If so, multivariable linear regression can be performed to study the effect of several variables on the dependent variable. In the multivariable regression model, the dependent variable is described as a linear function of the independent variable X_i , as follows:

$$Y = a + b_1 \times X_1 + b_2 \times X_2 + \dots + b_n \times X_n \text{ (Schneider et al., 2010).}$$

The main purpose of this analysis was to determine the relationship between dependent and independent variables. Several independent variables were selected to help predict the dependent variable. In addition, it helps validate whether the predictor variable is good enough to predict dependent variables. Where Y represents the positive effect of the existence of green open space on the community's economy. The Y is the dependent variable; X1: Appropriate green open space design with the city's slogan; X2: Clarity of public open space theme/design concept; X3: Unique public open space; X4: Government's active role in maintaining/improving the quality of green open space; X5: The active role of the community in maintaining/improving the quality of green open space; X6: public open space is fairly well maintained; X7: Orderliness in informal activities in public open space. X1, X2, X3, X4, X5, X6, and X7 are the independent variables. The purpose of the statistical analysis is to determine which factors influence the dependent variable. The art of statistical evaluation lies in identifying the variable that best explains the dependent variable.

3. Results and Discussion

In the questionnaire, respondents were asked to decide whether they agreed, disagreed, or abstained from some statements. These statements represent the parameters that were analysed using multivariable linear regression. Statements responded to 'agree' by each respondent were worth 5 (five), statements responded to 'disagree' by each respondent were worth 0 (zero), statements responded to

'abstain' by each respondent were worth 1 (one). The following is a summary of the output of the regression statistics.

TABLE I. SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0,24657
R Square	0,060797
Adjusted R Square	0,042685
Standard Error	1,991749
Observations	371

From the display shown in Table 1, 'Multiple R' is the correlation value between the positive effect of the existence of green open space on the community's economy and other parameters, falling within the low category. The 'R squared' is a number that ranges from 0 to 1, which indicates the magnitude of the combination of independent variables that together affect the value of the dependent variable. R squared adjusted calculates each additional variable and estimates the R squared value of the additional variable. If the addition of the new pattern improves the regression results model better than the estimate, the addition of these variables will increase the adjusted R-squared value. 'observations' is the number of respondents.

The collected data were initially analyzed using ANOVA. At this stage, the ANOVA aims to determine the significant effect between the positive effect of the existence of green open space on the community's economy and other parameters. The following is a table of ANOVA results.

TABLE II. ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	7	93,2173	13,3167	3,35682	0,001757
Residual	363	1440,04	3,96706		
Total	370	1533,26			

From the display in Table 2, 'df' is the degree of freedom. 'SS' is the sum of squares. 'MS' is the mean squares. 'F' is ANOVA coefficient. Based on the results of the ANOVA analysis, the 'significance value of F' is 0,001757 (<alpha=0.05). It can be concluded that there is a significant influence between the positive effect of the existence of green open space on the community's economy and other parameters.

Once it is known that there is a significant influence between the positive effect of the existence of green open spaces on the community's economy and other parameters, the next step is to perform a multivariable linear regression analysis. The following table shows the results of the multivariate linear regression analysis.

TABLE III. MULTIVARIABLE LINEAR REGRESSION

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Y	1,828496	0,398613	4,587151	6,2E-06	1,044616	2,612376	1,044616	2,612376
X1	0,0501	0,054484	0,919519	0,358435	-0,05705	0,157244	-0,05705	0,157244
X2	0,091863	0,054032	1,700163	0,089957	-0,01439	0,198118	-0,01439	0,198118
X3	0,050713	0,057352	0,884253	0,377145	-0,06207	0,163496	-0,06207	0,163496
X4	0,108366	0,06494	1,668711	0,096037	-0,01934	0,236073	-0,01934	0,236073
X5	0,095708	0,054323	1,761821	0,078941	-0,01112	0,202536	-0,01112	0,202536
X6	0,029117	0,070304	0,414159	0,679003	-0,10914	0,167371	-0,10914	0,167371
X7	0,011667	0,053777	0,216947	0,828372	-0,09409	0,117421	-0,09409	0,117421

The multivariable linear regression in Table 3 can be formulated into a multivariable linear regression equation as follows:

$$Y = 1,83 + 0,05 X1 + 0,09 X2 + 0,05 X3 + 0,11 X4 + 0,1 X5 + 0,03 X6 + 0,01 X7$$

Based on the equation above, if the value of the variable X1 to X7 is 0, then the magnitude of the Y value (the positive influence of the existence of green open space on the community's economy) is 1.83. Every time X1 (appropriate green open space design with the city's slogan) variable increases by 1%, the positive influence of the existence of green open space on the community's economy will increase by 0.05 (by 5%) or vice versa. Every time the X2 (clarity of public open space theme/design concept) variable increases by 1%, the positive influence of the existence of green open space on the community's economy will increase by 0.09 (by 9%) or vice versa. Every time there is an increase in the X3 (unique public open space) variable by 1%, the positive influence of the existence of green open space on the community's economy will increase by 0.05 (by 5%) or vice versa. Every time there is an increase in the X4 (government's active role in maintaining or improving the quality of green open space) variable by 1%, the positive influence of the presence of green open space on the community's economy will increase by 0.11 (by 11%) or vice versa. Every time there is an increase in the X5 (the active role of the community in maintaining or improving the quality of green open space) variable by 1%, the positive influence of the existence of green open space on the community's economy will increase by 0.1 (by 10%) or vice versa. Every time there is an increase in the X6 (public open space is fairly well maintained) variable by 1%, the positive influence of the presence of green open space on the community's economy will increase by 0.03 (by 3%) or vice versa. Every time there is an increase in the X7 (orderliness in informal activities in public open space) variable by 1%, the positive influence of the presence of green open space on the

community's economy will increase by 0.01 (by 1%) or vice versa. From the equation above, it can be concluded that X1 (appropriate green open space design with the city's slogan), X2 (clarity of public open space theme/design concept), X3 (unique public open space), X4 (government's active role in maintaining/improving the quality of green open space), X5 (the active role of the community in maintaining/improving the quality of green open space), X6 (public open space is fairly well maintained), and X7 (orderliness in informal activities in public open space) have an effect on the Y value (the positive influence of the existence of green open space on the community's economy).

4. Conclusion

The existence of green open spaces plays a crucial role in the community. This research examines the influence of green open spaces on the community's economy. This study was divided into 2 (two) main stages: analysis using ANOVA which aims to determine the significant effect between variables, followed by multivariable linear regression analysis which aims to determine the relationship between the dependent and independent variables. Based on the results of the research and discussion of multiple linear regression analysis, it can be concluded that aspects such as the suitability of green open space designs with city slogans, the clarity of the green open space design theme or concept, the uniqueness of green open space, the government's active role in maintaining or improving the quality of green open spaces, the active role of the community in maintaining or improving the quality of green open spaces, well maintained green open spaces, and orderly informal activities in green open spaces have a significant relationship with the positive influence of the existence of green open spaces on the community's economy. This can be seen from the results of the ANOVA, with a significance value of $F = 0.01757$. Therefore, the provision of green open spaces for an area is considered economically beneficial, with both direct and indirect benefits. Unfortunately, the regression equation with $R = 0.06$ is not a

good regression equation. This equation can cause deviations when applied to real-world situations.

This multivariable linear regression analysis for a set of dependent and independent variables proves that the independent variable is not a good predictor of the dependent variable, because the value of the coefficient of determination can be neglected. In this case, it is necessary to search for other predictor variables to predict the dependent variable in the regression analysis. This study suggests that a regression equation can be developed by adding other variables originating from social and environmental aspects so that a more valid equation is obtained with a larger regression coefficient value

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