JRSSEM 2024, Vol. 04, No. 7, 2025
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

The Relation of The Urban Settlement Quality Improvement Program and Land Prices: Case Study DKI Jakarta

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ABSTRACT: The Urban Settlement Quality Improvement Program was implemented in 220 slum areas (RW) in DKI Jakarta between 2018 and 2022, focusing on both physical and non-physical aspects of urban quality. This study aims to measure the impact of this program on land prices within these areas. Using the Staggered Difference in Differences (DiD) method, the analysis revealed that land price increases in developed areas showed weak statistical significance, with an average rise of Rp 68,919 per square meter compared to control areas. These findings suggest that, while the program contributed to improving the overall quality of urban living, its primary objective was to enhance the quality of life for residents rather than directly influencing land values. This underscores the importance of understanding the broader implications of urban development policies. The insights drawn from this study are crucial for the formulation of more integrated urban policies that can address both housing quality and economic growth in rapidly urbanizing cities like Jakarta. Further research into the long-term effects of urban quality improvements on land prices and community welfare is needed to inform future urban planning initiatives.

Keywords: urban economics; slum upgrading; land prices; DiD; Jakarta

INTRODUCTION

Urban slums and high land prices are interconnected and complex issues in rapidly growing cities. Slum areas often contribute to social, economic, and environmental challenges and generate negative externalities that impact urban development. In Jakarta, land demand has consistently increased, pushing prices upward. In response to these issues, various urban improvement programs have been implemented by the Jakarta administration.

Starting with the MHT Program (1969–2000), Jakarta's urban settlement policies have evolved, including interventions like the Kampung Deret (2013) and the spatially targeted approach of the Detailed Spatial Plan (RDTR) from 2014–2017. The latest programs, Collaborative Implementation Program (CIP) and Community Action Plan (CAP) from 2018-2022, highlight community participation as a core element of sustainable urban development. These programs involve active engagement from residents to both understand and manage the slum improvement processes in their communities.

Previous studies have indicated that slum upgrading can have mixed impacts on land prices. While some research, such as Corburn & Sverdlik (2016), has shown positive outcomes on residents' health and economic opportunities, the effect on property values often depends on local socio-economic factors and the nature of interventions. Futhermore Das et al. (2017),

identify positive impacts on land prices, while others report that the value gains are primarily influenced by external factors, such as local amenities or accessibility to commercial areas.

The availability of land in Jakarta has become increasingly limited, while the demand for land and housing as primary needs continues to rise. As a result, some residents living in slum areas occupy illegal land that is not designated for residential purposes, further compounded by their economic conditions, which make it difficult for them to afford Jakarta's high land prices. Therefore, it is necessary to develop policies that provide a "win-win solution" to enable communities to access affordable and livable housing.

The objectives of this study on improving settlement quality and land prices are to measure the impact of the Urban Settlement Quality Improvement Program on changes in land prices in urban areas, both in RWs that received the program and those that did not in areas surrounding slum settlements in DKI Jakarta.

Literature Review

Slum Upgrading and Economic Impacts

The rapid expansion of cities worldwide has been accompanied by the swift growth of informal settlements. These settlements emerge as local governments struggle to provide essential services for urban migrants, while the formal housing market fails to accommodate low-income urban residents. The United Nations estimates that nearly one billion people currently live in slum areas globally. By 2030, nearly five billion people are expected to reside in urban areas, up from 3.2 billion in 2007. This rapid and unplanned urbanization raises the likelihood of a proportional increase in informal urban settlements, significantly amplifying the number of slum dwellers and exacerbating social and environmental challenges.

Slum upgrading programs have long been a focal point of urban development policies in rapidly urbanizing cities. Research across Africa, Latin America, and Asia shows that such programs can positively affect health and reduce social disparities (Corburn & Sverdlik, 2016). However, their impact on land prices varies widely. Studies by Jaitman (2012) and others highlight that land price increases are not always a primary outcome, as these programs often focus on infrastructure and health improvements. Nonetheless, increased land prices are sometimes observed, especially in cases where physical upgrades are substantial and strategically located near commercial or residential centers (Das et al., 2017).

Factors Influencing Land Prices

Urban economics literature suggests that land values are shaped by multiple spatial and socio-economic factors, including proximity to public services, density, and access to green spaces. Fitriani & Sumarminingsih (2015) note that high population density in Jakarta’s fringe areas has a positive correlation with land prices, as demand for residential land remains high. Moreover, the provision of public spaces, which improves local desirability, has been linked to increased property values in urbanized areas (Anselin, 1988).

This study differs from previous research on slum settlement areas, as there has been limited exploration of the impact of upgrading programs on land prices. For instance, research by Das et al. (2017) only examined factors influencing house prices in slum settlements without considering the impact of slum upgrading programs. Meanwhile, Minnery et al. (2013) evaluated slum upgrading programs across cities in Indonesia, the Philippines, and Vietnam, focusing on governance, health, and economic aspects. Other studies have examined the impact of slum upgrading programs on disaster risk (Simanjuntak, 2020).

Considering the diverse regional characteristics and the fact that Jakarta ranks as the 28th most densely populated city in the world (World Population Review, 2023), this study provides empirical evidence for urban studies literature by examining the relationship between

housing programs and land prices. Land is a crucial issue in urban areas due to its limited availability, making its management and valuation essential for sustainable urban development. This research aims to analyze the impact of the Urban Settlement Quality Improvement programs implemented by the Jakarta Provincial Government from 2018 to 2022 on land prices in slum neighborhoods (Rukun Warga, RW) that have received the programs and those that have not.

RESEARCH METHODOLOGY

The study employs a quantitative approach using Staggered Difference in Differences (DiD) to assess program impacts on land prices. Secondary data were obtained from DKI Jakarta's official agencies, including data on 445 slum RW from 2018–2022, including both treated and control groups. Control RWs were selected based on their non-participation in the program, allowing for a clearer comparison of program effects. Key variables include :

- **Land Prices**: Measured using the NJOP land price data for each RW.
- **Program Intervention**: Coded as a dummy variable indicating whether an RW received the program intervention.
- **Control Variables**: Population density, accessibility, proximity to health and educational facilities, public space availability, flood risk, and the impact of COVID-19.

Analytical Approach

The study employs a Staggered Difference in Differences (DiD) approach to quantify the program's effect on land prices in treated neighborhoods. This methodology was chosen for its ability to handle staggered program implementations, capturing the temporal and spatial variations in policy application. The Staggered Difference in Differences (DiD) can be modeled using a panel data estimation method with a Fixed Effect model, incorporating both individual fixed effects and time fixed effects (two-way fixed effect), which accommodates multiple intervention groups and time periods (Goodman-Bacon, 2021). By selecting a control group to compare with the treatment group, this regression method becomes effective for assessing the impact and identifying differences in land price growth between the two groups.
The DiD regression model can be expressed mathematically as shown in Equation (1):

$$lprice_{it} = \alpha + \beta\ slumup_{it} + \gamma\ T_{it} + \delta\ (slumup_{it}\ T_{it}) + \theta X_{it} + \varepsilon_{it} \qquad (1)$$

RESULT AND DISCUSSION

Descriptive Analysis

The descriptive analysis of variables used in the research model consists of observations on slum neighborhoods (Rukun Warga, RW) that received the program and those that did not, as well as observations in sub-sample locations, specifically slum RWs located in TOD areas and non-slum RWs in their surroundings.

Table 1. Descriptive Statistics of Variables in the Slum Upgrading Program in DKI Jakarta (2018-2022)

Variable	Obs	Mean	Std. dev.	Min	Max
slum_yn	2740	.812	.391	0	1
Treat	2740	.401	.490	0	1
ln_landprice	2740	15.622	.742	13.194	18.290
ln_pop_den	2740	10.335	.994	6.277	12.501
Access	2740	.534	.499	0	1
public_space	2740	.223	.416	0	1
health_fac	2740	.173	.378	0	1
Shop	2740	1.244	1.636	0	9
School	2740	15.085	9.848	0	53
Flood	2740	3.469	1.134	0	4
covid_19	2740	.600	.490	0	1

Source: Processed using Stata 17

Table 1 presents descriptive statistics of variables for 445 slum RWs and 103 non-slum RWs over a five-year period. As the primary dependent variable, the average land price from 2018 to 2022 was 15.62, with a standard deviation of 0.74. The land price variable refers to the NJOP (Tax Object Sales Value) of DKI Jakarta for 2018–2022. However, land prices from 2020 to 2022 remained relatively stable due to policy decisions made by the Jakarta Provincial Government during the COVID-19 pandemic.

The highest recorded land price was 18.29 in 2022, observed in RW 002, Kuningan Barat, which is not categorized as a slum area. In contrast, the lowest land price was 13.19, found in RW 001, Pulau Panggang, in 2018, and in RWs 002, 003, 004, and 005 of Pulau Kelapa from 2018 to 2022. The control variable used in the study, population density, had an average value of 10,335 people/km^2 across RWs. The lowest population density was recorded in RW 005, Karet Kuningan, with 532 people/km^2 in 2018, increasing to 707 people/km^2 in 2022. Conversely, the highest population density was found in RW 002, Cipinang Besar Utara, with 268,660 people/km^2 in 2018, which decreased to 214,896 people/km^2 in 2022.

Next in Table 2 presents descriptive statistics for the treatment group (slum RWs that received the program) and the control group (slum RWs that did not receive the program) from 2018 to 2022. The average land price in the treatment group was slightly lower, by 0.201, compared to the control group. This difference is likely because the RWs that received the program were in areas with more severe slum conditions than those in the control group. Consequently, the initial land values in these areas were already lower before the implementation of the treatment.

Table 2. Descriptive Statistics of Variables for the Treatment Group and Control Group

Variabel	Treatment Group N= 1100 (220 RW kumuh)				Control Group N= 1125 (225 RW kumuh)			
	Mean	Sd	min	Max	mean	Sd	Min	Max
ln_landprice	15.359	0.629	13.193	17.24	15.561	0.614	13.953	17.384
ln_pop_den	10.623	0.941	6.513	12.501	10.292	0.904	6.888	12.219
Access	0.467	0.499	0	1	0.551	0.498	0	1
public_space	0.212	0.409	0	1	0.229	0.42	0	1
health_fac	0.141	0.348	0	1	0.198	0.399	0	1
Shop	0.951	1.348	0	7	1.482	1.845	0	9

School	16.324	10.32	2	47	16.302	10.385	0	53
Flood	3.465	1.129	0	4	3.33	1.239	0	4
covid_19	0.6	0.49	0	1	0.6	0.49	0	1

Source: Processed using Stata 17

The subsequent observation focuses on sub-samples in the TOD (Transit-Oriented Development) areas of Dukuh Atas and Istora Senayan and their surroundings, covering 19 urban villages and 160 RWs, consisting of both slum and non-slum RWs in South Jakarta and Central Jakarta. The observation spans the period before and after the Urban Settlement Quality Improvement program, specifically in 2018 and 2022. The selection of these locations is based on the TOD areas' accessibility advantages and their potential positive externalities on the surrounding areas, which are expected to influence land prices in the vicinity.

Table 3. Descriptive Statistics for Sub-Sample Locations in 2018 and 2022

Variables	Tahun 2018 (N=160)				Tahun 2022 (N=160)			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
ln landprice	15.939	0.735	14.947	17.913	16.232	0.767	15.162	18.29
ln pop_den	10.082	1.083	6.277	11.867	10.071	1.086	6.561	11.930
slum stat	0.706	1.079	0	4	0.7	1.069	0	4
access1	0.85	0.892	0	6	0.919	0.945	0	6
health faci	0.2	0.512	0	3	0.2	0.512	0	3
shop1	0.606	0.635	0	2	0.725	0.663	0	2
school1	2.788	0.531	0	3	2.788	0.531	0	3
ln public space	2.48	2.732	1	10.382	2.48	2.732	1	10.382
flood hist	0	0	0	0	0.55	1.175	0	4

Source: Processed using Stata 17

According to Table 3, the average NJOP land price in the sub-sample locations is 15.939 (in natural log) or approximately IDR 13,500,000/m^2. The lowest price was recorded in 2018 at 14.947 (in natural log) or IDR 3,100,000/m^2, observed in slum RWs in Manggarai, specifically RW 06 and RW 07, which received the Slum Upgrading program, and RW 05 and RW 012, which were slum RWs but did not receive the program. Meanwhile, the highest land price was recorded in 2022 at 18.29 (in natural log) or IDR 87,743,000/m^2, located in Kuningan Barat RW 02, which is categorized as a non-slum RW.

Difference in Differences (DiD) Analysis

Before conducting a Difference-in-Differences (DiD) estimation, the parallel trend assumption must be met. Figure 1 illustrates the anticipatory effect before the implementation of the Urban Settlement Quality Improvement program and the dynamic effects after the program, with a 95% confidence interval. In the pre-treatment period, or before the program's implementation, the coefficient interval includes the value of 0, indicating that the coefficients are not significant or do not differ from zero. Based on the t-test results, the p-values during the pre-policy period (leads) are not significant, providing evidence that the parallel trend assumption between the treatment and control groups is satisfied. Furthermore, in the period following the program's implementation, a significant impact on land prices is observed.

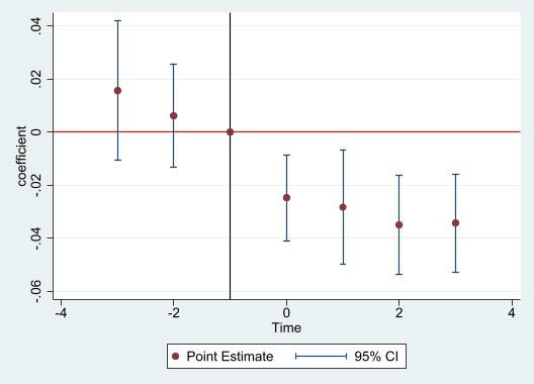

Figure 1. Dynamic Effect of the Urban Settlement Quality Improvement program on Land Prices with Leads and Lags
Source: Processed using Stata 17

To estimate the impact of the Urban Settlement Quality Improvement program on land prices, the author performed three regression analyses to obtain robust estimation results. In the first regression, calculations were conducted using the dependent variable of land prices, estimated in natural logs, starting with the basic equation and gradually incorporating control variables. Subsequently, to achieve more accurate results, the dependent variable was estimated by calculating its growth rate and using actual values. All control variables were included in the model, and regional clustering at the RW level was added to reduce the standard error values.

Table 4 indicates that the Urban Settlement Quality Improvement program has a weak significance level at 10%, where the program increases average land prices by approximately IDR 68,919/m^2 compared to slum RWs that did not receive the program. This is likely because the program's primary goal is not to boost land prices but to provide livable housing for the community. A broader slum improvement program could combine housing upgrades with more comprehensive interventions that positively impact residents in slum areas (Jaitman, 2012). A more dominant factor influencing land prices is not the Urban Settlement Quality Improvement program itself but the significant control variables. For instance, the presence of green open spaces (RTH) or public spaces can increase average land prices by approximately IDR 545,601/m^2 for every 1% increase in their area, compared to slum RWs that did not receive the program, at a 1% significance level.

Table 4. Comparison of Difference-in-Differences (DiD) Estimation Results

	(1)	(2)	(3)
VARIABLES	**ln_landprice**	**D.ln_landprice**	**D.landprice**
Posttreat	-0.00305	-0.00353	68,919*
	(0.00430)	(0.00550)	(40,822)
ln_pop_den	-0.0232	-0.0305	2.819e+06**
	(0.0270)	(0.0565)	(1.109e+06)
Access	0.0667	-	-
	(0.0569)		
health_fac	-0.0321	-0.0387	-127,164
	(0.0483)	(0.0698)	(102,317)
public_space	-0.0446*	0.0620	545,601***

	(0.0268)	(0.0409)	(160,193)
Shop	-0.0286***	0.0257	188,621*
	(0.00928)	(0.0314)	(103,596)
School	0.0144**	-0.0248	-158,690***
	(0.00670)	(0.0198)	(50,946)
Flood	0.000767	-0.000244	-21,780*
	(0.00158)	(0.00214)	(13,012)
covid_19	0.0610	-0.0751	-304,818***
	(0.0568)	(0.0625)	(45,491)
2019.year	0.116***	-	-
	(0.00364)		
2020.Year	0.176***	0.0811	435,459***
	(0.0569)	(0.0625)	(31,623)
2021.Year	0.177***	-0.0376	-379,375***
	(0.0570)	(0.0625)	(49,537)
2022.Year	0.177***	-0.0372	-383,938***
	(0.0570)	(0.0625)	(52,181)
Constant	15.32***	0.799	-2.652e+07**
	(0.307)	(0.674)	(1.161e+07)
Observations	2,225	1,780	1,780
R-squared	0.809	0.608	0.476
Number of _ID	445	445	445

For the control variable of population density, it can be stated that every 1% increase in population density in areas receiving treatment significantly raises land prices by approximately IDR 2,819,162/m^2 at the 5% significance level. This suggests that higher population density may lead to increased demand for land in those areas. This finding aligns with studies by Gleser and Gyourko (2003) and Fitriani and Sumarminingsih (2015), which used the hedonic price approach and concluded that population density positively impacts land prices.

Meanwhile, for the control variable of educational centers (elementary, middle, and high schools), there is a significant negative impact at the 1% level, reducing land prices by approximately IDR 158,690/m^2 in RWs that received the program. This is likely due to an oversupply of schools, particularly elementary schools, which calls for further evaluation to prevent potential negative externalities, such as traffic congestion in school areas, especially during mornings and afternoons. Mahendra and Winarso (2018) also used the hedonic price method to show that the presence of educational facilities has a negative impact, meaning that the closer a property is to infrastructure, the higher the land price tends to be. Additionally, the flood-prone variable negatively affects land prices, consistent with Pearce and Turner (1990), who found that areas with negative externalities can adversely impact land prices. The COVID-19 variable also decreases land prices in slum RWs, aligning with the findings of Peng and Zhang (2021), who studied land prices during the pandemic in the Yangtze River Delta. On the other hand, the presence of healthcare facilities does not significantly impact land prices, particularly in slum RW locations.

Interestingly, population density was positively correlated with land prices, where each 1% increase in population density led to a rise of Rp 2,819,162 per square meter. This aligns

with findings by Gleser & Gyourko (2003), which showed that dense population areas can lead to higher demand and subsequently higher land values, even in lower-income neighborhoods.

Discussion and Policy Implications

Urban Settlement Quality Improvement Program

The findings indicate that while the Urban Settlement Quality Improvement Program did not significantly boost land prices, its social and environmental contributions may nonetheless be valuable. The relatively minor land price increase observed in treated RWs can be interpreted as a reflection of the program's focus on quality of life rather than on economic returns. This aligns with other slum upgrading studies that underscore the value of non-economic improvements, especially in health and social equity outcomes (Jaitman, 2012; Corburn & Sverdlik, 2016).

The DiD analysis showed a statistically weak but positive impact of the program on land prices in treated areas. The estimated effect size was minor, suggesting that the program's primary objective may not have been to raise land values but rather to improve livability and the quality of local infrastructure. This aligns with program reports that emphasize the quality-of-life improvements for residents rather than direct economic benefits.

Policy Implications

The proposed policy suggestions and recommendations in this study include :

1. Enhanced Public Space Investment: Expanding green and public spaces within slum areas can have a positive impact on local land values and environmental quality, benefiting both residents and investors.
2. Population Density Controls: Providing affordable housing solutions in Jakarta's high-demand areas may help control population density, reducing pressure on existing resources.

Improved Management of Public Facilities: Proper planning around educational and health facilities is essential to minimize congestion and maximize positive spillover effects on land values.

CONCLUSION

This study contributes to the understanding of urban improvement program impacts on land values by providing empirical evidence from Jakarta's recent settlement quality program. Findings suggest that while the program had a modest and weakly significant effect on land prices, the more substantial factors influencing land value appreciation were public space and population density. This suggests a need for urban policies that balance slum upgrading with broader land use planning to optimize property values and enhance urban livability.

The limited impact of the program on land prices implies that its primary benefits may lie in social and environmental improvements rather than economic gains. As urban areas continue to densify, the integration of public spaces and careful population management will be crucial for sustainable urban growth. The insights from this study can inform future policy adjustments to improve land value while addressing residents' quality of life.

This study utilizes NJOP values to calculate land prices without considering land ownership status. For future research, it is recommended to use market prices, examine the role of land ownership and legality, assess alignment with spatial planning regulations, and expand the observed RW delineation. Additionally, incorporating a longer study period and analyzing spatial associations that vary over time could provide deeper insights.

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