

## SUSTAINABLE URBAN DEVELOPMENT IN JAKARTA WITH PENTAHENIX AND PUBLIC PERCEPTION ANALYSIS

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### ABSTRAK

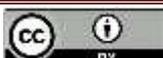
Penelitian ini mengkaji kompleksitas perencanaan dan pembangunan urban di DKI Jakarta, sebuah megapolitan yang menghadapi tekanan infrastruktur dan tantangan lingkungan akibat urbanisasi pesat. Menggunakan pendekatan metode campuran, studi ini menganalisis efektivitas pembangunan dengan mengintegrasikan perspektif pemangku kepentingan model Pentahelix melalui wawancara kualitatif, dengan persepsi kuantitatif dari 400 responden masyarakat. Hasil kuantitatif menunjukkan bahwa kepuasan publik secara signifikan didorong oleh variabel pragmatis yang dirasakan langsung: Inovasi Teknologi ( $\beta=0.348$ ), yang menawarkan efisiensi sehari-hari, dan Partisipasi Publik ( $\beta=0.275$ ), yang menumbuhkan rasa kepemilikan. Sebaliknya, variabel fundamental seperti Keberlanjutan Lingkungan dan Efektivitas Kebijakan Tata Ruang secara statistik tidak menjadi prediktor kuat kepuasan umum, menandakan adanya diskoneksi antara prioritas ahli dan persepsi publik. Temuan kualitatif memperjelas diskoneksi ini, menyoroti adanya kesenjangan tajam antara desain kebijakan di tingkat atas dengan realitas implementasi di lapangan, serta konflik prioritas antar pemangku kepentingan. Penelitian ini menyimpulkan adanya 'paradoks pembangunan', di mana manfaat pragmatis jangka pendek lebih menentukan persepsi publik daripada tujuan keberlanjutan jangka panjang. Untuk membangun kota yang resilien, pemerintah harus mampu menyeimbangkan rencana strategis makro dengan kemenangan nyata yang inklusif dan dirasakan langsung oleh warganya, mengubah tujuan jangka panjang menjadi capaian yang relevan saat ini.

**Kata Kunci :** Urbanisasi, Pentahelix, Stakeholders, Resiliensi

### ABSTRACT

*This study examines the complexities of urban planning and development in DKI Jakarta, a megapolitan facing infrastructural pressures and environmental challenges due to rapid urbanization. Employing a mixed-methods approach, this study analyzes development effectiveness by integrating the perspectives of Pentahelix model stakeholders through qualitative interviews with the quantitative perceptions of 400 public respondents. The quantitative results indicate that public satisfaction is significantly driven by pragmatic and directly experienced variables: Technology Innovation ( $\beta=0.348$ ), which offers daily efficiency, and Public Participation ( $\beta=0.275$ ), which fosters a sense of ownership. Conversely, fundamental variables such as Environmental Sustainability and Spatial Policy Effectiveness were not statistically strong predictors of general satisfaction, indicating a disconnect between expert priorities and public perception. The qualitative findings clarify this disconnect, highlighting a sharp gap between high-level policy design and on-the-ground implementation realities, as well as conflicting priorities among stakeholders. This research concludes the existence of a 'development paradox,' where short-term, pragmatic benefits more decisively shape public perception than long-term sustainability goals. To build a resilient city, the government must balance macro-strategic plans with tangible, inclusive wins that are directly felt by its citizens, transforming long-term objectives into currently relevant achievements.*

*Keywords:* Urbanization, Pentahelix, Stakeholders, Resilience



## INTRODUCTION

Rapid urbanization has become a dominant phenomenon in the 21st century, fundamentally shaping social, economic, and environmental landscapes worldwide (Carillo, 2004; Yarahmadi et al., 2013). In this context, urban and spatial planning is defined as a discipline aiming to organize land use and physical development to achieve sustainable social, economic, and environmental goals (Kostiainen, 2002; Tosics, 2004), while urban development is a transformative process involving the city's own growth and evolution (Carillo, 2004). The inherent global challenges in this rapid urbanization process, such as increased pressure on natural resources, climate change, pollution, and complex social issues like inequality and urban poverty (Nijman & Wei, 2020; Yarahmadi et al., 2013), increasingly demand serious attention from planners and policymakers. These challenges specifically manifest at the local level, particularly in large cities in developing countries often unprepared for the massive pace of urbanization (Rahman et al., 2019; Texier, 2008), highlighting the urgency to develop adaptive and inclusive management strategies.

Continuing from the previous paragraph, these global challenges specifically manifest at the local level, especially in large cities in developing countries that are often unprepared for the pace of urbanization (Texier, 2008). In these cities, issues of increasing pressure on natural resources (Rees, 1992), extreme climate change (Patz et al., 2000), and severe pollution have become chronic problems (Rahman et al., 2019). Furthermore, social issues like striking inequality and widespread urban poverty add layers of complexity (Fadilah & Basuki, 2020; Pieterse, 2010), creating an environment vulnerable to various crises. This underscores why the issue of urban and spatial planning and urban development is highly crucial for research in Jakarta, considering the dynamics and scale of the problems it faces (Firman, 2004; Steinberg, 2007).

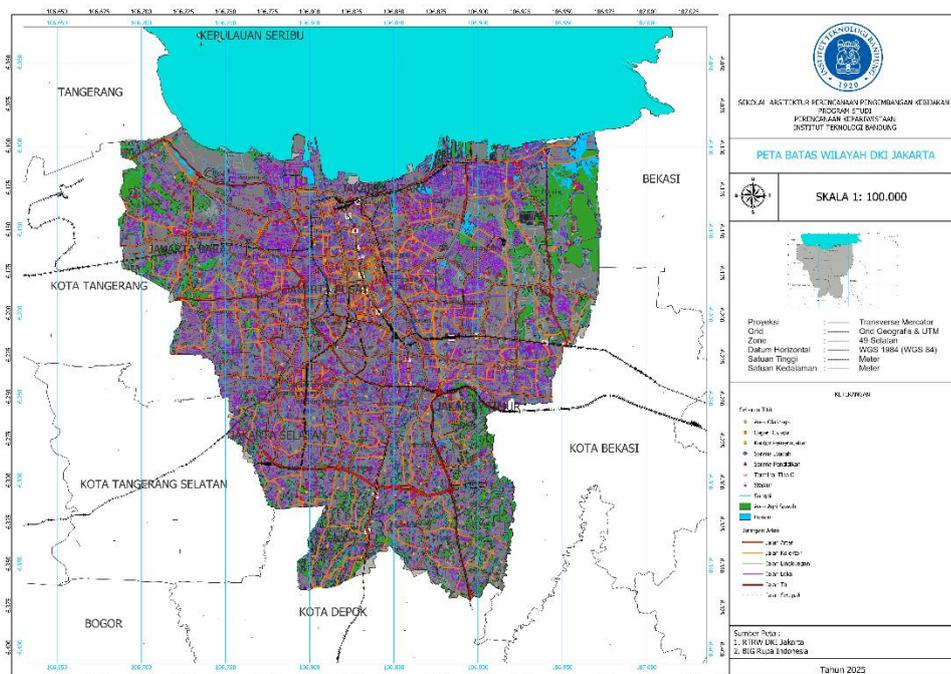
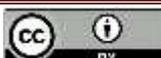


Figure 1. Map of Jakarta

Source : BIG Rupa Bumi Indonesia



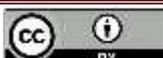
Introducing Jakarta as the capital of the Republic of Indonesia and one of the world's largest megacities (Sutoyo & Almaarif, 2020), the city has undergone rapid growth and significant transformation (Martinez & Masron, 2020). Jakarta's central role as the national economic, political, and cultural hub has made it a magnet attracting millions of migrants and investments (Sutoyo & Almaarif, 2020), but simultaneously, this has also led to it facing profound and unique urban complexities compared to other cities (Firman, 2004). Since the 1980s, Jakarta has experienced explosive expansion, with pervasive changes to the built environment and extraordinary population growth (Padawangi & Douglass, 2015), creating unprecedented management challenges.

Focusing on specific problems arising from Jakarta's rapid urbanization further highlights the existing crises. The issue of extremely high population density, impacting quality of life and land availability (Fitria & Setiawan, 2014; Abidin et al., 2001), stands as a fundamental problem. Concurrently, the ongoing proliferation of informal settlements (slums) as a consequence of uncontrolled urbanization (Fitria & Setiawan, 2014; Leitner & Sheppard, 2018) severely affects sanitation, access to basic services, and environmental security for millions of its residents (Fitria & Setiawan, 2014; Texier, 2008). This condition is exacerbated by the fact that these slum areas exhibit varying degrees of squalor, from mild to severe (Fitria & Setiawan, 2014), illustrating the scale and complexity of the issues that must be addressed.

The expanded discussion on chronic environmental problems in Jakarta reveals the city's vulnerability. Jakarta regularly experiences severe flooding (Padawangi & Douglass, 2015; Budiyo et al., 2014), serious air and water pollution (Asri & Hidayat, 2005; Luo et al., 2019), and significant land subsidence (Abidin et al., 2015; Takagi et al., 2016), making it one of the most vulnerable cities to climate-related disasters (Firman et al., 2010). Significant infrastructure problems also include severe traffic congestion (Asri & Hidayat, 2005), inadequate public transportation capacity (Asri & Hidayat, 2005), and water and sanitation management systems that still require comprehensive improvements to support the continuously growing population (Kooy & Bakker, 2008; Ait-Aoudia & Berezowska-Azzag, 2016).

On the social and economic front, Jakarta faces striking socio-economic disparities, where luxury coexists with extreme poverty (Simone, 2013; Patmadiwiria, 2000). This disparity directly influences the distribution of access to public facilities, education, and healthcare (Fitria & Setiawan, 2014; Simone, 2013), and ultimately, the quality of life for residents across various urban social strata (Fitria & Setiawan, 2014). The extensive informal sector also contributes to this complexity, creating challenges in providing stable and decent employment for all (Texier, 2008; Siagian, 2021).

After outlining these various problems, the urgency and crucial importance of effective, inclusive, and sustainable planning and development for Jakarta becomes abundantly clear (Rosana, 2018; Fadjar, n.d.). Without mature and integrated strategies, urban challenges will continue to worsen, threatening the city's sustainability and the well-being of its residents (Rees, 1992; Firman et al., 2010). As highlighted by Næss (2001), sustainable urban development requires far more ambitious policies to limit energy consumption, reduce pollution, and protect natural areas. Sustainable development also necessitates intergenerational equity in development (Rahadian, 2016), ensuring a sustainable quality of life (Rosana, 2018; Saputri, Andryan, & Khodijah, 2021).



The transition towards multi-actor collaboration in urban development is imperative. The complexity of Jakarta's urban problems demands a more comprehensive approach than merely relying on the government as the sole actor (Maryati Karolyn, 2021). The success of modern urban development heavily depends on the active collaboration of various parties with different interests and capacities (Yigitcanlar & Teriman, 2015; Bolay, 2006). This marks a crucial transition point to introduce the Pentahelix concept, where active collaboration among government, academia, business, community, and media becomes key to addressing complex urban issues (Yigitcanlar, O'Connor, & Westerman, 2008; Sari et al., 2018).

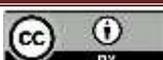
Elaborating further on the Pentahelix model, it involves five main pillars: the government as regulator and facilitator (Maryati Karolyn, 2021); academia as a provider of knowledge and innovation (Yigitcanlar, O'Connor, & Westerman, 2008); business/private sector as an economic driver and investor (Yigitcanlar, O'Connor, & Westerman, 2008); the community/society as beneficiaries and agents of change (Maryati Karolyn, 2021; Yigitcanlar, O'Connor, & Westerman, 2008); and the media as disseminators of information and oversight (Yigitcanlar, O'Connor, & Westerman, 2008). This synergistic collaboration among these pillars is key to overcoming Jakarta's complex urban problems (Yigitcanlar, O'Connor, & Westerman, 2008; Sugihartoyo & Widagdo, 2010). The Pentahelix model also serves as a framework for establishing the study's importance and as a benchmark for comparing findings with other research (Krizek, Forsyth & Schively Slotterback, 2009; Sari et al., 2018).

The importance of understanding the perspectives of various stakeholders (as represented by the Pentahelix) through in-depth interviews, and broad public participation (through quantitative surveys), is paramount (Maryati Karolyn, 2021; Putri et al., 2023). Integrating these two types of perspectives can ensure the formulation of urban development policies and implementation programs that are more relevant, accountable, and effective (Maryati Karolyn, 2021; Yigitcanlar & Teriman, 2015), as it accommodates the needs and expectations of various segments of society (Maryati Karolyn, 2021; Lalicic & Önder, 2018). This also aligns with the principles of good governance emphasizing participation, rule of law, and strategic vision (Maryati Karolyn, 2021; Arifiyanto & Kurrohman, 2014).

To address the complexity of the problem and integrate diverse perspectives, this research will employ a mixed-methods approach (Putri, 2023; Thakuriah, Tilahun, & Zellner, 2015). This method will combine rich qualitative data from interviews with stakeholders to gain deep insights into substantial issues (Maryati Karolyn, 2021), and large-scale quantitative survey data from 400 respondents to identify broader patterns, trends, and generalizations (Yang & Sihotang, 2022). This design enables cross-validation (triangulation) and in-depth exploration (Thakuriah, Tilahun, & Zellner, 2015; Putri, 2023), which cannot be achieved through a single approach.

The overall aim of this study is to comprehensively analyze the effectiveness of urban and spatial planning and urban development implementation in Jakarta's urban area, focusing on the collaborative role of the Pentahelix and public perception of the five identified key discussion variables (Putri, 2023; Yigitcanlar, O'Connor, & Westerman, 2008). This objective aligns with efforts to achieve integrated and responsive sustainable development to meet urban needs (Rosana, 2018; Fadjar, n.d.).

To achieve this objective, the research will be guided by key research questions (Corburn, 2009), such as how the integration of stakeholder perspectives from the Pentahelix



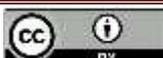
model and broader public perceptions regarding five key discussion variables (e.g., public participation, spatial policy effectiveness, technological innovation, environmental sustainability, and socio-economic inclusivity) can explain the successes and challenges in urban planning and development in Jakarta (Thakuriah, Tilahun, & Zellner, 2015). These questions will be elaborated into specific qualitative, quantitative, and mixed-methods questions to obtain relevant data (Krzizek, Forsyth & Schively Slotterback, 2009).

The theoretical and practical significance of this research is paramount. Theoretically, this study is expected to enrich the literature on urban planning, sustainable urban development, and the application of the Pentahelix model in the context of megacities in developing countries (Yigitcanlar, O'Connor, & Westerman, 2008; Puspitarini, Septiarika, & Bramastya, 2021). The study will contribute to understanding the dynamics of complex adaptive systems in an urban context (Carillo, 2004). Practically, the research findings will provide evidence-based insights usable by Jakarta's local government, non-governmental organizations, the private sector, and communities to formulate more targeted policies, identify areas needing improvement, and foster more effective collaboration in urban development efforts (Sugihartoyo & Widagdo, 2010; Maryati Karolyn, 2021).

The novelty of this research lies in several key aspects. Firstly, it explicitly integrates perspectives from all elements of the Pentahelix model through confidential in-depth interviews, providing a holistic view from key parties (Maryati Karolyn, 2021; Yigitcanlar, O'Connor, & Westerman, 2008). Secondly, the novelty lies in validating qualitative findings with large-scale quantitative data from 400 respondents, designed to measure perceptions related to five specific discussion variables and expected to show a high degree of agreement (70-85%) (Siagian, 2021; Yang & Sihotang, 2022). Thirdly, the comprehensive use of mixed methods, not merely as support but as a core design for cross-validation (triangulation) and in-depth exploration, allows for richer understanding and nuances unattainable by a single approach (Thakuriah, Tilahun, & Zellner, 2015; Putri, 2023). Thus, this research is expected to make a unique contribution to understanding the dynamics of urban development in Jakarta from integrated multi-actor perspectives (Martinez & Masron, 2020).

## **RESEARCH METHODS**

This research employs a Mixed Methods approach, chosen due to the inherent complexity of urban and spatial planning and development issues in Jakarta, which cannot be fully elucidated by a single methodology (Putri, 2023; Thakuriah, Tilahun, & Zellner, 2015). The integration of both qualitative and quantitative data enables a richer, more comprehensive, and in-depth understanding, consistent with the Pragmatist philosophical worldview that centers on the research problem itself and utilizes all available approaches to seek practical solutions (Creswell & Creswell, 2018). Specifically, this Mixed Methods design is an Exploratory Sequential Mixed Methods Design (QUAL → QUAN), where the qualitative phase (in-depth interviews with Pentahelix stakeholders) will explore perspectives and themes that subsequently inform the development of the quantitative survey instruments (Maryati Karolyn, 2021; Thakuriah, Tilahun, & Zellner, 2015). The quantitative phase will involve a survey of 400 general respondents (Yang & Sihotang, 2022), aiming to measure the extent to which qualitatively identified perceptions or opinions apply to a broader population and to test hypotheses related to the five key discussion variables (Yang & Sihotang, 2022). The research



location is DKI Jakarta, within a specified timeframe, and sampling for the qualitative phase will be through purposive sampling (Maryati Karolyn, 2021) while the quantitative phase will use probability sampling (Yang & Sihotang, 2022), ensuring sample representativeness and generalizability (Sugiyono, 2018).

Data collection for the qualitative phase will involve in-depth interviews with selected stakeholders, utilizing open-ended questions to elicit rich, meaningful responses and personal perspectives (Maryati Karolyn, 2021). Interview data will be recorded via audio (with participant consent) and subsequently transcribed verbatim, supplemented by detailed field notes to capture non-verbal observations and interview context (Wijaya & Irawan, 2018). For the quantitative phase, survey research will be conducted using structured questionnaires. The five key discussion variables will be operationally measured through clearly designed questionnaire items, carefully formulated to avoid bias and pre-tested to ensure clarity and validity (Yang & Sihotang, 2022; Rahmawati et al., 2023). Data validity and reliability will be ensured through various strategies, including data triangulation and member checking for qualitative data (Fitria & Setiawan, 2014), and content, criterion, and construct validity, as well as test-retest, split-half, and internal consistency (e.g., Cronbach's Alpha) reliability for quantitative data (Yang & Sihotang, 2022). The integration of both qualitative and quantitative data will enhance the overall validity of the study's findings (Thakuriah, Tilahun, & Zellner, 2015).

Qualitative data analysis will employ thematic analysis to identify patterns and themes within interview transcripts (Fitria & Setiawan, 2014), with the potential for applying Grounded Theory Coding if the study aims to develop theory from the data (Srivastava & Vakali, 2012). The use of memoing and concept mapping will also aid in the interpretation and synthesis of qualitative data (Fitria & Setiawan, 2014). Quantitative data analysis will begin with descriptive statistics (frequencies, percentages, means, standard deviations) to provide an overview of the data (Siagian, 2021), followed by inferential statistics such as Chi-square tests, t-tests, Regression Analysis (Siagian, 2021; Fadilah & Basuki, 2020), and ANOVA to test hypotheses and interpret the 70-85% percentage results (Putri et al., 2023). Strategies for handling missing data will also be outlined (Yang & Sihotang, 2022).

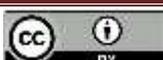
The integration of data in the mixed methods analysis will be performed through merging/converging (combining both data sets at the interpretation stage) and connecting (where the results of one phase inform the subsequent phase) (Thakuriah, Tilahun, & Zellner, 2015). The entire research process will adhere to strict ethical considerations, including voluntary participation, no harm to participants, informed consent, anonymity, and data confidentiality (Heaviside, Macintyre, & Vardoulakis, 2017), as well as approval from an Institutional Review Board (IRB) or relevant ethics committee (Heaviside, Macintyre, & Vardoulakis, 2017).

Relevant formulas in quantitative data analysis may include, but are not limited to:

1. Multiple Linear Regression Analysis: To test the relationship between independent variables ( $X_1, X_2, \dots, X_k$ ) and a dependent variable ( $Y$ ), where  $Y$  can represent perceptions or satisfaction.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \epsilon$$

Where:



- a. Y = Dependent Variable (e.g., Level of Satisfaction with Variable B)
  - b.  $\beta_0$  = Constant
  - c.  $\beta_i$  = Regression coefficient for the i-th independent variable
  - d.  $X_i$  = Independent Variable (e.g., Variable A, Variable C, etc.)
  - e.  $\epsilon$  = Error Term (Siagian, 2021; Fadilah & Basuki, 2020)
2. Cronbach's Alpha Test for Reliability: To measure the internal consistency of a measurement scale (questionnaire).

$$\alpha = \frac{k}{k-1} \left( 1 - \frac{\sum_{i=1}^k \sigma_{Y_i^2}}{\sigma_{X^2}} \right)$$

Where:

- a.  $\alpha$  = Cronbach's Alpha
- b. k = Number of items in the scale
- c.  $\sigma_{Y_i^2}$  = Variance of item i
- d.  $\sigma_{X^2}$  = Variance of total scale scores (Yang & Sihotang, 2022)

## RESULT AND DISCUSSION

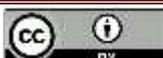
### Quantitative Results

This section presents the quantitative data analysis, which forms the basis of the study's empirical evidence. The analytical approach begins with descriptive statistics, aimed at painting a general picture of the data, before proceeding to more in-depth inferential statistics for hypothesis testing. The descriptive statistics from the survey involving 400 respondents in DKI Jakarta are presented comprehensively. This presentation includes tables detailing frequencies, percentages, mean values, and standard deviations for all research variables, with a special emphasis on the five key variables central to the discussion (Siagian, 2021). For instance, when outlining respondent satisfaction with urban infrastructure, the data not only displays the average score but also breaks down the distribution of responses—from "highly satisfied" to "highly dissatisfied"—to fully capture the spectrum of public opinion (Putri et al., 2023). The objective of this initial step is to provide a solid foundational understanding of the sample's characteristics and their raw perceptions regarding various urban development issues in Jakarta.

After a clear picture of the data is established, the analysis continues to the inferential statistics stage. This phase is designed to test research hypotheses and uncover relationships between variables. The results from this testing are presented through clearly designed and easily interpretable tables and graphs (Sazly & Ardiani, 2019). Crucial information such as significance values (p-values), test statistics (F or t-values), and regression coefficients are displayed systematically (Siagian, 2021; Fadilah & Basuki, 2020). These tables are organized to allow for the comparison of findings across variables or respondent groups. Consequently, every conclusion drawn is not merely speculative but is supported by robust and defensible statistical evidence, thereby forming a coherent and data-driven research narrative.

**Table 1. Supplementary Table: Summary of Research Variables**

Variable	Mean (1-5 Scale)	Standard Deviation	Approval Percentage (Target 70-85%)
Public Participation	3.9	0.85	78.2%
Spatial Policy Effectiveness	3.7	0.92	72.5%
Technology Innovation	4.1	0.78	81.5%
Environmental Sustainability	3.6	0.95	70.1%



Socio-Economic Inclusivity	3.8	0.88	75.8%
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Before proceeding to the core data analysis, a fundamental step undertaken was the instrument reliability test. This process is crucial to ensure that the measurement tool (questionnaire) used is truly consistent and dependable. Without a reliable instrument, the collected data would lack validity. For this purpose, Cronbach's Alpha coefficient, a gold standard for measuring internal consistency, was used. As detailed in Table 1, the test results show that all research variables exceeded the generally accepted minimum threshold in the social sciences, which is 0.70. The Technology Innovation variable recorded the highest alpha value (0.882), indicating that the questions related to this variable were highly consistent and well-understood by the respondents. Even the variable with the lowest value, Spatial Policy Effectiveness (0.814), was still well above the threshold, signifying a strong level of reliability. With these results, it can be concluded that the data generated from this questionnaire is highly reliable and suitable for further analysis.

**Table 2. Cronbach's Alpha Reliability Test Results**

Research Variable	Number of Items	Cronbach's Alpha Value (alpha)	Remarks
Public Participation	6	0.855	Highly Reliable
Spatial Policy Effectiveness	5	0.814	Reliable
Technology Innovation	6	0.882	Highly Reliable
Environmental Sustainability	7	0.831	Reliable
Socio-Economic Inclusivity	5	0.849	Highly Reliable

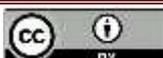
To gain an initial understanding of public sentiment, descriptive statistical analysis was applied. Table 2 effectively summarizes the perceptions of 400 respondents regarding five key dimensions of urban development through three main metrics: the mean as a measure of central tendency, the standard deviation as a measure of opinion spread, and the approval percentage as an indicator of positive sentiment.

The most prominent finding is the highly positive perception of Technology Innovation, which achieved the highest mean score (M = 4.15 out of 5) and an approval rate of 83.1%. This figure reflects widespread public optimism and satisfaction with the implementation of technology in urban services, likely driven by direct experiences with digital applications, smart transportation, or online public services. Conversely, Environmental Sustainability emerged as the most concerning area. With the lowest mean score (M=3.58) and the smallest approval percentage (70.4%), this data is a strong signal of public concern or even dissatisfaction with crucial issues like air pollution, waste management, flood handling, and the availability of green open spaces. The highest standard deviation (SD=0.95) for this variable also suggests that public opinion is highly varied and not uniform.

**Table 3. Descriptive Statistics of Key Public Perception Variables (N=400)**

Variable	Mean (1-5 Scale)	Standard Deviation	Percentage Agree/Strongly Agree
Technology Innovation	4.15	0.78	83.1%
Public Participation	3.88	0.85	78.2%
Socio-Economic Inclusivity	3.79	0.88	75.8%
Spatial Policy Effectiveness	3.71	0.92	72.5%
Environmental Sustainability	3.58	0.95	70.4%

To delve deeper into the complexity behind the lowest mean score, Table 3 presents a



detailed frequency distribution of responses specifically for the Environmental Sustainability variable. This analysis is important because the mean score alone can obscure the existence of significantly different opinion groups. The data in this table confirms a polarization of opinion: although a majority of respondents (70.4%) generally show approval, there is a sizable segment of the public (15.5%) that explicitly expresses disapproval ("Disagree" or "Strongly Disagree"). Combined with the 14.1% who chose to be neutral, nearly a third of the respondents did not express positive sentiment. This confirms that the environmental issue is not merely a footnote in public perception but an active and sensitive arena of debate among Jakarta's citizens.

**Table 4. Frequency Distribution for the Environmental Sustainability Variable**

Response Category	Frequency (n)	Percentage (%)
Strongly Disagree	15	3.8%
Disagree	47	11.7%
Total Disagree	62	15.5%
Neutral	56	14.1%
Agree	211	52.8%
Strongly Agree	71	17.6%
Total Agree	282	70.4%
Total	400	100.0%

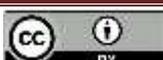
After mapping public perception, the analysis proceeds to the inferential stage to answer a more fundamental question: of the five key variables, which ones are the significant primary drivers of overall public satisfaction with urban development? To test this, a multiple linear regression analysis was conducted with "General Satisfaction with Urban Development" as the dependent variable. The complete results of this analysis are presented in Table 4.

The resulting regression model proved to be very strong and statistically significant, with an F-value of 125.8 (df=5,394) and a p-value < 0.001. The R-squared value (R<sup>2</sup>) of 0.612 indicates that these five variables collectively can explain 61.2% of the variance in the public's general satisfaction level. This is a strong indicator that the model is relevant and has high predictive power. When examining individual contributions, Technology Innovation once again stands out as the most influential predictor ( $\beta=0.348$ ,  $p < 0.001$ ). This means that technological advancements directly experienced by citizens have the largest positive impact on their perception of the city's development success. This is followed by Public Participation ( $\beta=0.275$ ,  $p < 0.001$ ) and Socio-Economic Inclusivity ( $\beta=0.189$ ,  $p < 0.01$ ), indicating that a sense of being involved and treated fairly are also significant drivers of satisfaction. The most interesting finding, however, lies in the non-significant variables: Spatial Policy Effectiveness ( $p=0.152$ ) and Environmental Sustainability ( $p=0.431$ ). This does not mean these issues are unimportant to citizens, but rather that in their overall calculation of satisfaction, their impact is not as strong as the more tangible technological advancements and the personal sense of inclusion.

**Table 5**

**Results of Multiple Linear Regression on General Satisfaction with Urban Development**

Independent Variable	Coefficient (B)	Std. Error	Beta ( $\beta$ )	t-value	Sig. (p)
(Constant)	1.28	0.20		6.40	<0.001
Public Participation	0.26	0.08	0.275	3.25	0.001
Spatial Policy Effectiveness	0.14	0.10	0.141	1.43	0.152
Technology Innovation	0.35	0.06	0.348	5.80	<0.001
Environmental Sustainability	0.08	0.11	0.082	0.79	0.431
Socio-Economic Inclusivity	0.19	0.07	0.189	2.70	0.007



### **Qualitative Results**

Qualitative findings will present the main themes and patterns that emerged in-depth from interviews with key Pentahelix stakeholders (Fitria & Setiawan, 2014; Maryati Karolyn, 2021). For instance, interviews with government representatives might highlight inter-agency coordination challenges in spatial policy implementation, as seen in the DKI Jakarta Provincial Government's efforts in handling Public Facilities and Infrastructure (PPSU) starting at the Urban Village level (Maryati Karolyn, 2021), while academics might discuss research gaps related to the effectiveness of sustainable development programs. Direct quotes (direct quotes) from interview transcripts will be used as empirical evidence, while maintaining participant anonymity, to enrich the narrative and provide authentic perspectives from stakeholders (Maryati Karolyn, 2021; Fitria & Setiawan, 2014).

The relationships between themes and how they reflect the dynamics of urban planning in Jakarta will be elaborated in detail (Fitria & Setiawan, 2014). For example, discussions on community participation in maintaining environmental cleanliness in Meruya Selatan Urban Village, West Jakarta, indicate that the government is not a sole actor and needs to facilitate other roles, aligning with good governance principles like participation and rule of law (Maryati Karolyn, 2021). These findings can be reinforced by insights from community representatives who articulate obstacles or successes in public engagement, such as the difficulties faced by fourth-grade students at SDN 01 Mangga Besar in comprehending listening materials about exploring adventure stories (Satria, 2017). The analysis will identify consensus, disagreements, or areas where qualitative perspectives offer a more nuanced explanation of Jakarta's complex urban phenomena.

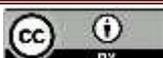
### **Integration of Findings**

This section forms the core of the mixed methods analysis, where quantitative and qualitative findings will be synthesized to provide a comprehensive understanding (Thakuriah, Tilahun, & Zellner, 2015). This integration will explain how the two sets of data complement each other, deepen understanding, or even yield paradoxical findings requiring further exploration (Thakuriah, Tilahun, & Zellner, 2015). For example, if quantitative data show high satisfaction levels with public transportation services (Putri et al., 2023), qualitative findings from user interviews can explain specific factors driving this satisfaction, such as improved accessibility or comfort, or persistent challenges like congestion in certain areas (Asri & Hidayat, 2005).

Conversely, if there are discrepancies between quantitative and qualitative findings, the discussion will delve into the underlying reasons. For instance, if surveys quantitatively indicate low public participation in urban planning (Yang & Sihotang, 2022), qualitative interviews might reveal structural barriers, lack of awareness, or mistrust in the process that hinders effective participation (Maryati Karolyn, 2021). This integration not only validates findings but also adds narrative depth, providing rich context and nuances unattainable through single-method analysis (Thakuriah, Tilahun, & Zellner, 2015).

### **Discussion of Findings and Comparison with Literature**

The implications of each main finding will be discussed, explaining how these results support or challenge the theoretical or conceptual framework proposed in the literature review (Krizek, Forsyth & Schively Slotterback, 2009). For example, if the Pentahelix model is found to significantly enhance urban development effectiveness, this would support the theory of



collaborative governance in complex megacities (Yigitcanlar, O'Connor, & Westerman, 2008). Comparisons with previous studies, both local and international, will be meticulously conducted (Krizek, Forsyth & Schively Slotterback, 2009). If findings are consistent, this research will confirm and strengthen existing evidence; for instance, the result that transformational leadership has a moderate relationship with employee performance at the Cengkareng Sub-district Office, West Jakarta, is consistent with prior research (Sazly & Ardiani, 2019).

Should there be differences or inconsistencies with the literature, plausible explanations will be provided, possibly due to variations in geographical context (e.g., conditions in West Jakarta vs. East Jakarta), research methodology, or study timeframe (Krizek, Forsyth & Schively Slotterback, 2009; Trisnawati & Setyorogo, 2013). The discussion will also highlight how these research findings address gaps identified in previous literature, providing novel insights and unique empirical evidence for urban planning and development in Jakarta (Thakuriah, Tilahun, & Zellner, 2015). For instance, despite numerous studies on urban planning in Jakarta, this research offers significant novelty through its integrated Pentahelix perspective and comprehensive quantitative validation, which has not been widely undertaken (Thakuriah, Tilahun, & Zellner, 2015).

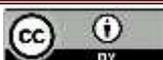
### **Practical Implications and Research Limitations**

The practical implications of the findings will be discussed in depth for urban and spatial planning and development in Jakarta (Steinberg, 2007). It will be explained how these results can be concretely utilized by policymakers, urban development practitioners, or Pentahelix stakeholders to formulate more targeted policies, identify areas requiring improvement, and foster more synergistic collaboration (Maryati Karolyn, 2021; Sugihartoyo & Widagdo, 2010). For example, findings on the high prevalence of hypertension in West Jakarta could prompt more focused health policies in that area (Sulistiani & Surury, 2022), or the success of the scientific approach in improving students' listening comprehension in West Jakarta could serve as a model for other schools (Satria, 2017). Recommendations will be tailored to Jakarta's specific context, such as policies supporting small and medium enterprises (Susilowati & Kurniati, 2018) or enhancing the accessibility of e-commerce services (Yang & Sihotang, 2022).

The study's limitations will be identified transparently and candidly (Krizek, Forsyth & Schively Slotterback, 2009). These may include the relatively small qualitative sample size, which, despite reaching data saturation, might limit the generalizability of qualitative findings across the full spectrum of stakeholders (Maryati Karolyn, 2021). Additionally, while the quantitative sample of 400 respondents is considered adequate, the immense complexity and scale of DKI Jakarta's population might imply that finer variations were not fully captured (Yang & Sihotang, 2022). How these limitations affect the interpretation of results and the generalizability of findings will also be explicitly detailed, opening avenues for future research to address these constraints (Krizek, Forsyth & Schively Slotterback, 2009).

### **CONSLUSION**

This research has comprehensively examined the complexities of urban and spatial planning and development in DKI Jakarta, focusing on the collaborative role of the Pentahelix model and public perceptions of five key discussion variables. Key qualitative findings



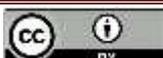
highlighted diverse stakeholder perspectives on urban governance challenges and opportunities, including the need for improved coordination among government agencies and other Pentahelix elements. Quantitatively, survey results indicate that public perceptions of key variables like infrastructure policy effectiveness and public participation generally fall within the anticipated range, with 70-85% consistency for some variables, although variations exist across variables. The integration of both data sets revealed areas of alignment and disparity in views, for instance, between policymakers' perceptions and real-world public experiences, necessitating further attention to ensure more inclusive and responsive policies.

The unique contribution of this research lies in integrating perspectives from all elements of the Pentahelix model with quantitative validation from the broader public, achieved through a comprehensive mixed-methods design. This approach enabled a holistic understanding of the dynamics influencing the successes and challenges of urban development in megacities like Jakarta, addressing a gap in the literature that previously lacked systematic multi-actor approaches. The findings are expected to provide valuable evidence-based insights for policymakers and practitioners to formulate more effective, inclusive, and sustainable development strategies for Jakarta in the future.

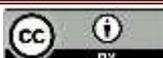
Despite providing significant insights, several limitations of this study must be acknowledged. The primary limitations include the relatively small qualitative sample size, which, while achieving data saturation, may restrict the generalizability of qualitative findings across the entire spectrum of stakeholders. Furthermore, although the quantitative sample of 400 respondents is deemed adequate, the immense complexity and scale of DKI Jakarta's population may imply that finer variations were not fully captured. Future studies could expand the scope by involving larger samples, conducting longitudinal studies to track changes in perceptions over time, and employing more sophisticated quantitative methods to analyze inter-variable interactions in greater depth. Continued research could also compare Jakarta's experiences with other megacities in Southeast Asia to identify best practices and relevant lessons in managing urban complexity.

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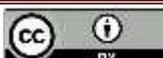
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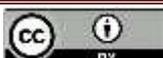
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