Jakarta Citizens' Perspective Toward Government Policy on Air Pollution

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Submitted to the Faculty of
Department of International Affairs in partial fulfillment of
the requirements for the degree of
Bachelor of Arts in International Affairs

Wenzao Ursuline University of Languages
2025

WENZAO URSULINE UNIVERSITY OF LANGUAGES
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Abstract

Air pollution in Jakarta is a problem experienced by all Jakarta citizens and has become a global issue that urgently needs to be addressed. This issue is exacerbated by the large number of motor vehicles, coal-fired power plants, and factories spread across Jakarta, which significantly contribute to air pollution and threaten the health and quality of life of city residents. The research aimed to assess the effectiveness of Jakarta's air pollution policies from the citizens' perspective, identifying the gap between the expectations of Jakarta's residents regarding air quality improvement policies and the outcomes of government policies, which were still considered ineffective in addressing Jakarta's air pollution issues. Using a close-ended survey, the study collected data to understand the opinions of 479 Jakarta citizens on government policies such as Air Quality Monitoring, Urban Planning and Infrastructure, Pollution Control Measures, and the Odd-Even Policy. The survey highlights strong public dissatisfaction with current air quality policies, especially among younger Jakarta citizens (ages 18-25), who are more skeptical than older residents (46 and above) about policy effectiveness. While older citizens tend to support policies like Air Quality Monitoring and the Odd-Even Traffic Regulation, the public overall shows a strong preference for infrastructure-based solutions. Improving public transportation and expanding renewable energy sources, such as solar and wind, are viewed as the most effective ways to reduce air pollution and reliance on fossil fuels. These findings suggest that to build public trust and improve policy effectiveness, Jakarta's government should prioritize long-term investments in clean public transport and renewable energy. Such initiatives align with public preferences and address key pollution sources, like vehicle emissions and fossil fuel dependency. Emphasizing eco-friendly urban planning and transparent policy-making could foster greater public support, enhancing urban air quality and contributing to broader climate goals.

Keywords: Air pollution policies, public transportation, renewable energy.

摘要

雅加達的空氣污染是所有市民面臨的問題，且已成為亟待解決的全球性議題。這一問題因雅加達大量的機動車輛、燃煤發電廠和工廠而加劇，這些污染源顯著地增加了空氣污染，威脅著市民的健康和生活品質。本研究旨在從市民的角度評估雅加達空氣污染政策的有效性，並找出雅加達市民對空氣質量改善政策的期望與政府政策結果之間的差距。通過使用封閉式調查問卷，本研究收集了479位雅加達市民對於政府空氣質量監測、城市規劃與基礎設施、污染控制措施以及单双號政策等政策的意見。調查結果顯示，市民對當前的空氣質量政策有強烈的不滿情緒，尤其是年輕市民（18-25歲），他們對政策的有效性比年長市民（46歲及以上）更為懷疑。儘管年長市民傾向於支持空氣質量監測和单双號交通管制等政策，但整體而言，市民更偏好以基礎設施為主的解決方案。改善公共交通並擴展如太陽能和風能等可再生能源被認為是減少空氣污染和對化石燃料依賴的最有效方法。這些發現表明，為了增強公眾信任並提高政策效力，雅加達政府應優先考慮對清潔公共交通和可再生能源的長期投資。此類措施不僅符合公眾偏好，還能解決主要污染源，如機動車排放和對化石燃料的依賴。強調環保的城市規劃和政策透明度有助於提升市民支持度，改善城市空氣質量並為更廣泛的氣候目標做出貢獻。

關鍵詞：空氣污染政策、大眾交通、可再生能源。

Preface

This research paper represents the culmination of my efforts to explore Jakarta Citizens' Perspective Toward Government Policy on Air Pollution. I am deeply grateful for the guidance, support, and encouragement I have received throughout this journey, each of which has been instrumental in bringing this paper to completion.

First and foremost, I wish to thank God, whose grace and guidance have provided me with strength, clarity, and perseverance throughout this graduation project. My faith has been a source of comfort and inspiration, especially in moments of challenge and uncertainty.

I would also like to extend my sincere gratitude to my associate professor, whose mentorship and constructive feedback have greatly enriched this research. Their insights and expertise helped shape the academic rigor of this paper, encouraging me to delve deeper into the nuances of my field and refine my arguments with precision. Their support has been a steady source of motivation along the way.

Additionally, I would like to thank ChatGPT, an AI language model, for its assistance in refining the structure and clarity of my writing. While all concepts, analyses, and conclusions in this paper are entirely my own, ChatGPT provided helpful suggestions that aided me in expressing my ideas more effectively. This tool was instrumental in enhancing the readability and flow of the manuscript, allowing my work to reach a polished form.

In the following pages, I present my findings and reflections with the hope that they will contribute meaningfully to the field. I am deeply grateful to everyone who supported me in this endeavor, each in their unique way.

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INTRODUCTION

Research Background

On 11th August 2023, netizens were shocked by a viral video on TikTok (@sheenamulan) that showed the Jakarta sky full of grayish fog from behind the passenger window of the plane.[1] Soon after, President Joko Widodo held an urgent meeting at the Merdeka Palace with relevant ministers and high-ranking officials regarding the air quality in Jakarta, which over the past week has been worse. Moreover, Jakarta's poor air quality was emphasized by IQAir, which at the end of 2023 issued the 2023 World Air Quality Report. It was reported that Indonesia was ranked 14th with the worst air quality in the world (average PM2.5 concentration: 37.1 μm/m3). Jakarta, as the capital city, was ranked 7th with the worst air quality in the world (average PM2.5 concentration: 43.8 μm/m3).[2] This poor performance beats other big cities worldwide, such as Kampala in Uganda, Kuwait, Qatar, and Dubai. This also makes Jakarta the city with the worst air quality in Southeast Asia. A large number of motorized vehicles, industrial factories, and coal-fired power plants spread across Jakarta are considered to contribute greatly to air pollution in Jakarta, which also poses a threat to the health and quality of life of city residents such as respiratory tract infections (RTI), cardiovascular problems, lung cancer, and even death.

Various policies and regulations have been issued by the Indonesian government to overcome this air pollution issue. Some of them are DKI Jakarta Governor Regulation No. 66 of 2020 concerning Motor Vehicle Exhaust Emission Tests, Indonesian Minister of Environment and Forestry Regulation No. 13 of 2021

[1] Sheenamulan, "Merinding Bgt, Stay Protected Ya Guys.," TikTok, 11th August, 2023, https://vt.tiktok.com/ZSFajxcsx/.
[2] IQAir, *2023 World Air Quality Report* (2023), https://www.iqair.com/dl/2023_World_Air_Quality_Report.pdf?utm_source=pdf&utm_medium=download&utm_campaign=waqr23&utm_id=waqr23&utm_term=ft#msdynmkt_trackingcontext=78fe29de-6595-4d8b-bf2f-a80bb1466a8e.

concerning Information Systems for Continuous Industrial Continuous Emission Monitoring, Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the Indonesian National Land Agency No. 14 of 2022 concerning the Provision and Utilization of Green Open Space, etc. This regulation is strengthened by concrete government actions such as implementing odd-even regulations on several roads in the city of Jakarta, the development of public transportation (LRT, MRT, high-speed trains, etc.), implementing vehicle emission standards, promoting electric vehicles, carrying out in-depth supervision of the power plants industry, expanding urban forests, and others. Collaboration with ASEAN countries and international organizations such as the World Health Organization (WHO) is also carried out to exchange experiences, knowledge, and resources in efforts to overcome air pollution globally.

However, the above efforts are still not enough considering that the average concentration of PM2.5 in Jakarta in 2023 reached 43.8 ug/m3.[3] This is certainly eight times more dangerous compared to the WHO Air Quality Guidelines 2021, where the average exposure concentration of PM2.5 annually is set at 5 µg/m3.[4] In fact, by meeting WHO air quality guidelines could significantly protect residents' health, reduce pollution-related diseases, and improve overall quality of life, thereby enhancing the city's attractiveness for tourism and business, and boosting economic growth. Achieving these standards aligns with the government's responsibility under Indonesian Law No. 32 of 2009 to ensure access to clean air for all residents, regardless of socio-economic status or geographical location. This commitment is crucial for safeguarding public health and fostering sustainable urban development. In

[3] IQAir.
[4] WHO, *Who Global Air Quality Guidelines* (2021), https://iris.who.int/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1.

this context, the government has done everything it can by making policies and regulations to reduce air pollution in Jakarta, which has been mentioned earlier. In a book entitled Public Policy by Dr. Riant Nugroho explained that policies must meet three main requirements, such as must be intelligent, must be wise, and must give hope, so that they can satisfy society. Even though policies made regarding air pollution or other environmental problems are made with the aim of more than satisfying the public, in reality, public satisfaction reflects the success of the policies themselves.[5] Therefore, the policies and regulations taken and implemented regarding Jakarta's air pollution should be good and effective in order to build public trust and satisfaction.

So far, public awareness of air pollution in Jakarta is relatively high due to its visible and tangible impact on daily life.[6] In this context, the existence of bad air pollution in Jakarta can no longer be denied. Jakarta's air quality has frequently been in the yellow and red zones, with vehicle emissions, industrial and construction activities, and coal-fired power plants contributing to the problem. As a result, citizens are increasingly aware of the health and quality of life problems associated with poor air quality, as well as government’s efforts to mitigate them. However, public perception of these efforts remains critical. Elisa Sutanudjaja, a Jakarta resident involved in legal action for clean air rights, describes the government's response as slow and insufficient, reflecting broader public dissatisfaction with the measures taken to address air pollution in Jakarta.[7]

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[5] R. Nugroho, *Public Policy 6 - Edisi Revisi* (Elex Media Komputindo, 2020). https://books.google.com.tw/books?id=994DEAAAQBAJ.

[6] Glenn Kaonang, "Survei: Kesadaran Masyarakat Indonesia Terhadap Isu Lingkungan Cukup Tinggi," (2023), https://solum.id/green-lifestyle/survei-kesadaran-masyarakat-indonesia-terhadap-isu-lingkungan-cukup-tinggi/.

[7] Ichsan Emrald Alamsyah, "Pemprov Dki Terbitkan Pergub Pengendalian Pencemaran, Warga: Viral Dulu, Baru Buru-Buru," *Republika News*2023, https://news.republika.co.id/berita/rzc87l349/pemprov-dki-terbitkan-pergub-pengendalian-pencemaran-warga-viral-dulu-baru-buruburu.

The citizens mostly criticize the adequacy and enforcement of these measures. They feel that government efforts have not been able to overcome the magnitude of this problem, this includes a lack of effective action and government delays in responding. Yet, they acknowledge the challenges faced by the government in reducing air pollution. They've recognized the complexity of the issue, including factors such as rapid urbanization, industrial activities, and transportation demands, which can make achieving significant improvements in air quality in Jakarta difficult. However, they still expect the government to prioritize and intensify efforts to address these challenges effectively. Thus, the main problem in this research is that there is a gap between the expectations of the people of Jakarta regarding air pollution policies to improve air quality and the reality which is the result of the implementation of government policies that are still considered ineffective and not good enough in overcoming Jakarta's air pollution problems.

Research Motivation

By aligning government policies more closely with the expectations of Jakarta's residents, there is a greater likelihood of reducing air pollution levels and resulting in cleaner air. This can improve public health outcomes and enhance overall environmental sustainability. Moreover, improved air quality resulting from effective policies can bring economic benefits, including increased productivity and enhanced people's quality of life. Last but not least, overcoming this problem also means that Jakarta is able to achieve Sustainable Development Goal (SDGs) target number 3 "Good Health and Well-being" which aims to ensure healthy lives and promote well-being for all people at all ages.

Research Purpose

The purpose of this research is to assess the effectiveness of Jakarta's air pollution policies based on citizen's perspectives, identifying the gap between the expectations of the people of Jakarta regarding air pollution policies to improve air quality and the result of the implementation of government policies which are still considered ineffective and not good enough in overcoming Jakarta's air pollution problems.

Research Questions

Question 1: What are the attitudes and opinions of the people of Jakarta towards the government policies that have been implemented to overcome air pollution?

Question 2: How do Jakarta citizens assess the effectiveness of government policies that have been implemented to reduce air pollution?

Question 3: Based on Jakarta citizens' perspective, what are other better and/or effective ways to reduce air pollution in Jakarta?

Contribution

In this research, the researcher tries to make an important contribution in providing an in-depth understanding of the Jakarta citizens' perceptions and preferences regarding government policies regarding air pollution. Through structured surveys and in-depth interviews, the study identifies key challenges in implementing these policies and highlights opportunities for future improvements. Overall, this research not only provides valuable insight into public opinion towards air pollution policy in Jakarta but also makes a significant contribution to efforts to formulate more effective and sustainable policies in facing this complex environmental challenge.

Limits

There are two limits in the research. First, research on public opinion on air pollution policies can change over time in response to new information and events, including changes in air quality conditions in Jakarta city. Research may only reflect opinions at a particular point in time and not track changes over the long term. Moreover, it may be difficult as this research may be limited by a sample size that is not large enough, which may limit the generalization of the results to a wider population of Jakarta residents. Lastly, time limitations in collecting data and resources may affect the depth and breadth of the researcher's research, as well as the ability to conduct more in-depth analysis.

Delimits

This research is delimited to focusing solely on Jakarta residents as research subjects, excluding opinions from other regions or populations. This focus is due to Jakarta's status as Indonesia's largest city, with a dense population whose well-being is significantly affected by air pollution. Additionally, Jakarta's economic, political, and cultural centrality means its air pollution issues have broader implications for the nation's stability. Moreover, the study will exclusively examine Jakarta citizens' perspectives on government policies and initiatives directly related to air pollution, such as vehicle and industrial emission regulations and urban planning policies.

LITERATURE REVIEW

Air Pollution in Jakarta

Overview of Air Quality in Jakarta

Air quality in Jakarta remains a pressing concern. It often exceeds national and international standards. The city consistently grapples with high concentrations of pollutants such as particulate matter (PM2.5 and PM10), nitrogen dioxide (NO2), sulfur dioxide (SO2), carbon monoxide (CO), and ozone (O3). These pollutants originate from various sources, including vehicular emissions, industrial activities, biomass burning, and construction dust. Despite efforts to improve air quality through regulatory measures and initiatives such as vehicle emission standards and green projects, Jakarta continues to face significant challenges in controlling pollution levels due to the rapid pace of urbanization and industrialization. As a result, according to Air Quality Index (AQI), Swiss air quality monitoring company, Jakarta is often in the unhealthy or hazardous range, posing health risks to the city's residents, particularly vulnerable groups such as children, the elderly, and individuals with pre-existing health conditions.[8]

Historical Data and Current Status

Jakarta continues to experience a decline in air quality as the city experienced drastic urbanization due to social and economic changes at the beginning of the 20th century. Although initial pollution levels were relatively low compared to today's standards, this period marked the beginning of a long-lasting air pollution problem, caused by a surge in vehicles and increased traffic, as well as the emergence of factories and urban sprawl. Furthermore, from the 1970s to the 2000s, coinciding with

[8] IQAir, *Kualitas Udara Di Jakarta*.

Jakarta's evolution into a commercial and industrial hub, air pollution became increasingly prominent. According to Bambang Sukana and Syahrudji Naseh, research staff at the Health Ecology Research Center, air pollution emerged as an urgent issue during this period, with the city frequently experiencing smog, particularly in the dry season (May to September).[9] Factors such as industrialization, urbanization, and an increasing number of vehicles on the road have led to a rise in emissions of pollutants in Jakarta.

The current status of air quality in Jakarta is not very good either. The reason is, in mid-August 2023, Jakarta's air pollution reached the purple zone with Jakarta's air quality as the worst at 172. It is categorized as an unhealthy level for everyone, including sensitive groups (people with respiratory problems: asthma, respiratory tract infections, etc.). This was then confirmed by IQAir, which at the end of 2023 issued the 2023 World Air Quality Report where Indonesia was ranked 14th with the worst air quality in the world (annual average PM2.5 concentration: 37.1 μm/m3) and Jakarta, as the capital city, was ranked 7th with the worst air quality in the world (annual average PM2.5 concentration: 43.8 μm/m).[10]

Despite efforts to reduce air pollution, Jakarta continues to struggle with poor air quality. The city frequently exceeds national air quality standards and international air quality standards set by WHO, especially for PM2.5. The combination of high population density, severe traffic congestion, inadequate waste management practices, and industrial emissions exacerbates Jakarta's air pollution problem.

[9] Syahrudji Naseh Bambang Sukana, "Pencemaran Udara Di Dki Jakarta (Review)," *Media Litbangkes* 3 (1993), https://media.neliti.com/media/publications-test/156988-pencemaran-udara-di-dki-jakarta-review-5d3cac32.pdf.
[10] IQAir, *2023 World Air Quality Report*.

Major Pollutants and Their Sources

Air pollution in Jakarta stems from a multitude of sources. According to the 2023 Final Report of the Jakarta Environmental Service regarding the Inventory of Emission Profiles and Reporting on Reducing Greenhouse Gas Emissions for DKI Jakarta Province, these pollutants originate from various sources such as vehicle emissions amounting to 53%, followed by coal-fired power plants amounted to 25%, then industrial activities (particularly those in the manufacturing and construction sectors) amounted to 8%, and others such as landfill solid waste amounted to 5%, housing amounted to 5%, domestic liquid waste amounted to 4%, and commercial amounted to 1%.[11]

The three main sources of air pollution in Jakarta are the busy transportation sector, coal-fired power plants, and rapidly growing industry. The transportation sector, including motor vehicles and public transportation, contributes the majority of exhaust emissions, such as nitrogen dioxide (NO2) and carbon monoxide (CO), as well as particulate matter (PM) which continually pollutes urban air. Meanwhile, coal-fired power plants, which are the main source of energy in the region, produce large amounts of sulfur dioxide (SO2) and particulate matter (PM) emissions. In addition, the industrial sector, which includes various manufacturing activities, factories and other industrial processes, also contributes significantly to air pollution through emissions of various types of exhaust gases, including greenhouse gases and other dangerous chemical compounds.

[11] Dinas Lingkungan Hidup Pemprov DKI Jakarta, *Inventarisasi Profil Emisi Dan Pelaporan Penurunan Emisi Gas Rumah Kaca Provinsi Dki Jakarta* (Jakarta: 2023), https://lingkunganhidup.jakarta.go.id/files/gasrumah/2023_LaporanAkhir_DKIJakarta.pdf.

Impact of Air Pollution on Health and Environment

The status quo of air pollution in Jakarta poses significant risks to both human health and the environment. Residents face increased exposure to respiratory and cardiovascular ailments due to prolonged exposure to pollutants like particulate matter (PM), sulfur dioxide (SO2), carbon monoxide (CO), and nitrogen dioxide (NO2). These pollutants are linked to a range of health problems, from short-term issues such as coughing and shortness of breath to long-term illnesses like respiratory tract infections and cardiovascular problems. Additionally, air pollution contributes to environmental degradation and ecosystem disruption, including the degradation of green spaces and loss of biodiversity.

Health-Related Issues Among Jakarta Residents

Health problems among Jakarta residents, especially those related to Acute Respiratory Infections (ARI), are a critical issue that requires serious attention. At the beginning of 2023, ARI cases experienced a drastic increase. Almost everyone is at risk of getting ARI, but there are several groups who are more vulnerable, such as children, pregnant women, the elderly, people with heart and lung disease, smokers, and people with weak immune systems. Data from the Jakarta Health Service explains that ARI cases in Jakarta reached 638.291 cases during January-June 2023, with details of cases in January 102.609 cases, February 104.638 cases, March 119.734 cases, April 109,705 cases, May 99.130 cases, and June 102.475 cases, followed by July 156.000 cases, and in August 2023, ISPA cases doubled to 200.000 cases.[12]

[12] Rokom, "Polusi Ancam Saluran Pernapasan," *Sehat Negriku*, *Kementerian Kesehatan RI*, 2024, https://sehatnegeriku.kemkes.go.id/baca/blog/20240108/5644635/polusi-ancam-saluran-pernapasan/.

The increase in the incidence of ARI also has a serious impact on the healthcare system in Jakarta. Jakarta residents, especially those living in dense urban areas, are often exposed to high levels of air pollution, which is known to be a major risk factor for ARI. There is a surge in the number of patients coming to hospitals and other health facilities in Jakarta with complaints of asthma and shortness of breath, which lead to symptoms of ARI. According to news reported by Kumparan.com, the Main Director of Persahabatan Hospital, Agus Dwi Susanto, said that there were more patient visits in early 2023 than last year. He also emphasized that overall, the increase in pollutants in Jakarta had a significant impact on ISPA cases.[13]

Environmental Degradation Within Urban and Surrounding Areas

Environmental degradation in Jakarta and its surrounding areas is a pressing concern exacerbated by rapid population growth and extensive development. Various forms of pollution, notably air pollution from motor vehicle emissions, industrial activities, and biomass burning, have inflicted significant damage on the environment. Significant reductions in air quality, often exceeding WHO safety standards, pose serious risks not only to human health but also to local ecosystems. This environmental damage extends to plants and habitats, resulting in biodiversity loss and ecological imbalance. The prevalence of diseases in both humans and animals is exacerbated by poor air quality, underscoring the urgent need for comprehensive measures to combat pollution and protect the environment in Jakarta and its surrounding areas.

[13] Raga Imam Annisa Thahira Madina, "Saat Udara Jakarta Buruk, Rs Alami Kenaikan Kasus Ispa," *KumparanNEWS*2023, https://kumparan.com/kumparannews/saat-udara-jakarta-buruk-rs-alami-kenaikan-kasus-ispa-2103lysNVYs/full.

Comparative Analysis

Jakarta grapples with formidable challenges in combating air pollution, stemming from rapid urbanization, inadequate public transportation infrastructure, and a heavy reliance on fossil fuels for energy generation. Despite regulatory efforts and investments in mass transit systems, the city struggles to tackle the underlying causes of air pollution effectively Thus, a comparative analysis with other major cities offers invaluable insights into both the hurdles and opportunities for enhancing air quality and mitigating environmental degradation. Although the solutions cannot be directly implemented in Jakarta considering the success of strategies depends on these factors, but still, by learning the approaches taken by these cities can be observed and possibly implemented in Jakarta.

Comparison with Other Major Cities Globally

A comparative analysis between Jakarta and other major cities globally, such as Singapore and Tokyo, offers valuable insights into the challenges and opportunities for enhancing air quality and combating environmental degradation. Based on research entitled ‘Singapore in Efforts to Increase the Air Pollution Index’ by Alma, Winarko, and Mutiara, Singapore has implemented rigorous policies to reduce vehicular emissions and promote green spaces in measures to control air pollution in cities, which results in relatively cleaner air and a higher quality of life for its residents.[14] Similarly, Tokyo's extensive public transportation system and emphasis on renewable energy have contributed to lower levels of air pollution, according to

[14] Juli Winarko Austiva Alma Rahmawati Hasyim, Marcellina Mutiara Firsty Hanindya, “Singapore in Efforts to Increase the Air Pollution Index” (Universitas Sebelas Maret, 2020), https://download.garuda.kemdikbud.go.id/article.php?article=2587626&val=24349&title=Singapore%20in%20Efforts%20to%20Increase%20the%20Air%20Pollution%20Index.

Shunta Hayashi and Tomoo Kikuchi on research ‘Traffic Congestion in Jakarta and the Japanese Experience of Transoriented Development.’[15]

On the other hand, the cities of Beijing in China and Bangkok in Thailand face similar challenges to Jakarta, where air quality levels in both countries have worsened and exceeded the safe limits recommended by the WHO. Daniel Kass, Senior Vice President of the Environmental Health Division at Vital Strategies, stated that in this scenario, the Chinese government is promoting the transition from biomass to LPG and electricity for natural gas usage, as well as shifting generator fuel from coal to gas. Regarding air pollution in Bangkok, he mentioned that the Bangkok government has implemented various policies such as enforcing clean vehicle technology, restricting the number of motorized vehicles, and better planning for land use and transportation.[16]

Lessons Learned and Applicable Insights

One of the main lessons in this regard is the importance of comprehensive and proactive policies in addressing air pollution. Both cities such as Singapore and Tokyo have shown that investments in sustainable transport, renewable energy, and green infrastructure can have a significant positive impact on the environment and the quality of life of city residents. Lessons from these cities underscore the importance of cross-sectoral policies and integration to achieve environmentally sustainable goals. Moreover, Jakarta can also benefit from experiences and best practices from other cities, such as Beijing and Bangkok that have similar air pollution experiences but

[15] Shunta Hayashi Tomoo Kikuchi, “Traffic Congestion in Jakarta and the Japanese Experience of Transoriented Development” (Nanyang Technological University, 2020), https://www.rsis.edu.sg/wp-content/uploads/2020/08/PR200825_Traffic-Congestion-in-Jakarta-and-the-Japanese-Experience-of-Transit-Oriented-Development.pdf.
[16] Vital Strategies Dinas Lingkungan Hidup Pemprov DKI Jakarta, "Menuju Udara Bersih Jakarta," (2019), https://www.vitalstrategies.org/wp-content/uploads/Menuju-Udara-Bersih-Jakarta.pdf.

have implemented stricter regulations and invested heavily in cleaner technologies. Through leveraging these learnings and insights, Jakarta can develop more effective strategies to address air pollution problems and protect the environment for future generations.

Indonesian Government's Policies to Combat Air Pollution

Policy Framework and Initiatives

The Indonesian government, including city authorities like Jakarta, has implemented various policy frameworks and initiatives to tackle air pollution and environmental degradation. At the national level, Indonesia has adopted various regulations and rules to control pollutant emissions from various sectors, including transportation, industry, and energy. One of the initiatives carried out by the Indonesian government is the National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK). According to the Indonesian Ministry of Environment and Forestry (KLHK), this plan targets a 29% reduction in greenhouse gas emissions by 2030, with the largest efforts focused more on energy, waste, industrial processes, and production use (IPPU), agriculture, and forestry.[17]

Furthermore, the Indonesian government has designated transportation infrastructure as one of the seven key sustainable development agendas in the 2020-2024 National Medium Term Development Plan (RPJMN). As per the Indonesian Directorate of Air Pollution Control, the primary objectives are enhancing the availability and quality of transportation infrastructure, along with the development of public transportation systems.[18] This serves as clear evidence of the Indonesian

[17] Kementerian Lingkungan Hidup dan Kehutanan, *Perkembangan Ndc Dan Strategi Jangka Panjang Indonesia Dalam Pengendalian Perubahan Iklim* (Jakarta: 2021).
[18] Direktorat Pengendalian Pencemaran Udara, *Rencana Strategis Tahun 2020-2024* (Kementerian Lingkungan Hidup dan Kehutanan, 2020).

government's commitment to supporting the implementation of SDGs target number 3 which aims to improve the prosperity of people worldwide.

Moreover, the Indonesian government also created the Air Pollution Standard Index (ISPU) as a national air quality monitoring tool. ISPU was created in 2020 by the Indonesian Ministry of Environment and Forestry (KLHK) based on regulation number 14 of 2020 concerning the Air Pollution Standard Index (ISPU). According to the website of the Indonesian Directorate of Air Pollution Control, ISPU is a number without units, used to describe the condition of ambient air quality in a particular location and is based on the impact on human health, aesthetic value, and other living things.[19] The government's initiative in creating the ISPU serves as an early warning system and provides information about ambient air quality for the public at specific locations and times. The public can find out the results of real-time air quality monitoring in Indonesia through the Android-based application and ISPU Net website, or through the Ambein Air Quality Monitoring Station (SPKUA) which is currently spread across 12 points in the Jakarta city area.

In addition, Jakarta also actively participates in regional and international initiatives to address environmental problems, including as a member of the C40 Cities Climate Leadership Group since 2006 and the ASEAN Working Group on Environmentally Sustainable Cities. Through cross-sectoral collaboration and knowledge exchange with other cities in Indonesia and around the world, Jakarta government seeks to develop more effective strategies for protecting the environment and improving the quality of life of city residents.

[19] Annisa Zahara Dasrul Chaniago, Indah Suci Ramadhani, "Indeks Standar Pencemar Udara (Ispu) Sebagai Informasi Mutu Udara Ambien Di Indonesia," *Direktorat Pengendalian Pencemaran Udara* (2020), https://ditppu.menlhk.go.id/portal/read/indeks-standar-pencemar-udara-ispu-sebagai-informasi-mutu-udara-ambien-di-indonesia.

National Regulations and Local Ordinances

The Indonesian government has issued a series of national regulations aimed at protecting the environment and controlling air pollution. One of the regulations is Jakarta Government Regulation Number 41 of 1999 concerning Air Quality Management and Air Pollution Control. This regulation provides a framework for local governments to regulate air quality in their respective regions. Apart from that, another significant national regulation is Law Number 32 of 2009 concerning Environmental Protection and Management, which includes environmental protection and management, preserving ecosystem functions, preventing pollution and environmental damage, as well as sustainable management of natural resources.

On the other hand, the Jakarta government has also issued several regulations that regulate air pollution more specifically. For instance, Jakarta Regional Regulation Number 2 of 2005 concerning Air Pollution Control, which sets emission standards for various types of air pollutants as well as control measures that must be followed by industry and motorized vehicles in Jakarta. Additionally, the regulation governs the development of green spaces, Car Free Day initiatives, emission permits for industries with regular evaluations, and emission taxes. Moreover, another local ordinance is the Governor of Jakarta's regulation Number 66 of 2020 concerning motor vehicle exhaust emission tests, which requires every motor vehicle owner to carry out an exhaust gas emission test and meet the emission thresholds.

Specific Policies Aimed at Reducing Air Pollution in Jakarta

The Jakarta government has implemented several specific policies aimed at reducing air pollution and improving air quality in the capital city. One of these is the Odd-Even policy, which was first implemented in 2016 as an effort to reduce air

pollution from motorized vehicles. At that time, this policy only applied to the Sudirman-Thamrin road and part of the Gatot Subroto area. Later, the points were expanded to 13 roads in 2018. Up to now, the Odd-Even policy has been implemented on 26 roads in Jakarta. This policy is implemented in accordance with Jakarta Governor Regulation Number 88 of 2019 concerning Amendments to Regulation Number 155 of 2018 regarding Traffic Restrictions with an Odd-Even System. With this policy, private four-wheeled vehicles are only allowed to operate on certain days based on their license plate numbers, thereby reducing the number of vehicles on the road on any given day and lowering exhaust emissions.

Furthermore, the Jakarta regional government is also imposing an emission test policy on motor vehicles in several areas in Jakarta. This policy is implemented based on Regional Regulation Number 2 of 2005 concerning Air Pollution Control, specifically Article 19, which requires motorized vehicles to meet vehicle exhaust emission thresholds. Uniquely, emissions testing on motorized vehicles in Jakarta is usually carried out in the form of a "ticket" operation. This law enforcement operation was carried out by the Jakarta regional police called Polda Metro Jaya and the Jakarta Government on several roads in Jakarta. However, emission tests can be carried out in workshops that are equipped with emission test equipment.

Apart from that, the Jakarta Government has also adopted a sustainable transportation policy that aims to reduce air pollution from the transportation sector, such as Regional Regulation Number 5 of 2014 concerning Transportation and Jakarta Governor Regulation Number 68 of 2021 concerning the Implementation of Integrated Transportation Systems. This includes developing public transportation infrastructure that is more environmentally friendly, such as building the Jakarta MRT

and LRT, electrification of the transport sector, increasing cyclist lanes on the right side of roads, and expanding pedestrian areas.

Implementation Strategies

Effective implementation of air pollution regulations requires a range of strategies. In Indonesia, the government has identified several key strategies to implement planned transportation infrastructure programs, including monitoring and enforcement, increasing collaboration between partnerships between the public and private sectors, as well as improving coordination between institutions and government levels in implementing transportation infrastructure projects. The government also applies an inclusive and participatory approach by involving various stakeholders, including local communities, in the planning, decision-making, and implementation processes of transportation infrastructure projects. This aims to ensure that the interests of the community are taken into account and that the projects provide maximum benefits for all levels of society.

Enforcement Mechanisms

As mentioned before, the government has implemented various policies and law enforcement mechanisms to address the problem of violations and non-compliance with environmental and transportation regulations. One of them is the Emission Test, which is law enforcement against violations of motor vehicle emissions that exceed the limits. In this context, Jakarta Governor Regulation Number 66 of 2020 concerning Air Pollution Control is the legal basis for efforts to control air pollutant emissions. Based on the Jakarta Low Emissions website, the official emission test enforcement was implemented as of September 1, 2023, with fines for violators in

accordance with Law Number 22 of 2009 concerning Road Traffic and Transportation. The fines are set at IDR 250,000 for two-wheeled vehicles and IDR 500,000 for four-wheeled vehicles.[20] By implementing stricter enforcement of emissions tests, the Jakarta regional government hopes to reduce emissions from motorized vehicles, which are the main contributor to air pollution.

Apart from that, the government is also implementing law enforcement against Odd-Even violations in Jakarta which are regulated in article 287 of Law Number 12 of 2009 concerning Road Traffic and Transportation. According to Jakarta Transportation Agency website, supervision and enforcement of Odd-Even violations are carried out in two ways, such as manually by the Police and electronic ticketing (ETLE). In this case, Odd-Even violators will be subject to a fine of a predetermined amount or a maximum fine of up to IDR 500,000.[21]

Public-Private Partnerships and Collaborations

Partnerships between the public and private sectors have become an integral part of Jakarta's air pollution control strategy. In this context, various initiatives have been implemented to strengthen this collaboration to achieve the common goal of maintaining better Jakarta air quality. One example of a partnership between the public and private sectors in overcoming air pollution is through the development of environmentally friendly public transportation. For example, the government is collaborating with private companies such as PT MRT Jakarta (Perseroda) together with PT Kereta Api Indonesia (Persero) to simplify and improve integrated intermodal transportation services for communities in the Jakarta area. The private

[20] Jakarta Rendah Emisi, "Penegakan Uji Emisi: Langkah Kritis Dalam Mengatasi Polusi Udara Di Jakarta," (2023), https://rendahemisi.jakarta.go.id/article/197/penegakan-uji-emisi-langkah-kritis-dalam-mengatasi-polusi-udara-di-jakarta.
[21] Dinas Perhubungan, "Ganjil Genap," (2023), https://www.jakarta.go.id/ganjil-genap.

companies mentioned above can play a role in providing vehicles, charging infrastructure, and related technologies, while governments provide the necessary incentives, regulations, and policy support to facilitate the use of this sustainable transportation. This kind of collaboration not only helps reduce private vehicle emissions, which are the main cause of air pollution but also expands the accessibility of public transportation for society, thereby promoting more sustainable mobility.

Challenges and Limitations

Despite concerted efforts to tackle air pollution in Jakarta, significant challenges persist. Foremost among these challenges is the relentless rise in motorized vehicles and population mobility. According to a report from the Central Statistics Agency (BPS), the number of motorized vehicles in Jakarta has continued to increase over the last five years.[22] Moreover, rapid economic growth and urbanization have contributed to the surge in the number of vehicles on the road, subsequently escalating the emission of exhaust gases and harmful particulates into the air. This issue is further compounded by the inadequate public transportation infrastructure and the low level of public awareness regarding the significance of sustainable transportation.

[22] Badan Pusat Statistik, *Jumlah Kendaraan Bermotor Menurut Provinsi Dan Jenis Kendaraan (Unit)* (2022), https://www.bps.go.id/id/statistics-table/3/VjJ3NGRGa3dkRk5MTlU1bVNFOTVVbmQyVURSTVFUMDkjMw==/jumlah-kendaraan-bermotor-menurut-provinsi-dan-jenis-kendaraan--unit---2022.html?year=2019.

Financial, Technological, and Logistical Hurdles

In Jakarta, addressing air pollution is impeded by a trifecta of challenges: limited financial resources, technological barriers, and logistical constraints. The insufficient budget allocation for green infrastructure and pollution control technologies hampers efforts to implement emission reduction programs and adopt clean energy solutions, such as building bicycle lanes or promoting electric vehicles. Furthermore, the high costs associated with deploying green technology and enhancing air monitoring systems pose additional hurdles, exacerbated by the scarcity of technical resources and inadequate infrastructure. Meanwhile, logistical obstacles compound the complexity of combating air pollution in Jakarta. The development of essential green infrastructure and public transportation necessitates meticulous planning and coordination among various stakeholders. However, bureaucratic complexities, slow licensing processes, and resistance from affected parties hinder progress, delaying critical projects and exacerbating the city's pollution woes.

Policy Effectiveness and Gaps

Combating air pollution in Indonesia has not yet touched the root of the problem. This happens because existing policies have minimal evaluation, are not yet comprehensive, and are not effective. Violations still occur and there is a lack of strict law enforcement against perpetrators of violations. This results in low compliance with regulations so that the effectiveness of policies in reducing air pollution is still questioned.

Moreover, there is also a gap between existing policies and real conditions in the field. For example, although there are programs to introduce environmentally friendly public transportation, there are still limitations in building adequate public

transportation infrastructure and services. This causes people to still tend to use private vehicles, which contributes to increasing exhaust emissions and air pollution in Jakarta.

Gaps also exist in terms of resources and financial support to implement policies. Some programs that have been designed to reduce air pollution may not be implemented optimally. In other words, this gap arises because desired outcomes are not met. This certainly creates barriers to adopting environmentally friendly technologies, conducting effective air quality monitoring, and providing incentives for people to switch to more sustainable lifestyles.

Dubious Effects of Such Policies

Effectiveness and Controversies

Government efforts, both by the Indonesian government and the Jakarta government, to address air pollution in Jakarta have raised a number of questions and controversies regarding the effectiveness of the policies implemented and their implementation. Despite steps taken to reduce vehicle emissions, industrial pollution, and emissions from power plants, the effectiveness of these policies is often questioned due to the continued increase in air pollution levels in Jakarta.

Evaluation of the Actual Impact on Air Quality Improvement

An assessment of the actual impact of efforts to address air pollution in Indonesia shows some progress. Air quality monitoring data shows a decrease in air pollution levels in recent years, especially in the parameters of PM2.5 particulates and other polluting gases. According to the 2023 Performance Report of the Directorate of Air Pollution Control, the result of calculating the National Air Quality Index (IKU)

obtained from ambient air quality measurement data in 511 cities in Indonesia in 2023 is 88.67, while the target for 2023 is set at 84.40, resulting in a performance achievement of 105.06%.[23] This indicates that the National Air Quality Index exceeds the target originally set and shows that the policies and programs that have been implemented are starting to provide positive results in improving air quality in the capital city.

However, the evaluation also revealed that there were gaps that needed further attention. Even though there has been an improvement in Indonesia's overall air quality, based on data from the 2023 World Air Quality Report by IQAir, Indonesia ranks 14th for having the worst air quality in the world (annual average PM2.5 concentration: 37.1 µm/m3).[24] This is very concerning. Moreover, there are still several areas in Indonesia, such as Jakarta, that experience high levels of air pollution, especially areas within the city of Jakarta that surround industrial centers and main transportation routes. This shows that efforts to control air pollution are still uneven and need to be strengthened in areas that are vulnerable to air pollution.

Controversies Surrounding Policy Measures and Their Implementation

Although the Jakarta government has taken steps to address air pollution in the capital, the policy measures and their implementation are not free from controversy. One of the main sources of controversy is related to the success of law enforcement and the implementation of existing policies. Even though there are regulations regarding vehicle emissions testing, there are still violations that are not strictly monitored by the authorities, with many vehicles remaining untested in Jakarta.

[23] Direktorat Pengendalian Pencemaran Udara, *Laporan Kinerja Direktorat Pengendalian Pencemaran Udara Tahun 2023* (2023), https://ppkl.menlhk.go.id/website/filebox/1196/240118151938LKj%20Dit%20PPU%202023.pdf.
[24] IQAir, *2023 World Air Quality Report*.

According to data from the Jakarta Environmental Service, the total number of emission tests conducted on 4-wheeled vehicles as of the beginning of 2024 was 1,409,475 out of a total of 2,238,377 vehicles, while the total number of emission tests conducted on 2-wheeled vehicles was 139,068 out of a total of 8,871,233 vehicles.[25]

Moreover, controversy also arises regarding the effectiveness of policies implemented in dealing with air pollution. Although there have been measures to reduce vehicle emissions such as the Odd-Even regulations, there has not been a significant improvement in overall air quality in Jakarta. In fact, private vehicle transportation increases every year, which contributes to increasing congestion and air pollution in Jakarta. This, of course, ultimately raises questions about the success and relevance of the policies that have been implemented in overcoming the increasingly worsening air pollution problem in the capital city.

Apart from that, controversy also arises regarding the social and economic impacts of the policies implemented. For example, restrictions on motorized vehicles cause dissatisfaction among drivers, especially if the public transportation infrastructure available in Jakarta is deemed inadequate. Meanwhile, investment in green technology and the energy transition from fossil to renewable energy in reality requires high capital costs but in the long term can affect economic competitiveness. This raises questions about the balance between environmental policy and economic interests in the context of Jakarta's development as a fast-growing business and trade center.

[25] Dinas Lingkungan Hidup Provinsi DKI Jakarta, *Data Statistik Uji Emisi Kendaraan* (Jakarta: 2024).

Unintended Consequences

Regarding the problem of air pollution in Jakarta, there are a number of undesirable consequences that need to be taken into account. One of the most striking impacts is the health problems it causes. High levels of air pollution have been shown to contribute to increased cases of respiratory infections, as well as increasing the risk of cardiovascular issues and lung cancer. Apart from that, air pollution also has a negative impact on the environment, such as forest destruction, decreasing water and soil quality, and reducing agricultural productivity. All of these can have a direct impact on the welfare of the people and the sustainability of Jakarta's environment, especially giving a deep impact on local businesses and communities, and giving potential displacement and marginalization effects, especially to those people who live in areas that are more exposed to air pollution in Jakarta.

Economic Impacts on Local Businesses and Communities

The impact of Jakarta's air pollution on business is very significant. This is because air pollution not only has an impact on public health, but also affects business performance, including reduced productivity and reduced profits for businesses, which ultimately affects economic growth in the region. High levels of air pollution can result in decreased work productivity due to higher employee absenteeism and increased health costs for medical care.

Apart from that, Jakarta's business image and investment attractiveness can also be negatively affected due to Jakarta's persistent air pollution and unhealthy surrounding environmental factors. This certainly makes companies reluctant to operate or invest capital in the area. In this context, the economic impact of air

pollution can cause a decline in investment and business activity in the city, which results in reduced employment opportunities and reduced economic growth.

Potential Displacement or Marginalization Effects

In Jakarta, the implications of air pollution extend far beyond statistical figures—they're stories of lives disrupted. The pervasive pollutants emitted by industrial and transportation sectors aren't merely triggers for health issues; they're catalysts for societal upheaval. Families mourn loved ones lost too soon, while children struggle to breathe. Hospitals strain under the weight of respiratory cases, a grim reminder of the toll exacted by polluted air. Yet, it's the marginalized segments of society that bear the brunt. Trapped in neighborhoods saturated with pollutants, individuals face a daily assault on their well-being, compounded by the socio-economic barriers of poverty, discrimination, and unemployment. This cyclical dynamic perpetuates inequality, pushing those already marginalized even further into the margins, where the prospect of a brighter future seems increasingly out of reach.

Public Distrust and Skepticism

Public distrust and skepticism often stem from regulations made by the government to reduce air pollution in Jakarta, leading to a lack of confidence in the effectiveness and compliance with implemented regulations regarding air pollution in the city. This reflects doubts about the government's ability to enforce regulations and ensure effective policy implementation in addressing air pollution problems.

Public distrust of air pollution in Jakarta and regulations made by the government can indirectly hinder understanding of public skepticism. In other words, public distrust of the government's efforts to address air pollution can make it difficult

to comprehend and respond positively to the distrust and doubt that arises among the public. Public skepticism towards regulations and government efforts to reduce air pollution in Jakarta can sow doubts about the effectiveness and success of regulations, which can then increase obstacles to the success and compliance of these regulations.

Instances of Public Dissent or Protest Against Policies

There are differences of opinion regarding the success of the policies implemented in reducing air pollution levels. The odd-even regulation, which has been planned and implemented since 2016, has generated a lot of responses from the public, including protests. Some people feel that existing policies (e.g., the Odd-Even policy in Jakarta) are inadequate or ineffective in dealing with air pollution problems. On the contrary, some people think that this regulation actually increases the number of private vehicle users and then results in increasingly worse traffic jams. This is because this policy makes people choose to use different number plates so they can pass on protocol roads in Jakarta.

Moreover, there are also protests regarding emission test tickets for motorized vehicles. Many people think that fines for emission test tickets are too large and burdensome. Additionally, the government's lack of information and transparency to the public regarding emission test regulations means that most Jakarta residents who receive tickets are confused about the reasons for their fines. On the other hand, many Jakarta residents are still reluctant to use public transportation because Jakarta's transportation modes are still inadequate and undergoing development.

Surveys and Studies Revealing Public Distrust or Skepticism towards Government Actions

When examining public distrust or skepticism towards government actions regarding air pollution in Jakarta and the regulations implemented, surveys and studies play a crucial role in providing insights into public perceptions and attitudes. For example, research entitled "Adaptive Governance or Status Quo?" by Dimas Luqito and M. Irwanda Firmansyah shows that several government policies that have been implemented regarding air pollution in Jakarta have led to public dissatisfaction. In this study it is also explained that there is a strong tendency towards limited public involvement and participation in air pollution control programs in Jakarta, where the status quo is maintained in the absence of adequate adaptation or broad involvement of all stakeholders.

In addition, public distrust towards government actions is evident in criticisms alleging downplaying of air pollution severity and inadequate action to improve air quality. In a 2021 court ruling found that the government, including President Joko Widodo and former Jakarta governor Anies Baswedan, had been negligent in handling the city's air pollution problem. After the decision, central government officials appealed to the DKI Jakarta High Court, but the panel of judges refused and still decided the defendants were unlawful in October 2022. According to Elisa Sutanudjaja, one of the 'Capital Coalition' who is suing the government regarding the right to clean air in 2021, said that even though the lawsuit has been won, she feels that up to now there has been no significant change made by the government in addressing air pollution problem.[26]

[26] Eva Rianti, "Pemprov Dki Terbitkan Pergub Pengendalian Pencemaran, Warga: Viral Dulu, Baru Buru-Buru," *Republika News* (Jakarta)2023, https://news.republika.co.id/berita/rzc87l349/pemprov-dki-terbitkan-pergub-pengendalian-pencemaran-warga-viral-dulu-baru-buruburu.

Comparative Analysis of Expected vs. Actual Outcomes

In evaluating the success of efforts to combat air pollution in Jakarta, there's a significant difference between initial expectations and the actual results achieved. Initially, there was public confidence that government policies, such as stricter regulations on motor vehicles and reduced industrial emissions, would bring about significant positive changes in the capital's air quality. However, in reality, Jakarta still grapples with air pollution. Actual results show that despite several implemented policies, Jakarta's air quality, according to IQAir, often falls within the orange and red zones, which indicates that the air quality is unhealthy.[27] This certainly reflects the disparity between expectations and reality.

Discrepancies between policy goals and real-world outcomes

Discrepancies between policy goals and real-world outcomes are common across various domains, including in air pollution policies. Policies aimed at mitigating air pollution in Jakarta, such as emissions regulations or conservation efforts, may not always produce the desired outcomes due to factors like lack of enforcement, or resistance from industries. For example, the policy that limits access to motorized vehicles based on plate numbers, or commonly known as the odd-even regulation, was implemented with the hope of reducing exhaust emissions but has not been able to have a significant impact. Initially, this odd-even system was created by the Jakarta government to reduce traffic jams, as well as to reduce air pollution and encourage people to use public transportation.

[27] IQAir, "Kualitas Udara Di Jakarta."

The Odd-Even rule basically still has pros and cons. However, research on the Government's Success in Overcoming Congestion in the Capital City of Jakarta by Setyaningsih shows that the Odd-Even policy is not only less effective in reducing air pollution, but also causes negative impacts such as increased traffic on alternative roads and inconvenience for people who are forced to change their transportation habits.[28] This emphasizes the need for an in-depth evaluation of policy implementation and possible adjustments so that the desired results can be achieved more effectively.

Analysis of Gap between Scientific Predictions and Policy Effectiveness

Although scientists have made strong predictions about the adverse impacts of air pollution on public health and the environment, government policy implementation often fails to achieve the expected results. For instance, the odd-even regulation was implemented with the aim of reducing the level of air pollution and traffic congestion in Jakarta, but the results have not been satisfactory. Ika Idris, Chair of the Monash Climate Change Communication Research Hub (MCCCRH), argued that the narrative regarding air pollution in Jakarta is dominated by policymakers who have minimal support from scientific data.[29] Therefore, instead of actually reducing pollution, policymakers who speak without data actually obscure the causes of pollution and the policy is often based on the scientific-based. Moreover, the government seems to often ignore and not consider the importance of scientists'

[28] A. Setyaningsih, “Metode Binomial Mengenai Keberhasilan Pemerintah Dalam Mengatasi Kemacetan Di Ibu Kota Jakarta” (2021).
[29] CNN Indonesia, "Pakar Sindir Cara Pemerintah Tangani Polusi Udara: Dengarkan Ilmuwan," *CNN Indonesia* (Jakarta)2023, https://www.cnnindonesia.com/teknologi/20230829184555-199-992053/pakar-sindir-cara-pemerintah-tangani-polusi-udara-dengarkan-ilmuwan.

voices. This often results in a striking gap between scientific predictions and the effectiveness of policies implemented by the government.

Context and Significance of Air Pollution in Jakarta

Central Policy Role

As Indonesia's capital, Jakarta is critical in addressing environmental challenges, notably air pollution. Situated on the northwest coast of Java, Jakarta isn't just a bustling political and economic hub but also the place where environmental rules are set for the entire Indonesian archipelago. Its pivotal role in shaping and enforcing policies to combat air pollution cannot be emphasized enough. With a large population and bustling industrial scene, Jakarta deals with significant environmental challenges, including alarming levels of air pollution. This pollution isn't just a nuisance; it's a serious threat to the health and well-being of its residents, and it seriously affects their day-to-day lives.

The government of Jakarta is tasked with devising innovative and effective strategies to combat these challenges. This includes the development of regulations aimed at reducing emissions from vehicles and industrial activities, the promotion of green spaces to improve air quality, and initiatives to encourage the use of public transportation. Moreover, Jakarta's efforts serve as a benchmark for other Indonesian cities grappling with similar issues, making its policies and initiatives critical in setting national standards for environmental management and sustainability.

High Pollution Levels

The significant air quality issues currently facing Jakarta highlight the city's urgent need for policy-focused research. The Jakarta city's high pollution levels have

become a major concern for its residents, affecting millions of lives by exacerbating respiratory conditions and other health problems. Yet, it also becomes increasingly clear that addressing this environmental challenge is not just a matter of public health but also of sustaining the city's economic productivity and quality of life.

The emphasis on "policy-focused research" here implies that there is a need for evidence-based strategies that can guide lawmakers and city planners in implementing measures that will significantly improve air quality. That means, efforts to tackle these issues require a multifaceted approach, including rigorous research to identify pollution sources, evaluate the effectiveness of current regulations, and propose evidence-based solutions. By prioritizing policy-focused research, stakeholders can develop targeted strategies that address the root causes of air pollution in Jakarta, ultimately leading to a healthier, more sustainable urban environment.

Urban and Demographic Dynamics

Urban dynamics and demographics play an important role in understanding the diverse views on air pollution in Jakarta. The city, known for its vibrant cultural mosaic, is home to a diverse and dynamic population. This diversity spans a wide spectrum of socioeconomic backgrounds, education levels, and ethnicities, all contributing to varying perceptions and concerns regarding air pollution.

These urban dynamics and demographics intricately intertwine with Jakarta's air pollution dilemma. The city's rapid population expansion and urbanization fuel heightened industrial, transport, and construction activities, amplifying pollution levels. Social and spatial disparities further compound the issue, with densely populated urban centers bearing the brunt of vehicle emissions and limited access to

public transportation. In contrast, suburban areas may grapple with lower pollution levels but face environmental degradation from deforestation and land conversion.

Thus, understanding the characteristics of this diverse and dynamic population is critical to developing effective strategies to combat air pollution in Jakarta. This allows policymakers and environmental activists to adapt their approaches to address the specific needs and problems of different segments of society. For example, more affluent regions may prioritize technological solutions, while lower-income areas may focus on short-term health impacts and affordable mitigation strategies. Understanding these dynamics becomes increasingly crucial as cities grow in estimating future pollution levels and planning sustainable urban development.

Jakarta Citizens as Stakeholders in Air Pollution Management

Direct Health Impacts

Due to the poor air quality that permeates the city, Jakarta residents often face significant health challenges. A noticeable number of locals report experiencing respiratory issues, such as asthma, chronic bronchitis, and other lung-related diseases, which they directly attribute to the high levels of pollutants in the air. Besides respiratory problems, there is also a concerning rise in other health impacts, including cardiovascular diseases, eye irritations, and skin conditions, which further exacerbate the public health crisis. Moreover, children and the elderly are particularly vulnerable to these adverse health effects, which can lead to increased mortality rates and reduced life expectancy among the city's population.

Jakarta residents' experiences with respiratory problems or other health issues greatly influence how they view air quality management. These individuals, who face daily challenges due to the polluted air, often develop strong opinions on how air

pollution should be tackled and mitigated. Moreover, this personal experience becomes an essential factor in shaping the views and attitudes of Jakarta residents towards air quality management efforts. They may be more supportive of government policies aimed at reducing air pollution and improving air quality in their cities, as they recognize the direct impact on their health, well-being, and communities.

Visibility and Awareness

High visibility of Jakarta's air pollution problems increases public support for robust air pollution policies. In this context, when the severe pollution issues affecting Jakarta become more visible and widely recognized by the public, especially in mid-2023, there's a significant increase in the demand for action and intervention from policymakers. This heightened awareness among citizens and residents about the harmful effects of air pollution on health, the environment, and the quality of life acts as a catalyst, urging government officials and stakeholders to develop and implement comprehensive strategies to reduce pollution levels in the city. Consequently, the visibility of Jakarta's pollution challenges raises public consciousness. It fosters a collective push toward adopting stringent air pollution controls and measures, underscoring the importance of transparency and information dissemination in environmental advocacy and policy reform.

Engagement with Policy

The closeness of the people of Jakarta to the policy-making process on air pollution creates a strong foundation for their active participation. As the people of Jakarta live close to the issues at hand, experiencing the effects of air pollution first-hand, they have a unique perspective that could enrich the policy-making process.

This proximity not only fosters a deeper understanding of the nuances around air pollution challenges but also empowers the community to potentially play a more active role in shaping policies. This closeness allows the public to voice their concerns and provide the government and policymakers valuable input. Moreover, this perspective can also be crucial for developing effective and practical solutions that address the root causes of air pollution and mitigate its impacts.

Assessment of Jakarta Citizens' Responses to Air Pollution Policies

Effectiveness of Air Pollution Control Policies and Public Awareness

Jakarta residents' perceptions of the air pollution policies effectiveness are becoming increasingly complex. While measures like vehicle emissions controls and Odd-Even traffic rules are seen positively by some as government efforts to combat pollution, many highlight implementation shortcomings such as inconsistent enforcement and inadequate infrastructure. According to Ika Idris, an advocacy group called Greenpeace has highlighted persistent dissatisfaction with government communication regarding environmental issues, with concerns ranging from transparency to comprehension.[30] There's a clear need for attention not only to policy implementation but also to improving government communication methods to effectively convey information to the public and foster greater environmental awareness and engagement.

[30] Ika Idris, *Jakarta Air Pollution: The Challenges of Turning Evidence into Policy* (Melbourne: Monash University, 2023).

Policy Effectiveness

While some people praise the government's efforts in reducing pollution levels, others remain skeptical about the actual impact of such measures. In this context, the implementation of vehicle emissions controls, including regular vehicle inspections and emission standards, has faced challenges in enforcement and compliance. Similarly, the Odd-Even traffic rule, which restricts vehicles based on their license plate numbers on alternate days, has been met with mixed reactions due to concerns about its efficacy in curbing pollution, especially in the long term. According to Budiyanto, a former Head of the Sub-Directorate of Polda Metro Jaya, this could happen due to the number of vehicles that is not commensurate with road infrastructure development.[31]

Communication Effectiveness

Effective communication of air quality standards and pollution policy achievements in Jakarta is crucial for fostering public awareness. Yet, some people felt that the communication lacked transparency and was hard to understand, while others hoped for more initiatives to raise awareness of the impacts of air pollution and achieve environmental policies. While initiatives such as public awareness campaigns, online platforms for air quality data dissemination, and educational programs have been implemented, their effectiveness in reaching and engaging all segments of the population remains a challenge. According to monitoring by Kompas.com, on a number of roads with odd-even regulations, it was observed that

[31] Gilang Satria, and Agung Kuniawan, "Alasan Ganjil-Genap Dinilai Tak Efektif Urai Kemacetan Jakarta," *Kompas.com* (Jakarta)2021, https://otomotif.kompas.com/read/2021/08/19/122200615/alasan-ganjil-genap-dinilai-tak-efektif-urai-kemacetan-jakarta.

there were still many drivers with odd plates passing on even-numbered days.[32] This indicates that many car drivers still do not know about the point on which roads the Odd-Even regulations apply. Limited access to information and varying levels of environmental literacy among citizens contribute to gaps in communication effectiveness.

Public Satisfaction

The level of satisfaction of the people of Jakarta with air pollution policies is currently low. This is because air pollution is still real and continues to occur in this city. Many city residents are worried and dissatisfied with the ever-increasing levels of air pollution. Even though the government has implemented several policies to reduce air pollution, such as limiting motorized vehicles and increasing urban greening, the positive impacts have not been felt significantly. A number of residents feel that mitigation efforts are still inadequate and that more concrete and effective steps are needed. This is made clear by the 2024 study on the Evaluation of Air Pollution Handling Policies Based on Community Perceptions in Jakarta, which states that the level of satisfaction of the people of Jakarta City with the evaluation of air pollution handling policies is 47.85%, which is included in the "very poor" category.[33] Therefore, some Jakarta residents are still demanding greater and more sustainable changes in addressing the air pollution problem that threatens their well-being.

[32] Mita Amelia Hapsari, and Irfan Maullana, "Masih Banyak Pengendara Mobil Belum Tahu Ganjil Genap Berlaku Dan Diperluas Menjadi 25 Titik," *Kompas.com* (Jakarta)2022, https://megapolitan.kompas.com/read/2022/06/07/07543041/masih-banyak-pengendara-mobil-belum-tahu-ganjil-genap-berlaku-dan?page=all.
[33] Pricilia Angel, "Evaluasi Kebijakan Penanganan Polusi Udara Berdasarkan Persepsi Masyarakat Di Jakarta," (2024), https://digilib.uns.ac.id/dokumen/detail/111205/.

Implementation and Compliance of Air Pollution Policies

Both vehicle emissions testing and the implementation of the Odd-Even rule in Jakarta encounter hurdles, highlighting challenges in policy implementation and compliance. The complexity and inconsistency of emissions testing procedures pose difficulties for the public in adhering to emission limits, exacerbated by insufficient information dissemination and outreach efforts. Similarly, the Odd-Even rule, while praised by some for reducing rush hour congestion, receives criticism for merely displacing traffic to alternative routes and failing to offer a sustainable solution to traffic and air pollution issues. Concerns also arise regarding its consideration of the diverse mobility needs of the population, particularly those reliant on private vehicles for daily activities. These challenges underscore the importance of addressing implementation issues and fostering public awareness to ensure effective compliance with air pollution policies in Jakarta.

Emissions Testing

The public opinion regarding the vehicle emissions testing process in many areas of Jakarta still shows considerable dissatisfaction. Difficult access to testing facilities can pose challenges, particularly for residents in outlying areas or those with limited transportation options. Additionally, the reliability of testing procedures and equipment may come into question, with concerns about accuracy and consistency in measuring vehicle emissions. According to Inez, a resident of Jakarta, in her interview with KBR Indonesia, the government was not serious about carrying out emissions tests because the workshop where she tested her vehicle's emissions was not

responsive.[34] As a result, there is pressure from public for increased monitoring and strict enforcement of the emissions testing process, as well as demands for increased transparency in its implementation to ensure that vehicles operating in Jakarta meet established emission standards.

Compliance Challenges

Currently, many Jakarta residents admit that the air pollution policies implemented by the government have good intentions. But at the same time, the residents also face a number of challenges in complying. The Odd-Even Rule, which limits vehicles based on plate numbers on certain days, often causes inconvenience for people in their daily mobility, especially for those who depend on private vehicles. Meanwhile, the implementation of vehicle emission controls is also faced with technical challenges that make it difficult for vehicle owners to ensure their vehicles meet established emission standards.

Limited access to reliable and affordable public transportation has also become one of the main challenges. Despite the implementation of measures like the Odd-Even regulations aimed at encouraging the use of public transportation or eco-friendly alternatives, many residents continue to rely on private vehicles. This reliance contributes to increased air pollution levels due to factors such as discomfort, longer travel times, and perceived safety concerns with public transport. According to Greenpeace Indonesia in the Jakarta Transportation Transformation Report, more efforts need to be made to provide environmentally friendly transportation alternatives

[34] Heru Haetami, and Astri Yuanasari, "Keluhan Warga Soal Sulitnya Uji Emisi Kendaraan Bermotor," *KBR Indonesia* (Jakarta)2023, https://kbr.id/berita/nasional/keluhan-warga-soal-sulitnya-uji-emisi-kendaraan-bermotor-.

and improve public transportation infrastructure so as to minimize dependence on private vehicles.[35]

Enforcement Perceptions

The opinions of the people of Jakarta regarding the enforcement of political air policy laws, especially regarding Odd-Even regulations and vehicle emission controls, show a number of diverse thoughts and evaluations. Although many recognize the importance of law enforcement to ensure compliance with air policy policies, there is also dissatisfaction with the consistency and firmness of enforcement of these rules. Many residents feel that law enforcement regarding Odd-Even regulations and vehicle emission controls is still lacking, with many violations occurring without any firm enforcement action. In addition, providing information and counseling to the public has resulted in many public opinions feeling that this regulation is still not effective enough in reducing air pollution in Jakarta. This casts doubt on the effectiveness of air pollution policies and undermines public confidence in the government's commitment to dealing with environmental problems.

Unintended Health and Economic Consequences of Air Pollution

Jakarta's air pollution has undesirable health and economic consequences that are highly detrimental to society and the economy as a whole. From a health perspective, constant exposure to air pollution can cause a variety of serious health problems, including respiratory problems such as asthma and bronchitis, cardiovascular disease, and even increase the risk of lung cancer. High levels of air

[35] Elisabeth Rianawati et al., *Transformasi Transportasi Jakarta: Mengkaji Ulang Target Emisi Nol Sektor Transportasi Tahun 2050* (Jakarta: Greenpeace Indonesia, 2022), https://www.greenpeace.org/static/planet4-indonesia-stateless/2024/02/aca5c6c5-full-report_ind.pdf.

pollution can also cause an increase in the number of hospital visits and an increase in death rates from air pollution-related illnesses. Economically, the impact of air pollution is also significant. The high health care costs of treating diseases caused by air pollution place a huge financial burden on health systems and individuals. Apart from that, work productivity can also be disrupted due to higher work absenteeism due to illnesses caused by air pollution. In addition, air pollution can also damage infrastructure and other economic assets, such as buildings and agriculture, which can cause long-term economic losses.

Health Impact

The health impacts of air pollution reflect the increasing concerns of the people of Jakarta. More and more people are realizing that air pollution has a serious impact on their health. High levels of air pollution in Jakarta have been linked to various health problems, including respiratory problems, cardiovascular disease and even cancer risk. Many Jakarta residents experience symptoms such as eye irritation, coughing and shortness of breath due to exposure to high levels of air pollution. In addition, Jakarta's deteriorating air quality makes people vulnerable to Acute Respiratory Infections (ARI). This has sparked deep concern for the health of themselves and their families, as well as increasing calls for stronger action to tackle the problem of air pollution. Increasing information about the negative health impacts of air pollution has sparked a push for more proactive policies to reduce emissions and improve air quality in Jakarta. Thus, awareness of the health impacts of air pollution is increasing among the people of Jakarta, strengthening the demand for concrete measures that can address this problem more effectively.

Economic Impact on Citizens

High levels of air pollution in the capital city hamper economic activity. In this case what is meant is community work productivity. In this case, air pollution issue is correlated with workers' health and concentration issue where people's outdoor work activities and productivity are decreasing. In addition, economic opportunities associated with sectors such as tourism and industry can also be negatively affected by the negative image generated by high levels of air pollution. So, at the same time this also affects several activities such as shopping and tourism. These two activities certainly have a big influence on the country's economy. When people reduce shopping and tourism activities, this will indirectly reduce local income. This will affect individual community income, as well as state income. The cost of losses resulting from poor air quality in Jakarta during the period January to July 2020 has reached 23 trillion rupiah.[36] These losses are of course not only limited to health costs that must be paid by society and the state, but also the costs of opportunity loss and decreased productivity experienced by disease sufferers.

Impact on Local Businesses

Air pollution also has a major impact on local businesses in Jakarta, both directly and indirectly. Directly, reduced air quality can reduce the number of customers visiting businesses, especially for businesses that depend on foot traffic or outdoor activities. Additionally, poor air quality can discourage customers from visiting establishments, leading to decreased foot traffic and revenue. Indirectly,

[36] Bondan Andriyanu, and Rahma Shofiana, *Polusi Udara Memakan Biaya Rp 21 Triliun Di Jakarta Pada Tahun 2020* (Jakarta: Greenpeace Indonesia, 2020).

increasing health costs and work absenteeism due to air pollution can also affect people's purchasing power, reduce consumer spending and hinder business growth.

Overall, the impact of Jakarta's pollution on business is very significant. Health problems caused by air pollution can lead to increased absenteeism and decreased productivity at work. This can result in decreased profits for the business. The impact of air pollution can also cause a decrease in investment and a decrease in business activity in the city. This can lead to reduced job opportunities and decreased overall national economic growth.

Public Distrust and Policy Recommendations Regarding Air Pollution

There is a significant level of distrust from the public towards government actions to reduce air pollution. This is often due to the perception that existing policies are not effective enough or that law enforcement against environmental violations is inconsistent. This distrust also arises from a lack of transparency in the policy-making process and a lack of public participation in environmental decision-making. To address this, concrete steps such as increasing transparency and public involvement in policy-making, alongside bolstering the role of scientific data, are essential. By enhancing access to information on air quality and pollution impacts and involving the public in decision-making, confidence in implemented policies can be boosted. Additionally, prioritizing the use of robust scientific data in policy formulation can provide a solid foundation for government decisions, leading to more effective and reliable air pollution policies with greater positive impacts on society and the environment.

Trust in Government

Public trust in the government's commitment to reducing air pollution varies widely, influenced by past experiences, transparency in policymaking, and perceived political motivations. While some citizens express confidence in government initiatives, others are skeptical, citing inconsistencies in enforcement or perceived prioritization of economic interests over public health. Regulatory capture and industry influence on policymaking further erode trust in government efforts. This divergence in trust levels highlights the importance of transparent and accountable governance to rebuild public confidence and effectively address air quality challenges.

Policy Suggestions

Citizens are increasingly vocal about the need for more effective air pollution control strategies, advocating for a comprehensive and multi-pronged approach to address this pressing issue. Policy recommendations often emphasize the importance of stricter emissions standards for industries, vehicles, and other sources of pollution. Suggestions also include promoting renewable energy sources, incentivizing green technologies, and investing in public transportation infrastructure to reduce reliance on fossil fuels. Additionally, there's a growing call for community engagement and participation in decision-making processes related to air quality, as well as greater emphasis on environmental justice to ensure equitable distribution of pollution-reducing measures. Overall, citizens are pushing for proactive policies that prioritize public health and environmental sustainability while holding polluters accountable for their actions.

Role of Scientific Data

Opinions on the importance and desired use of scientific data in the development and implementation of air pollution policies vary among Jakarta's residents. While some advocate for a data-driven approach, emphasizing the need for accurate and comprehensive scientific data to inform policy decisions, others express skepticism about the reliability and accessibility of scientific information. Additionally, there are calls for greater transparency in how scientific data is used and communicated by government agencies to ensure public trust and accountability. Leveraging scientific data effectively requires investments in monitoring infrastructure, data analysis capabilities, and public education initiatives to enhance understanding and trust in the scientific basis of air pollution policies.

Overview of Related Studies

The overview of related studies on the perspective of Jakarta residents toward government policies regarding air pollution has been a deep and significant subject in recent research. Various previous studies have explored the views and perceptions of Jakarta residents regarding government efforts to address the worsening problem of air pollution in the capital city. These studies include analyses of the level of public awareness of the health and environmental impacts of air pollution, as well as assessments of the effectiveness of policy measures taken by the government to tackle this issue. Additionally, some studies have highlighted social, economic, and cultural factors that influence the attitudes and behaviors of Jakarta residents toward air pollution prevention efforts. Therefore, through a comprehensive review of previous literature, it will be possible to gain a better understanding of the dynamics and

challenges related to Jakarta residents' perceptions of government policies in addressing the issue of air pollution.

General Trends in Research Methodologies

Previous studies often utilize both quantitative and qualitative approaches to understand public perceptions of air pollution policies. Quantitative methods frequently involve the use of surveys or questionnaires administered to respondents to gather data on levels of awareness, attitudes, and behaviors related to air pollution, as well as perceptions of government efforts to address the issue. For example, the survey "Evaluation of Air Pollution Management Policy Based on Public Perception in Jakarta" employed a quantitative data collection method involving 198 respondents.[37] On the other hand, qualitative methods often utilize in-depth interviews or data analysis to delve into the context and factors influencing public perceptions of air pollution policies. For instance, the survey "Community Perspectives on Efforts to Reduce Air Pollution in Central Jakarta" utilized primary data collection techniques through interviews and secondary data observation from literature studies.[38] By analyzing both approaches, research can gain a more holistic understanding of the dynamics and complexities of Jakarta residents' perceptions of government efforts to mitigate air pollution.

[37] Angel.
[38] Marya Aurelia et al., "Perspektif Masyarakat Terhadap Upaya Penurunan Polusi Udara Di Kota Jakarta Pusat" (Universitas Pembangunan Nasional "Veteran" Jakarta, 2023), https://ugc.production.linktr.ee/c0e47200-0255-4f43-9fd0-a83c3498e18a_Artikel-PJBL-MKWU-Kel-1.pdf.

Specific Focus on Policy Perception Studies

Previous research has provided a specific focus on studying the perceptions of Jakarta residents regarding air pollution policies. These studies have specifically explored the level of awareness, attitudes, and responses of the Jakarta populace to government efforts to address air pollution issues. Moreover, these studies encompass various aspects, from assessing policy effectiveness to analyzing socio-economic and cultural factors shaping public perception. Similarly, research has taken into account the spatial distribution of air pollution and its impacts on various communities in Jakarta, thereby enabling a deeper understanding of local-level perceptions and responses. By considering these previous studies, the research focus was justified by complementing or expanding upon existing knowledge and adjusting the approach to better understand the dynamics of public perception towards air pollution policies in Jakarta.

Methodology Justification for Current Study

In the context of the complexity of air pollution issues in Jakarta, a careful and targeted methodological approach was needed. The goal was to gain a comprehensive understanding of public perceptions. Therefore, the methodological justification for the study on the perspectives of Jakarta residents regarding government policies on air pollution emphasized the use of a quantitative survey method. This quantitative method was used to broadly collect data on the levels of awareness, attitudes, and behaviors of the public regarding air pollution and their perceptions of government efforts. Thus, this research made a valuable contribution to understanding the dynamics of public perception and supporting government efforts in managing air pollution issues in Jakarta.

Selection and Adaptation of Methods

The selection of a quantitative research method in the form of a survey for this study was based on careful considerations directly linked to the purpose and objectives of the research. Firstly, quantitative surveys allow for the systematic and measurable collection of data on the perceptions and responses of Jakarta residents regarding government policies on air pollution. In this study, extensive and representative information was collected from various segments of Jakarta's society, enabling a comprehensive understanding of their views and attitudes towards this relevant issue. Additionally, quantitative surveys enable in-depth statistical analysis of the collected data using SPSS (Statistical Package for the Social Sciences), allowing for the precise identification of patterns and relationships between variables. Moreover, given the specific characteristics of Jakarta's heterogeneous population in terms of demographics and education, quantitative surveys provide the opportunity to collect socioeconomic background data from various social groups within the population, such as lower to middle classes. Thus, the selection of the quantitative survey method aligns with the research aim of gaining a comprehensive understanding of Jakarta residents' perceptions of air pollution policies while considering the diversity of the population.

Implementation of Proposed Methods

The implementation of the proposed method for this study involved the use of a quantitative survey. The survey was conducted through a specially designed questionnaire to explore the perceptions of Jakarta residents regarding government policies on air pollution. The survey utilized a specially designed questionnaire

comprising closed-ended questions to assess key variables such as awareness levels, attitudes towards government efforts, and satisfaction with implemented policies. Questions were structured to measure respondents' knowledge of emission reduction policies using a Likert scale and to elicit opinions on policy effectiveness and desire for further government action. To ensure the representativeness and validity of the data, the researchers used diverse sampling techniques. The survey was conducted randomly across various regions of Jakarta to ensure geographical representation. Additionally, the researchers selected a sample that included various age groups, educational backgrounds, and socioeconomic statuses to ensure better representation of Jakarta's heterogeneous population. This approach helped reduce sampling bias and enhanced the validity of the research findings.

Conclusion and Implications

The review of methodological insights affirms that quantitative surveys are the most effective approach for understanding Jakarta residents' perspectives on government policies regarding air pollution. Surveys offer extensive, representative, and statistically measurable data, providing a comprehensive understanding of public awareness, attitudes, and satisfaction levels. This conclusion underscores the importance of continuing to utilize surveys in this research, employing well-designed questionnaires and representative sampling techniques to enhance data validity and reduce bias. The findings of this study had the potential to inform more responsive policies tailored to the needs and perceptions of Jakarta's community regarding air pollution.

Summary of Methodological Insights

The summary of key methodological insights obtained from the literature review indicates that quantitative methods, particularly surveys, are effective tools for measuring public perceptions regarding air pollution policies in Jakarta. Previous studies have utilized surveys with closed-ended questionnaires, enabling systematic and statistically measurable data collection on the public's awareness, attitudes, and satisfaction towards government policies. The use of Likert scales in questionnaires, for example, has proven effective in measuring detailed perceptions and attitudes of the public.

These insights provide valuable input for the current research by affirming that quantitative methods, such as surveys, are appropriate approaches for obtaining representative and in-depth data. Through surveys, researchers can reach various segments of Jakarta's population and gather extensive and profound insights into their views on air pollution policies. Thus, the findings from this literature review support the selection of quantitative methods in this research and help ensure that the approach used will yield valid and comprehensive results.

Implications for Future Research

The implications of this review for future research on Jakarta residents' perspectives on air pollution policies are significant. While a multimodal approach integrating quantitative and qualitative methods is beneficial for exploring socio-economic and cultural contexts, the emphasis remains on employing surveys as the primary tool for measuring public perceptions. Well-designed questionnaires, featuring closed-ended questions and Likert scales, are recommended to gather statistically analyzable data. This approach ensures broader and more representative

insights into Jakarta residents' opinions, facilitating the development of more responsive policies addressing air pollution concerns.

These methodological insights have profound implications for future research endeavors, offering a blueprint for constructing a robust and comprehensive methodological framework. By embracing these insights, future studies can elevate the quality and accuracy of data collection processes, facilitating a deeper understanding of Jakarta residents' perspectives on air pollution policies. This, in turn, positions future research to make a more significant contribution towards the formulation of effective and responsive policies that address the evolving needs and perceptions of the community, ultimately striving towards sustainable solutions for mitigating air pollution in Jakarta.

METHODOLOGY

Introduction

The research methodology in this study reviewed how previous literature on public perspectives towards government policies had shaped the current research methodology, with a specific focus on quantitative methods in the form of surveys. Literature reviews indicated that surveys were an effective tool for collecting quantitative data on public perceptions and attitudes towards government policies, including in the context of air pollution in Jakarta. This was due to the use of structured questionnaires and representative sampling techniques that ensured the collected data was accurate and generalizable. Therefore, this research methodology adopted a quantitative approach by designing a comprehensive survey to measure the satisfaction and perceptions of Jakarta residents regarding government policies on air pollution. This section detailed the process of questionnaire development, including the selection of relevant questions and appropriate measurement scales, sampling procedures to ensure representativeness of the Jakarta population, and data analysis techniques used to accurately interpret survey results.

Research Design

The chosen research design for this study was a descriptive quantitative research design. This design was selected because it allowed researchers to collect numerical data that clearly depicted the perceptions, knowledge, and attitudes of Jakarta residents towards government policies on air pollution. This method was highly effective in providing a comprehensive picture of public attitudes and opinions without manipulating variables, thus yielding objective and reliable results. Structured surveys were the main data collection tool, as they could reach a large and diverse

sample in a short period. With this design, researchers could obtain quantitative data that could be statistically analyzed to identify patterns and trends in public perceptions. The primary justification for using this descriptive design was its ability to provide representative and comprehensive information about Jakarta residents' views on government air pollution policies.

This descriptive design effectively answered the research questions by providing detailed and structured data. The first question, regarding the attitudes and opinions of Jakarta residents towards government policies, was answered through analysis of survey responses that reflected satisfaction levels and acceptance of existing policies. The second question, which evaluated the effectiveness of government policies, was addressed by assessing public perceptions of how effective these policies were in reducing air pollution, based on survey data. The third question, seeking residents' suggestions for better ways to reduce air pollution, was answered by analyzing survey responses that offered insights into alternative solutions proposed by residents. Thus, this descriptive design not only illustrated public attitudes and assessments but also provided a strong foundation for better policy recommendations.

Sources of Data

The research location was Jakarta, the capital city of Indonesia, known for its high levels of air pollution due to industrial activities, motor vehicles, and other factors. The choice of Jakarta was based on its relevance as a significant urban and industrial center where government policies on air pollution control had a substantial impact on residents' quality of life. Jakarta's demographic diversity also allowed this research to encompass perspectives from various societal groups, ensuring that the

research results provided a comprehensive and representative picture of public perceptions towards air pollution policies.

The study population comprised Jakarta residents aged 18–40, male and female, who had lived in Jakarta for approximately 5 to 10 years. The sampling method used was stratified random sampling, ensuring that the sample reflected the demographic distribution of Jakarta's population, such as age, gender, and residential area. By dividing the population into strata based on socioeconomic class, researchers could also assess opinion differences among socioeconomic classes (lower to middle) regarding air pollution policies. Each stratum was then randomly sampled to maintain representativeness and reduce bias.

The targeted sample size was 350 respondents. This size was determined to provide a high level of confidence and a low margin of error in data analysis. It was also considered sufficient for conducting in-depth statistical analysis and ensuring that the research results could be generalized to the entire Jakarta population. Data collection was conducted using an online survey distributed via Google Forms, allowing for broad and efficient participation from various segments of Jakarta's society.

Instrumentation and Data Collection

The main instrument used in this research was a structured questionnaire designed to collect quantitative data on Jakarta residents' perspectives on government policies regarding air pollution. The questionnaire was carefully designed by the researchers to collect data effectively. The content of the questionnaire consisted of six sections, including the first section (Basic Information), the second section (Air Quality Monitoring), the third section (Urban Planning and Infrastructure), the fourth

section (Pollution Control Measures), the fifth section (Odd-Even Policy as Traffic and Air Pollution Management Measure), and the sixth section (Public Suggestions). Questions in the questionnaire were designed using both Likert scales and multiple-choice questions. Likert scale questions measured respondents' agreement or disagreement with various statements ordinally, allowing for in-depth statistical analysis. In this context, five options of “Strongly disagree,” “Disagree,” “Neutral,” “Agree,” and “Strongly agree” were given, with scores assigned as 1, 2, 3, 4, and 5. On the other hand, multiple-choice questions provided more insights into Jakarta residents' opinions, perceptions, and preferences.

To ensure the validity and reliability of the instrument, the questionnaire underwent a pilot test on a small, representative sample of the target population. Instrument validity was evaluated using face validity techniques where, before distributing the questionnaire, researchers ensured that the questions were relevant and understandable to respondents. This was done through limited trials with a representative number of respondents. Instrument reliability was tested using the test-retest method, where researchers re-administered the questionnaire to several respondents within a short period to ensure consistency of responses over time.

Data collection procedures were conducted through an online survey distributed via digital platforms such as Google Forms and promoted through social media and community networks to ensure a broad and diverse sample. Respondents, aged 18–40 and residing in Jakarta for 5 to 10 years, were invited based on their ability to access and comprehend the questionnaire. Each participant received information about the research purpose, data confidentiality, and provided informed consent before completing the survey. With this procedure, it was expected that the

collected data would provide in-depth and representative insights into Jakarta residents' perspectives on air pollution policies.

Tools for Data Analysis

The data analysis tools used in this research were statistical software SPSS (Statistical Package for the Social Sciences). The selection of SPSS was based on its powerful and flexible capabilities in processing and analyzing quantitative data. SPSS allowed researchers to perform various types of statistical analyses needed to answer research questions with a high degree of accuracy. Additionally, software like Excel was also used for basic data analysis and visualization, aiding in the interpretation of research findings.

The analysis methods involved several key steps to address the research questions. Factor analysis, as outlined by Roderick P. McDonald in *Factor Analysis and Related Methods,* was used to identify the underlying structure of complex data by reducing observed variables into fewer, interpretable factors.[39] This simplification helped in understanding the relationships among variables. The derived factors were then analyzed using ANOVA and independent t-tests to compare means across seven demographic variables (age, gender, education level, occupation, income, residential location, and length of residence), addressing the first research question concerning Jakarta residents' attitudes towards government policies on air pollution.

For the second research question, which assessed public satisfaction with policies like Air Quality Monitoring, Urban Planning Infrastructure, Pollution Control Measures, and the Odd-Even Policy, SPSS was employed to conduct frequency and

[39] Roderick P. McDonald, *Factor Analysis and Related Methods*, vol. 1 (New York: Psychology Press, 2014), http://dx.doi.org/https://doi.org/10.4324/9781315802510.

percentage analyses. These tests highlighted the highest and lowest levels of satisfaction among residents.

The third research question focused on identifying preferred solutions to air pollution, such as environmentally friendly public transportation, reducing fossil fuel vehicles, increasing renewable energy use, urban greening, and public education initiatives. SPSS analyzed the PSU4 variable, beginning with frequency and percentage summaries, followed by ANOVA and t-tests to compare preferences across demographic groups. This process provided critical insights into the most favored solutions and overall public opinion.

Ethical Considerations

In conducting the survey on Jakarta residents' perspectives on government policies related to air pollution, researchers considered ethical considerations to protect participants' rights. First, approval from the research ethics committee was obtained before the survey began. In this context, participants were provided with clear information about the survey's purpose, procedures, potential risks and benefits, and gave written consent voluntarily. Additionally, participant confidentiality and anonymity were strictly maintained, ensuring personal data was securely stored and only used for research purposes. Researchers understood that with these ethical procedures, the survey could be conducted responsibly and ethically.

Limitations of the Methodology

In researching Jakarta residents' perspectives on government policies related to air pollution using quantitative survey methods, several methodological limitations were considered. First, the survey sample may not have fully represented Jakarta's

population, given the city's demographic and socioeconomic diversity, which could cause bias in research results. Second, respondents might have provided socially desirable answers or not been entirely truthful due to the sensitivity of the topic, affecting data accuracy. To address these limitations, the survey design included carefully crafted questions to reduce social bias and used Likert scales that allowed for nuanced responses. With these strategies, methodological limitations could have been minimized, resulting in more accurate and reliable research outcomes.

Summary

In researching Jakarta residents' perspectives on government policies related to air pollution, a descriptive quantitative method was chosen to collect objective and reliable numerical data. Structured surveys were used as the main data collection tool, allowing researchers to efficiently reach a large and diverse sample. Using stratified random sampling, this survey ensured the representativeness of various demographic groups in Jakarta, making the research results reflect the views of the entire population. The questionnaire used consisted of Likert scale and multiple-choice questions to evaluate residents' attitudes, knowledge, and suggestions regarding air pollution policies. Data analysis was conducted with SPSS software to gain in-depth and accurate insights into public perceptions. Although the chosen method had limitations, such as potential social bias and sample representativeness, it remained relevant to the research objectives. This method was believed to effectively provide representative and detailed information that could support better policy recommendations for reducing air pollution in Jakarta.

DATA ANALYSIS

The study explored how Jakarta's citizens perceived the government's efforts to tackle air pollution and whether these policies aligned with their expectations. By focusing on public opinion, the research sought to identify the gap between citizens' hopes for cleaner air and the perceived effectiveness of current policies, which many still found inadequate. The study aimed to answer three key questions: (1) How Jakarta citizens felt about the government's air pollution policies, (2) How effective they believed these policies had been in improving air quality, and (3) What alternative approaches they considered more effective in reducing air pollution in the city.

Data Collection Profile

The survey was distributed through various online platforms, including Line, Instagram, Email, and Telegram, to reach a broader audience and ensure diverse participation. Data were securely stored in digital format via Google Forms, with measures taken to protect the confidentiality and security of participant information. During the summer of 2024, the close-ended survey gathered responses from 479 participants. The "Basic Information" part collected demographic details such as respondents' age, gender, education level, occupation, income (per month), residential location within Jakarta, and length of residence in the city. Overall, the demographic profile revealed that the majority of respondents were young and educated, with lower incomes, factors that likely influenced their perspectives on air pollution and government policies.

The survey on Jakarta citizens' perspectives toward government policies on air pollution showed that 55.5% of the sample were aged 18-25, while 25.1% were

between 26-35 years old, indicating a predominantly young demographic. A slight majority of respondents (54.1%) were female, ensuring a balanced gender representation. In terms of education, 63% had completed high school or less, while 29.6% held a college or university degree. Over half of the respondents (51.1%) were students, reflecting the younger socio-economic demographic. Income data revealed that 43.4% of participants earned less than Rp 1,000,000 per month, with 28.4% earning between Rp 5,000,000 and Rp 10,000,000. Geographically, respondents were fairly evenly distributed across Jakarta, with West Jakarta accounting for 24.4%. Additionally, 43% of respondents had lived in Jakarta for over 10 years, highlighting a significant portion of long-term residents.

Factor Analysis of Jakarta Citizens' Perspectives on Government Policies

After collecting and excluding inadequate questionnaires, the final dataset consisted of 479 responses from citizens of Jakarta regarding their perspectives on government policies related to air pollution. The data underwent analysis using SPSS. The analytical process involved two main stages: initially applying factor analysis to consolidate the attitudinal questions into smaller factors, and then utilizing these factor scores for further examination.

The sample size was 479, with a Kaiser-Meyer-Olkin (KMO) measure of .789 and a highly significant Bartlett's test of sphericity ($p < .001$), indicating that the sample was sufficient for factor analysis. In the study of Jakarta Citizens' Perspective Toward Government Policy on Air Pollution, an exploratory factor analysis was conducted to identify underlying factors that explain the correlations among the variables. The analysis revealed six main factors, which are summarized in Table 1.

Table 1. Summary of Exploratory Factor Analysis Results for Jakarta Citizens' Perspective Toward Government Policy on Air Pollution

Factors	Code	Questions	Factor loadings
1. Attitudes toward Air Quality Monitoring	*government transparency*	AQM4 I think the government is transparent in reporting air quality information.	.858
	government reliability	AQM3 I find the air quality data provided by the government to be reliable.	.845
	air quality monitoring awareness	AQM1 I am aware of the air quality monitoring efforts conducted by the Jakarta government.	.815
	satisfaction coverage	AQM2 I am satisfied with the coverage and frequency of air quality monitoring stations in Jakarta.	.460
2. Urban Planning Strategies	*air pollution reduction strategies*	UPI2 I find the current urban planning strategies to be effective in mitigating air pollution.	.823
	non-motorized infratructure	UPI5 I find the pedestrian and cycling infrastructure to be adequate in encouraging non-motorized transportation.	.796
	urban initiatives awareness	UPI1 I am aware of urban planning initiatives aimed at reducing air pollution in Jakarta (e.g., preserving green open spaces, environmentally friendly city planning, infrastructure development).	.667
3. Urban Environmental Support	*satisfaction with public transport system*	UPI4 I am satisfied with the public transportation systems and infrastructure as alternatives to reduce vehicle emissions.	.749
	green space support	UPI3 I support the integration of green spaces, parks, and urban forests in urban planning to improve air quality.	.729
4. Attitudes toward Government Emission Controls	*industry emission enforcement*	PCM5 The government enforces emission standards for industries strictly	.799
	industry pollution control	PCM2 I am aware of pollution control measures in industries.	.777
	power plant emission enforcement	PCM6 The government enforces emission standards for coal-fired power plants strictly.	.762
	power plant pollution control	PCM3 I am aware of pollution control measures in coal-fired power plants.	.758
	vehicle emission enforcement	PCM4 The government enforces emission standards for vehicles strictly.	.669
	vehicle pollution control	PCM1 I am aware of pollution control measures in vehicles.	.621
	satisfaction with power plant emission regulation	PCM9 I am satisfied with the government's efforts in regulating emissions from coal-fired power plants.	.462
	satisfaction with industrial emission regulation	PCM8 I am satisfied with the government's efforts in regulating emissions from industries.	.452
5. Satisfaction with Government Emission Controls	*satisfaction with transport emission regulation*	PCM7 I am satisfied with the government's efforts in regulating emissions from transportation.	.794
	satisfaction with industrial emission regulation	PCM8 I am satisfied with the government's efforts in regulating emissions from industries.	.745
	satisfaction with power plant emission regulation	PCM9 I am satisfied with the government's efforts in regulating emissions from coal-fired power plants.	.666
6. Attitudes toward Odd-Even Policy	*odd-even policy awareness*	OEP1 I am aware of the traffic and air pollution management policies such as the Odd-Even Policy implemented in Jakarta, including the rules and implementation schedule.	.710
	odd-even policy improvement support	OEP4 Do you agree that the Odd-Even Policy needs to be improved or modified for better effectiveness?	.683
	odd-even policy effectiveness	OEP2 I believe the Odd-Even Policy has been effective in reducing traffic congestion and air pollution in Jakarta.	.637
	odd-even policy implementation satisfaction	OEP3 I am satisfied with the implementation of the Odd-Even Policy, including the clarity of regulations and the availability of information in Jakarta.	.412

Note: Questions with factor loadings less than 0.4 were suppressed.

The first factor included four questions with factor loadings greater than 0.4. All four questions had positive factor loadings: "I think the government is transparent in reporting air quality information" (AQM4, .858), "I find the air quality data provided by the government to be reliable" (AQM3, .845), "I am aware of the air quality monitoring efforts conducted by the Jakarta government" (AQM1, .815), and “I am satisfied with the coverage and frequency of air quality monitoring stations in Jakarta” (AQM2, .460). These questions indicate respondents’ perceptions regarding government transparency and reliability in air quality reporting. Therefore, this factor was named Attitudes toward Air Quality Monitoring.

The second factor comprised three questions with positive factor loadings: "I find the current urban planning strategies to be effective in mitigating air pollution" (UPI2, .823), "I find the pedestrian and cycling infrastructure to be adequate" (UPI5, .796), and "I am aware of urban planning initiatives aimed at reducing air pollution in Jakarta" (UPI1, .667). These questions reflect respondents’ views on urban development initiatives aimed at reducing pollution. Thus, this factor was named Urban Planning Strategies.

The third factor included two questions with positive factor loadings: "I am satisfied with the public transportation systems" (UPI4, .749) and "I support the integration of green spaces in urban planning" (UPI3, .729). These responses reflect a commitment to supporting environmentally friendly urban initiatives, leading to this factor being named Urban Environmental Support.

The fourth factor included eight questions with significant factor loadings, among which several had strong positive values: "The government enforces emission standards for industries strictly" (PCM5, .799), "I am aware of pollution control measures in industries" (PCM2, .777), and "The government enforces emission

standards for coal-fired power plants strictly" (PCM6, .762). These questions indicate respondents' perceptions of government enforcement and awareness of emission control measures, resulting in the factor being named Attitudes toward Government Emission Controls.

The fifth factor comprised three questions with positive factor loadings: "I am satisfied with the government's efforts in regulating emissions from transportation" (PCM7, .794), "I am satisfied with the government's efforts in regulating emissions from industries" (PCM8, .745), and "I am satisfied with the government's efforts in regulating emissions from coal-fired power plants" (PCM9, .666). These items capture respondents' satisfaction with the government's overall emission control measures, leading to the factor being labeled Satisfaction with Government Emission Controls.

The sixth factor included four questions with significant loadings, such as: "I am aware of the traffic and air pollution management policies such as the Odd-Even Policy" (OEP1, .710), "I believe the Odd-Even Policy has been effective in reducing traffic congestion" (OEP2, .637), and "Do you agree that the Odd-Even Policy needs to be improved or modified for better effectiveness?" (OEP4, .683). These questions reflect public awareness and perceptions of the Odd-Even Policy. Accordingly, this factor was named Attitudes toward the Odd-Even Policy.

Finally, factor scores were calculated using a formula that combines the variables' factor loadings. For each factor, the variables were multiplied by their respective factor loadings. The sum was then divided by the total of the factor loadings, producing scores ranging from 1 to 5, where 1 indicates "strongly disagree," 2 indicates "disagree," 3 indicates "neutral," 4 indicates "agree," and 5 indicates "strongly agree."

For example, the formula for the Attitudes toward Air Quality Monitoring factor score is:

F1S = (AQM4*0,858313433311554 + AQM3*0,844572407947885 + AQM1*0,814966455393389 + AQM2*0,459809277233063)/2,97766157388589

This method standardizes respondents' attitudes across different factors, providing a clear and quantifiable measure of their perceptions.

Jakarta Citizens' Opinions on Air Pollution Policies

One-way ANOVA and t-test analysis were used to address Research Question 1: What were the attitudes and opinions of the people of Jakarta towards the government policies implemented to overcome air pollution? This method was also employed to explore the attitudes of Jakarta residents toward air pollution control policies, focusing on how key demographic factors shaped public opinion and policy support. The analysis included factors 1 through 6 (FAC1 to FAC6, see Table 1) — to compare their means across 7 basic demographic variables—age, gender, income, education, occupation, residential location, and length of residence. This approach helped uncover the underlying relationships between these demographic variables and the six key factors, offering a deeper understanding of how public perceptions of air pollution policies varied across different segments of the population.

Table 2. Mean Comparison of FAC1 (Attitudes toward Air Quality Monitoring) Across Demographic Groups

Demographic Variables	Statistical Test	F/t-value	p-value	Pair means with Significant Difference
Age	One-way ANOVA	F(3, 475) = 4.636	0.003	"18-25" (3.93) : "26-35" (4.15)
Gender	T-test	t(477) = 1.657	0.098	None
Education	One-way ANOVA	F(2, 476) =.952	0.387	None
Occupation	One-way ANOVA	F(4,474) = 12.746	0.000	"Unemployed" (1.71) : "Students" (3.95) "Unemployed" (1.71) : "Employee" (4.05) "Unemployed" (1.71) : "Self-employed" (4.13) "Unemployed" (1.71) : "Retired" (3.72)
Income	One-way ANOVA	F(3, 475) = 5.567	0.001	">Rp 10.000.000" (3.20) : "<Rp 1.000.000" (4.09) ">Rp 10.000.000" (3.20) : "Rp 1.000.000 – Rp 5.000.000" (3.99) ">Rp 10.000.000" (3.20) : "Rp 5.000.000 – Rp 10.000.000" (3.94)
Residence	One-way ANOVA	F(4,474) = 3.963	0.004	"West Jakarta" (3.81) : "Central Jakarta" (4.07) "West Jakarta" (3.81) : "South Jakarta" (4.12)
Length of Residence	One-way ANOVA	F(3,475) = 4.515	0.004	">10 years" (3.88) : "1-5 years" (4.11) ">10 years" (3.88) : "6-10 years" (4.11)

Table 2 presents the statistical findings from the comparison of FAC1 scores across various demographic sub-categories. Significant differences were observed for age ($F(3, 475) = 4.636$, $p = 0.003$), with individuals aged 18–25 scoring lower (3.93) than those aged 26–35 (4.15). Occupation also showed substantial variation ($F(4, 474) = 12.746$, $p < 0.001$), with unemployed individuals (1.71) scoring lower than students, employees, self-employed individuals, and retirees. Income groups differed significantly ($F(3, 475) = 5.567$, $p = 0.001$), with higher-income earners (>Rp 10,000,000) scoring lower (3.20) than those in lower income brackets. Differences were also noted by residence ($F(4, 474) = 3.963$, $p = 0.004$) and length of residence ($F(3, 475) = 4.515$, $p = 0.004$), where West Jakarta residents and those living over 10 years scored lower. No significant differences were found for gender ($t(477) = 1.657$, $p = 0.098$) or education level ($F(2, 476) = 0.952$, $p = 0.387$). The overall mean FAC1 score was 4.00, serving as a benchmark for these comparisons.

These findings suggested that demographic factors such as age, occupation, income, and location were associated with varying experiences or perceptions reflected in FAC1 (Attitudes toward Air Quality Monitoring) scores. Younger individuals, unemployed residents, higher-income earners, and those who had lived in Jakarta for more than 10 years tended to report more negative attitudes, potentially reflecting differences in their perceptions of environmental issues or access to information. In contrast, older participants, those with stable occupations, lower-income groups, and residents of Central and South Jakarta showed more favorable attitudes. These results implied that targeted communication and intervention strategies might be necessary to improve public engagement with air quality initiatives, particularly for demographic groups exhibiting lower satisfaction levels.

Table 3. Mean Comparison of FAC2 (Urban Planning Strategies) Across Demographic Groups

Demographic Variables	Statistical Test	F/t-value	p-value	Pair means with Significant Difference
Age	One-way ANOVA	F(3, 475) = 8.438	0.000	"18-25" (4.22) : "26-35" (4.45) "18-25" (4.22) : "36-45" (4.48) "18-25" (4.22) : "46 years and above" (4.57)
Gender	T-test	t(477) = 2.929	0.007	"Female" (4.26) : "Male" (4.41)
Education	One-way ANOVA	F(2, 476) =.399	0.671	None
Occupation	One-way ANOVA	F(4,474) = 2.801	0.000	"Unemployed" (2.86) : "Students" (4.26) "Unemployed" (2.86) : "Employee" (4.35) "Unemployed" (2.86) : "Self-employed" (4.50) "Unemployed" (2.86) : "Retired" (4.20) "Self-employed" (4.50) ; "Students" (4.26)
Income	One-way ANOVA	F(3, 475) = 4.557	0.004	"Rp 1.000.000 – Rp 5.000.000" (4.23) : "<Rp 1.000.000" (4.42) ">Rp 10.000.000" (3.84) : "Rp 1.000.000" (4.42)
Residence	One-way ANOVA	F(4,474) = 6.152	0.000	"West Jakarta" (4.11) : "North Jakarta" (4.42) "West Jakarta" (4.11) : "Central Jakarta" (4.39) "West Jakarta" (4.11) : "South Jakarta" (4.42) "West Jakarta" (4.11) : "East Jakarta" (4.38)
Length of Residence	One-way ANOVA	F(3,475) = 4.271	0.005	">10 years" (4.23) : "6-10 years" (4.41)

Table 3 presents the statistical findings from the comparison of FAC2 (Urban Planning Strategies) scores across various demographic sub-categories. Significant differences were observed for age (F(3, 475) = 8.438, p = 0.000), with individuals

aged 18–25 scoring lower (4.22) than those aged 26–35 (4.45), 36–45 (4.48), and 46 years and above (4.57). Gender differences were also significant ($t(477) = 2.929$, $p = 0.007$), with females scoring lower (4.26) than males (4.41). Occupation showed substantial variation ($F(4, 474) = 9.091$, $p < 0.001$), with unemployed individuals scoring lower (2.86) than students (4.26), employees (4.35), self-employed individuals (4.50), and retirees (4.20). Income groups differed significantly ($F(3, 475) = 4.557$, $p = 0.004$), with higher-income earners (>Rp 10,000,000) scoring lower (3.84) than those earning under Rp 1,000,000 (4.42). Differences were also noted by residence ($F(4, 474) = 6.152$, $p = 0.000$), where West Jakarta residents scored lower (4.11) compared to those from other regions, including North Jakarta (4.42) and Central Jakarta (4.39). Lastly, length of residence was also significant ($F(3, 475) = 4.271$, $p = 0.005$), with those living in Jakarta for over 10 years scoring lower (4.23) than those living there for 6–10 years (4.41). The overall mean FAC2 score was 4.33, serving as a benchmark for these comparisons.

These findings suggested that demographic factors such as age, gender, occupation, income, residence, and length of residence significantly influenced perceptions of FAC2 (Urban Planning Strategies). Younger individuals, unemployed respondents, higher-income earners, and West Jakarta residents tended to score lower, indicating less favorable attitudes or satisfaction with urban planning strategies compared to their counterparts. This may have reflected differences in expectations, access to resources, or priorities regarding urban development across these demographic groups. The data highlighted the need for targeted urban planning initiatives to address these variations in public opinion and better cater to the needs of diverse communities.

Table 4. Mean Comparison of FAC3 (Urban Planning Strategies) Across Demographic Groups

Demographic Variables	Statistical Test	F/t-value	p-value	Pair means with Significant Difference
Age	One-way ANOVA	F(3, 475) = 1.205	0.307	None
Gender	T-test	t(477) = -.767	0.443	None
Education	One-way ANOVA	F(2, 476) = 3.324	0.037	"College or University" (3.68) : "High school or below" (3.59)
Occupation	One-way ANOVA	F(4,474) = 1.410	0.229	None
Income	One-way ANOVA	F(3, 475) = 1.813	0.144	None
Residence	One-way ANOVA	F(4,474) = 1.920	0.106	None
Length of Residence	One-way ANOVA	F(3,475) = 0.835	0.475	None

Table 4 compares the mean FAC3 scores across various demographic groups. The results showed no statistically significant differences in FAC3 scores for age ($F(3, 475) = 1.205$, $p = 0.307$), gender ($t(477) = -0.767$, $p = 0.443$), occupation ($F(4, 474) = 1.410$, $p = 0.229$), income ($F(3, 475) = 1.813$, $p = 0.144$), residential location ($F(4, 474) = 1.920$, $p = 0.106$), or length of residence ($F(3, 475) = 0.835$, $p = 0.475$). However, a significant difference was found in FAC3 scores based on education level ($F(2, 476) = 3.324$, $p = 0.037$), where post-hoc tests revealed that those with a college or university education scored higher (3.68) than those with a high school education or below (3.59), although the difference was not marginal (not significant at the 0.05 level). The overall mean FAC3 score was 3.61, serving as a benchmark for these comparisons.

These findings suggested that most demographic factors, such as age, gender, occupation, income, residence, and length of residence, were not significantly associated with perceptions of FAC3 (Urban Environmental Support). However, education played a notable role, with those holding a college/university degree perceiving higher levels of support for urban environmental initiatives compared to those with lower educational attainment. This may have indicated that individuals

with higher education were more aware of or placed greater value on environmental efforts in urban areas, pointing to a need for targeted awareness programs among less educated groups to enhance support for environmental sustainability in urban settings.

Table 5. Mean Comparison of FAC4 (Attitudes toward Government Emission Control) Across Demographic Groups

Demographic Variables	Statistical Test	F/t-value	p-value	Pair means with Significant Difference
Age	One-way ANOVA	F(3, 475) = 4.450	0.004	"18-25" (4.01) : "26-35" (4.20)
Gender	T-test	t(477) = 2.285	0.007	"female" (4.04) : "male" (4.15)
Education	One-way ANOVA	F(2, 476) = .726	0.484	None
Occupation	One-way ANOVA	F(4,474) = 5.986	0.000	"Unemployed" (2.74) : "Students" (4.05) "Unemployed" (2.74) : "Employee" (4.13) "Unemployed" (2.74) : "Self-employed" (4.17)
Income	One-way ANOVA	F(3, 475) = 9.100	0.000	">10.000.000" (3.3) : "<1.000.000" (4.1)
Residence	One-way ANOVA	F(4,474) = 3.840	0.004	"West Jakarta" (3.92) : "North Jakarta" (4.14) "West Jakarta" (3.92) : "Central Jakarta" (4.14) "West Jakarta" (3.92) : "East Jakarta" (4.14)
Length of Residence	One-way ANOVA	F(3,475) = 7.344	0.000	">10 years" (3.97) : "1-5 years" (4.23) ">10 years" (3.97) : "6-10 years" (4.17)

Table 5 presents a comparison of the mean FAC4 scores across various demographic groups. The statistical findings from the comparison of FAC4 (Attitudes toward Government Emission Control) scores across various demographic sub-categories showed significant differences for age ($F(3, 475) = 4.450$, $p = 0.004$), with individuals aged 18–25 scoring lower (4.01) than those aged 26–35 (4.20). Occupation also showed substantial variation ($F(4, 474) = 5.986$, $p < 0.001$), with unemployed individuals (2.74) scoring lower than students (4.05), employees (4.13), and self-employed individuals (4.17). Income groups differed significantly ($F(3, 475) = 9.100$, $p < 0.001$), with higher-income earners (>Rp 10,000,000) scoring lower (3.3) than those in lower income brackets. Differences were also noted by residence ($F(4, 474) = 3.840$, $p = 0.004$), where West Jakarta residents scored lower (3.92) compared to residents of North, Central, and East Jakarta (all at 4.14). Length of residence also

showed significant differences ($F(3, 475) = 7.344$, $p < 0.001$), with those living for more than 10 years scoring lower (3.97) than those living for 1-5 years (4.23). No significant differences were found for education ($F(2, 476) = 0.726$, $p = 0.484$). The overall mean FAC4 score was 4.09, serving as a benchmark for these comparisons.

These findings suggested that demographic factors such as age, occupation, income, residence, and length of residence were associated with varying attitudes toward FAC4 (Attitudes toward Government Emission Control). Younger individuals, unemployed respondents, higher-income earners, and long-term or West Jakarta residents tended to score lower, indicating less favorable attitudes. Notably, the lack of significant differences based on education indicated that perceptions of emission control were less related to educational attainment and more closely linked to other socioeconomic and geographic factors. Policymakers might consider these variations when designing and implementing environmental regulations to ensure broad-based public support.

Table 6. Mean Comparison of FAC5 (Satisfaction with Government Emission Controls) Across Demographic Groups

Demographic Variables	Statistical Test	F/t-value	p-value	Pair means with Significant Difference
Age	One-way ANOVA	F(3, 475) = .728	0.536	None
Gender	T-test	t(477) = 1.172	0.913	None
Education	One-way ANOVA	F(2, 476) = .502	0.605	None
Occupation	One-way ANOVA	F(4,474) = 1.128	0.342	None
Income	One-way ANOVA	F(3, 475) = .486	0.692	None
Residence	One-way ANOVA	F(4,474) = .398	0.810	None
Length of Residence	One-way ANOVA	F(3,475) = .831	0.477	None

Table 6 presents the statistical findings from the comparison of FAC5 (Satisfaction with Government Emission Controls) scores across various demographic

sub-categories. No statistically significant differences were observed across the seven demographic variables. For age, the analysis yielded $F(3, 475) = 0.728$, $p = 0.536$, and for gender, $t(477) = 1.172$, $p = 0.913$, both indicating no meaningful differences. Similarly, no significant differences were found for education ($F(2, 476) = 0.502$, $p = 0.605$), occupation ($F(4, 474) = 1.128$, $p = 0.342$), income ($F(3, 475) = 0.486$, $p = 0.692$), residence ($F(4, 474) = 0.398$, $p = 0.810$), or length of residence ($F(3, 475) = 0.831$, $p = 0.477$). The overall mean FAC5 score was 3.06, serving as a benchmark for these comparisons.

These findings suggested that none of the demographic sub-categories (age, gender, education, occupation, income, residence, or length of residence) were associated with differences in FAC5 scores in this sample. The similarity of scores across all groups implied a relatively uniform level of satisfaction, irrespective of demographic factors. This could indicate that public sentiment about government emission policies was consistent across various demographic profiles, though the lack of significant differences also suggested there might be other factors, not captured by these variables, influencing overall satisfaction levels.

Table 7. Mean Comparison of FAC6 (Attitudes toward Odd-Even Policy) Across Demographic Groups

Demographic Variables	Statistical Test	F/t-value	p-value	Pair means with Significant Difference
Age	One-way ANOVA	F(3, 475) = 5.164	0.002	“18-25” (4.05) : “46 years and above” (4.30)
Gender	T-test	t(477) = 1.015	0.108	None
Education	One-way ANOVA	F(2, 476) = .562	0.570	None
Occupation	One-way ANOVA	F(4,474) = 3.169	0.014	Unemployed” (3.65) : “Students” (4.07) “Unemployed” (3.65) : “Self-employed” (4.17)
Income	One-way ANOVA	F(3, 475) = .691	0.558	None
Residence	One-way ANOVA	F(4,474) = 1.760	0.136	None
Length of Residence	One-way ANOVA	F(3,475) = 2.806	0.039	“>10 years” (4.05) : “6-10 years” (4.18)

Table 7 presents the statistical findings from the comparison of FAC6 scores (attitudes toward the Odd-Even policy) across various demographic groups. Significant differences were found for age ($F(3, 475) = 5.164$, $p = 0.002$), with individuals aged 18–25 scoring lower ($M = 4.05$) compared to those aged 46 years and above ($M = 4.30$, $p = .016$). Occupation also showed notable variation ($F(4, 474) = 3.169$, $p = 0.014$), with the unemployed group ($M = 3.65$) scoring lower than students ($M = 4.07$) and self-employed individuals ($M = 4.17$). Moreover, length of residence exhibited significant differences ($F(3, 475) = 2.806$, $p = 0.039$), with those living in the area for more than 10 years ($M = 4.05$) scoring lower than those residing there for 6-10 years ($M = 4.18$). However, no significant differences were found for gender ($t(477) = 1.015$, $p = 0.108$), education ($F(2, 476) = 0.562$, $p = 0.570$), income ($F(3, 475) = 0.691$, $p = 0.558$), or residence ($F(4, 474) = 1.760$, $p = 0.136$). The overall mean FAC6 score is 4.11, which serves as a benchmark for these comparisons.

These findings suggest that demographic factors such as age, occupation, and length of residence are linked to differences in attitudes toward the Odd-Even policy. Younger individuals and unemployed respondents tend to have more negative perceptions of the policy, which could reflect concerns about its impact on their daily lives or their limited mobility options. Meanwhile, longer-term residents show lower satisfaction with the policy compared to those who have lived in the area for a shorter period, potentially indicating growing dissatisfaction over time. The lack of significant differences by gender, education, income, and residence suggests that these factors do not significantly shape individuals' attitudes toward the Odd-Even policy.

Overall, the findings showed significant variations in public attitudes toward air pollution policies in Jakarta across demographic groups, particularly age,

occupation, income, and length of residence. Younger individuals, unemployed respondents, higher-income earners, and long-term residents tended to hold less favorable views on policies like air quality monitoring and emission control. In contrast, older individuals, those with stable occupations, lower-income earners, and residents of Central and South Jakarta generally expressed more positive attitudes. On the other hand, gender and education levels showed minimal influence on public opinion, with no significant differences observed in most areas. These variations suggested that public opinion was largely shaped by daily experiences and socio-economic factors.

Evaluating Government Policies on Air Pollution

To answer Research Question 2—How do Jakarta citizens assess the effectiveness of government policies that have been implemented to reduce air pollution?— public satisfaction with air pollution policies, including the variables AQM2, UPI4, PCM7, PCM8, PCM9, and OEP3, was measured using percentages and mean scores in SPSS, as described in Table 8.

Table 8. Frequencies and Percentages of Jakarta Citizens' Satisfaction with Air Pollution Policies (AQM2, UPI4, PCM7, PCM8, PCM9, & OEP3)

	AQM2		UPI4		PCM7		PCM8		PCM9		OEP3	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Strongly Disagree	10	2.1%	-	-	12	2.5%	6	2.5%	8	1.7%	3	0.6%
Disagree	206	43.0%	171	35.7%	175	36.5%	147	36.5%	97	20.3%	148	30.9%
Neutral	241	50.3%	269	56.2%	154	32.2%	188	32.2%	255	53.2%	286	59.7%
Agree	13	2.7%	25	5.2%	60	12.5%	80	12.5%	80	16.7%	25	5.2%
Strongly Agree	9	1.9%	14	2.9%	78	16.3%	58	16.3%	39	8.1%	17	3.5%

Table 8 summarizes public satisfaction with air quality and emission control policies, revealing that a significant portion of respondents remained neutral or

dissatisfied. The Air Quality Monitoring Stations (AQM2) policy had the lowest satisfaction rating, with an average score of 2.59 and 43.0% of respondents expressing dissatisfaction. Similarly, the Use of Public Transport to Reduce Emissions (UPI4) received similar feedback, with an average satisfaction score of 2.75, while 35.7% expressed dissatisfaction, and a majority (56.2%) remained neutral. The Transport Emission Regulation (PCM7) received more varied responses, with an average satisfaction score of 3.04. However, 36.5% of respondents were dissatisfied, while only 28.8% expressed satisfaction. For the Industrial Emission Regulation (PCM8), the average satisfaction score was 3.08, with a majority of respondents being neutral (39.2%) and 28.8% satisfied, reflecting a more divided public opinion. Meanwhile, the Coal Power Plant Emission Regulation (PCM9) mostly received neutral feedback, with 53.2% of respondents choosing neutral, while only 24.8% expressed satisfaction, resulting in an average satisfaction score of 3.09. The Odd-Even Policy (OEP3) remained one of the most controversial policies, with 59.7% of respondents being neutral and 30.9% dissatisfied, yielding an average satisfaction score of 2.80.

These findings suggested that public sentiment toward these policies leaned toward neutrality or dissatisfaction, particularly regarding air quality monitoring (AQM2) and the use of public transport to reduce emissions (UPI4). Additionally, the Odd-Even policy remained a controversial issue, with many residents feeling neutral or dissatisfied with its impact. This underscored the need for a comprehensive evaluation to improve public approval, including enhancements to public transportation options and more public awareness campaigns.

Citizen-Suggested Approaches for Improving Air Quality in Jakarta

Addressing Jakarta's air pollution challenges requires solutions that reflect the needs and perspectives of its citizens. To explore Research Question 3—Based on Jakarta citizens' views, what are the most effective alternative solutions to reduce air pollution in the city?—was examined through an analysis of the PSU4 variable, which directly asked respondents to select the solution they believe should be prioritized. This variable offered choices such as developing more efficient and eco-friendly public transportation, reducing reliance on fossil-fuel motorbikes and private vehicles, increasing the use of renewable energy sources like solar and wind, expanding green spaces with more trees and larger parks, and promoting public awareness and education on environmental protection. Frequencies and percentages to analyze these preferences were described in Table 9. While One-way ANOVA and T-tests provided comparative insights across demographic groups, which were described in Table 10.

Table 9. Frequencies and Percentages of Jakarta Citizens' Prioritized Alternative Solutions to Address Air Pollution in Jakarta (PSU4)

	PSU4 (What alternative solutions do you think are the most important and should be prioritized by the government to reduce air pollution in Jakarta?)	
	Freq.	%
Greening the city with more trees and larger parks	52	10.9%
Public awareness and education about the importance of protecting the environment and reducing air pollution	37	7.7%
Reducing the use of motorbikes and private vehicles using fossil fuels	58	12.1%
Development of more efficient and environmentally friendly public transportation	221	46.1%
Increased use of renewable energy sources such as solar and wind power	111	23.2%

Table 9 presents preferred measures suggested by the respondents to reduce air pollution. The mean score (3.63) indicated general agreement on several approaches, with 46.1% advocating for "Development of more efficient and environmentally friendly public transportation" as the top preference. Other responses

included "Increased use of renewable energy sources" (23.2%), "Reducing use of motorbikes and private vehicles" (12.1%), and "Greening the city with more trees and parks" (10.9%).

Table 10. Mean Comparison of Jakarta Citizens' Prioritized Alternative Solutions to Address Air Pollution in Jakarta (PSU4) Across Demographic Groups

Demographic Variables	Statistical Test	F/t-value	p-value	Pair means with Significant Difference
Age	One-way ANOVA	F(3, 475) = 2.814	0.039	"36-45 years" (4.01) : "46 years and above" (3.42)
Gender	T-test	t(477) = .395	0.857	None
Education	One-way ANOVA	F(2, 476) = 2.797	0.062	None
Occupation	One-way ANOVA	F(4,474) = 5.100	0.000	"Self-employed" (3.79) : "Unemployed" (1.00)
Income	One-way ANOVA	F(3, 475) = 6.799	0.000	"<Rp 1,000,000" (3.81) : ">Rp 10,000,000" (2.00)
Residence	One-way ANOVA	F(4,474) = 1.326	0.259	None
Length of Residence	One-way ANOVA	F(3,475) = .941	0.421	None

Table 10 presents the statistical findings for comparing PSU4 scores across various demographic sub-categories. Significant differences were observed for age ($F(3, 475) = 2.814$, $p = 0.039$), where individuals aged 36–45 years reported the highest mean score (4.01), while those aged 46 and above showed the lowest mean (3.42). Significant variation was also found in occupation ($F(4, 474) = 5.100$, $p < 0.001$), with self-employed individuals reporting the highest score (3.79) and unemployed respondents scoring the lowest (1.00). Income differences were notable as well ($F(3, 475) = 6.799$, $p < 0.001$), with individuals earning under Rp 1,000,000 scoring highest (3.81), compared to those earning over Rp 10,000,000 (2.00). No significant differences were found for gender ($t(477) = .395$, $p = 0.857$), education ($F(2, 476) = 2.797$, $p = 0.062$), residence ($F(4, 474) = 1.326$, $p = 0.259$), or length of residence ($F(3, 475) = .941$, $p = 0.421$).

These findings suggested that demographic variables such as age, occupation,

and income were associated with varying perceptions of prioritized alternative solutions for air pollution reduction in Jakarta. However, the absence of significant post-hoc test results implied no specific pairwise differences among the age sub-groups, indicating that while age, occupation, and income influenced PSU4 scores, they did not show distinct differences within each category. This broader trend could indicate that respondents' demographic backgrounds generally shaped their perspectives, yet targeted interventions might not need to focus on any one particular demographic subgroup exclusively.

The overall analysis of PSU4 revealed diverse public opinions on air pollution policies and preferred solutions in Jakarta. Nearly half (46.1%) of respondents prioritized infrastructure solutions, particularly the development of environmentally friendly public transportation, with additional support for renewable energy and reducing fossil fuel vehicle use. Demographic factors, including age, occupation, and income, influenced these preferences, with higher support among those aged 36–45 and lower-income earners, while unemployed and higher-income individuals showed lower satisfaction. Despite these variations, the lack of pairwise differences in post-hoc tests suggested that broad-based public engagement strategies, such as prioritizing infrastructure improvements, public transport, and awareness campaigns, could effectively address concerns across demographic groups.

Summary of Major Findings

This section presents key insights from the previous chapter: an analysis of public perceptions regarding air pollution policies, and preferred solutions in Jakarta. The findings revealed that demographic factors, including age, occupation, income, and length of residence, significantly shaped public attitudes, with younger

individuals, higher-income earners, and long-term residents tending to express less favorable views toward existing policies. Overall sentiment toward current air quality monitoring and public transport initiatives leaned toward neutrality or dissatisfaction, highlighting areas for potential policy improvement. The public showed a strong preference for infrastructure-based solutions, with nearly half of respondents prioritizing the development of environmentally friendly public transportation as the most effective approach to address Jakarta's air pollution challenges. These insights highlight the importance of demographic considerations in policy-making and the public's preference for infrastructure solutions to achieve lasting environmental benefits.

CONCLUSION

Three major findings of this study highlight the influence of demographic factors and Jakarta citizens' preferences on government policy on air pollution:

1. Age, income, occupation, and length of residence strongly shaped public views on air pollution policies, with younger, higher-income, and long-term residents showing less favorable attitudes.
2. Overall, public opinion on current air quality monitoring and public transport was neutral to dissatisfied, highlighting areas for policy improvement especially air quality monitoring and public transportation system.
3. Nearly half of respondents favored environmentally friendly public transport as the primary solution for Jakarta's air pollution issues.

As this study aimed to bridge the gap between the government's current policies and the expectations of Jakarta's citizens regarding clean air, by focusing on the public's perspective on air pollution measures in Jakarta, these findings provide clear insights to answer the three research questions effectively:

- Research Question 1 sought to understand the attitudes and opinions of Jakarta's residents toward the government policies implemented to address air pollution. The findings revealed significant variations in public attitudes toward air pollution policies across demographic groups, specifically in age, occupation, income, and length of residence. where younger individuals, unemployed respondents, higher-income earners, and long-term residents expressed less favorable views on policies like air quality monitoring and emission control. In comparison, older individuals, those with stable occupations, lower-income earners, and residents of

Central and South Jakarta generally held more positive attitudes. These findings suggest that public opinion is largely influenced by individuals' daily experiences and socio-economic factors, whereas gender and education level did not show a significant impact.

- Research Question 2 explored how Jakarta citizens assess the effectiveness of the government's policies aimed at reducing air pollution. The study indicated that public sentiment toward current air pollution policies was largely neutral or dissatisfied, especially regarding air quality monitoring and public transportation system. The Odd-Even Policy also emerged as a controversial issue, with many residents feeling neutral or dissatisfied with its impact. These results suggest that a more comprehensive policy evaluation is needed to enhance public acceptance, including improved public transportation options and increased public awareness campaigns.
- Research Question 3 examined alternative approaches, from the perspective of Jakarta's residents, that could be more effective in reducing air pollution in the city. Analysis of PSU4 revealed that better solutions for reducing air pollution involve infrastructure-based strategies, particularly environmentally friendly public transportation. Nearly half of the respondents (46.1%) supported this solution, followed by support for renewable energy and the reduction of fossil fuel-powered vehicle usage. Preferences varied based on age, occupation, and income; however, infrastructure-based strategies, improvements to public transportation, and public awareness campaigns were generally viewed as effective ways to address the concerns of diverse demographic groups in Jakarta.

Based on the analysis and conclusions drawn from this research, several practical and theoretical suggestions emerge. Policymakers should prioritize infrastructure improvements in public transportation and enhance the quality, frequency, and reliability of air quality monitoring to meet public expectations. Additionally, targeted campaigns that address the unique concerns of younger, and lower-income residents could improve policy acceptance. Although in this study, the level of education did not significantly influence air pollution levels, education should still be a focus for the government. Environmental awareness must be instilled in each individual from an early age. Future research could explore the long-term effects of infrastructure changes on public attitudes and investigate how these changes can be effectively communicated to the community. Overall, the findings advocate for evidence-based, actionable policies that can foster public trust and engagement in Jakarta's environmental initiatives.

APPENDIX

Jakarta Citizens' Perspective toward Government Policy on Air Pollution

Dear Respondents,

Welcome to our survey on Jakarta citizens' perspective toward Government policy on air pollution. The aim of this survey is to gain a better understanding of how the people of Jakarta respond and understanding the government's policies on air pollution will provide a deeper view of how these policies affect people's daily lives and well-being.

It will take approximately 5-10 minutes to answer these survey questions as honestly and as best as possible. Please be assured that all your answers will be processed anonymously and used only for research purposes. Thank you for your participation in this survey.

Advisor: Professor Daniel Lin
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PART I: BASIC INFORMATION

Please only select one option.

1. Age
   □ 18-25 years old □ 26-35 years old □ 36-45 years old □ above 46 years old

2. Gender
   □ Male □ Female

3. Highest education level
   □ High school or below □ College/ University
   □ Postgraduate degree or equivalent □ No formal education

4. Occupation
   □ Student □ Employee □ Self-employed
   □ Retired □ Unemployed

5. Income per month
   □ Below Rp 1.000.000 □ Rp 1.000.000 – Rp 5.000.000 □ Rp 5.000.000 – Rp 10.000.000 □ Above Rp 10.000.000

6. Residential location
   □ West Jakarta □ North Jakarta □ Central Jakarta □ South Jakarta □ East Jakarta

7. Length of residence in Jakarta
   □ less than 1 year □ 1-5 years □ 6-10 years □ more than 10 years

PART II: AIR QUALITY MONITORING

1. I am aware of the air quality monitoring efforts conducted by the Jakarta government.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

2. I am satisfied with the coverage and frequency of air quality monitoring stations in Jakarta.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

3. I find the air quality data provided by the government to be reliable.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

4. I think the government is transparent in reporting air quality information.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

PART III: URBAN PLANNING AND INFRASTRUCTURE

1. I am aware of urban planning initiatives aimed at reducing air pollution in Jakarta (e.g., preserving green open spaces, environmentally friendly city planning, infrastructure development).
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

2. I find the current urban planning strategies to be effective in mitigating air pollution.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

3. I support the integration of green spaces, parks, and urban forests in urban planning to improve air quality.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

4. I am satisfied with the public transportation systems and infrastructure as alternatives to reduce vehicle emissions.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

5. I find the pedestrian and cycling infrastructure to be adequate in encouraging non-motorized transportation.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

PART IV: POLLUTION CONTROL MEASURE

1. I am aware of pollution control measures in vehicles.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

2. I am aware of pollution control measures in industries.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

3. I am aware of pollution control measures in coal-fired power plants.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

4. The government enforces emission standards for vehicles strictly.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

5. The government enforces emission standards for industries strictly.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

6. The government enforces emission standards for coal-fired power plants strictly.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

7. I am satisfied with the government's efforts in regulating emissions from transportation.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

8. I am satisfied with the government's efforts in regulating emissions from industries.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

9. I am satisfied with the government's efforts in regulating emissions from coal-fired power plants.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

PART V: ODD-EVEN POLICY AS TRAFFIC AND AIR POLLUTION MANAGEMENT MEASURE

1. I am aware of the traffic and air pollution management policies such as the Odd-Even Policy implemented in Jakarta, including the rules and implementation schedule.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

2. I believe the Odd-Even Policy has been effective in reducing traffic congestion and air pollution in Jakarta.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

3. I am satisfied with the implementation of the Odd-Even Policy, including the clarity of regulations and the availability of information in Jakarta.
   □ Strongly disagree □ Disagree □ Neutral □ Agree □ Strongly agree

4. Do you believe that the Odd-Even Policy needs to be improved or modified for better effectiveness?
   □ Strongly agree □ Agree □ Neutral □ Disagree □ Strongly disagree

5. Which of the following improvements on Odd-Even Policy would you support? (Choose one answer)
   □ Stricter policy enforcement
   □ More flexible implementation time
   □ More public awareness campaigns
   □ Better public transport options

PART VI: PUBLIC SUGGESTIONS

1. What do you think is the biggest barrier to reducing air pollution in Jakarta? (Choose one answer)
   □ Lack of public awareness
   □ Inadequate public transport infrastructure
   □ High dependence on private vehicles
   □ Inadequate enforcement of environmental regulations
   □ Industrial Emissions

2. What incentives would most encourage people to use public transportation instead of private vehicles? (Choose one answer)
   □ Fare reductions or subsidies for public transportation
   □ Improving public transport services (expanding routes, increasing frequency)
   □ Better integration of different modes of public transport (e.g., bus, train, MRT)
   □ Improving safety and security in public transportation
   □ Improving the comfort and cleanliness of public transportation

3. What measures would you support to reduce emissions from industries in Jakarta? (Choose one answer)
   □ Stricter emission standards and regulations
   □ Financial incentives for industries to adopt cleaner technologies
   □ Development of industrial zones away from residential areas
   □ Regular monitoring and reporting of emissions
   □ Public disclosure of industrial emissions data

4. What alternative solutions do you think are the most important and should be prioritized by the government to reduce air pollution in Jakarta? (Choose one answer)
   □ Development of more efficient and environmentally friendly public transportation

□ Reducing the use of motorbikes and private vehicles using fossil fuels
□ Increased use of renewable energy sources such as solar and wind power
□ Greening the city with more trees and larger parks
□ Public awareness and education about the importance of protecting the environment and reducing air pollution

End of survey. Thank you.

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