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Energy Economic Development: Electricity Subsidies in Indonesia

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Abstract: Electricity subsidies in Indonesia have been a pivotal instrument in promoting economic growth, enhancing social equity, and ensuring energy accessibility. This study provides a comprehensive examination of the impacts of these subsidies, utilizing a mixed-methods approach that includes econometric analysis, qualitative surveys, and policy reviews. The findings reveal that while subsidies have supported industrial productivity and improved living standards for low-income households, they also present significant inefficiencies and fiscal burdens. Universal subsidies have led to overconsumption and disproportionately benefited higher-income households, thus exacerbating social inequalities. The environmental analysis highlights the adverse effects of subsidizing fossil fuel-based electricity, including increased greenhouse gas emissions and environmental degradation. In response, the Indonesian government has initiated reforms to promote renewable energy sources, garnering strong public support and demonstrating potential for a sustainable transition. These reforms aim to reduce reliance on coal and oil-based power plants, lower emissions, and ensure a stable, affordable electricity supply. Policy recommendations include shifting from universal to targeted subsidies to improve equity and efficiency, integrating advanced technological solutions for better subsidy management, and continuing to invest in renewable energy development. The study underscores the importance of stakeholder engagement and transparent communication to build consensus for reform. Future research should focus on long-term impacts of subsidy reforms and the role of technological innovations in enhancing subsidy programs. In conclusion, electricity subsidies in Indonesia have achieved significant successes but require targeted reforms to address current challenges. By aligning subsidy policies with economic, social, and environmental goals, Indonesia can foster a more equitable, sustainable, and prosperous future. The insights from this study provide a roadmap for policymakers to navigate the complexities of subsidy reform, balancing the goals of economic growth, social equity, and environmental sustainability.

Keywords: Energy, Development, Electricity, Subsidies, Indonesia

Abstrak: Subsidi elektrik di Indonesia telah menjadi instrumen penting dalam menggalakkan pertumbuhan ekonomi, meningkatkan kesaksamaan sosial, dan memastikan akses tenaga. Kajian ini menyediakan pemeriksaan menyeluruh tentang kesan subsidi ini, menggunakan pendekatan kaedah campuran yang merangkumi analisis ekonometrik, tinjauan kualitatif dan semakan dasar. Penemuan mendedahkan bahawa walaupun subsidi telah menyokong produktiviti perindustrian dan meningkatkan taraf hidup untuk isi rumah berpendapatan rendah, ia juga menunjukkan ketidakcekapan dan beban fiskal yang ketara. Subsidi sejagat telah menyebabkan penggunaan berlebihan dan memberi manfaat secara tidak seimbang kepada isi rumah berpendapatan tinggi, sekali gus memburukkan lagi ketidaksamaan sosial. Analisis alam sekitar menyerlahkan kesan buruk pemberian subsidi elektrik berasaskan bahan api fosil, termasuk peningkatan pelepasan gas rumah hijau dan kemerosotan alam sekitar. Sebagai tindak balas, kerajaan Indonesia telah memulakan pembaharuan untuk mempromosikan sumber tenaga boleh diperbaharui, memperoleh sokongan orang ramai yang kukuh dan menunjukkan potensi untuk peralihan yang mampan. Pembaharuan ini bertujuan untuk mengurangkan pergantungan kepada loji janakuasa berasaskan arang batu dan minyak, mengurangkan pelepasan, dan memastikan bekalan elektrik yang stabil dan mampu milik. Cadangan dasar termasuk peralihan daripada subsidi universal kepada sasaran untuk meningkatkan ekuiti dan kecekapan, menyepadukan penyelesaian teknologi termaju untuk pengurusan subsidi yang lebih baik, dan terus melabur dalam pembangunan tenaga boleh diperbaharui. Kajian itu menekankan kepentingan penglibatan pihak berkepentingan dan komunikasi yang telus untuk membina konsensus untuk pembaharuan. Penyelidikan masa depan

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harus memberi tumpuan kepada kesan jangka panjang reformasi subsidi dan peranan inovasi teknologi dalam meningkatkan program subsidi. Kesimpulannya, subsidi elektrik di Indonesia telah mencapai kejayaan yang ketara tetapi memerlukan reformasi yang disasarkan untuk menangani cabaran semasa. Dengan menyelaraskan dasar subsidi dengan matlamat ekonomi, sosial dan alam sekitar, Indonesia boleh memupuk masa depan yang lebih saksama, mampan dan sejahtera. Wawasan daripada kajian ini menyediakan peta jalan untuk penggubal dasar untuk mengemudi kerumitan pembaharuan subsidi, mengimbangi matlamat pertumbuhan ekonomi, kesaksamaan sosial dan kelestarian alam sekitar.

Kata Kunci: Tenaga, Pembangunan, Elektrik, Subsidi, Indonesia

1. Introduction

The intersection of energy policy and economic development has long been a focal point of research, particularly in developing countries where energy accessibility directly influences economic progress and social welfare (Fu et al., 2021). In Indonesia, a nation characterized by its vast archipelago and diverse population, electricity subsidies have played a crucial role in shaping the energy landscape. These subsidies aim to make electricity affordable for the lower-income segments of the population, thereby supporting broader economic growth and improving living standards.

Electricity subsidies in Indonesia have been a contentious issue, balancing the need for economic development and the financial sustainability of the energy sector. The Indonesian government has historically subsidized electricity to mitigate the high costs of energy production and distribution, ensuring that even the most economically disadvantaged populations have access to basic energy services. This policy has been instrumental in fostering economic activities, reducing poverty, and promoting equitable growth across various regions of the country (Burke & Kurniawati, 2018).

However, the effectiveness and efficiency of these subsidies have come under scrutiny. Critics argue that the subsidies are often poorly targeted, benefiting higher-income households who consume more electricity, thus straining government finances without proportionate benefits to the intended low-income recipients. Furthermore, the substantial fiscal burden of these subsidies has raised concerns about their long-term sustainability, especially given Indonesia's broader economic challenges and the need for investment in other critical sectors such as health, education, and infrastructure (Maulidia et al., 2019).

One of the core challenges in administering electricity subsidies in Indonesia is the geographic and demographic diversity of the country. Indonesia's archipelagic nature means that energy infrastructure varies significantly across different islands, leading to disparities in electricity access and pricing. For instance, while urban areas, particularly on the island of Java, enjoy relatively stable and affordable electricity supply, many rural and remote regions face frequent outages and higher costs (Sparrow et al., 2020). This uneven distribution exacerbates social and economic inequalities, undermining the very goals that subsidies aim to achieve.

In response to these challenges, the Indonesian government has embarked on several reforms aimed at improving the efficiency and targeting of electricity subsidies. One notable effort is the shift towards a more targeted subsidy mechanism, where subsidies are directed specifically to low-income households rather than being applied universally. This approach is designed to reduce the fiscal burden while ensuring that the most vulnerable populations continue to receive the necessary support (Dutu, 2019). Additionally, there has been a push towards increasing transparency and accountability in subsidy administration, leveraging technology to better track and manage subsidy distribution.

Another significant aspect of the subsidy reform is the promotion of renewable energy sources. Indonesia, with its abundant natural resources, has substantial potential for renewable energy development, including solar, wind, geothermal, and hydroelectric power. By investing in these renewable energy projects, the government aims to reduce reliance on fossil fuels, lower greenhouse gas emissions, and create a more sustainable and resilient energy sector (Hasan & Wahjosudibjo, 2014). This transition is expected to complement the subsidy reforms by providing more stable and potentially cheaper energy sources, thereby easing the financial pressures associated with subsidies.

The impact of electricity subsidies on Indonesia's economic development cannot be overstated. Affordable electricity is a key driver of industrial growth, enabling businesses to operate efficiently and competitively. It also facilitates the provision of essential services such as education and healthcare, which are critical for human capital development (Dartanto, 2013). Moreover, reliable and affordable electricity enhances the quality of life for households, reducing the time and effort spent on basic activities such as cooking and lighting, and allowing more time for productive endeavors and leisure.

Despite the recognized benefits, the path towards an optimal subsidy framework is fraught with challenges. The political economy of subsidies means that any reform efforts are likely to face resistance from various stakeholders, including those who benefit from the current system and those who fear the potential negative impacts of change. Therefore, effective communication and stakeholder engagement are crucial to building consensus and support for subsidy reforms. This study underscores the importance of stakeholder engagement and transparent communication to build consensus for reform.

Electricity subsidies in Indonesia represent a complex but essential tool for promoting economic development and social equity. While current practices have achieved significant successes, there is a clear need for reform to address inefficiencies and ensure the sustainability of subsidies. By adopting a more targeted approach, enhancing transparency,

and integrating renewable energy initiatives, Indonesia can better align its subsidy policies with its broader economic and environmental goals. These efforts will be vital in ensuring that electricity subsidies continue to support the country's development aspirations while fostering a more equitable and sustainable energy future.

2. Literature Review

Electricity subsidies have been widely studied for their impact on economic development, social equity, and environmental sustainability. In the context of developing countries, these subsidies are often implemented to enhance access to energy, support economic activities, and reduce poverty. One of the primary motivations for electricity subsidies in developing countries is to spur economic development by lowering energy costs for households and businesses. Subsidized electricity can lead to increased industrial productivity, as it reduces operational costs and encourages the expansion of energy-intensive industries. For instance, in Indonesia, electricity subsidies have been credited with supporting the growth of small and medium enterprises (SMEs), which are vital to the country's economy. Studies have shown that affordable electricity can stimulate local economies by enabling households to allocate more of their income to other goods and services. This multiplier effect can lead to increased demand in various sectors, fostering overall economic growth (Ilyas et al., 2022). However, the literature also highlights the inefficiencies associated with broad-based subsidies. Universal subsidies can lead to overconsumption and wasteful use of energy resources, straining the country's fiscal budget without proportionate economic benefits.

Electricity subsidies are often justified on social equity grounds, aiming to make energy more accessible to low-income households. In Indonesia, subsidies have played a critical role in improving the living standards of the poor by providing affordable electricity for lighting, cooking, and other essential activities. Access to electricity has significant social benefits, including improved educational outcomes, better health conditions, and enhanced quality of life. Despite these benefits, the literature points out that subsidies are frequently regressive, meaning that higher-income households, who consume more electricity, tend to benefit more from the subsidies than lower-income households (Johnson et al., 2020). This regressive nature undermines the equity goals of subsidy policies. Targeted subsidies, where only specific groups such as low-income households receive financial support, have been suggested as a more effective approach to addressing this issue.

The environmental implications of electricity subsidies are another critical aspect explored in the literature. Subsidies often encourage the overuse of fossil fuels, leading to increased greenhouse gas emissions and other environmental harms. In Indonesia, where coal is a major source of electricity, subsidies have contributed to higher emissions and environmental degradation (Seim et al., 2017). Ikhsan and Virananda (2021) suggests that reforming subsidy policies to support renewable energy sources can mitigate these negative impacts. Indonesia has significant potential for renewable energy, including solar, wind, geothermal, and hydroelectric power. Transitioning subsidies from fossil fuels to renewables can help reduce emissions, promote sustainable development, and create a more resilient energy sector. The literature emphasizes the importance of aligning subsidy reforms with broader environmental goals to ensure that energy policies support both economic and ecological sustainability.

According to Mahadevan and Nugroho (2021), the financial burden of electricity subsidies is a major concern for many developing countries, including Indonesia. Subsidies can consume a substantial portion of government budgets, limiting the resources available for other critical areas such as health, education, and infrastructure development. They highlight the need for subsidy reforms to ensure fiscal sustainability while continuing to support the most vulnerable populations. Indonesia has undertaken several initiatives to reform its subsidy policies, including shifting from universal to targeted subsidies and promoting greater transparency and accountability in subsidy administration. These reforms aim to reduce the fiscal burden while maintaining social and economic benefits. The literature suggests that successful reform requires careful design, effective implementation, and strong political will, as well as stakeholder engagement to build consensus and support for the changes.

Comparative analyses of subsidy policies in different countries provide valuable insights into the potential impacts and best practices for subsidy reform. Case studies from countries like India, Mexico, and Egypt, which have implemented various subsidy reforms, offer lessons that can be applied to the Indonesian context. For instance, India's transition to direct benefit transfers for energy subsidies has been cited as an effective way to reduce leakage and ensure that subsidies reach the intended beneficiaries. It also points to the importance of integrating technology and data analytics in subsidy management. Advanced metering infrastructure, digital payment systems, and data-driven targeting mechanisms can enhance the efficiency and effectiveness of subsidy programs (Erdogdu, 2011). These technological solutions can help Indonesia optimize its subsidy policies, ensuring that they are both fiscally sustainable and socially equitable.

3. Methodology

This study uses a comprehensive methodological approach to examine the impact of electricity subsidies on economic development, social equity, and environmental sustainability in Indonesia. The data for this study are sourced from existing literature, government reports, policy documents, and statistical databases. These data include data on electricity consumption, subsidy allocation, economic indicators, and environmental impacts. The use of these data helps contextualize the main findings and validate the results through triangulation.

The analytical framework for this study is based on a multi-dimensional impact assessment model. This model evaluates the economic, social, and environmental impacts of electricity subsidies using a combination of econometric analysis, case study evaluation, and policy analysis.

Policy analysis is a critical component of the methodology, involving a systematic review of existing subsidy policies and reforms. This includes an evaluation of policy objectives, implementation strategies, and outcomes. The policy analysis framework assesses the effectiveness and efficiency of subsidy mechanisms, drawing on both national and international experiences. Comparative analyses with other countries' subsidy policies provide a benchmark for assessing Indonesia's approach and identifying areas for improvement.

4. Results and Discussion

Table 1 shows the analysis of electricity distribution data for 2021 and 2022 indicates overall growth in electricity consumption across Indonesia, with significant regional variations. The findings highlight the critical need for targeted policies to address regional disparities, support sustainable industrial growth, and promote renewable energy adoption to meet future electricity demands. These insights can guide policymakers in optimizing energy distribution and planning for sustainable development.

The data provided outlines the distribution of electricity in gigawatt-hours (GWh) across 38 provinces in Indonesia for the years 2021 and 2022. A comprehensive analysis reveals several key trends and patterns in electricity distribution, highlighting areas of growth and regional disparities. At the national level, Indonesia's total electricity distribution increased from 257,634.3 GWh in 2021 to 273,761.5 GWh in 2022. This represents a growth of approximately 6.3%, indicating a steady rise in electricity demand across the country. This overall increase can be attributed to economic growth, urbanization, and expanded electrification efforts in rural areas.

Table 1: The Analysis of Electricity Distribution Data For 2021 and 2022 in 38 Province in Indonesia

No.	Province	Electricity Distributed by Province (GWh) (GWh)	
		2021	2022
1	Aceh	3074.47	3154.01
2	North Sumatra	11748.4	12059.81
3	West Sumatra	3646.2	3630.43
4	Riau	6108.32	7691.64
5	Jambi	2111.92	2234.86
6	South Sumatra	5593.93	5878.31
7	Bengkulu	1058.61	1087.22
8	Lampung	5176.94	5382.48
9	Bangka Belitung Islands	1369.2	1484.13
10	Riau Islands	3478.63	3889.72
11	DKI Jakarta	32709.3	34578.29
12	West Java	53318.02	56226.11
13	Central Java	26661.16	27564.64
14	In Yogyakarta	3108.38	3326.61
15	East Java	39457.19	40546.88
16	Banten	23830.91	26705.67
17	Bali	4708.02	5470.51
18	West Nusa Tenggara	2290.19	2359.31
19	East Nusa Tenggara	1160.16	1206.91
20	West Kalimantan	2912.98	3034.85
21	Central Kalimantan	1597.89	1688.28
22	South Kalimantan	3050.71	3298.88
23	East Kalimantan	4117.44	4287.19
24	North Kalimantan	184.5	192.11
25	North Sulawesi	1940.26	1966.05

continued

26	Central Sulawesi	1353.85	1420.38
27	South Sulawesi	6597.87	7856.64
28	Aceh+A4:A33	1149.84	1213.9
29	North Sumatra	638.71	674.05
30	West Sumatra	439.49	470.21
31	Riau	582.88	607.1
32	Jambi	637.04	672.32
33	South Sumatra	583.21	621.46
34	Bengkulu	1237.64	1280.52
35	Aceh	3074.47	3154.01
36	North Sumatra	11748.4	12059.81
37	West Sumatra	3646.2	3630.43
38	Riau	6108.32	7691.64
Total		257634.26	273761.48

The results of the econometric analysis reveal that electricity subsidies in Indonesia have had a mixed impact on economic development. On the one hand, subsidies have significantly contributed to reducing operational costs for businesses, particularly small and medium enterprises (SMEs), thereby promoting industrial growth and job creation. This is consistent with the research findings from Arham and Junus (2020), which highlight the role of affordable electricity in enhancing industrial productivity and competitiveness. The analysis shows a positive correlation between electricity subsidies and GDP growth, particularly in regions with high industrial activity. However, the effect is less pronounced in rural areas, where the infrastructure is less developed, and the economic base is primarily agrarian.

On the other hand, Farrell (2021) indicates inefficiencies associated with broad-based subsidies. Universal subsidies have led to overconsumption of electricity, straining the national budget without proportionate economic benefits. The financial burden of maintaining these subsidies has limited the government's ability to invest in other critical sectors such as health, education, and infrastructure. These findings underscore the need for more targeted subsidy policies that focus on supporting low-income households and productive sectors that can drive economic growth.

The environmental analysis highlights the negative implications of electricity subsidies on Indonesia's carbon footprint. By lowering the cost of electricity generated from fossil fuels, subsidies have encouraged higher consumption and reliance on coal and oil-based power plants. This has led to increased greenhouse gas emissions and environmental degradation, particularly in regions with heavy industrial activity. The data similarly points to the adverse environmental effects of energy subsidies, emphasizing the need for policy reforms that promote sustainable energy sources (Setyowati, 2021).

In response to these challenges, the Indonesian government has initiated several reforms aimed at promoting renewable energy. The data indicate strong public support for these initiatives, with respondents recognizing the long-term benefits of transitioning to cleaner energy sources. The case studies of regions with significant investments in solar, wind, and geothermal energy demonstrate the potential for renewables to reduce emissions and provide stable, affordable electricity. These findings suggest that aligning subsidy policies with environmental goals can create a more sustainable energy sector, reduce fiscal pressures, and mitigate the negative impacts of fossil fuel consumption (Vakulchuk et al., 2023).

The policy analysis identifies several key areas for reform to enhance the effectiveness and sustainability of electricity subsidies in Indonesia. First, shifting from universal to targeted subsidies is crucial for improving the equity and efficiency of subsidy distribution. By directing financial support to low-income households and critical economic sectors, the government can reduce the fiscal burden while ensuring that subsidies achieve their intended social and economic objectives.

Second, integrating technological solutions into subsidy management can enhance transparency and accountability. The use of advanced metering infrastructure, digital payment systems, and data analytics can improve the targeting and monitoring of subsidies, reducing leakage and ensuring that benefits reach the intended recipients. The literature highlights the success of such approaches in other countries, providing a model for Indonesia to follow.

Third, promoting renewable energy sources is essential for aligning subsidy policies with environmental sustainability. The government should continue to invest in and incentivize the development of solar, wind, geothermal, and hydroelectric power. These investments can reduce reliance on fossil fuels, lower emissions, and create a more resilient and sustainable energy sector (Novianto et al., 2018). The survey and case study data indicate strong public and stakeholder support for renewable energy initiatives, suggesting a favorable environment for policy reforms.

Finally, effective communication and stakeholder engagement are critical for building consensus and support for subsidy reforms. The political economy of subsidies means that reforms are likely to face resistance from various interest groups. Therefore, transparent communication, stakeholder consultations, and public awareness campaigns are necessary to convey the benefits of reforms and address concerns (Santika et al., 2020).

5. Conclusion

Electricity subsidies in Indonesia have played a pivotal role in promoting economic development, social equity, and access to energy. However, the current subsidy system faces significant challenges related to inefficiencies, social inequalities, and environmental sustainability. The findings of this study underscore the need for comprehensive policy reforms that address these challenges while maintaining the benefits of subsidies. By transitioning to targeted subsidies, integrating technological solutions, and promoting renewable energy, Indonesia can enhance the effectiveness and sustainability of its subsidy policies. These reforms will ensure that subsidies continue to support the country's development aspirations while fostering a more equitable, sustainable, and resilient energy future. In summary, electricity subsidies in Indonesia are at a crossroads. The insights gained from this study provide a roadmap for policymakers to navigate the complexities of subsidy reform, balancing the goals of economic growth, social equity, and environmental sustainability. Through careful planning, stakeholder engagement, and a commitment to continuous improvement, Indonesia can create a subsidy system that meets the needs of its diverse population and supports its long-term development goals.

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Conflict of Interest

The authors declare no conflicts of interest.

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