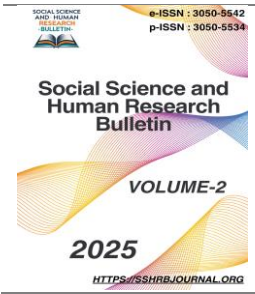

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Promoting Digital Inclusion through Free and Open Source Software (FOSS) in Indonesian Public Policy

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ABSTRACT: This study examines the adoption of Free and Open Source Software (FOSS) in Indonesian public policy through a qualitative approach. Data were collected from scholarly articles, government reports, case studies, and policy documents, analyzed using thematic content analysis to identify trends, benefits, and challenges. Findings indicate an increase in FOSS adoption, driven by initiatives such as the Indonesian Government Open Source (IGOS) program (2006), the Public Information Disclosure Law (2008), and the need for transparency during the COVID-19 pandemic. FOSS benefits include cost efficiency, security, flexibility, digital inclusion, and community engagement. However, challenges such as regulatory barriers, lack of skilled personnel, legacy systems, and industry resistance hinder implementation. Proposed strategies include streamlining regulations, enhancing human resource training, modernizing infrastructure, and fostering cross-sector collaboration. This study affirms FOSS's potential as a transformative tool for transparent, efficient, and inclusive governance in Indonesia, with recommendations to address hidden costs and sectoral variations. The findings enrich understanding of the complexities of FOSS adoption, reinforcing its role in achieving an inclusive digital society.

Purpose: To examine the use of Free and Open Source Software (FOSS) in Indonesian public policy.

Patients and methods: Qualitative approach.

Results: FOSS serves as a tool for digital transformation, supporting transparent, efficient, and inclusive governance in Indonesia, with recommendations to address hidden costs and sectoral variations.

Conclusion: The findings enhance understanding of the complexities of FOSS adoption, affirming its role in achieving an inclusive digital society.

1. INTRODUCTION

Free and Open Source Software (FOSS) has emerged as a strategic element in the digital transformation of public policy across various countries, including Indonesia, due to its ability to support transparent, efficient, and inclusive governance. Initiatives such as the Indonesian Government Open Source (IGOS) program since 2006 and the Public Information Disclosure Law (Law No. 14/2008) demonstrate Indonesia's commitment to adopting FOSS to reduce reliance on proprietary software, promote local innovation, and enhance technology accessibility (Yusuf & Santoso, 2023; Pratama & Sari, 2023). During the COVID-19 pandemic, FOSS played a critical role in facilitating efficient data sharing and combating misinformation, underscoring its relevance in crisis situations (Susanti & Nugroho, 2022). Despite recognized benefits such as cost efficiency, security, flexibility, and digital inclusion, challenges including regulatory barriers, a shortage of skilled personnel, legacy systems, and industry resistance continue to impede full adoption (Wibowo, 2024; Rahmawati & Pratama, 2025). Furthermore, hidden costs (e.g., training and maintenance) and variations in FOSS adoption across public sectors (government, education, healthcare) remain underexplored.

Recent literature highlights FOSS's significant potential in public policy. Wibowo (2024) confirms that FOSS adoption in Indonesia, driven by IGOS and the COVID-19 pandemic, supports cost efficiency, security, and flexibility but is hindered by

regulatory constraints and human resource shortages. Prastyo et al. (2020) emphasize FOSS's role in paperless applications in the education sector, yielding benefits such as time efficiency and reduced paper waste, though challenged by infrastructure limitations and cultural resistance. Supari and Anton (2022) demonstrate that FOSS enhances micro, small, and medium enterprise (MSME) resilience during the pandemic, albeit limited by digital skills gaps. Conversely, Kodhek and Kamau (2025) offer a contrasting perspective, highlighting hidden costs (e.g., training and maintenance) in FOSS adoption in Kenyan education, challenging the narrative of cost efficiency. These studies suggest that while FOSS benefits are well-documented, in-depth analyses of hidden costs and sectoral variations, particularly in the Indonesian context, remain limited.

Although prior research affirms FOSS's benefits in public policy, there is a gap in analyzing hidden costs, such as training, maintenance, and system integration, which may diminish FOSS's financial advantages (Kodhek & Kamau, 2025). Additionally, most studies focus on public policy broadly or specific sectors like education and MSMEs (Prastyo et al., 2020; Supari & Anton, 2022), without systematically comparing FOSS adoption across public sectors such as government, education, and healthcare. This study addresses these gaps by providing a comprehensive analysis of hidden costs and sectoral dynamics in FOSS adoption in Indonesia, employing a qualitative approach based on a systematic literature review. By exploring trends, benefits, challenges, and forward-looking strategies, this research aims to deepen understanding of FOSS adoption complexities and offer strategic recommendations to support transparent and inclusive digital governance in Indonesia.

II. METHOD

This study adopts a qualitative approach as the primary method to analyze trends in FOSS adoption in Indonesian public policy. This approach was selected for its exploratory nature, enabling researchers to understand the complex social, political, and technical contexts surrounding FOSS adoption (Susanti & Nugroho, 2022). Qualitative data were collected through an in-depth literature review of the following sources: scholarly articles and academic journals, government and organizational reports, case studies, and policy and regulatory documents. Analysis of Law No. 14/2008 and policies related to public procurement and data localization was conducted to understand regulatory barriers (Pratama & Sari, 2023).

Qualitative data collection was carried out through documentation, involving the collection and review of relevant written documents. This approach allowed researchers to capture historical and contextual narratives, such as the role of IGOS since 2006 and the impact of the COVID-19 pandemic on FOSS adoption (Yusuf & Santoso, 2023; Susanti & Nugroho, 2022). Data analysis was conducted using a qualitative approach through thematic content analysis to identify patterns and contexts, supplemented by descriptive quantitative analysis to provide empirical evidence. The systematic literature review with a mixed-methods approach enabled this study to generate comprehensive insights into FOSS adoption trends, benefits, and challenges in Indonesia. This approach ensures that findings are relevant, valid, and supportive of strategic recommendations for the future.

III. RESULTS

Table 1. Findings on FOSS Adoption in Indonesian Public Policy

Category	Findings
Main Trends	Increased FOSS adoption for transparency, cost efficiency, and digital inclusion, driven by the IGOS initiative (2006), the Public Information Disclosure Law (Law No. 14/2008), and the need for transparent communication during the COVID-19 pandemic.
FOSS Benefits	- Cost Efficiency: Eliminates licensing costs, enabling budget reallocation to essential services. - Security and Transparency: Global community code scrutiny reduces vulnerabilities. - Flexibility and Customization: Adaptable to local and sectoral needs. - Digital Inclusion: Lowers technology access barriers. - Community Engagement: Strengthened through collaboration with NGOs, universities, and private sector initiatives.
Challenges	- Regulatory Barriers: Opaque public procurement policies and data localization requirements. - Lack of Skilled Personnel: Limited digital expertise in the public sector. - Technical Constraints: Legacy systems hinder integration. - Industry Resistance: Resistance from proprietary software providers and cultural preferences for traditional solutions.
Future Strategies	- Strengthen supportive policies by simplifying procurement regulations and incentivizing local FOSSdevelopment. - Enhance human resource capacity through training and university partnerships. - Modernize infrastructure to support FOSS integration. - Expand collaboration with local communities and the private sector for innovation.

Source : (Processed by researchers from various sources, 2025)

IV. DISCUSSION

The adoption of Free and Open Source Software (FOSS) in Indonesian public policy has shown a significant upward trend, particularly in supporting transparency, cost efficiency, and digital inclusion. The Indonesian Government Open Source (IGOS) initiative, launched in 2006, marked a pivotal step in reducing reliance on proprietary software while promoting local innovation (Yusuf & Santoso, 2023). Additionally, the Public Information Disclosure Law (Law No. 14/2008) has strengthened the government's commitment to transparency through the implementation of FOSS-based information systems, supported by the establishment of the Information Commission for service standardization (Pratama & Sari, 2023).

FOSS's role became particularly prominent during the COVID-19 pandemic, facilitating efficient data sharing, combating misinformation, and enhancing public communication (Susanti & Nugroho, 2022). These trends position FOSS as a strategic tool in Indonesia's digital transformation, supporting more open and efficient governance. FOSS offers multidimensional benefits that reinforce its role in public policy. First, cost efficiency is a primary advantage, as FOSS eliminates licensing fees, enabling budget reallocation to essential services such as infrastructure and healthcare (Wibowo, 2024). Second, its open-source nature supports security and transparency, with global community scrutiny reducing security vulnerabilities and enhancing public trust (Rahmawati & Pratama, 2025). Third, FOSS's flexibility and customization capabilities allow tailored technological solutions to meet specific regional or sectoral needs, supporting policy diversity (Yusuf & Santoso, 2023). Fourth, FOSS promotes digital inclusion by lowering technology access barriers, enabling remote communities to participate in the digital economy (Susanti & Nugroho, 2022). Fifth, community engagement, through collaboration with NGOs, universities, and private sector initiatives such as Pertamina's CSR programs, amplifies FOSS's impact through local capacity building and knowledge sharing (Pertamina, 2024).

The adoption of Free and Open Source Software (FOSS) has become increasingly relevant to Indonesian public policy, offering a cost-effective and flexible alternative to proprietary solutions. FOSS is defined by licenses that allow anyone to inspect, modify, and redistribute its source code freely (Soo Hoe, 2006). This inherent openness fosters efficiency and collaborative development, with estimates suggesting that 97% of global software relies on FOSS components (Khadafi et al., 2024).

In the Indonesian context, FOSS has emerged as a viable alternative to proprietary software in various information and communication technology (ICT) applications (Soo Hoe, 2006). The absence of licensing costs and its adaptability make FOSS particularly appealing for public policy initiatives in developing regions, enhancing ICT affordability and effectively addressing local needs (Soo Hoe, 2006). The Indonesian government has recognized this potential and actively supported FOSS initiatives, viewing it as a tool for national development and bridging the digital divide (Soo Hoe, 2006).

In practice, FOSS has been integrated into Indonesian public policy in sectors such as healthcare and digital literacy. A study on the adoption of Free/Open Source Hospital Management Information Systems (SIMRS) revealed that healthcare institutions are influenced by adoption affordability, comprehensive product features, and robust support from developers and user communities. For example, Khanza HMIS is preferred due to its free license, comprehensive functionality including integration with national healthcare services like BPJS Kesehatan, and strong community support from organizations such as Yayasan SIMRS Khanza Indonesia (ASKI) (Putratama & Ali, 2020). Similarly, the BlankOn Linux project, a localized Indonesian GNU/Linux distribution, aims to introduce FOSS and GNU/Linux to Indonesians who are not fluent in English by providing software in their native language, offering a legal and affordable alternative to widespread unlicensed proprietary software (Soo Hoe, 2006).

Despite these successes, challenges such as a lack of skilled human resources and difficulties in integrating FOSS with existing systems have been identified (Putratama & Ali, 2020). The intrinsic principles of FOSS, namely openness and transparency, extend to broader public policy challenges in Indonesia, particularly in the realm of information disclosure (Soo Hoe, 2006). Research on the Indonesian government's compliance with public information disclosure laws during the COVID-19 pandemic revealed significant transparency shortcomings, inconsistent information dissemination, and public skepticism toward scientific findings (Khadafi et al., 2024). This situation underscores the critical need for robust public policies that genuinely uphold access to information, consistent with Law No. 14/2008, which aims to guarantee citizens' rights to public information (Khadafi et al., 2024).

Furthermore, documented pro-government disinformation campaigns on social media, using automated duplicate posts to narrow political discourse, highlight the importance of transparent and verifiable public information systems (McRae et al., 2022). While these campaigns are not direct FOSS implementations, they emphasize the value of authentic information dissemination—a principle inherently supported by FOSS through publicly inspectable and modifiable source code (Putratama & Ali, 2020). Adopting FOSS in public policy can foster greater accountability and public trust by demonstrating a commitment to open systems (Soo Hoe, 2006). Globally, FOSS is recognized as critical digital infrastructure, requiring sustained and stable government support and promoting responsible consumption by key users (Scott et al., 2023). For Indonesia, this translates to the need for proactive policy support for FOSS to achieve long-term national goals, such as net-zero energy targets, where existing price-based policies are inadequate and more cost-effective, transparent pathways are needed (Syafina & Oluleye, 2024).

Despite its significant benefits, FOSS adoption in Indonesia faces several challenges. Regulatory barriers, such as opaque public procurement policies and data localization requirements, complicate FOSS integration, particularly for foreign entities (Pratama & Sari, 2023). A shortage of digital expertise in the public sector hinders effective FOSS implementation, necessitating intensive training and recruitment (Wibowo, 2024). Additionally, technical constraints, such as outdated legacy systems, impede the

integration of modern FOSS solutions, requiring substantial infrastructure investment (Yusuf & Santoso, 2023). Industry resistance, from both proprietary software providers and cultural mindsets favoring traditional solutions, also poses a major barrier to FOSS acceptance (Rahmawati & Pratama, 2025). These challenges highlight the complexity of widespread FOSS adoption in Indonesia's public sector.

To address these challenges and maximize FOSS's potential, several forward-looking strategies are necessary. First, simplifying procurement regulations and providing incentives for local FOSS development can accelerate adoption (Pratama & Sari, 2023). Second, enhancing human resource capacity through training and university partnerships will build a skilled workforce capable of managing FOSS (Wibowo, 2024). Third, modernizing infrastructure, including upgrading legacy systems, is essential for effective FOSS integration (Yusuf & Santoso, 2023). Fourth, expanding collaboration with local communities and the private sector, as exemplified by Pertamina's CSR initiatives, can drive innovation and strengthen the FOSS ecosystem (Pertamina, 2024). These strategies, if implemented cohesively, can position FOSS as a key catalyst for governance reform and societal empowerment in Indonesia.

This study highlights the strategic role of Free and Open Source Software (FOSS) in Indonesian public policy, focusing on adoption trends, multidimensional benefits, challenges, and future strategies. For comparative analysis, recent scholarly literature was identified from credible sources, including journal articles and research reports, with a focus on Indonesia and comparable developing countries like Kenya. The analysis compares findings that align with and contradict the main study, highlighting similarities and differences in trends, benefits, challenges, and strategic recommendations. The analyzed literature includes several relevant studies. First, Prastyo et al. (2020) examined the development of paperless applications in Indonesia, highlighting FOSS's dominance in the education sector due to its low cost and flexibility, with benefits such as time efficiency, budget savings, and reduced paper waste. Identified challenges include inadequate technological infrastructure, a lack of skilled personnel, and cultural resistance, with strategies focusing on human resource training and infrastructure modernization. Second, Supari and Anton (2022) explored FOSS-based digitalization for MSME resilience during the COVID-19 pandemic, finding improved operational efficiency and service accessibility but constrained by limited digital skills and infrastructure. Third, Kodhek and Kamau (2025) analyzed FOSS adoption in Kenyan education, emphasizing hidden costs such as training and maintenance as challenges, contrasting with the cost-efficiency narrative. Finally, Wibowo (2024) corroborates the main study's findings on FOSS adoption driven by IGOS and the pandemic, with similar benefits and challenges. Comparatively, the literature shows strong alignment with the main study regarding FOSS adoption trends, which are increasing in public, education, and MSME sectors, driven by the need for transparency and efficiency, as evidenced by IGOS and the COVID-19 pandemic (Wibowo, 2024; Supari & Anton, 2022).

Benefits such as cost savings, security, flexibility, and digital inclusion are consistent across studies, with Prastyo et al. (2020) adding environmental benefits. Challenges like a lack of skilled personnel, infrastructure limitations, and cultural resistance are also consistent, except for Kodhek and Kamau (2025), which highlight hidden costs as a primary barrier, challenging the cost-efficiency narrative of FOSS. Proposed strategies, such as human resource training, infrastructure modernization, and cross-sector collaboration, align across studies, with the main study and Wibowo (2024) emphasizing regulatory simplification.

However, differences emerge in sectoral focus and contradictory findings. The main study and Wibowo (2024) focus on public policy broadly, while Prastyo et al. (2020) and Supari and Anton (2022) are more specific to education and MSMEs. Kodhek and Kamau (2025) provide a distinct perspective by highlighting hidden costs in Kenyan education, suggesting that FOSS's financial benefits may be limited by long-term costs. These differences affirm that sectoral and geographical contexts influence FOSS adoption, enriching understanding of its complexities. Based on findings that research on hidden costs and sectoral focus in FOSS adoption for Indonesian public policy remains limited, a systematic research design is needed to address this gap. This research should be designed to analyze hidden costs (e.g., training, maintenance, and system integration) and explore variations in FOSS adoption across public sectors (e.g., government, education, and healthcare).

V. CONCLUSION

Prior research supports the main findings on the potential of Free and Open Source Software (FOSS) as a tool for digital transformation in Indonesia, focusing on transparency, efficiency, and digital inclusion. Studies confirm that FOSS supports cost efficiency, security, and technology accessibility, reinforced by initiatives like IGOS and the Public Information Disclosure Law. However, challenges such as hidden costs indicate that FOSS's financial benefits may be constrained by training, maintenance, and system integration costs, necessitating more targeted strategies to address contextual barriers.

This study enriches understanding of FOSS's role in public policy by highlighting the importance of human resource training, infrastructure modernization, and cross-sector collaboration to maximize FOSS's potential. By addressing challenges such as regulations, a shortage of skilled personnel, and legacy systems through integrated strategies, FOSS can serve as a catalyst for achieving a transparent and inclusive digital society in Indonesia and other developing countries.

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VII. DISCLOSURE

The authors declare that they have no conflicts of interest in this research.

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