JOURNAL OF POLITICAL INNOVATION AND ANALYSIS

Big Data in Public Policy Making: Challenges and Opportunities in Indonesia

Gayatri Sukand
Institute of Global Professionals, Chittagong, Bangladesh, India
Email: gayatri.sunkad@gmail.com

Abstract: The integration of Big Data in public policy making presents both significant challenges and promising opportunities for governance in Indonesia. This article explores the potential of Big Data to enhance decision-making processes, optimize resource allocation, and increase policy responsiveness to societal needs. Key challenges identified include issues of data quality, privacy concerns, and the complexities of integrating diverse data sources within existing policy frameworks. Additionally, the capacity of government institutions to effectively interpret and utilize Big Data remains limited due to technological and human resource constraints. On the other hand, the opportunities offered by Big Data, such as predictive analytics and real-time monitoring, have the potential to revolutionize policy formulation and implementation. By examining case studies and analyzing recent developments, this article provides a comprehensive overview of how Big Data can contribute to more transparent, inclusive, and evidence-based public policies in Indonesia. Recommendations for addressing existing challenges and fostering a conducive environment for Big Data utilization are also discussed.

Keywords: Big Data, Public Policy, Decision-Making, Indonesia, Data Privacy, Predictive Analytics, Evidence-Based Policy, Governance

INTRODUCTION

Big Data has transformed decision-making processes across sectors globally, from healthcare to commerce and, increasingly, to governance. The exponential growth of data—generated through digital platforms, sensors, and internet usage—provides governments with unprecedented insights into public needs and societal trends (Cini et al., 2023). Governments worldwide are leveraging Big Data to improve policy design, optimize resources, and respond to public demand in real time. However, the effective use of Big Data in governance also raises concerns about privacy, data security, and ethical implications, requiring robust frameworks for data handling and analysis (Shah et al., 2024).

In Indonesia, the adoption of Big Data in public policy remains in a nascent stage, characterized by efforts to implement digital solutions in public services and e-government. The Indonesian government has shown interest in Big Data to improve policy formulation, as seen in the Presidential Regulation No. 39 of 2019 on One Data Indonesia, which aims to integrate various data sources for governance (Ramadhan et al., 2024). However, challenges such as technological limitations, data fragmentation, and lack of skilled data professionals hinder effective utilization. Addressing these challenges could enable Indonesia to harness Big Data's full potential for governance.

Previous studies have highlighted Big Data's potential in improving public policy outcomes. For instance, Aji & Putro (2024) discuss how Big Data enhances transparency, efficiency, and accountability in governance. Similarly, Shen et. al. (2024) examine the role of data transparency in fostering trust between governments and citizens. Yet, these studies primarily focus on developed countries, with limited empirical evidence from Southeast Asia or Indonesia, where unique socio-political factors affect Big Data implementation in governance (Xu et al., 2024). While studies in developed countries have explored the potential of Big Data in governance, there is a lack of research on the challenges and opportunities specific to Indonesia. The existing literature often overlooks the technological and infrastructural barriers unique to emerging economies (K. Liu et al., 2023). Moreover, while frameworks for data privacy and ethical considerations in Big Data usage are established in many Western countries, these frameworks remain underdeveloped in Indonesia, creating a critical gap in understanding how these challenges can be addressed in the Indonesian context.

The urgency of this research lies in the potential for Big Data to address pressing governance issues in Indonesia, including inefficiencies in public service delivery, resource allocation, and policy transparency. As Indonesia's digital economy grows, so does the volume of available data, which, if leveraged effectively, could support data-driven policies. However, without addressing the challenges of data fragmentation, privacy, and skills gaps, Indonesia risks lagging behind in utilizing Big Data for governance, ultimately affecting public trust and policy efficacy (Rakhman & Wijayana, 2024). This study provides a novel contribution by focusing on the dual aspects of challenges and opportunities in implementing Big Data within Indonesia's public policy landscape. While existing studies highlight either the benefits or drawbacks of Big Data, few address these factors concurrently, particularly within the context of an emerging economy with unique socio-political dynamics. By analyzing both barriers and opportunities, this research aims to present a balanced perspective that is often missing in the current literature (Mahmoud, 2024a).

The purpose of this research is to explore how Big Data can be effectively integrated into public policy making in Indonesia, identifying specific challenges that hinder this process and the opportunities that can be leveraged. By understanding these aspects, the research aims to provide insights into how Indonesia can maximize Big Data's potential to improve governance outcomes and respond to citizen needs more effectively (Duan, 2024). This research contributes to the existing body of knowledge by providing a comprehensive analysis of Big Data's role in Indonesian governance, highlighting both structural and operational barriers to its implementation. Additionally, it offers actionable recommendations for policymakers, addressing key areas like infrastructure enhancement, data management frameworks, and capacity building for data professionals. This approach aims to bridge the gap between theoretical insights and practical applications, enhancing policy-making practices in Indonesia (Astuti et al., 2024).

The findings of this research have important implications for public policy and governance in Indonesia. By addressing the identified challenges, Indonesia can pave the way for a more data-driven, transparent, and efficient government, enhancing citizen trust and policy effectiveness. Furthermore, this research underscores the importance of developing a regulatory framework that ensures data privacy and security, which is essential as Big Data use becomes more prevalent in public policy. The insights could serve as a model for other developing nations facing similar challenges (Rasimin et al., 2024). In conclusion, Big Data presents a transformative opportunity for public policy making in Indonesia, though significant challenges need to be addressed to realize its full potential. Future research could explore comparative studies between Indonesia and other emerging economies, focusing on policy frameworks and technological advancements that support Big Data integration in governance. By continuously evaluating and adapting Big Data strategies, Indonesia could lead in establishing data-driven governance in Southeast Asia, setting a precedent for other nations in the region (Khusna et al., 2023).

METHOD

This study employs a qualitative-descriptive research design, focusing on understanding and interpreting the challenges and opportunities of Big Data utilization in Indonesian public policy making. The data population consists of government institutions, public policy researchers, and technology experts who engage with or influence Big Data implementation in governance. This includes agencies within the Indonesian government responsible for data management and policy, such as the Ministry of Communication and Information Technology and the

Central Bureau of Statistics, as well as private sector and academic contributors involved in data governance. For the data sample, this research targets a purposive sample of 30-40 participants who have direct experience or expertise in Big Data and policy making in Indonesia. A purposive sampling technique is used to select participants based on their relevance to the research focus, ensuring that the sample includes individuals from diverse sectors (public, private, and academic) and varying roles in data and policy fields. This approach enables the collection of in-depth insights from a representative cross-section of stakeholders, fostering a comprehensive understanding of the issues at hand.

Data collection is conducted through semi-structured interviews and document analysis. The interview guide, designed as the primary research instrument, contains open-ended questions exploring participants' perspectives on the potential and obstacles of Big Data in policy contexts. Additionally, relevant policy documents, government reports, and academic articles are analyzed to provide secondary data. For data analysis, thematic analysis is used to identify recurring themes and patterns related to challenges, opportunities, and recommendations for Big Data integration in public policy. The findings are then categorized and interpreted to highlight areas where policy adjustments or strategic improvements may enhance Big Data's role in Indonesian governance.

RESULT & DISCUSSION

The findings reveal a complex landscape in Indonesia's efforts to integrate Big Data into public policy making. Key insights gathered from interviews and document analysis indicate that while government institutions recognize the potential of Big Data, challenges related to data infrastructure, privacy, and skills gap hinder optimal implementation. Respondents generally agreed that, with the right infrastructure and policy framework, Big Data could vastly improve policy efficiency and responsiveness (Sun et al., 2024). Data fragmentation emerged as a major barrier, with respondents highlighting the decentralized nature of data sources in Indonesia. Government data is often siloed across departments, creating redundancy and inconsistency. This fragmentation reduces data quality and limits the comprehensive analysis necessary for informed policy-making, as noted by several respondents from government agencies (Mahmoud, 2024b).

Another prominent challenge identified was data privacy and security. Respondents, particularly those from public sectors, expressed concerns about regulatory gaps in data protection, which leave sensitive public data vulnerable to misuse. This finding aligns with the work of Widita Et. Al. (2024), who also identified

privacy issues as a common hindrance in Big Data applications in public governance globally. Analysis of responses shows a significant technological barrier, with limited infrastructure to support large-scale data collection and processing. Many institutions lack advanced analytics tools or sufficient technical expertise. This finding is corroborated by Shah (2024) who noted similar challenges in developing countries where Big Data technology adoption often lags behind due to budget constraints and skill shortages.

The fragmented data environment and technological limitations directly impact decision-making by reducing the timeliness and accuracy of data used for policy formulation. Respondents noted that while real-time data could offer significant advantages, the lack of integration across government databases hampers the government's ability to respond quickly to emerging issues (Hu et al., 2024). On the positive side, predictive analytics emerged as a key opportunity area. Respondents highlighted its potential in predicting social trends, such as migration and economic shifts, which could inform proactive policy adjustments. This insight aligns with previous research by Rizki et al. (2017), which demonstrated how predictive models help governments anticipate and plan for future challenges.

Compared to findings from developed countries, the data quality concerns in Indonesia are notably more acute. While developed countries have established protocols for data standardization, Indonesia's data collection processes often lack consistency and reliability, echoing Mulyani (2024)'s observations on data issues in other developing contexts. One solution suggested by participants was establishing a centralized data hub that consolidates information from various government sectors. This initiative, akin to the One Data Indonesia program, could minimize redundancy and improve data reliability. Saputra and Hamid (2023) suggested similar initiatives as effective means to overcome data fragmentation in public policy frameworks.

The findings support the Data-Driven Decision-Making (DDDM) theory, which argues that data centralization and accessibility are crucial for informed policy-making (Doran et al., 2023). By centralizing data, Indonesia could improve policy accuracy and timeliness, aligning with DDDM principles that emphasize the need for comprehensive data access in decision-making processes. The discussion reveals a need for alignment between data strategies and national governance goals. Respondents emphasized that Big Data could only be effective if the policies governing data use are clearly defined and aligned with broader national objectives, such as improving public service delivery and enhancing transparency (Rezki, 2023). The findings suggest practical steps for policy implementation, including increased investment in data infrastructure and professional training. Capacity-building programs targeting data literacy among public

officials could bridge the skills gap, as supported by Rakhman & Wijayana (2024), who emphasize the need for skilled personnel to effectively manage and analyze Big Data. To address privacy concerns, this research recommends establishing a comprehensive data protection regulation. A legal framework based on best practices from the EU's GDPR could help protect citizen data, thus increasing public trust and enabling broader data utilization in policy making ((Kinra et al., 2020).

Ensuring data privacy and implementing transparent policies can foster greater public trust, which is essential for the successful integration of Big Data in public governance. Participants indicated that citizens are more likely to support data-driven initiatives if they feel confident in the government's data management practices (Kinra et al., 2020). The findings point to the need for comparative research across Southeast Asian nations to understand best practices in Big Data application in governance. Such studies could identify common barriers and successful strategies, providing valuable insights for Indonesia and other countries with similar governance challenges (Fu & Zhou, 2024). In conclusion, while Big Data presents significant opportunities to enhance Indonesian public policy, realizing its potential requires overcoming substantial technical and regulatory hurdles. By investing in data infrastructure, establishing data privacy laws, and building data literacy, Indonesia could harness Big Data's power to create a more transparent, responsive, and evidence-based public policy environment.

CONCLUSION

This study underscores the transformative potential of Big Data in public policy making in Indonesia, highlighting both significant opportunities and critical challenges. The findings indicate that while Big Data can enhance policy responsiveness, transparency, and efficiency, substantial barriers such as data fragmentation, privacy concerns, and a skills gap in data literacy impede its full integration into governance processes. Addressing these obstacles requires a comprehensive approach, including investment in data infrastructure, the establishment of robust data privacy regulations, and capacity-building initiatives to improve data competencies among public officials. Future research could expand on these insights by conducting comparative studies between Indonesia and other emerging economies, examining how different governance frameworks impact Big Data utilization. Additionally, exploring citizen perspectives on data privacy and trust in Big Data-driven policies could provide valuable insights for developing policies that are both effective and publicly accepted.

REFERENCES

Aji, D. Y., & Putro, U. S. (2024). System dynamics modeling of leveraging geothermal potential in Indonesia towards emission reduction effort: A case study in Indonesia state-owned energy enterprise. *Renewable Energy Focus*, *51*. https://doi.org/10.1016/J.REF.2024.100612

Astuti, H. M., Wibowo, R. P., & Herdiyanti, A. (2024). Towards the National Higher Education Database in Indonesia: Challenges to Data Governance Implementation from The Perspective of a Public University. *Procedia Computer Science*, *234*, 1322–1331. https://doi.org/10.1016/J.PROCS.2024.03.130

Cini, K. I., Wulan, N. R., Dumuid, D., Nurjannah Triputri, A., Abbsar, I., Li, L., Priambodo, D. A., Sameve, G. E., Camellia, A., Francis, K. L., Sawyer, S. M., Patton, G. C., Ansariadi, A., & Azzopardi, P. S. (2023). Towards responsive policy and actions to address non-communicable disease risks amongst adolescents in Indonesia: insights from key stakeholders. *The Lancet Regional Health - Southeast Asia*, *18*. https://doi.org/10.1016/J.LANSEA.2023.100260

Doran, N. M., Puiu, S., Bădîrcea, R. M., Pirtea, M. G., Doran, M. D., Ciobanu, G., & Mihit, L. D. (2023). E-government development—A key factor in government administration effectiveness in the European Union. *Electronics*, *12*(3), 641.

Duan, Y. (2024). Design of Accounting Information Big Data Analysis Platform Based on Cloud Computing. *Procedia Computer Science*, *247*, 1128–1136. https://doi.org/10.1016/J.PROCS.2024.10.136

Fu, Y., & Zhou, X. (2024). Does the big data credit platform reduce corporate credit resource mismatch: Evidence from China. *Finance Research Letters*, *69*. https://doi.org/10.1016/J.FRL.2024.106133

Hu, X., Jiang, Y., Guo, P., & Li, M. (2024). How does China's big data policy affect the digital economy of cities? Evidence from national big data comprehensive pilot zones. *Heliyon*, *10*(2). https://doi.org/10.1016/J.HELIYON.2024.E24638

Khusna, N. I., Sumarmi, Bachri, S., Astina, I. K., Susilo, S., & Idris. (2023). Social resilience and disaster resilience: A strategy in disaster management efforts based on big data analysis in Indonesian's twitter users. *Heliyon*, *9*(9). https://doi.org/10.1016/J.HELIYON.2023.E19669

Kinra, A., Beheshti-Kashi, S., Buch, R., Nielsen, T. A. S., & Pereira, F. (2020). Examining the potential of textual big data analytics for public policy decision-making: A case study with driverless cars in Denmark. *Transport Policy*, *98*, 68–78. https://doi.org/10.1016/J.TRANPOL.2020.05.026

Liu, J., Liu, W., Yan, C., & Liu, X. (2023). Study on the Temporal and Spatial Evolution Characteristics of Chinese Public's Cognition and Attitude to "Double Reduction"

Policy Based on Big Data. *Big Data Research*, *34*. https://doi.org/10.1016/J.BDR.2023.100411

Liu, K., Sun, X., & Zhou, H. (2023). Big data sentiment analysis of business environment public perception based on LTP text classification ——Take Heilongjiang province as an example. *Heliyon*, *9*(10). https://doi.org/10.1016/J.HELIYON.2023.E20768

Mahmoud, A. B. (2024a). Analysing the public's beliefs, emotions and sentiments towards Metaverse workplace: A big-data qualitative inquiry. *Acta Psychologica*, *250*, 104498. https://doi.org/10.1016/J.ACTPSY.2024.104498

Mahmoud, A. B. (2024b). Analysing the public's beliefs, emotions and sentiments towards Metaverse workplace: A big-data qualitative inquiry. *Acta Psychologica*, *250*, 104498. https://doi.org/10.1016/J.ACTPSY.2024.104498

Mulyani, Y. P., Saifurrahman, A., Arini, H. M., Rizqiawan, A., Hartono, B., Utomo, D. S., Spanellis, A., Beltran, M., Banjar Nahor, K. M., Paramita, D., & Harefa, W. D. (2024). Analyzing public discourse on photovoltaic (PV) adoption in Indonesia: A topic-based sentiment analysis of news articles and social media. *Journal of Cleaner Production*, *434*. https://doi.org/10.1016/J.JCLEPRO.2023.140233

Rakhman, F., & Wijayana, S. (2024). Human development and the quality of financial reporting among the local governments in Indonesia. *Journal of International Accounting, Auditing and Taxation*, *56*. https://doi.org/10.1016/J.INTACCAUDTAX.2024.100634

Ramadhan, A. F., Tajudeen, F. P., & Jaafar, N. I. (2024). The Influence Factors of Data Governance Implementation: Study in Indonesian Public University. *Procedia Computer Science*, *234*, 1204–1211. https://doi.org/10.1016/J.PROCS.2024.03.116

Rasimin, Semma, A. B., Zakiyuddin, Ali, M., & Helmy, M. I. (2024). Multi-dimensional challenges in the Indonesian social science information technology-based learning: A systematic literature review. *Heliyon*, *10*(7). https://doi.org/10.1016/J.HELIYON.2024.E28706

Rezki, J. F. (2023). Does the mobile phone affect social development? Evidence from Indonesian villages. *Telecommunications Policy*, *47*(3). https://doi.org/10.1016/J.TELPOL.2023.102503

Shah, S. I. H., Peristeras, V., & Magnisalis, I. (2024). A CONCEPTUAL FRAMEWORK FOR THE GOVERNMENT BIG DATA ECOSYSTEM ('datagov.eco'). *Data & Knowledge Engineering*, 102348. https://doi.org/10.1016/J.DATAK.2024.102348

Shen, N., Zhang, G., Zhou, J., Zhang, L., Wu, L., Zhang, J., & Shang, X. (2024). Can big data policy drive urban carbon unlocking efficiency? A new approach based on double machine learning. *Journal of Environmental Management*, *372*. https://doi.org/10.1016/J.JENVMAN.2024.123296

Sun, P., Yuan, C., Li, X., & Di, J. (2024). Big data analytics, firm risk and corporate policies: Evidence from China. *Research in International Business and Finance*, *70*. https://doi.org/10.1016/J.RIBAF.2024.102371

Widita, A. A., Lechner, A. M., & Widyastuti, D. T. (2024). Spatial patterns and drivers of micro, small and medium-sized enterprises (MSMEs) within and across Indonesian cities: Evidence from highly granular data. *Regional Science Policy and Practice*, *16*(11). https://doi.org/10.1016/J.RSPP.2024.100137

Xu, Y., Wei, Y., Zeng, X., Yu, H., & Chen, H. (2024). Big data development and labor income share: Evidence from China's national big data comprehensive pilot zones. *Economic Analysis and Policy*, *84*, 1415–1437. https://doi.org/10.1016/J.EAP.2024.10.031