
CONSTITUTIONAL IMPLICATIONS OF THE USE OF MACHINE LEARNING IN INDONESIA'S SOCIAL ASSISTANCE SELECTION AND DISTRIBUTION SYSTEM

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Abstract

This study examines the constitutional implications of using machine learning in Indonesia's social assistance selection and distribution system. The main objective is to analyze how algorithmic decision-making may affect citizens' constitutional rights to social security, welfare, equality before the law, legal certainty, and protection from discrimination. This research applies a qualitative legal method with normative-juridical and socio-legal approaches. The analysis is based on constitutional provisions, statutory regulations, social welfare data governance, and policy documents related to Indonesia's social assistance system, particularly DTKS and SIKS-NG. The findings show that machine learning may improve targeting accuracy and administrative efficiency in social assistance distribution. At the same time, it may reproduce or intensify existing problems in welfare data, especially when the system relies on incomplete, outdated, biased, or unevenly collected information. Algorithmic discrimination may occur indirectly through proxy variables such as residence, housing condition, employment status, digital access, and household composition. This study argues that machine learning should be positioned only as a decision-support tool, not as an autonomous decision-maker. Its constitutional legitimacy depends on data quality, explainability, meaningful human oversight, contestability, independent audit, and clear institutional accountability. The contribution of this study lies in framing machine learning-based social assistance as a constitutional issue, not merely as a technical matter of prediction accuracy or administrative efficiency.

Keywords: algorithmic discrimination; constitutional rights; machine learning; social assistance; welfare state.

1. INTRODUCTION

The digital transformation of social assistance has increasingly moved welfare administration from manual verification toward data-driven decision-making. In many countries, machine learning is promoted as a technical instrument to improve the accuracy, speed, and efficiency of identifying eligible beneficiaries, especially where poverty data are incomplete, outdated, or fragmented. The core promise of this approach is straightforward: algorithms can process large volumes of socioeconomic, demographic, geospatial, and administrative data to estimate vulnerability and rank households according to need [1], [2]. In the context of social protection, this promise is attractive because inclusion errors may waste public resources, while exclusion errors may deprive vulnerable citizens of basic support. Yet the use of machine learning in welfare allocation cannot be treated merely as an administrative innovation, since every technical classification may produce legal consequences for citizens who are accepted, delayed, deprioritized, or excluded from public assistance.

In Indonesia, the constitutional relevance of this issue is particularly strong. The 1945 Constitution places social welfare not only as a policy objective but also as a constitutional obligation of the state. Article 28H paragraph (3) recognizes the right of every person to social security, while Article 34 obliges the state to care for the poor and neglected children and to develop a social security system for all citizens. These provisions are closely connected with the principles of equality before the law, legal certainty, non-discrimination, and fair administrative treatment. When machine learning is used, or is proposed to be used, to support the selection and distribution of social assistance, the decision-making process shifts from visible bureaucratic judgment to computational classification. This shift raises a central constitutional question: can an algorithmic welfare system guarantee equal protection and social rights when its outputs are shaped by historical data, proxy variables, modelling assumptions, and institutional discretion that may not be visible to affected citizens?

The Indonesian case also shows that the problem of social assistance targeting is not new. The Integrated Social Welfare Data (*Data Terpadu Kesejahteraan Sosial*—DTKS) and the Social Welfare Information System—Next Generation (SIKS-NG) have been used to support beneficiary identification and data updating in social assistance programs. Recent studies indicate that data accuracy, updating mechanisms, local verification capacity, and uneven digital infrastructure remain persistent challenges in the distribution of social assistance [19]–[23]. Poor households

not registered in DTKS may fail to access social assistance, while outdated or inconsistent data may lead to the inclusion of ineligible beneficiaries [19], [20]. If machine learning models are developed on the basis of incomplete or biased administrative data, algorithmic systems may not correct existing welfare-administration problems; they may reproduce them at a larger scale and with stronger institutional authority. In this sense, algorithmic discrimination in social assistance may occur not only through direct use of prohibited characteristics, but also through indirect proxies such as location, housing condition, education level, occupation type, digital access, family structure, or irregular income patterns.

Existing scholarship has made important contributions to understanding the use of machine learning in poverty targeting and social assistance. Aiken et al. demonstrated that mobile phone data and machine learning could improve humanitarian aid targeting in Togo, while also showing that such models still produce exclusion errors when compared with a comprehensive social registry [1]. Smythe and Blumenstock showed that high-resolution poverty maps constructed from machine learning and satellite imagery may improve geographic targeting of social assistance [2]. Dietrich, Malerba, and Gassmann warned that data bias in predicting social assistance beneficiaries can generate social welfare losses, especially when vulnerable groups are underrepresented in training data [3]. Hall et al. reviewed the implications of machine learning and satellite imagery for poverty prediction in development research [4], while McBride et al. emphasized the use of predictive poverty models for targeting, mapping, monitoring, and early warning [5]. Other studies have examined poverty prediction, random forest classification, model selection for social aid beneficiaries, and artificial intelligence for poverty estimation [24]–[28]. These studies are valuable because they show the technical potential of machine learning for welfare targeting, but their primary concern remains model performance, prediction accuracy, and program efficiency.

A second body of literature discusses automated decision-making, administrative law, public-sector AI governance, fairness, accountability, and discrimination. Madan and Ashok identified fairness, transparency, privacy, and human rights as key tensions in AI adoption within public administration [6]. Criado, Sandoval-Almazán, and Gil-Garcia proposed that AI in public administration should be understood through macro, meso, and micro governance levels [7]. Roehl examined automated decision-making from the perspective of good administration, including transparency, accountability, fairness, and administrative capability [8], [9]. Carlsson specifically analyzed legal certainty in automated decision-making within welfare services [10], while Hirvonen argued that accountability structures are necessary to promote the safe use of automated decision-making in the public sector [11]. Sztandar-Sztanderska highlighted the limits of human oversight in digital welfare administration [12]. Studies on algorithmic discrimination and fairness further show that machine learning may produce wrongful discrimination through disparate impact, biased training data, proxy variables, and opaque model design [13]–[17]. These works establish a strong theoretical foundation, yet they rarely examine machine learning in social assistance through the specific lens of Indonesian constitutional welfare rights.

This article addresses that gap by analyzing the constitutional implications of using machine learning in the selection and distribution of social assistance in Indonesia. Its novelty lies in shifting the discussion from a purely technical question of targeting accuracy to a constitutional question of welfare rights, equality, legal certainty, due process, and non-discrimination. The study argues that machine learning may support more responsive social assistance only if it is embedded within a rights-based governance framework that ensures data quality, explainability, human review, contestability, public accountability, and protection against indirect discrimination. The objective of this article is to examine how algorithmic welfare targeting may affect citizens' constitutional right to social welfare in Indonesia and to formulate normative safeguards so that digital welfare innovation does not transform administrative inefficiency into automated exclusion.

2. RESEARCH METHODS

This study employs a qualitative legal research method with a normative-juridical and socio-legal approach. The normative-juridical approach is used to examine the constitutional, statutory, and administrative-law framework governing social assistance, social welfare, personal data protection, and public decision-making in Indonesia. The socio-legal approach is applied to understand how algorithmic systems, particularly machine learning, may operate within the practical context of beneficiary selection and social assistance distribution. This study does not build, train, or test a new machine learning model. Instead, it critically evaluates the constitutional implications that may arise when machine learning is used as a decision-support instrument in determining social assistance beneficiaries.

The research design is descriptive-analytical. It describes the legal and institutional structure of social assistance governance in Indonesia, then analyzes the potential constitutional risks of algorithmic decision-making. The main analytical focus is directed toward the relationship between machine learning-based targeting and constitutional principles, including equality before the law, the right to social security, the right to welfare, legal certainty, due process, administrative accountability, and protection from discrimination. In this framework, machine learning is not treated as a neutral technical tool, but as a governance mechanism that may influence access to constitutionally protected welfare rights.

The case study of this research is Indonesia's social assistance selection and distribution **system**, particularly the use of integrated social welfare data and digital welfare-administration platforms. The study focuses on the institutional relevance of the *Data Terpadu Kesejahteraan Sosial* (DTKS), the *Sistem Informasi Kesejahteraan Sosial-Next Generation* (SIKS-NG), and the broader development of unified social and economic data for social assistance governance. The official legal database records Minister of Social Affairs Regulation No. 3 of 2021 on the management of integrated social welfare data, while the later Minister of Social Affairs Regulation No. 3 of 2025 concerns the updating and use of unified social and economic data for social assistance, social empowerment, and social welfare programs. These regulations show that Indonesia's welfare administration has increasingly relied on centralized and updated data infrastructures as the basis for determining program eligibility.

Data collection in this study is conducted through documentary research. The primary legal materials include the 1945 Constitution of the Republic of Indonesia, Law No. 13 of 2011 on the Handling of the Poor, Law No. 40 of 2004 on the National Social Security System, Law No. 27 of 2022 on Personal Data Protection, Law No. 30 of 2014 on Government Administration, and relevant ministerial regulations concerning social welfare data and social assistance governance. The 1945 Constitution is used as the highest normative basis because it contains provisions on equality before the law, the right to social security, and the state's responsibility toward poor and neglected citizens. Law No. 13 of 2011 provides the statutory framework for poverty handling, while Law No. 40 of 2004 establishes the national social security system as part of Indonesia's welfare-state commitment.

Secondary data consist of peer-reviewed journal articles published within the last five years on machine learning in poverty targeting, algorithmic governance, automated decision-making, public-sector artificial intelligence, digital welfare systems, algorithmic discrimination, and data-driven social protection. These sources are used to construct the state of the art and to compare Indonesia's case with broader international debates on algorithmic welfare governance. The article also uses official government documents, policy reports, and regulatory materials to strengthen the contextual analysis of Indonesia's social assistance system.

The technique of analysis used in this study is qualitative legal analysis through three stages. First, the study identifies the constitutional norms and statutory provisions relevant to welfare rights, equality, legal certainty, and non-discrimination. Second, it maps the potential points where machine learning may affect the selection and distribution of social assistance, including data collection, data validation, model training, eligibility scoring, beneficiary ranking, and administrative review. Third, it evaluates whether those algorithmic practices are compatible with constitutional guarantees and principles of good administration. The analysis is guided by a rights-based framework, meaning that efficiency and accuracy are not treated as the only indicators of success. A machine learning system may be technically accurate but constitutionally problematic if it produces opaque exclusion, indirect discrimination, or unequal access to remedies.

The study uses Indonesia as a single-country case study because the country presents a relevant context for examining the constitutional risks of algorithmic welfare governance. Indonesia has a large population, wide regional disparities, complex poverty characteristics, and an expanding digital government infrastructure. These conditions make social assistance targeting highly dependent on accurate, updated, and inclusive data. At the same time, unequal digital access, uneven local administrative capacity, and fragmented socioeconomic records may create risks when machine learning models are applied to welfare distribution. The Indonesian case is therefore analytically important because it allows the study to examine how algorithmic decision-making may interact with constitutional welfare obligations in a developing democratic state.

To maintain the validity of the analysis, this study applies source triangulation by comparing constitutional norms, statutory provisions, policy documents, and recent academic literature. The study also applies conceptual triangulation by combining constitutional law, administrative law, data protection, and algorithmic fairness perspectives. This approach is necessary because the constitutional implications of machine learning in social assistance cannot be assessed only from the standpoint of technology or administrative efficiency. They must also be evaluated from the perspective of citizens' rights, state responsibility, procedural fairness, and access to justice.

The limitation of this study is that it does not conduct empirical testing of a specific machine learning model used by government institutions. The analysis is limited to legal, constitutional, and institutional implications based on available regulations, policy documents, and scholarly literature. This limitation is acceptable because the purpose of the study is not to measure algorithmic performance, but to develop a constitutional framework for assessing the legality, fairness, and accountability of machine learning in Indonesia's social assistance system.

3. RESULTS AND DISCUSSION

3.1. Machine Learning as a Constitutional Issue in Indonesia's Social Assistance Governance

This study finds that the use of machine learning in the selection and distribution of social assistance cannot be understood only as a matter of administrative modernization. In the Indonesian constitutional framework, social assistance is directly connected with the state's obligation to protect poor and vulnerable citizens. Article 28H paragraph (3) of the 1945 Constitution guarantees the right to social security, while Article 34 places responsibility on the state to care for the poor and neglected children and to develop a social security system. Based on this

constitutional structure, any system used to determine eligibility for social assistance must be assessed through the principles of equality, legal certainty, social justice, and non-discrimination.

The research identifies that Indonesia's welfare administration already depends heavily on digital data infrastructure, especially through the *Data Terpadu Kesejahteraan Sosial* (DTKS) and *Sistem Informasi Kesejahteraan Sosial-Next Generation* (SIKS-NG). Minister of Social Affairs Regulation No. 3 of 2021 defines the legal basis for managing integrated social welfare data and recognizes SIKS-NG as an information system supporting data management processes. This finding confirms that the Indonesian social assistance system has entered a data-driven stage, even when machine learning has not yet been fully institutionalized as a formal decision-making mechanism. The constitutional problem emerges when data-driven systems begin to influence who is recognized as poor, who is classified as eligible, and who is excluded from state assistance.

From a normative-juridical perspective, machine learning may function as a decision-support tool, but it cannot replace the constitutional responsibility of public officials. The legality of welfare decisions must remain traceable to public authority, not to the technical output of an algorithm. This finding is consistent with Roehl, who argues that automated decision-making in public administration must be evaluated through the principles of good administration, including transparency, accountability, and fairness [8]. Carlsson also emphasizes that automated welfare decisions may threaten legal certainty when citizens cannot understand the basis of administrative classification [10]. In Indonesia, this risk becomes more serious because social assistance is not merely a policy benefit, but a concrete instrument for fulfilling constitutional welfare rights.

The study also finds that machine learning may change the character of administrative discretion. In conventional welfare administration, discretion is exercised by public officials through verification, validation, and local assessment. In algorithmic welfare governance, discretion may shift into model design, variable selection, data cleaning, weighting, scoring, and threshold-setting. These technical stages may look neutral, but they contain legal and political choices. For example, when a model assigns higher predictive value to household assets, electricity use, location, or digital traces, it may indirectly privilege certain forms of poverty while overlooking informal, fluctuating, or hidden vulnerability. This supports the argument of Madan and Ashok that AI adoption in public administration must be linked to institutional governance, not only to technical readiness [6].

The constitutional implication is clear: machine learning in social assistance must be subject to legal standards before, during, and after deployment. Before deployment, the state must ensure that the data used are accurate, updated, representative, and legally obtained. During deployment, the state must guarantee that algorithmic outputs do not become final decisions without meaningful human assessment. After deployment, citizens must have access to explanation, correction, objection, and remedy. Without these safeguards, machine learning may transform social assistance from a constitutional right into a technical privilege granted through opaque classification.

3.2. Algorithmic Discrimination and the Risk of Automated Exclusion in the Indonesian Case

The second finding of this study is that the most serious constitutional risk in machine learning-based social assistance is not only technical error, but algorithmic discrimination. Algorithmic discrimination may occur when a system produces unequal effects against certain individuals or groups, even if the model does not explicitly use prohibited categories such as ethnicity, religion, gender, or disability. In social assistance, discrimination may arise through proxy variables, biased historical data, uneven administrative records, and unequal access to digital infrastructure. This finding is closely related to Cossette-Lefebvre and Maclure, who explain that wrongful discrimination in automated decision-making can occur when algorithmic classification reproduces social disadvantage through apparently neutral variables [13].

The Indonesian case provides a strong basis for this argument. DTKS and SIKS-NG depend on administrative data collection, local verification, and periodic updating. Studies on Indonesia's social welfare data system show that data accuracy, updating capacity, and local administrative performance remain persistent challenges [19]–[23]. SMERU also notes that DTKS is used as a database for targeting social protection and poverty reduction programs, including social assistance schemes. When machine learning is trained using data that are incomplete, outdated, or unevenly collected, the resulting model may reproduce the weaknesses of the original database. A household excluded from DTKS due to administrative delay may become invisible in the algorithmic system. A poor household without stable digital traces may be classified as less vulnerable than a household whose poverty profile is more easily captured by available variables.

This study identifies at least four forms of algorithmic discrimination that may arise in Indonesia's social assistance system. First, data-based discrimination may occur when poor or vulnerable citizens are underrepresented in the training data. This can affect people in remote areas, informal workers, persons with disabilities, elderly citizens living alone, indigenous communities, undocumented residents, or households with unstable income. Dietrich, Malerba, and Gassmann warn that biased data in predicting social assistance beneficiaries can create welfare damage because targeting errors affect citizens differently depending on their position in the welfare distribution [3]. Their finding is particularly relevant for Indonesia, where exclusion errors may directly affect access to food assistance, cash transfers, health insurance subsidies, or other welfare programs.

Second, proxy discrimination may occur when machine learning uses variables that appear neutral but are closely associated with social disadvantage. Location, housing quality, mobile phone use, electricity consumption, bank access, educational background, and employment type may all function as indirect indicators. Aiken et al. show that mobile phone data and machine learning can improve humanitarian aid targeting in Togo, especially when traditional data are limited [1]. The same study also acknowledges that machine learning is not always superior to a comprehensive social registry when reliable registry data are available [1]. This comparison is important for Indonesia because the state already has DTKS as a formal welfare database. Machine learning may be useful as a complementary tool, but it should not become a substitute for participatory verification and rights-based administrative review.

Third, regional discrimination may emerge because Indonesia has wide disparities in digital infrastructure, administrative capacity, and local data governance. A model trained on data from areas with better administrative records may perform poorly in regions with weaker data collection systems. This risk is also reflected in poverty-mapping literature. Smythe and Blumenstock show that high-resolution poverty maps can support geographic targeting of social assistance [2], while Hall et al. explain that satellite imagery and machine learning can contribute to poverty prediction in development contexts [4]. These approaches may be useful for identifying spatial deprivation, but they may also oversimplify poverty if geographic indicators are treated as a complete representation of household vulnerability.

Fourth, procedural discrimination may occur when affected citizens cannot challenge algorithmic outputs. In social assistance, exclusion is not only a statistical error. It is an administrative event that may affect survival, dignity, and equal citizenship. If citizens do not know why they are excluded, cannot access the data used against them, and cannot request human review, the system violates the principle of procedural fairness. Decker's study on procedural fairness in algorithmic decision-making emphasizes the importance of public engagement and procedural legitimacy [15]. Sztandar-Sztanderska also shows that human oversight in welfare automation must be meaningful, not merely symbolic [12]. This supports the finding that Indonesia needs a clear legal mechanism for explanation, objection, correction, and appeal in algorithmic social assistance governance.

The analysis also shows that efficiency cannot be the sole benchmark for evaluating machine learning in welfare distribution. Technical accuracy may improve targeting performance, but constitutional legitimacy requires more than predictive precision. A model may reduce average error while still harming specific vulnerable groups. A model may increase administrative speed while reducing citizens' ability to contest decisions. A model may improve fiscal efficiency while weakening the state's obligation to protect those most at risk of exclusion. This finding strengthens the argument of Hirvonen that automated decision-making in the public sector requires accountability structures capable of preventing unsafe and unjust outcomes [11].

3.3. Rights-Based Framework for Machine Learning in Social Assistance

The third finding of this study is that machine learning can be constitutionally acceptable in Indonesia's social assistance system only if it is placed within a rights-based governance framework. This framework does not reject technology. It requires that technology be subordinated to constitutional principles. In this study, the minimum constitutional safeguards consist of five elements: data quality, explainability, human oversight, contestability, and institutional accountability.

First, data quality must become a constitutional requirement, not merely a technical standard. Since social assistance eligibility depends on the accuracy of welfare data, the state has a duty to ensure that DTKS, SIKS-NG, and related databases are continuously updated, inclusive, and verifiable. Minister of Social Affairs Regulation No. 3 of 2021 already provides a regulatory basis for managing integrated social welfare data. The legal challenge is to connect data governance with constitutional protection. Inaccurate data may lead to wrongful exclusion, and wrongful exclusion may violate the right to social security. For this reason, machine learning models should not be trained or deployed without prior data audit, bias assessment, and local validation.

Second, explainability must be guaranteed for both public officials and citizens. Public officials must understand the logic, limitations, and risks of the system they use. Citizens must receive understandable reasons when algorithmic assessment affects their access to assistance. Explainability does not require disclosing every technical detail of a model, but it does require meaningful information about the variables used, the basis of classification, and the available channels for correction. This finding aligns with Rizk and Lindgren, who argue that automated decision-making changes the decision space between public officials and citizens [18]. In the Indonesian context, that decision space must not become one-sided, where the state can classify citizens but citizens cannot question the classification.

Third, human oversight must be substantive. A public official should not merely approve algorithmic recommendations automatically. Human review must include the authority to question, correct, override, and document disagreement with algorithmic outputs. This is important because social assistance decisions often involve complex social conditions that may not be fully captured by data. For example, a household may experience sudden vulnerability due to illness, disaster, job loss, family breakdown, or informal debt. A machine learning model trained on previous data may fail to recognize these changes. Human oversight is constitutionally necessary because public welfare decisions must remain accountable to law, not only to statistical probability.

Fourth, contestability must be built into the system. Citizens who are excluded, delayed, or classified as ineligible must have access to complaint mechanisms, data correction procedures, and administrative remedies. This requirement is closely related to Law No. 30 of 2014 on Government Administration, which emphasizes legality, protection against abuse of authority, and principles of good governance. In a machine learning-based welfare system, contestability should include the right to know whether algorithmic assessment was used, the right to correct personal or household data, the right to request human review, and the right to receive a reasoned administrative response. Without contestability, algorithmic decision-making may produce what Carlsson describes as uncertainty in automated welfare services [10].

Fifth, institutional accountability must be clearly assigned. The state cannot shift responsibility to software vendors, data scientists, or technical operators. If machine learning is used in social assistance, responsibility must remain with the public institution authorized by law to administer the program. Accountability should cover procurement, model design, data processing, deployment, monitoring, audit, and remedy. This finding is supported by Criado, Sandoval-Almazán, and Gil-Garcia, who argue that AI in public administration must be understood across governance levels, from policy design to organizational implementation [7]. In Indonesia, this means that algorithmic welfare governance requires coordination among the Ministry of Social Affairs, local governments, data protection authorities, audit institutions, and administrative oversight bodies.

Based on these findings, this study formulates the following analytical proposition: machine learning may strengthen Indonesia's social assistance system only when it is used as a transparent, accountable, and contestable decision-support instrument, not as an autonomous mechanism for determining citizens' welfare rights. Its constitutional legitimacy depends on whether the system protects vulnerable citizens from automated exclusion and indirect discrimination. The state may pursue efficiency, but efficiency must remain consistent with the constitutional mandate to promote social justice, protect the poor, and guarantee equal access to welfare.

4. CONCLUSION

This study concludes that the use of machine learning in Indonesia's social assistance selection and distribution system has direct constitutional implications. Social assistance is not merely an administrative program, but part of the state's constitutional responsibility to guarantee social security, welfare, equality, and protection for poor and vulnerable citizens. For that reason, machine learning cannot be positioned as a neutral technical instrument whose legitimacy is measured only by speed, efficiency, or predictive accuracy. Its constitutional legitimacy depends on whether the system protects citizens from arbitrary exclusion, indirect discrimination, opaque classification, and the loss of access to administrative remedies.

The main finding of this study shows that machine learning may strengthen the accuracy of social assistance targeting, especially when the state faces fragmented poverty data, regional disparities, and limited administrative capacity. Yet the same system may also reproduce existing weaknesses in welfare governance if it is trained on incomplete, outdated, biased, or unevenly collected data. In the Indonesian context, this risk is closely related to the quality of DTKS, SIKS-NG, and local verification mechanisms. If vulnerable households are not properly recorded in the database, algorithmic systems may treat them as statistically invisible. This condition may lead to automated exclusion, especially for informal workers, elderly citizens, persons with disabilities, remote communities, disaster-affected households, and groups with limited digital access.

The novelty of this study lies in its constitutional framing of machine learning in social assistance governance. Previous studies have largely examined machine learning in poverty targeting from the perspective of model accuracy, prediction performance, administrative efficiency, and data innovation [1]–[5]. Other studies have discussed automated decision-making in public administration through fairness, accountability, transparency, and good administration [6]–[13]. This article contributes to those debates by placing algorithmic welfare targeting within Indonesia's constitutional structure, especially the right to social security, equality before the law, legal certainty, due process, and the state's obligation to care for poor and vulnerable citizens. This perspective shows that algorithmic discrimination in social assistance is not only a technological problem, but also a constitutional problem.

The findings also extend previous research by emphasizing that discrimination in algorithmic welfare systems may occur indirectly. A machine learning model does not need to explicitly use prohibited categories to produce discriminatory outcomes. Bias may appear through proxy variables such as place of residence, housing condition, employment type, digital access, electricity consumption, education level, or household composition. In a country with wide socioeconomic and regional inequality such as Indonesia, these proxies may create unequal treatment against citizens who already face structural disadvantage. This study therefore argues that algorithmic fairness must be connected with constitutional welfare obligations, not separated as a purely technical standard.

This study proposes that machine learning in Indonesia's social assistance system should be used only as a decision-support mechanism, not as an autonomous decision-maker. Public officials must remain legally responsible for final decisions, and citizens must have the right to understand, correct, object to, and challenge algorithmic classifications that affect their access to social assistance. The minimum safeguards should include data quality audits, bias assessment, explainability, meaningful human oversight, contestability, independent monitoring, and clear

institutional accountability. These safeguards are necessary to ensure that digital innovation does not transform administrative weakness into automated injustice.

The limitation of this study is that it does not empirically test a specific machine learning model used by Indonesian government institutions. The analysis is based on normative legal materials, policy documents, and recent academic literature. Future research should conduct empirical studies on how welfare data are collected, validated, updated, and used at the national and local levels. Further studies may also examine the views of beneficiaries, local government officials, data operators, and social assistance administrators to understand how algorithmic systems affect real access to welfare programs. Comparative research with other countries that have implemented algorithmic welfare targeting would also be valuable to identify best practices for preventing algorithmic discrimination while improving the accuracy of social assistance distribution.

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