

DEVELOPMENT OF POPULATION INFORMATION SYSTEM AND CIVIL REGISTRATION BASED ON INFORMATION TECHNOLOGY

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Abstract

This study aims to legally analyze the development of a population information system and civil registration based on information technology in an international context and its implementation in Indonesia. Digital transformation in population administration is crucial along with the increasing demands for fast, transparent, and equitable public services. Using a legal-normative approach through a library research method, this study examines national laws and regulations such as Law No. 24 of 2013 concerning Population Administration and international standards set by UN DESA, World Bank ID4D, and UNHCR. Data were analyzed qualitatively with a comparative approach to the practices of countries such as Estonia, India, and Rwanda. The results of the study show that the Centralized SIAK and Digital Dukcapil systems in Indonesia have progressed, but have not fully met the principles of good governance, interoperability, and personal data protection as global standards. The impact of this study is expected to be able to provide normative recommendations in updating population administration regulations and encourage synergy between sectors for the development of an information system that is inclusive, safe, and respects the digital human rights of every citizen.

Keywords:

*Digital Identity,
Population
Administration,
Digital Transformation of
Government,
Personal Data Protection.*

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INTRODUCTION

In today's global landscape, population information systems and civil registration have undergone a major transformation through the integration of information technology. Countries around the world realize that accurate and digitized population data is not just an administrative instrument, but the foundation of democratic and responsive governance. The *World Bank Identification for Development (ID4D)* report in 2021 shows that more than 1 billion people in the world do not have a legal identity,



most of whom are from developing countries (Sperfeldt, 2022). Countries such as Estonia and India have shown that digitizing civil registration not only improves the efficiency of public services but also strengthens people's civil rights to legal identity recognition.

A strong, technology-based digital identity system is now considered part of human rights because it touches on access to education, health, social assistance, and political participation. International conventions such as *the International Covenant on Civil and Political Rights* (ICCPR) and UNICEF recommendations encourage countries to strengthen birth and death registration systems as part of guaranteeing the legal existence of every citizen (Brolan & Gouda, 2017). Therefore, the development of an IT-based population information system is not merely a technological agenda, but a legal and ethical agenda that has direct relevance to the principles of legality and equality in public law.

In the Indonesian context, the population administration system has undergone substantial reform after the enactment of Law Number 24 of 2013 concerning Population Administration (Male, 2023). Through the Directorate General of Dukcapil, the government has implemented the Population Administration Information System (SIAK) which allows for the consolidation of population identity data nationally. However, although national regulations have provided a fairly progressive legal framework, the challenges of implementation in the field are still very large. Infrastructure gaps, limited human resources, and the geographical complexity of Indonesia make the integration of population information systems a major undertaking that requires a careful and contextual legal approach.

The development of population information systems in Indonesia must also be viewed in a global comparative framework. Countries such as the Philippines with *PhilSys* and Nigeria with NIMC have adopted national digital identity governance models that include the principles of transparency, personal data protection, and interoperability between institutions. In Indonesia, the implementation of electronic ID cards (e-KTP) is an important step, but it has not been optimally supported by a legal information system that guarantees data security and accountability for its use. This raises a profound question: to what extent has the development of digital population systems in Indonesia met international legal standards regarding identity, data security, and access to justice?

Scientific discourse and public policy on digital civil registration have now crossed from technical debates to normative aspects and citizens' rights. Contemporary writings such as Gelb & Clark (2020) and Zwitter (2021) highlight the importance of a clear legal framework in protecting citizens' digital identities (Masiero, 2023). In Indonesia, this shift has begun to be felt along with the enactment of Law Number 27 of 2022 concerning Personal Data Protection (Christine & Kansil, 2023). However, the integration between the law and population policy is still partial. There is no explicit guarantee in the legal system that identity data will not be misused or monopolized by certain entities, either state or private.

The need for a legal system that ensures digital inclusion and data fairness. Countries like Kenya and Rwanda show that even in resource-limited regions, digital identity systems can be built on principles of equity and efficiency, as long as they are supported by transparent legal governance. (Djuraev et al., 2025). Unfortunately, in Indonesia, there has not been much legal research that explores the implications of the

development of population information systems on aspects such as digital discrimination, marginalization of vulnerable groups, or violations of citizens' privacy rights. Therefore, there is a normative vacuum that needs to be filled through in-depth, critical, and solution-oriented legal studies.

The main motivation in raising this topic is to formulate a solid legal basis for the development of a fair, inclusive, and socially just digital population system. In a country of law like Indonesia, every government system, including digital-based ones, must be subject to the principles of legality, accountability, and respect for human rights. However, if the law lags behind technological innovation, then what happens is a vacuum of legal protection, such as in the case of population data leaks by irresponsible parties. This research aims to bridge the gap between technological innovation and the clarity of legal norms in the modern civil registration system.

Moreover, the importance of integration between national interests and international commitments in building an IT-based population system. Indonesia cannot close itself off from the global flow of digitalization of public administration, but it also cannot become a market for foreign technological solutions without a strong domestic legal framework. Therefore, a normative legal study is needed that critically examines Indonesia's legal position in a global context. This study is also expected to be able to offer a regulatory design that is not only responsive to technological advances, but also sides with the people as the main subject of digital population administration.

METHOD STUDY

The research method used in this article is a juridical-normative approach with the main method of library research. This study relies on tracing primary and secondary legal sources in order to comprehensively understand the legal basis, policy practices, and development models for population information systems and civil registration based on information technology. The primary legal sources analyzed include Law Number 24 of 2013 concerning Population Administration, Regulation of the Minister of Home Affairs Number 102 of 2019 concerning Centralized SIAK, and legal instruments for personal data protection in Indonesia. This study also pays attention to relevant international legal materials such as *the Social Protection Floors Recommendation (ILO R202)*, *the United Nations Principles on Identification for Sustainable Development (UN Legal Identity Agenda)*, and *the World Bank ID4D Global Dataset report*. Within the framework of legal analysis, this approach uses *systematic and teleological interpretation techniques* to link national legal norms with international standards that are oriented towards digital justice and protection of citizens' constitutional rights.

In exploring the global context, this study also adopts a *comparative-normative method*. (Muthoifin et al., 2024), namely comparing the legal systems and policies of technology-based civil registration from various countries, especially Estonia, India (*Aadhaar*), the Philippines (*PhilSys*), and Nigeria (NIMC). Through this approach, researchers analyze the suitability of the principles of *data interoperability*, *legal infrastructure*, and *digital governance* with Indonesia's actual needs. This study also evaluates the important role of *e-governance*, data privacy, and accessibility in creating an efficient, inclusive, and human rights-based population administration system. Secondary data were obtained from scientific publications, annual reports of UNDP, UNDESA, ITU, and evaluation results from the Indonesian Ombudsman and the Central Information Commission regarding digital population services. By combining

normative, comparative, and empirical dimensions, this study not only aims to capture the current legal conditions, but also to formulate *progressive legal recommendations* to support digital transformation in a civil registration system that is fair and in accordance with the flow of information technology globalization.

RESULTS AND DISCUSSION

International Standards and Practices in Digital Population Information Systems

Globally, population information systems and civil registration have undergone significant transformation through the application of information technology. International institutions such as *the United Nations Department of Economic and Social Affairs (UN DESA)*, *the World Bank through the Identification for Development (ID4D) program*, and UNHCR have established universal standards and principles to support the inclusion of legal identity as part of human rights (Djuraev et al., 2025). These principles include *universal coverage*, inclusivity, interoperability, personal data protection, and accountability. *The UN Legal Identity Agenda*, as a global framework, underlines the importance of identification systems that are not only efficient but also respect the principles of non-discrimination and social justice.

Examples of successful implementation of these principles are seen in *the e-Residency and X-Road systems* in Estonia, which were able to integrate digital identity with various public services without compromising user privacy (Särav & Kerikmäe, 2016). In India, the Aadhaar program has successfully registered more than 1.3 billion people into a single biometric identity system, although it continues to face criticism over issues of data protection and inclusion of vulnerable groups (Bhatia & Bhabha, 2017). In Africa, Rwanda developed *the National ID Agency (NIDA)* which combines civil registration with health and education systems (Ali et al., 2021). These three countries demonstrate that the success of digital transformation depends heavily on regulatory leadership, commitment to data ethics, and the ability of institutions to build public trust.

Indonesia's Adoption of International Standards in the SIAK and Digital Dukcapil Systems

Indonesia has taken progressive steps through the development of the Centralized Population Administration Information System (SIAK Terpusat) and the transformation towards *Digital Dukcapil* (Taping et al., 2024). This system aims to centralize the entire civil registration process and population data in one national system that can be accessed across sectors. In principle, this system has begun to adopt elements of *good governance*, transparency, and data integration as recommended in global standards such as ID4D. However, there are a number of substantial challenges, especially related to *data interoperability between agencies*, cybersecurity, and privacy protection that have not been fully guaranteed in national legal instruments.

In particular, the issue of data security has come into the spotlight after several e-KTP data leak cases were revealed, raising questions about the effectiveness of the national cyber protection system. In addition, the aspect of inclusivity is still a problem for vulnerable groups such as indigenous peoples in remote areas, residents without a permanent address, and citizens with digital disabilities who still have difficulty accessing Dukcapil services. In this context, although Indonesia has followed the global trend of digitalization, adjustments to the principles of digital human rights protection

and the principle of procedural justice still need to be strengthened through more substantial normative and technical reforms.

Legal, Technical, and Administrative Obstacles in Digital Population System Transformation

The biggest legal challenge in developing a population information system in Indonesia is the stagnation of the legal framework that has not been able to respond to the dynamics of the digital era. Law No. 24 of 2013 concerning Population Administration, although an initial milestone, does not cover critical issues such as the right to personal data, platform interoperability, or citizen involvement in technology-based systems (Sumiati & Lestari, 2020). On the technical side, disparities in infrastructure between regions are a real obstacle. There are still disparities in internet connectivity and the availability of digital devices in underdeveloped areas, which hinder real-time recording and online-based services.

In the administrative field, low human resource capacity at the local level and a slow bureaucratic system also complicate the effectiveness of population data collection and updating. According to the report of the Indonesian Ombudsman (2022), discriminatory practices are still found in Dukcapil services against poor or undocumented residents (Taping et al., 2024). In addition, implementing regulations related to data exchange between agencies have not been fully harmonized, causing redundancy and inefficiency. This shows that system transformation is not only about technology procurement, but also institutional restructuring and affirmation of digital rights as citizens' civil rights.

Comparison of Indonesia's Civil Registration Digitalization System with Other Developing Countries

In international comparison, Indonesia is still in the stage of strengthening the foundation of the digital system, in contrast to the Philippines which has integrated *the PhilSys system* into the national financial, social service, and biometric identity systems (“Towards Integrated and Quality-Assured Health Service Delivery: Making a Case for Health Smart Card in the Philippines,” 2024). The Philippines enacted *Republic Act No. 11055 on the National ID System* which explicitly regulates data security, interoperability, and public involvement in the system formation process. Likewise, Nigeria, through *the National Identity Management Commission (NIMC)*, has begun to adopt a biometric-based verification system integrated with banking and basic services.

An important lesson from these countries is the courage to design inclusive digital systems from the start, as well as building a specific legal framework for digital identity protection. Meanwhile, Indonesia does not yet have a stand-alone digital identity law, even though the role of digital identity is increasingly important in governance and the fulfillment of citizens' rights. Therefore, Indonesia needs to consider *a hybrid model* that combines a technocratic (technology-based) approach with a participatory (rights-based) approach to ensure a comprehensive and equitable transformation.

Future Normative and Institutional Reform Strategy

Future reform strategies must be directed at strengthening regulations and updating policies that place digital population information systems as an integral part of national legal development. First, a comprehensive revision of the Population

Administration Law is needed to adapt to digital dynamics, including including articles on personal data protection, the right to data correction, and the right to access and delete personal information. Second, derivative regulations must guarantee inter-institutional interoperability and open up space for collaboration with the private sector that provides digital infrastructure, with strict human rights-based supervision.

In addition, cross-sector involvement, especially universities, civil society organizations, and the media, needs to be strengthened to build digital legal literacy at the community level. The government can also establish a *National Digital Identity Commission* as an independent supervisory body tasked with overseeing the use of population data ethically and transparently (Male, 2023). This model has been implemented in Kenya through *the Data Protection Commission* which serves as a liaison between the government, society, and the private sector in ensuring that the digital identity system is run according to the principle of *accountability* (Sule et al., 2021). Reforms like this are important so that digital transformation is not only a technological project, but also a manifestation of social and constitutional justice in the order of national life.

CONCLUSION

Based on the results of a literature review of international practices and implementation in Indonesia, it can be concluded that the development of a population information system based on information technology has become an essential need in order to guarantee the civil rights of every citizen efficiently, safely, and inclusively. International standards promoted by institutions such as UN DESA, World Bank ID4D, and UNHCR have emphasized the importance of digital identity that guarantees data accuracy, privacy protection, and universal affordability, especially in developing countries that have structural challenges in civil services.

In Indonesia, *the Centralized SIAK* and *Digital Dukcapil systems* have become strategic steps in modernizing population administration services. However, there are still a number of fundamental challenges, especially in terms of interoperability between agencies, personal data security, and disparities in technological infrastructure in underdeveloped areas. In addition, regulations such as Law No. 24 of 2013 need to be adjusted to the needs of the digital era which demands flexibility and stronger legal protection for citizens' digital rights.

Comparisons with countries such as India (Aadhaar), the Philippines (PhilSys), and Nigeria (NIMC) show that the success of a population information system is not only determined by technological sophistication, but also by the clarity of the legal framework, institutional governance, and community involvement in the process of digitizing civil data. Therefore, normative and institutional reforms in Indonesia need to be directed at building a system that is not only efficient and transparent, but also equitable and based on human rights.

Future recommendations require cross-sector collaboration, between government, private sector, academics, and civil society, to realize a digital population system that is credible, accountable, and adaptive to global dynamics. Thus, the population information system is not only an administrative tool, but also a strategic instrument in building an inclusive, democratic, and responsive government to the needs of citizens.

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