AI-Based Digital Transformation in Correctional Systems and The Challenges of Inmates' Rights Protection (A Study at The Youth Correctional Institution of Langkat)

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Abstract

Digital transformation in correctional systems constitutes part of public service modernization aimed at improving administrative efficiency and institutional security. One emerging innovation is the implementation of the *Artificial Intelligence–Driven Visitor Management System* (AI-VMS) in managing inmate visitation services. Despite its operational benefits, the use of artificial intelligence-based technology raises complex legal issues, particularly concerning the protection of human rights and personal data.This study aims to analyze the legal implications of AI implementation in correctional systems and to examine the challenges in protecting inmates' rights from a human rights perspective. The research employs a normative juridical method with statutory, conceptual, and case approaches, focusing on the Youth Correctional Institution of Langkat.The findings indicate that the implementation of AI-VMS has not yet been supported by comprehensive technical regulations, resulting in potential legal uncertainty, weak accountability, and risks of privacy violations through biometric data processing. Furthermore, reliance on algorithm-based decision-making may lead to disproportionate restrictions on visitation rights, which are not yet balanced by adequate correction mechanisms.This study concludes that digital transformation in correctional systems must be aligned with the principles of legality, proportionality, and human rights protection through regulatory strengthening, effective oversight mechanisms, and a human-centered approach to ensure consistency with the rule of law.

Keywords: Artificial Intelligence, Correctional System, Inmates' Rights, Personal Data Protection, Human Rights

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Introduction

Digital transformation in public governance has become a global phenomenon that is inseparable from the agenda of modern bureaucratic reform. Digitalization is not merely understood as the use of information technology, but also as a systematic effort to enhance efficiency, transparency, and accountability in public services. In the context of correctional systems, digital transformation has gained greater urgency due to the complexity of prison management, which is confronted with persistent issues such as overcrowding, limited human resources, and increasing demands for security [1], [2].

One concrete form of digitalization in correctional systems is the modernization of inmate visitation services through the utilization of artificial intelligence-based technology. A system known as the Artificial Intelligence–Driven Visitor Management System (AI-VMS) enables the processes of registration, identity verification, and visitation monitoring to be carried out automatically based on data and algorithms. This technology not only improves administrative efficiency but also has the potential to minimize irregularities in visitation services [3], [4].

At the Youth Correctional Institution of Langkat, the implementation of a digital system in visitation services has become increasingly relevant considering the operational dynamics of the institution, which faces limitations in facilities and a growing demand for fast and accurate public services. Factually, in recent years, the institution has experienced administrative pressure due to the high frequency of inmate family visits, as well as the limited number of officers available to conduct manual identity verification. This condition has encouraged the adoption of digital systems as an administrative solution to improve service effectiveness while maintaining institutional security.

However, digital transformation in correctional systems cannot be separated from legal and human rights dimensions. Normatively, correctional institutions are not merely instruments of law enforcement but also institutions of rehabilitation that are obligated to ensure respect for the rights of inmates. The fundamental principle of corrections emphasizes that imprisonment only restricts freedom of movement without eliminating other fundamental rights, including the right to privacy and the right to maintain social relationships through visitation [5].

Within this framework, the application of artificial intelligence-based technology must be positioned within clear legal boundaries. The principle of legality requires a firm legal basis for the use of such technology, while the principle of accountability demands mechanisms for responsibility over every decision generated by the system. On the other hand, the principle of proportionality requires that any restriction on inmates' rights must be reasonable, not excessive, and must pursue a legitimate aim [6].

Despite offering various advantages, the use of artificial intelligence in correctional systems also raises several critical issues. The utilization of biometric technologies, such as facial recognition and identity scanning, directly implicates the processing of sensitive personal data. In practice, the management of biometric data without adequate protection mechanisms may lead to violations of privacy rights and create opportunities for data misuse [7].

Furthermore, the use of algorithms in decision-making processes introduces new challenges in administrative law. Artificial Intelligence (AI)-based systems tend to operate as *black boxes*, making them difficult to audit or transparently understand by users. This condition creates risks of algorithmic bias and a lack of clarity in decision-making processes, which may ultimately result in unlawful restrictions on inmates' rights [8], [9].

Another significant issue concerns legal accountability. In conventional systems, every administrative decision can be traced to an authorized official. However, in AI-based systems, there is a potential shift in responsibility due to the dominance of algorithmic systems in decision-making processes. This raises fundamental questions regarding who should be held accountable in cases of system errors or violations of inmates' rights [10].

These issues become increasingly relevant given the absence of specific technical regulations governing the use of AI in correctional systems. This condition may create a legal vacuum (*rechtsvacuum*), leading to legal uncertainty and weak protection of inmates' rights.

Moreover, from a human rights perspective, the use of technology in correctional systems must be assessed based on four key principles: legality, legitimate aim, necessity, and proportionality. Any restriction of rights that fails to meet these principles risks violating nationally and internationally recognized human rights standards.

Thus, digital transformation based on artificial intelligence in correctional systems can be seen as situated at the intersection between technological innovation and the protection of human rights. On the one hand, technology offers solutions to administrative and security challenges. On the other hand, the use of technology without an adequate legal framework may generate new and more complex problems. Based on the foregoing discussion, this study is directed to address the following research questions:

1. What are the legal implications of artificial intelligence-based digital transformation in the correctional system at the Youth Correctional Institution of Langkat?
2. What challenges arise in ensuring the protection of inmates' rights in the implementation of such technology from a human rights perspective?

Literature Review

1. Artificial Intelligence from the Perspective of Administrative Law

The development of Artificial Intelligence (AI) technology has brought fundamental changes to the practice of public administration, particularly in data-driven decision-making processes. Within the framework of administrative law, AI is not positioned as an independent legal subject but rather as an instrument utilized by governmental bodies in exercising their authority. Therefore, all legal consequences arising from the use of AI remain attributable to the officials or institutions that operate it [2].

The use of AI in the public sector is often associated with increased efficiency and objectivity in decision-making. However, the algorithmic and complex nature of AI systems raises significant concerns regarding transparency and accountability. AI systems frequently operate through mechanisms that are not fully explainable (*black box*), making it difficult to conduct legal audits or assess the rational basis of administrative decisions [6].

In a rule-of-law state, every administrative action must comply with the general principles of good governance, such as legality, legal certainty, accuracy, and accountability. Accordingly, the use of AI in public service delivery must be supported by a clear legal basis and accompanied by adequate supervisory mechanisms. Without a robust regulatory framework, the use of AI may result in administrative practices that lack transparency and are difficult to hold accountable from a legal standpoint [3].

2. Digital Transformation in the Correctional System

Digital transformation in the correctional system constitutes part of institutional reform aimed at improving service quality while strengthening security systems. Digitalization is not merely about the adoption of technology but also reflects a paradigm shift in correctional governance toward a more adaptive and responsive system in line with contemporary developments [11].

One form of digital transformation is the implementation of technology-based visitor management systems, including those integrated with artificial intelligence. These systems are designed to manage visitation processes more efficiently, from registration to monitoring interactions between visitors and inmates. In practice, such systems reduce administrative burdens and enhance the accuracy of identity verification [14].

However, digital transformation in correctional institutions also presents challenges. The implementation of digital systems without adequate regulatory readiness and human resources may lead to disparities and potential misuse of technology. Furthermore, an excessive focus on security aspects may shift the primary purpose of correctional systems away from rehabilitation and social reintegration [8].

3. Inmates' Rights from Legal and Human Rights Perspectives

In the doctrine of correctional law, inmates remain recognized as legal subjects who possess fundamental rights that are not extinguished by imprisonment. The restriction imposed is limited to freedom of movement, while other rights such as the right to humane treatment, privacy, and communication with family must still be guaranteed by the state [24].

From a human rights perspective, the state bears the obligation to respect, protect, and fulfill the rights of inmates. These obligations persist regardless of the individual's status as a convicted person. Therefore, any policy implemented within correctional institutions must take into account its impact on the realization of these rights [18].

In the context of visitation services, the right to maintain contact with family plays a crucial role in preserving inmates' psychological well-being and supporting their social reintegration. Any restriction on this right must be based on clear legal grounds and applied proportionally. The use of AI-based technology that may limit access to visitation must therefore be strictly evaluated to ensure compliance with human rights principles [5].

4. Personal Data and Biometric Data Protection in Artificial Intelligence Systems

The application of AI technology in correctional systems inevitably involves the use of personal data, including biometric data, which is highly sensitive. Biometric data, such as fingerprints and facial recognition, constitutes a unique form of personal identity that, if misused, can pose serious risks to privacy [13].

From a legal perspective, the processing of personal data must adhere to fundamental principles, including purpose limitation, data security, and transparency. The state has an obligation to ensure that collected data is not used beyond its intended purpose and is adequately protected against unauthorized access [3].

However, in practice, the use of biometric technology in correctional systems is often not accompanied by detailed operational standards. This situation creates the potential for data breaches, whether through information leaks or unauthorized use of personal data. Therefore, personal data protection must be integrated as a core component of correctional digitalization policies, rather than being treated merely as a technical aspect of information technology.

5. Oversight and Accountability Mechanisms in the Use of Artificial Intelligence

Oversight is a critical element in ensuring that the use of technology by the state does not violate legal norms and human rights. In the context of AI, oversight encompasses not only technical aspects but also legal and ethical dimensions. Broadly, oversight can be categorized into internal and external mechanisms. Internal oversight is conducted by the institution itself to ensure that systems operate in accordance with established procedures, while external oversight is carried out by independent bodies to monitor potential abuses of authority [8].

In the implementation of AI within correctional institutions, an effective oversight mechanism should include several key aspects:

a) Evaluation of the legal basis for the use of technology
b) Assessment of system accuracy and reliability
c) Monitoring of personal data protection
d) Provision of complaint and remedy mechanisms

Without a comprehensive oversight system, the use of AI may lead to administrative practices that lack transparency and are difficult to hold accountable. Therefore, strengthening oversight mechanisms is a fundamental prerequisite for the implementation of AI-based technologies in the public sector, including correctional systems [2].

Research Methodology

This study employs a normative juridical approach oriented toward the analysis of legal norms governing correctional systems, human rights protection, and the use of artificial intelligence in public service delivery. This approach is selected because the primary focus of the research does not lie in empirically testing the performance of technological systems, but

rather in assessing the conformity of the implementation of the *Artificial Intelligence–Driven Visitor Management System* (AI-VMS) with the principles of the rule of law and standards for the protection of inmates' rights. Accordingly, this study positions law as a normative system that must provide limitations, legitimacy, and control mechanisms over the use of technology by the state [10], [15].

The nature of this research is doctrinal, examining law both as a set of applicable rules (*law in books*) and as an instrument that should guide the practice of correctional administration. In this context, the Youth Correctional Institution of Langkat is used as the locus of analysis to contextualize legal issues arising from the implementation of AI-based technology. The selection of this locus is not intended to produce empirical generalizations, but rather to test the relevance of legal norms in addressing technological developments within correctional institutional practices [7], [15].

The analysis in this study is conducted through several complementary approaches. The statutory approach is used to examine positive legal provisions related to correctional systems, personal data protection, and human rights principles. The conceptual approach is employed to analyze relevant legal doctrines and theories, including artificial intelligence within administrative law, the principle of legality, the principle of proportionality, and theories of inmates' rights protection. Meanwhile, the case approach is utilized to understand how these legal norms interact with the implementation of AI-VMS within the Youth Correctional Institution of Langkat as a representation of institutional-level policy implementation [2], [6].

The legal materials used in this study consist of primary, secondary, and tertiary sources. Primary legal materials include statutory regulations governing correctional systems, personal data protection, and human rights instruments. Secondary materials consist of academic literature such as textbooks, journal articles, and scientific publications addressing artificial intelligence, administrative law, and correctional systems. In addition, reports from international institutions and recent research findings are utilized to strengthen the analysis of global developments in the use of AI in the public sector [11], [18]. Tertiary materials are used in a limited manner to support the understanding of relevant legal terminology and concepts.

The technique for collecting legal materials is conducted through library research by exploring various legal sources and literature directly related to the research object. All collected materials are then classified based on their relevance to the research problems, namely the legal implications of AI-based digital transformation and the challenges in protecting inmates' rights. This process is carried out systematically to ensure that each argument developed is grounded in strong normative and conceptual foundations [4], [19].

The analysis of legal materials is conducted qualitatively using deductive reasoning, whereby conclusions are drawn from general legal norms toward their application in concrete cases. In this process, statutory interpretation is carried out using systematic and teleological methods to understand the purpose of legal norms and their relevance to technological developments. Furthermore, the analysis integrates expert opinions and previous research findings to construct comprehensive legal arguments [10], [16].

The results of the analysis are presented in a descriptive-analytical manner, emphasizing the interrelationship between legal norms, human rights principles, and the practice of AI-based technology in correctional systems. Through this approach, the study is expected not only to explain existing normative conditions but also to provide conceptual recommendations on how the use of artificial intelligence should be regulated to remain aligned with the principles of the rule of law and the protection of inmates' rights [15], [18].

Results

1. Legal Implications of AI-Based Digital Transformation in the Correctional System

The implementation of the *Artificial Intelligence–Driven Visitor Management System* (AI-VMS) in visitation services at the Youth Correctional Institution of Langkat can normatively be understood as part of the use of technology as an instrument of public administration. However, the use of such technology has not been fully accompanied by a

comprehensive regulatory framework, thereby giving rise to several legal implications that require critical analysis. There are indications of a legal vacuum (*rechtsvacuum*) in the technical regulation of artificial intelligence within the correctional environment. Although general regulations concerning correctional systems and personal data protection exist, there are no specific provisions governing AI operational standards, including system validity, algorithmic auditing, and the limits of its application. This condition creates potential legal uncertainty due to the absence of clear guidelines on how such technology should be implemented and supervised in practice [10], [15].

The use of algorithm-based systems also raises issues of legal accountability. In conventional systems, administrative decisions can be traced back to authorized officials. However, in AI-based systems, decision-making processes are partially delegated to automated systems. This creates ambiguity regarding who should be held accountable in cases of system errors, such as the denial of visitation due to verification failures. From the perspective of administrative law, such responsibility must remain attached to correctional authorities, and therefore the use of AI cannot be used as a justification to evade legal accountability [2], [6].

This digital transformation also leads to a shift in the correctional paradigm. Technology-based systems tend to prioritize efficiency and security, which in practice may marginalize the rehabilitative and human-centered approach that forms the core of correctional philosophy. Without a strong legal framework, the use of technology risks transforming correctional institutions from rehabilitative systems into technology-driven control mechanisms. This development has implications for the general principles of good governance, particularly in relation to transparency and legal certainty. AI systems, which are inherently complex and not fully transparent, may reduce users' ability to understand the basis of decision-making. This condition may hinder access to administrative justice, particularly for inmates adversely affected by system-generated decisions. Therefore, it can be concluded that AI-based digital transformation at the Youth Correctional Institution of Langkat has not yet been fully embedded within an adequate legal framework, and regulatory strengthening is urgently required to ensure compliance with the principles of the rule of law [10], [18].

2. Challenges in Protecting Inmates' Rights in the Implementation of AI-VMS

In addition to structural legal implications, the implementation of AI-VMS also presents significant challenges in ensuring the protection of inmates' rights. These challenges primarily relate to the right to privacy, visitation rights, and procedural fairness. The use of biometric technology in AI-VMS poses substantial risks to privacy rights. Biometric data is highly sensitive as it is directly linked to an individual's identity. The collection and processing of such data without clear protection standards may lead to misuse or unauthorized disclosure of personal information. This indicates that personal data protection has not yet been fully integrated into the digital systems used in correctional services [13], [16].

There is also a risk of disproportionate restrictions on visitation rights due to reliance on algorithmic systems. In practice, system errors in identity verification may result in the denial of visitation, even though inmates legally retain the right to receive visits. Without adequate correction mechanisms, such situations may lead to systematic violations of inmates' rights. The implementation of AI-VMS also reveals limitations in objection and remedy mechanisms. Algorithm-based systems often fail to provide users with opportunities to challenge decisions, which contradicts the principle of *due process of law*, requiring access to corrective administrative procedures. Furthermore, there is a risk of algorithmic bias that may lead to unfair treatment of inmates or visitors. AI systems are not entirely free from bias, particularly when the data used is not representative. In the long term, this may result in systemic discrimination [6], [17].

From a human rights perspective, the implementation of AI-VMS at the Youth Correctional Institution of Langkat has not fully met the principles of legality, necessity, and proportionality. The absence of specific technical regulations indicates that the use of such

technology lacks a sufficiently strong legal basis. Moreover, the use of intrusive technologies affecting privacy must be assessed to determine whether it is truly necessary and cannot be replaced by less invasive alternatives. Therefore, the primary challenge in protecting inmates' rights lies in the lack of integration of human rights principles into the design and implementation of technological systems. Without a human-centered approach, the use of AI risks generating systemic and continuous violations of rights [5], [18].

Conclusion

1. The implementation of *Artificial Intelligence–Driven Visitor Management System* (AI-VMS) in the correctional system, particularly at the Youth Correctional Institution of Langkat, reflects a fundamental shift in the governance of inmate visitation services. While digital transformation offers administrative efficiency, improved verification accuracy, and enhanced institutional security, the findings indicate that its implementation is not yet supported by an adequate legal framework. From an administrative law perspective, the absence of specific technical regulations governing AI particularly concerning operational standards, supervision, and accountability has resulted in a condition of normative uncertainty and a potential legal vacuum. This situation weakens the principles of accountability and transparency, while also creating ambiguity in determining legal responsibility, especially in cases where algorithmic decisions adversely affect inmates' rights. Consequently, AI-based digital transformation in correctional systems has not yet been fully aligned with the principles of the rule of law.
2. From a human rights perspective, the implementation of AI-VMS presents significant challenges, particularly in relation to privacy protection, visitation rights, and procedural fairness. The use of biometric data without stringent safeguards increases the risk of privacy violations, while reliance on automated systems may lead to disproportionate restrictions on inmates' rights, especially in the absence of effective correction mechanisms. Furthermore, the lack of accessible objection procedures indicates that the principle of *due process of law* has not been fully integrated into the system design. These findings affirm that digital transformation in correctional systems must not be treated merely as a technical innovation, but as a public policy issue that must adhere to the principles of legality, proportionality, and human rights protection. Therefore, strategic measures are required, including the establishment of specific regulatory frameworks governing AI use, the integration of human rights principles into system design, and the development of comprehensive oversight mechanisms. In addition, a human-centered approach must be prioritized, ensuring that technology functions as a supportive tool for rehabilitation rather than as a dominant instrument of control. Ultimately, the success of AI-based digital transformation in correctional systems depends on its ability to balance technological innovation with the protection of fundamental rights, in accordance with the principles of the rule of law.

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