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The Effect of Auto Gate Systems on The Traveler Profiling System at Soekarno-Hatta International Airport

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Abstrak

Meningkatnya jumlah penerbangan internasional berdampak pada perbaikan proses imigrasi di bandara. Oleh karena itu, gerbang biometrik swalayan telah dikembangkan untuk menjamin kecepatan dan keamanan yang lebih baik di perbatasan. Dalam tulisan ini, penulis mengevaluasi dampak penerapan sistem auto gate di Bandara Internasional Soekarno-Hatta, khususnya melihat pengaruh efisiensi operasional, privasi, dan keamanan data. Penelitian ini menggunakan pendekatan kualitatif dengan analisis literatur. Penulis menggunakan penelitian sebelumnya, makalah Pemerintah, dan dokumen industri untuk mengidentifikasi mekanisme yang memfasilitasi penerapan dan penerimaan sistem ini secara efektif dan hubungannya dengan masalah privasi dan keamanan data. Penerapan sistem gerbang otomatis yang tepat mungkin memudahkan proses imigrasi dan mendorong perjalanan keliling dunia, namun menangani aspek internal seperti persepsi, keamanan data, dan bahkan aspek manusia akan selalu menjadi hal yang penting. Temuan dari analisis ini merekomendasikan peningkatan model perlindungan data yang ada, meningkatkan keakuratan sistem, dan membuat prosedur lebih terbuka.

Kata Kunci: *Sistem Gerbang Otomatis, Teknologi Biometrik, Pengendalian Imigrasi, Privasi, Keamanan Data, Efisiensi, Bandara Internasional Soekarno-Hatta*

Abstract

The growing numbers of international flights have resulted in the improvement of immigration processes at the airports. Therefore, self-service biometric gates have been developed to guarantee more speed and security at the border. In this paper, the authors evaluate the effects of implementing auto gate systems at Soekarno-Hatta International Airport, specifically looking into the effect of operational efficiencies, privacy, and data security. This study uses a qualitative approach to literature analysis. The author uses previous studies, Government papers, and industry documents to identify the mechanisms that facilitate effective implementation and acceptance of these systems and their relationship to privacy and data security issues. Implementation of the proper auto gate systems might ease immigration processes and encourage traveling around the world, but addressing internal aspects like perception, data safety, and even human beings will always be vital. The findings from this analysis recommend an increase in the data protection models in place, enhancing the accuracy of the systems and making the procedures more open.

Keywords: *Automated Gate Systems, Biometric Technology, Immigration Control, Privacy, Data Security, Efficiency, Soekarno-Hatta International Airport*

INTRODUCTION

The exponential growth in global air travel in the international airline sector has brought new challenges to immigration authorities all over the world. With the increase in passengers, there is a need to maintain control of the borders smoothly and securely while keeping national interests and legitimate travel in perspective. Staffed immigration counters that primarily require document validation and scanning of the traveler's face are becoming harder and harder to operate as the number of travelers grows. Resorting to these manual procedures can be tedious, expose a significant margin of error, and lead to long queues, especially when under high volumes of operations.

To alleviate these pressures, many nations are opting for the use of automated border control (ABC) systems such as e-gates which utilize biometrics. These systems ensure that the person verification process is carried out in an automated, reduced period, minimize errors, and, in turn, assist in preventing various security breaches. Indonesia has gone a step further in using this technology by installing automated gates at its major airports, including Soekarno-Hatta International Airport, which is one of the busiest in the region of Southeast Asia. This tactical move shows that Indonesia is looking to restore its immigration processes and the general experience of travelers.

Nonetheless, the information provided suggests that the application of biometrics to immigration issues raises significant ethical questions, particularly about actions and manifestations and the consequences of bias and discrimination. Such technology has

implications for national security, control of information, and protection of privacy. Furthermore, there are concerns about the effectiveness and accuracy of these systems, especially for people with specific physical or disability characteristics.

This study looks into the use of automated gate systems in Soekarno-Hatta International Airport and their effects on efficiency, security, and other privacy concerns, given the current evolving legal and regulatory context of Indonesia. This research employs a comparative approach by positioning Indonesia's situation to those in other ASEAN countries and developed countries to trace best practices aside from challenges and areas for improvement. The research attempts to provide answers to the following research questions:

1. How much improvement have auto gate systems managed to achieve in terms of efficiency in immigration processes at Soekarno-Hatta International Airport?
2. What are the key challenges concerning privacy and data protection in the application of biometrics technology in auto gate systems in Indonesia?
3. What are the possible strategies that can be employed to enhance the legal, social, or regulatory mechanisms within Indonesia that would facilitate the ethical and responsible use of biometric information in immigration space control?
4. Which aspects of the systems can be further refined for optimal performance or to contain any potential concerns based on experiences from the enhanced auto gate systems in other countries?

As part of this purpose, this research also seeks to look into the implications of automated border control technologies for travelers, immigration authorities, and society in general.

Problem Statement

In spite of the notable advantages auto gates have brought to the immigration process at the Soekarno-Hatta International Airport, specific issues emerge as potential risks to the system in terms of its efficiency, security, and ethical application.

Firstly, the aspect that primarily concerns auto gate operators is the effect on the privacy of travelers. Auto gate systems utilize sensitive biometric information such as images of the traveler's face and fingerprints. This raises issues around data protection and the chances of data being accessed or abused. This particular issue is pertinent to Indonesia as data protection legislation is still in the infancy stage and does not take into consideration the specific issues associated with biometric data.

Secondly, there are issues with the accuracy and reliability of biometric technologies. While there have been improvements in biometric authentication, they cannot be deemed infallible as they may be compromised due to old age, sickness, or poor image capture. This then raises the potential question regarding the auto gate system's capacity to sufficiently authenticate the identity of travelers or the accompanying risk of a type I or type II error, which have wider ramifications for security and customer service, respectively.

Moreover, the asymmetry of the dependence on computer systems and the capacity for human participation in immigration procedures concerns moderation. While automation systems can be used to reduce the chances of human losses and operational inefficiencies, the encroachment of technology over human involvement is not acceptable as well.

To solve these problems, a broad strategy is needed, for example, reformulating the laws on the protection of data, liberalizing the legal framework for biometric systems, and finding an optimal ratio between artificial resistance and the physical one in the immigration procedure.

Research Objectives

This literature review aims to achieve the following objectives:

1. Critically analyze the existing literature on the implementation and impact of auto gate systems on immigration processes. This includes examining the technological aspects, operational efficiency, and user experience of auto gate systems in various contexts.
2. Investigate the privacy and data protection implications of utilizing biometric technology in auto gate systems. This involves reviewing relevant legal frameworks, ethical considerations, and best practices for safeguarding traveler data.
3. Evaluate the literature on the reliability and accuracy of biometric technologies used in auto gate systems. This includes assessing the effectiveness of different biometric modalities, identifying potential sources of error, and analyzing strategies for mitigating risks.
4. Conduct a comparative analysis of the implementation and impact of auto gate systems in Indonesia and other selected countries. This involves examining similarities, differences, and lessons learned from various national experiences.
5. Synthesize the findings from the literature review to identify critical challenges and opportunities associated with the use of auto gate systems in Indonesia. This includes providing insights for policymakers, immigration authorities, and technology developers to improve the effectiveness and ethical implementation of these systems.

RESEARCH METHOD

This paper adopts a qualitative literature review strategy to explore the operationalization and effects of automated gates at Soekarno-Hatta International Airport in Jakarta, Indonesia. This methodology substracts the literature from various perspectives, researching a specific concept. The investigation concentrates on the review of articles, government documents, industry reports, monographs, and other factual reasoning sources to assess the technological, operational, societal, and legal aspects of auto gate systems in Indonesia.

Data Sources and Selection Criteria

1. Multiple secondary data sources were used to gather necessary and appropriate information on the subject matter. For these, the following selection criteria were considered Two: Relevance, Credibility, Accessibility, and Timeframe. For these, the following selection criteria were considered as well:
2. Relevance: Sources were selected due to their essential link to the lifecycles of DEEG between auto gate systems and biometric technology, immigration control issues, privacy, data protection, and the like.
3. Credibility: Sources were extracted from respected academic institutions, government institutions, professional bodies, and the news, which are known to be accurate and reliable.
4. Accessibility: Preference was given to readily available sources in English or Indonesian.
5. Timeframe: Although no strict timeframe was imposed, in general, more recent publications were preferred as they reflect the realities of the developments in the field.
6. The sources of data used in this research include the following:
7. Academic databases: Consult your views via the websites JSTOR, IEEE Xplore, ScienceDirect, Scopus, and Google Scholar, which are used explicitly for academic literature of peer-reviewed articles, conference proceedings, and book chapters for academics.
8. Government publications: Examining Indonesian government documents such as reports and policies from the Directorate General of Immigration, the Ministry of Law and Human Rights, and other related governmental institutions.
9. Industry reports: A detailed review of material from the IATA (International et al. Association) and the ACI (Airports et al.).

10. News articles and media reports: Gathering information from reputable media, newspapers, and other sources concerning the events that are happening and the people's perspectives about them.

Data Collection and Analysis Procedures

The data collection strategy consisted of systematic searching of databases and sources previously identified using a number of keywords, for example, 'auto gate systems, 'biometric technology', 'immigration control ', immigration control' 'Soekarno-Hatta Airport', 'privacy', and 'data protection.'

The gathered data was then interpreted qualitatively by following the steps outlined below:

1. Organization and Familiarization: Organizing and reviewing the collected data to provide a detailed conspectus of the literature.
2. Coding and Theme Identification: The aims and objectives of the study that were of central concern to this study's key themes and concepts were spelt out and coded.
3. Critical Evaluation: Critically, the literature was reviewed such that the information presented different views regarding the same subject, highlighting the gaps and strengths of various authors on the same issues and evaluating the relevance and usefulness of the sources.
4. Synthesis and Interpretation: The results were merged and interpreted so as to come up with reasonable conclusions and, in some cases, additional insights on the research questions that were posed.
5. Connecting to Theory: The analysis focused on technology and innovation but broadly within relevant theories such as the technology acceptance model, diffusion of innovations, and actor-network theory to enhance the understanding of the results.

RESULT AND DISCUSSION

A systematic literature review indicates that the security control system can significantly improve the efficiency of immigration procedures. The findings of other studies, such as these, show a tendency to shorten processing times, streamline passenger and baggage flow, and maximize resources. For example, a study conducted at Soekarno-Hatta International Airport, compliments of this system, shows how auto gate systems reduce average processing time by 50% while increasing passenger throughput by 20%.

Nevertheless, the implementation and efficiency of auto gate systems are primarily determined by international traveler attitudes. For instance, the Technology Acceptance

Model (TAM) otherwise shows that both ease of use and the level of perceived usefulness are among the most critical factors determining the use of new technology and its acceptance. Passengers who consider the system to be smooth and easy are likely to take it up. Furthermore, the Diffusion of Innovation Theory (DOI) mentions that relative advantage, compatibility, complexity, trialability, and observability can influence the adoption of technology. For example, a survey conducted by travelers at Soekarno Hatta International Airport indicated that 75% of respondents believed that auto gate systems worked faster and were more efficient than the immigration counter systems. In comparison, 80% were satisfied with the user experience offered.

The review notes, in particular, the continuing difficulties that are related to the use of auto gate systems. Data security is one of the issues, as these are susceptible systems involving biometric data. Europe has the General Data Protection Regulation, which protects individuals' data, including students' biometric data. However, Indonesia's legal system with regard to biometric data protection is still evolving, which is a cause for concern. In addition, the effectiveness and reliability of biometric technologies are significant in avoiding errors and biases that could be detrimental to security and even consumer care. In an auto gate system comparative study between Indonesia and other ASEAN countries, the comparison showed Indonesia has weaker data protection laws than Singapore and Malaysia, which calls for better measures to be implemented.

Moreover, the literature highlights that the automated processes of immigration should still have human intervention. Automation can undoubtedly optimize many processes, but human officers are needed for exceptions, interventions of technical hitches, and general comfort of passengers. Research conducted at Amsterdam Airport Schiphol demonstrated that auto gate systems alongside immediate neighbouring trained immigration officers were able to avoid passenger misunderstanding during busy times and even reduce waiting periods.

Drawing all things to a close, the successful application of auto gate systems is through all the available measures that cut across technology and society. In order to achieve the best gains out of this form of gate while still addressing some of the concerns regarding the system, such as risks and threats, it is essential to work on the security frameworks, work on reliability and precision, ensure human interventions are made and increase the level of openness.

CONCLUSION

The present work has undertaken the analysis of the use and the results of implementing the automated gate systems in Soekarno-Hatta International Airport, as well as their advantages and difficulties in the dynamism of immigration in Indonesia. This review has pointed out the broad incorporation in the user's acceptance of such systems, the penetration level of the technology, stakeholder interactions, and the privacy issues to prevent ethical violations in the course of using these systems during the implementation phase.

From the analyzed literature, one can draw several conclusions:

1. Auto gate systems have the potential to significantly improve the efficiency of immigration processes by minimizing processing time, facilitating more passengers, and enabling better utilization of resources.
2. The primary concerns of auto gate systems' acceptance can depend on international travelers' perception of the systems' utility and ease of usage, as well as the perceived social advantage, compatibility, complexity, trialability, and observability of the technology.
3. The acceptance and success of auto gate systems would depend significantly on an appreciation of the cross-influence of several players, such as travelers, customs officers, technology developers, and the government.
4. The ethical implications of using biometric identification in automated gate systems are of great significance and warrant attention in the formulation of legal structures and security measures that will ensure the privacy of travelers' data.
5. The hope of automation without incorporating any monitoring seems inappropriate when the use of auto gate systems is being discussed in practice, which contemplates the need for human interference in some situations because of technological incapacity or unusual situations.

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