



DOI: <https://doi.org/10.38035/sjam.v4i2>
<https://creativecommons.org/licenses/by/4.0/>

Implementation of an Artificial Intelligence-Based Chatbot for Immigration Services and Smart Government at the Directorate General of Immigration, Ministry of Immigration and Corrections, Indonesia

Catur Susaningsih^{1*}, Triyuni Soemartono², Pandji Sukmana³, T. Herry Rachmatsyah⁴

¹Universitas Prof. Dr. Moestopo, Jakarta Pusat, Indonesia, caturSusan7@gmail.com.

²Universitas Prof. Dr. Moestopo, Jakarta Pusat, Indonesia, triyuni@dsn.moestopo.ac.id.

³Universitas Prof. Dr. Moestopo, Jakarta Pusat, Indonesia, pandjisukmana@dsn.moestopo.ac.id.

⁴Universitas Prof. Dr. Moestopo, Jakarta Pusat, Indonesia, herry.rachmatsyah@dsn.moestopo.ac.id.

*Corresponding Author: caturSusan7@gmail.com¹

Abstract: Digital modernization of public services is an important component of Smart Government implementation in Indonesia. The Immigration Service Chatbot at the Directorate General of Immigration supports service efficiency, effectiveness, and public satisfaction in accordance with the Electronic-Based Government System (SPBE) principles stipulated in Presidential Regulation Number 95 of 2018. However, its implementation still faces challenges related to public trust and perceived risks associated with artificial intelligence technology. This study analyzes the implementation of the Artificial Intelligence-based Immigration Service Chatbot using the Bélanger and Carter model as an analytical framework. A qualitative case study approach was employed. Data were collected through in-depth interviews with 7 key informants and 3 supporting informants, complemented by documentation. Data were analyzed using thematic analysis based on four constructs: Trust in Government, Trust in Technology, Perceived Risk, and Behavioral Intention/Use. The findings show that Trust in Government and Trust in Technology strengthen chatbot acceptance and intention to use, while Perceived Risk inhibits adoption. The chatbot contributes to service efficiency, information delivery, and public satisfaction. Key challenges include concerns about personal data protection and AI response accuracy. Strengthening data security, chatbot accuracy, and public dissemination is essential to optimize public acceptance.

Keywords: Chatbot, Artificial Intelligence, Smart Government, Bélanger and Carter, Directorate General of Immigration.

INTRODUCTION

The development of information and communication technology has transformed public administration and service delivery. Governments are increasingly expected to provide services that are fast, accessible, transparent, accountable, and responsive to citizens' needs. In Indonesia, this transformation was strengthened through Presidential Instruction No. 3 of 2003

concerning the National Policy and Strategy for E-Government Development, which promoted information and communication technology to improve government efficiency, transparency, and service quality (Sinaga et al., 2014). E-government consequently became an important instrument for strengthening public governance and government-citizen interaction (Murni Gea et al., 2023; Qader & Kheder, 2016). Citizen trust, perceived ease of use, and compatibility also influence the acceptance of digital government services (Bélanger & Carter, 2008; Parent & Smyth, 2005).

The shift toward digital government has extended beyond administrative digitization toward more responsive and citizen-oriented public interaction. Smart Government emphasizes the strategic use of technology to improve service efficiency, accessibility, responsiveness, and governance capacity (Eom & Lee, 2022). Citizen-centricity has likewise become an important dimension of digital transformation, placing citizens at the center of service design and delivery (Dechamps & al., 2025; Sundberg & Holmström, 2024). Digital service quality can further influence perceived value, satisfaction, and continued engagement with government services (Pham & Limbu, 2023; Yaya & Sukardi, 2025).

Artificial Intelligence (AI) has expanded this transformation by enabling governments to automate and support public-service interactions. AI applications offer opportunities to improve service delivery while raising concerns regarding accountability, transparency, privacy, bias, and governance (Zuiderwijk & Chen, 2021). Citizen acceptance of AI-enabled public services is also influenced by factors such as accuracy, perceived fairness, and human involvement (Horvath & al., 2023). AI-based chatbots have consequently emerged as an interactive mechanism for accessing government information and services. Androutsopoulou & Karacapilidis (2019) demonstrate their potential to transform citizen-government communication, while Larsen and Følstad (2024) show their contribution to public-service access. Citizen preferences may also be influenced by chatbot characteristics such as proactivity, consistency, and perceived intelligence (Ju & al., 2023).

Government chatbot adoption, however, depends on more than technological capability. Chen (2024) identify organizational factors influencing AI chatbot adoption in public organizations, while Cortés-Cediel (2023) highlight technological, implementation, open-data, and citizen-participation dimensions. Pimentel Bernardo M. R. & Rocha (2025) demonstrate the potential of public chatbots in administrative contexts, and Yun Yun S. & Xue (2024) show that generative-AI applications can improve citizens' access to and understanding of policy information. These studies indicate that government chatbot implementation constitutes a multidimensional technological and governance process.

The immigration context presents additional complexity because services involve personal information, dynamic regulations, diverse users, and administrative decisions. Research on AI in migration governance highlights risks related to privacy, bias, data governance, and power asymmetries (Bircan & Korkmaz, 2021), while Poyares (2025) raises concerns about the extraction and use of migrant data in AI-based border governance. AI-enabled migration technologies therefore require attention to technological capability, data protection, regulation, organizational governance, and service characteristics.

Trust and perceived risk are further important considerations. Bélanger & Carter (2008) establish trust and perceived risk as important dimensions of e-government adoption, while Bélanger & Carter (2008) identify trustworthiness, perceived ease of use, and compatibility as predictors of e-government acceptance. Welch et al. (2005) demonstrate the relationship between e-government satisfaction and trust in government. Wang (2024) further show that trust in government institutions can extend to AI-enabled government systems when users perceive them as reliable and accountable. These considerations are particularly relevant to immigration services, where users may rely on chatbot-generated information for processes with administrative implications.

Despite growing research on e-government, public-sector AI, and government chatbots, a specific gap remains in the Indonesian immigration context. Existing studies have largely examined public-service chatbots, citizen interaction, citizen-centric digital government, or general AI adoption (Chen 2024; Cortés-Cediel 2023; Sundberg & Holmström, 2024), while other studies address AI-related trust, acceptance, and governance risks (Horvath & al., 2023; Wang Chen Y.-C. Chien S.-Y. & Wang, 2024; Zuiderwijk & Chen, 2021). Research specifically connecting AI-based immigration chatbots with Smart Government, trust in government, trust in technology, perceived risk, data protection, organizational governance, and public satisfaction remains limited. The gap therefore concerns not only technological adoption but also how chatbot implementation operates within the institutional, regulatory, and service characteristics of immigration administration.

This distinction is important because immigration services vary in complexity. Chatbots can support procedural and informational services, including visa information, but face limitations when handling personal data, legal status, regulatory interpretation, and administrative discretion. Effective implementation consequently requires an appropriate boundary between automated information provision and human intervention (Horvath & al., 2023).

The novelty of this study lies in positioning the AI-based immigration chatbot as a socio-technical public-service system within the Smart Government perspective and Trust & Risk in E-Government Adoption. The study integrates five dimensions technology, organization and governance, human resources, users, and the regulatory environment to explain implementation in the specific context of immigration services. This approach extends chatbot research by connecting technological implementation with institutional governance, user trust and risk, human resources, data governance, and regulatory characteristics.

Accordingly, this study aims to analyze the implementation of an AI-based Immigration Service Chatbot at the Directorate General of Immigration in supporting Smart Government, identify the factors influencing its implementation, and examine its contribution to service efficiency, effectiveness, and public satisfaction. These objectives correspond to the three research questions formulated in the revised study.

METHOD

Research Design and Paradigm

This study employed a qualitative approach with an instrumental case study design to examine the implementation of an Artificial Intelligence (AI)-based immigration chatbot at the Directorate General of Immigration. The analysis focused on the implementation process, influencing factors, and the chatbot's contribution to service efficiency, effectiveness, user trust, and behavioral intention/use. The study was guided by the Trust & Risk in E-Government Adoption framework of Bélanger and Carter, comprising Trust in Government, Trust in Technology, Perceived Risk, and Behavioral Intention/Use.

The study adopted an interpretive-constructivist paradigm with a pragmatic policy orientation, viewing the chatbot as a service reality formed through interactions among users, technology, and the organization. The analysis used thematic analysis and abductive reasoning. The Bélanger and Carter framework served as a sensitizing framework while allowing themes emerging from the empirical data to be identified. Data credibility was maintained through triangulation, an audit trail, and member checking, with findings intended for analytical rather than statistical generalization.

Research Setting and Period

The research was conducted at the Directorate General of Immigration, Gedung Sentra Mulia, Jalan HR. Rasuna Said Kav. 8-9, Kuningan, South Jakarta, focusing on organizational

units directly involved in the implementation and operation of the immigration chatbot, including complaint services, Information and Communication Technology, Public Relations, the Program and Reporting Division, the Directorate of Visa and Travel Documents, and the Directorate of Immigration Stay Permit and Immigration Status. The setting was selected to capture the actual workflow of immigration question-and-answer services, from policy formulation, data provision, and content quality assurance to service responses and escalation to human officers.

The research was conducted from August 2025 to June 2026, covering observation, problem identification, proposal preparation, data collection, and data processing. The main data collection was conducted in April 2026 at the Directorate General of Immigration in Jakarta.

Subjects, Object, and Unit of Analysis

The subjects of this study comprised three main groups directly involved in the immigration chatbot service ecosystem. The first group consisted of officials and personnel responsible for policy, system architecture, and chatbot content management, including the complaint service unit, the Directorate of Information and Communication Technology, Public Relations, the Program and Reporting Division, and the relevant technical directorates. The second group comprised service officers responsible for handling cases escalated from the chatbot to human service channels. The third group consisted of service users who directly interacted with the chatbot and provided information regarding their experiences, perceptions, and needs.

The object of the study was the implementation of an Artificial Intelligence-based chatbot as a public immigration service channel. The analysis covered the implementation process from design and governance to operational implementation, service performance, and user experience, with the aim of understanding the chatbot's contribution to service quality.

The unit of analysis was the interaction among users, the chatbot, and the organization within the Directorate General of Immigration. This unit encompassed policy dimensions, including regulations, standards, and accountability business-process dimensions, including service workflows and escalation mechanisms, and technological dimensions, including system robustness, response accuracy, and data management.

The study was limited to information, complaint, and question-and-answer services that could be functionally handled by the chatbot within the Directorate General of Immigration. Accordingly, the findings were not intended to be generalized to other government institutions or immigration services outside the chatbot's functional scope. This boundary was established to maintain a focused and in-depth analysis of the operational context under study.

Data Sources and Informants

The study used primary and secondary data sources. Primary data were obtained through in-depth interviews with relevant stakeholders, direct observation of chatbot operations, and examination of service artifacts, including anonymized case logs. Secondary data comprised relevant policies and regulations, Standard Operating Procedures (SOPs), internal guidelines, data security and privacy policies, and service-performance records, including response time, automated-resolution ratios, and the proportion of cases escalated to human officers.

Informants were selected through purposive sampling based on their knowledge of the research problem and involvement in chatbot implementation. The study involved seven key informants, with the number determined by data saturation, when additional data no longer generated significant new information.

The informants represented key perspectives in policy and system architecture, chatbot operation and content management, service evaluation, technical policy decision-making,

immigration service operations, and service users. They included the Head of Team at the Complaint Service of the Directorate of Information and Communication Technology, the Head of Team and staff of Public Relations, the Head of the Program and Reporting Division, the Director of Information and Communication Technology represented by the Head of Administration, officials and service officers from the Directorate of Visa and Travel Documents and the Directorate of Immigration Stay Permit and Immigration Status, and service users.

Data Collection

Data were collected through source triangulation using three techniques: semi-structured in-depth interviews, observation, and documentation. These techniques were used to examine chatbot implementation, factors influencing its implementation, and its contribution to digital immigration services.

Semi-structured in-depth interviews were conducted with the seven key informants representing policy, system management, complaint services, Public Relations, the Program and Reporting Division, technical directorates, service officers, and service users. The interviews addressed the implementation process, human-resource readiness, system integration, knowledge-base updating, security and privacy, escalation mechanisms, and the chatbot's contribution to service efficiency, effectiveness, quality, trust, and public satisfaction.

Observation focused on user interaction with the immigration chatbot, including accessibility, response clarity, barriers to use, and differences between the designed service process and actual practice. Documentation and chatbot performance logs were examined to assess relevant policies, SOPs, complaint services, user-question patterns, response failures, system requirements, and chat logs.

The integration of interviews, observation, documentation, and service-performance data enabled triangulation across sources and perspectives. The resulting data were used to examine the implementation of the chatbot, factors affecting its implementation, and its contribution to digital immigration service delivery.

Data Analysis and Trustworthiness

Data were analyzed using thematic analysis, which provides a theoretically flexible approach for identifying and interpreting patterns or themes within qualitative data (Braun & Clarke, 2006). The process began with open coding to identify units of meaning from interview transcripts, observation notes, and documents. The codes were then grouped to identify relationships and develop the main themes. The initial themes were guided by the Bélanger and Carter framework, comprising Trust in Government (TOG), Trust in Technology (TOT), Perceived Risk (PR), and Behavioral Intention/Use (BI).

The analysis also allowed themes to emerge from the empirical data beyond the initial constructs. Through qualitative analysis and abductive reasoning, themes such as data governance, human-resource readiness, and system integration were incorporated where supported by the empirical findings.

Data credibility was maintained through triangulation, an audit trail, and member checking, which are established strategies for strengthening trustworthiness in qualitative research (Lincoln & Guba, 1986; Morse et al., 2002). Triangulation involved comparing information from different sources and data-collection techniques, while member checking was used to validate findings with key informants. The audit trail supported the traceability of the analytical process. The findings were intended for analytical rather than statistical generalization, within the specific context and functional scope of the immigration chatbot.

RESULTS AND DISCUSSION

Implementation of the AI-Based Immigration Chatbot in Supporting Smart Government

The findings show that the AI-based immigration chatbot is implemented as an instrument of digital public-service transformation at the Directorate General of Immigration. The chatbot is positioned not merely as a technological product but as part of the immigration digital-service ecosystem, particularly for information services, complaints, visa services, and other immigration-related inquiries. Its implementation responds to a service environment characterized by high demand, diverse user groups, time-sensitive information, and regulatory requirements.

The scale and diversity of immigration services provide an important context for the implementation. In 2024 and 2025, the Directorate General of Immigration handled millions of passport, visa, and residence-permit services, while immigration non-tax state revenue (PNBP) also showed substantial growth. These conditions illustrate the volume and complexity of services requiring accessible and responsive information channels.

Table 1. Scale of Immigration Services as the Context of the Research Object

Service Indicator	2024	2025	Policy Implication
Passport	4,838,581 passports issued from 1 Januari-15 December 2024	4,033,676 passports issued throughout 2025	Indicates high demand for travel-document services and the need for rapid access to passport information
Visa	5,162,775 visas issued from 1 Januari-15 December 2024, 4,635,858 (approximately 89%) were Visa on Arrival	7,551,371 visas issued throughout 2025	Indicates substantial information needs among foreign nationals, sponsors, tourists, investors, and other travelers
Residence Permit	9,325,307 ITK, 259,944 ITAS, and 6,437 ITAP issued in 2024	1,369,012 residence permits issued throughout 2025	Requires accurate information and escalation mechanisms because of its relationship to foreigners' legal status
Immigration PNBP	IDR 9 trillion, or 150% of the IDR 6 trillion target, increased 18.39% from 2023	IDR 10.4 trillion, increased approximately 18% from 2024	Indicates the significant fiscal contribution of immigration services and the importance of service quality and public trust

The characteristics of the research object further indicate that the chatbot serves users with diverse needs, including Indonesian citizens, foreign nationals, sponsors, tourists, investors, foreign workers, students, diaspora communities, and the general public. The services include passports, visas, Visa on Arrival, residence permits, complaints, foreigner reporting, and application-status information. Because the problems range from routine inquiries to matters requiring verification and regulatory interpretation, the chatbot is designed to provide initial information while maintaining escalation to human officers.

Table 2. Characteristics of the Research Object and Policy Implications

Dimension	Description	Implication for AI Chatbot Policy
User groups	Indonesian citizens, foreign nationals, sponsors, tourists, investors, foreign workers, students, diaspora, and the general public	The service channel should be accessible, responsive, and capable of addressing different user needs
Service types	Passports, visas, Visa on Arrival, residence permits, complaints, foreigner reporting, and application-status information	The chatbot knowledge base must be updated according to regulations and service processes
Problem characteristics	High volume of routine questions, rapid-response needs, regulatory variation, risk of misinformation, and cases requiring verification	The chatbot can handle initial information but requires clear boundaries and escalation mechanisms

Policy objectives	Improved accessibility, efficiency, information consistency, service documentation, and user satisfaction	AI functions as an instrument of Smart Government rather than an end in itself
Governance risks	Personal-data protection, information accuracy, decision accountability, and user trust	Implementation requires SOPs, content supervision, service audits, and human-in-the-loop mechanisms

Within this context, the chatbot operates as a digital frontliner or first point of contact. It enables users to obtain immigration information without directly contacting service officers and is available through the official Directorate General of Immigration website. The website chatbot provides information covering passports, visas, residence permits, citizenship, complaints, and other immigration services, while users can interact through natural-language questions.

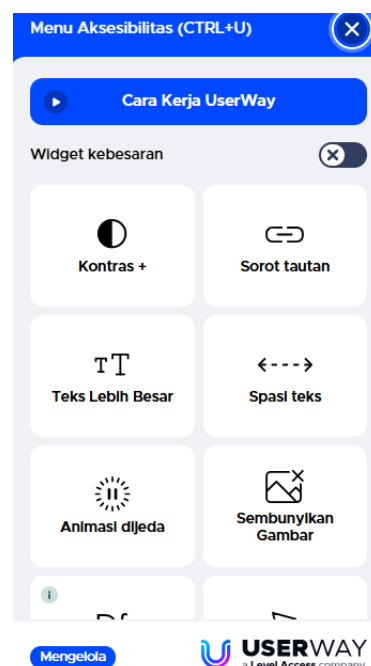


Figure 1. Chatbot Display on the Directorate General of Immigration Website

The implementation is adapted to the characteristics of each service platform. In addition to the main immigration website, the chatbot is implemented on the e-Visa portal, where its scope is more specific to visa and residence-related information. The system provides information on visa types, document requirements, application procedures, validity periods, and related electronic services. This differentiation demonstrates that AI implementation has been adjusted to the substantive needs of each service rather than applied uniformly.

The chatbot is supported by an integrated technical architecture involving Qiscus Omnichannel, Azure OpenAI, Azure Kubernetes Service, Azure Data Factory, transactional APIs, replicated databases, and the Helpdesk system. The implementation also includes analytical dashboards used to monitor conversations, response times, complaint tickets, question categories, and service-resolution levels.

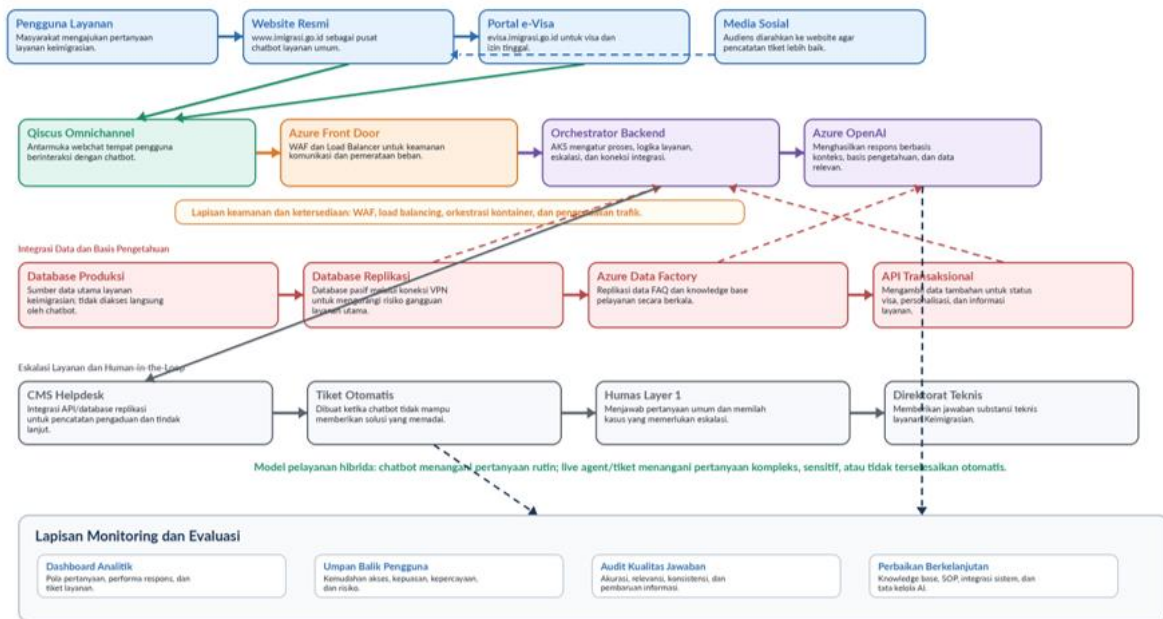


Figure 2. Architecture of the Immigration Chatbot System

The integration between the chatbot, CMS Helpdesk, and immigration systems enables automated interactions to be connected with organizational service processes. This integration supports the handling of inquiries that cannot be resolved automatically and provides a pathway for further assistance by the relevant officers.

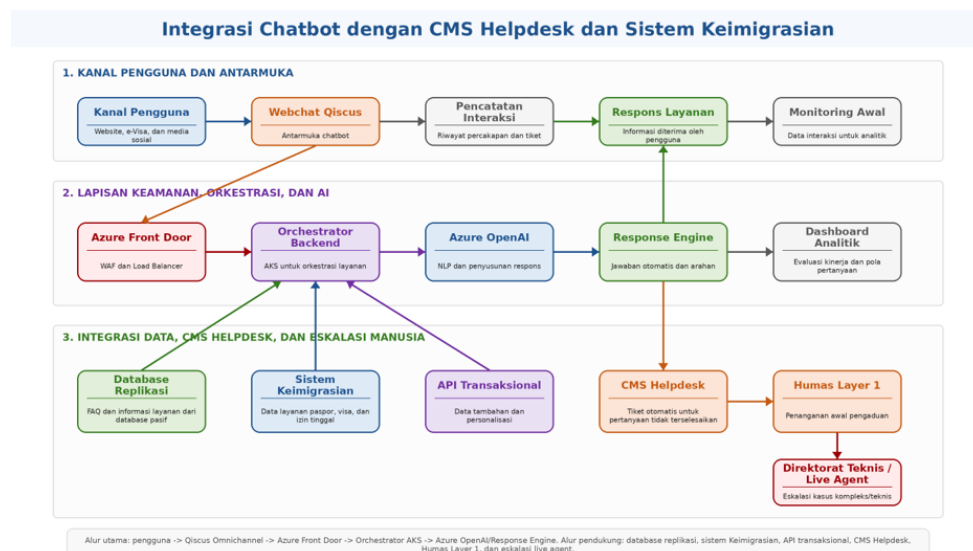


Figure 3. Integration of the Chatbot with the CMS Helpdesk and Immigration Systems

The chatbot also functions as an initial channel for public complaints. It receives complaints, provides initial responses, classifies issues, and connects users with the Helpdesk through an escalation mechanism. This mechanism allows routine inquiries to be handled automatically while cases requiring further attention can proceed to the responsible service officers.

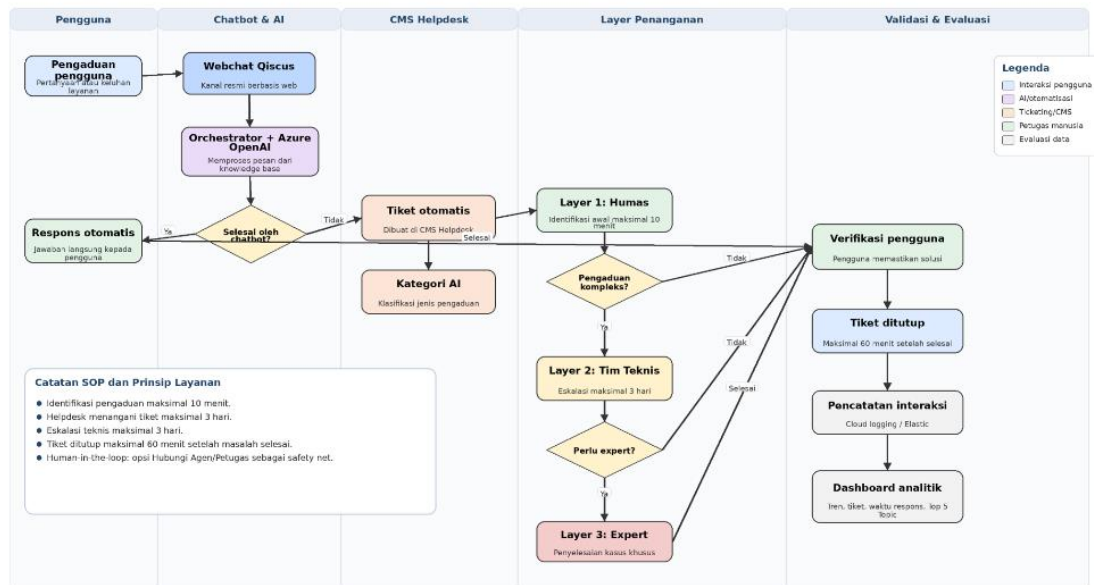


Figure 4. Complaint Handling Flow through the Chatbot and CMS Helpdesk

The e-Visa chatbot applies the same principle of automated initial service combined with human escalation. It provides information concerning visa types, administrative requirements, fees, validity periods, procedures, and relevant service links. When the chatbot cannot provide an appropriate response, users are directed to an official officer or service channel.

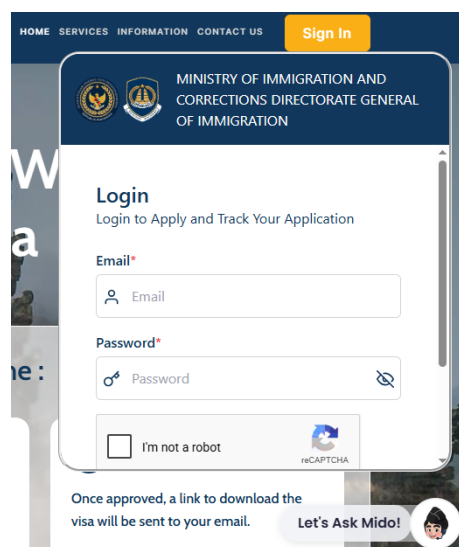


Figure 5. Chatbot Display on the Directorate General of Immigration e-Visa Portal

The implementation of the chatbot on the e-Visa portal is further illustrated by its conversation flow, which enables users to access information related to visa services through an automated interaction process.

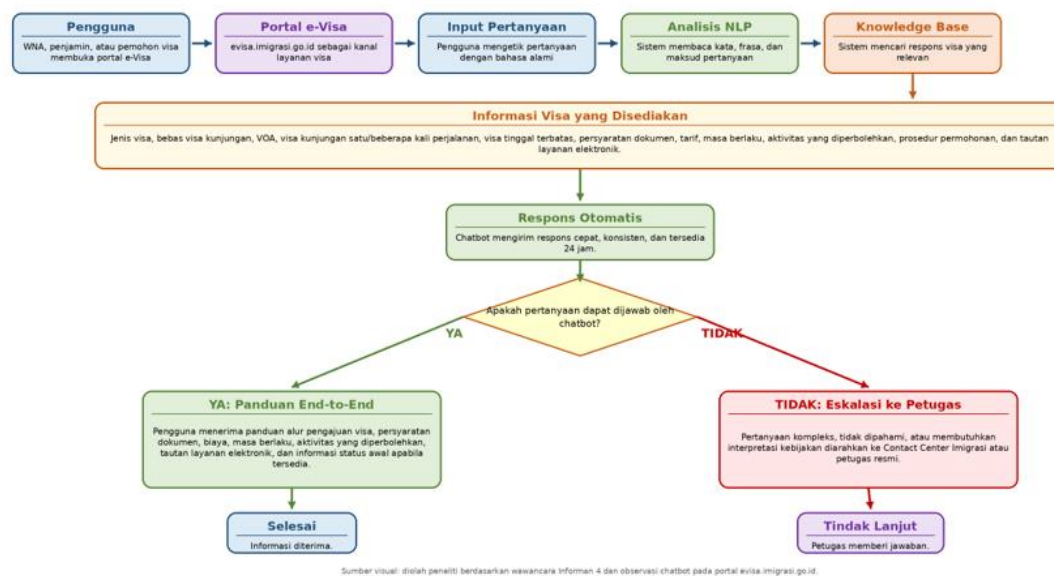


Figure 6. Chatbot Conversation Flow for Visa Services

From the user perspective, the chatbot has become an initial choice for obtaining immigration information because it is considered accessible, practical, and fast. Users reported that it reduced the need to visit an immigration office or contact a call center for basic information. Nevertheless, users also identified limitations when questions were complex or required specific policy interpretation. Consequently, escalation to human officers remains necessary, positioning the chatbot as a first-line service rather than a complete substitute for human officers.

The findings therefore indicate that the implementation of the AI-based immigration chatbot reflects Smart Government through integrated digital service delivery. Its role extends beyond automated question answering to include information provision, complaint entry, service guidance, system integration, and connection with human officers. At the same time, the implementation recognizes the limits of automation: routine and informational services can be automated, whereas cases involving document verification, legal status, regulatory interpretation, personal-data protection, or administrative decisions require human involvement.

Factors Influencing the Implementation of the AI-Based Immigration Chatbot

The findings indicate that the successful implementation of the AI-based immigration chatbot is influenced by five interrelated factors: technology, organization and governance, human resources, users, and the external environment. These factors do not operate independently but form an implementation ecosystem that determines the chatbot's ability to provide reliable and sustainable digital immigration services.

Technology constitutes the operational foundation of the chatbot. The findings show that integrated system architecture, Artificial Intelligence and Natural Language Processing (NLP), Application Programming Interface (API) integration, cloud computing, information-security mechanisms, and scalability enable the chatbot to provide services that are fast, stable, secure, and adaptable to increasing user demand. Thus, technological readiness is a basic prerequisite for reliable digital service delivery.

Organization and governance provide the strategic direction for implementation. Leadership support, organizational policies, Standard Operating Procedures (SOPs), knowledge management, Public Relations, and collaboration among directorates ensure that the technology is implemented consistently with organizational objectives. The findings

demonstrate that chatbot implementation depends not only on technical capability but also on governance capable of integrating technical, administrative, and public-service dimensions.

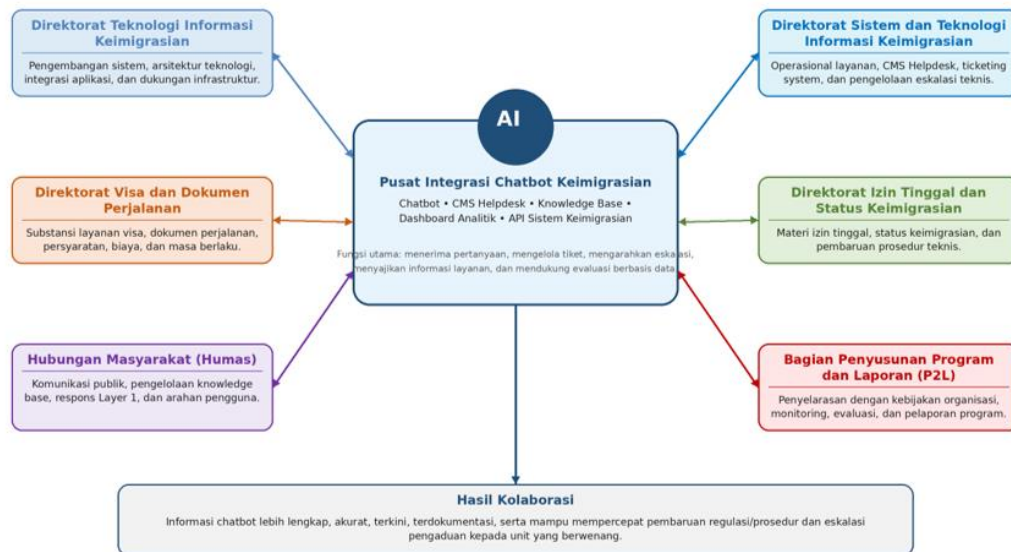


Figure 7. Inter-Directorate Collaboration Scheme in Chatbot Implementation

The collaboration shown in Figure 7 enables information from different directorates to be incorporated into the chatbot, supporting more complete and updated responses. Coordination among units also facilitates information updates when immigration regulations or service procedures change. The observation further confirmed integration among the chatbot, CMS Helpdesk, analytical dashboard, e-Visa system, and escalation mechanism, indicating that content management is conducted collaboratively.

Human resources represent another important determinant. Although the chatbot relies on Artificial Intelligence, its effectiveness remains dependent on personnel who develop, manage, update, and evaluate the system. The findings emphasize staff competence, Artificial Intelligence training, continuous knowledge-base updating, and the role of chatbot administrators in maintaining service quality. This demonstrates that AI implementation does not eliminate human involvement but requires digital competencies to sustain a *human-in-the-loop* service model.

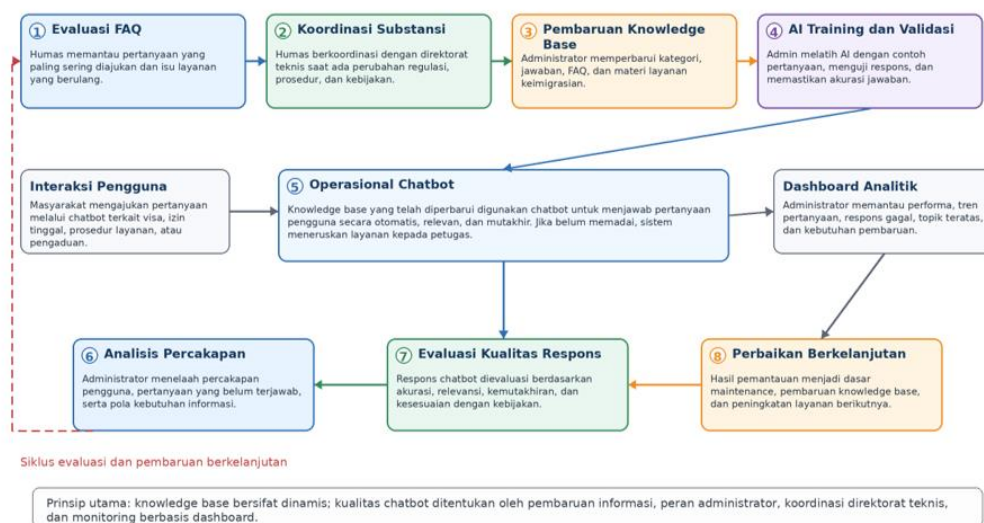


Figure 8. Knowledge Base Management and Chatbot Performance Monitoring Process

The knowledge base and performance-monitoring process is particularly important because the completeness and currency of the knowledge base determine the chatbot's ability to provide appropriate responses. The analytical dashboard also enables administrators to monitor chatbot performance as a basis for service-quality evaluation.

The user factor concerns acceptance of the chatbot, which is shaped by trust, perceived risk, user experience, ease of use, and satisfaction. Users tend to accept the chatbot when the information is trusted, accessible, fast, and relevant to their needs. The findings also show that trust is closely associated with the official status of the Directorate General of Immigration website, which strengthens users' confidence in the information provided.

Finally, the external environment influences implementation through regulations, personal-data protection, changes in visa policies, and increasing public expectations for digital services. These conditions require continuous information updates and organizational adaptation. Thus, chatbot implementation is situated within the broader national Smart Government policy environment and requires alignment between technological innovation, regulatory requirements, and public-service needs.

Contribution of the AI-Based Chatbot to Service Efficiency, Effectiveness, and User Satisfaction

The findings show that the implementation of the AI-based chatbot contributes to service efficiency, effectiveness, accessibility, and user satisfaction in immigration services. These contributions are reflected in the automation of repetitive inquiries, faster access to information, continuous service availability, and reduced workload for service officers.

From an efficiency perspective, the chatbot automates responses to frequently asked questions, operates 24 hours, reduces the need for direct contact with service officers, and saves users' time. This allows officers to focus on cases requiring analysis, verification, or administrative decisions. Automation therefore contributes to both user convenience and organizational efficiency.

From an effectiveness perspective, the chatbot provides consistent information based on its knowledge base and covers various immigration services, including visas, residence permits, passports, and public complaints. Its integration with the Helpdesk and escalation mechanism enables inquiries that cannot be resolved automatically to be transferred to officers. The chatbot therefore complements rather than replaces human service through a *human-in-the-loop* approach.

The contribution to user satisfaction is reflected in the chatbot's accessibility, response speed, and convenience through official immigration channels. Users reported that the chatbot was easy to access and useful for obtaining information on common immigration matters. However, satisfaction was not fully optimal because the chatbot still produced repetitive responses, had limitations in understanding lengthy questions, and was less capable of handling complex cases.

The findings also indicate that trust and user experience are closely related to the perceived usefulness of the chatbot. Users expressed greater confidence because the chatbot is provided through the official Directorate General of Immigration website. Rapid responses, ease of access, and information consistency contributed to positive experiences, while the availability of escalation to human officers helped maintain user confidence when automated responses were insufficient.

Overall, the chatbot makes a meaningful but bounded contribution to immigration service delivery. Its strongest contribution lies in handling routine information requests and improving access and response speed, whereas complex questions requiring policy interpretation or verification remain dependent on human officers. The findings therefore reinforce a hybrid

service model in which AI supports service delivery while human intervention remains essential for cases beyond the chatbot's functional capacity.

Conceptual Model and Theoretical Contribution

The synthesis of the findings indicates that the implementation of the AI-based immigration chatbot is shaped by the interaction of technology, organization and governance, human resources, users, and the external environment. These dimensions form an interconnected implementation ecosystem in which technological capability must be supported by organizational coordination, competent personnel, user acceptance, and adaptation to regulatory and policy changes.

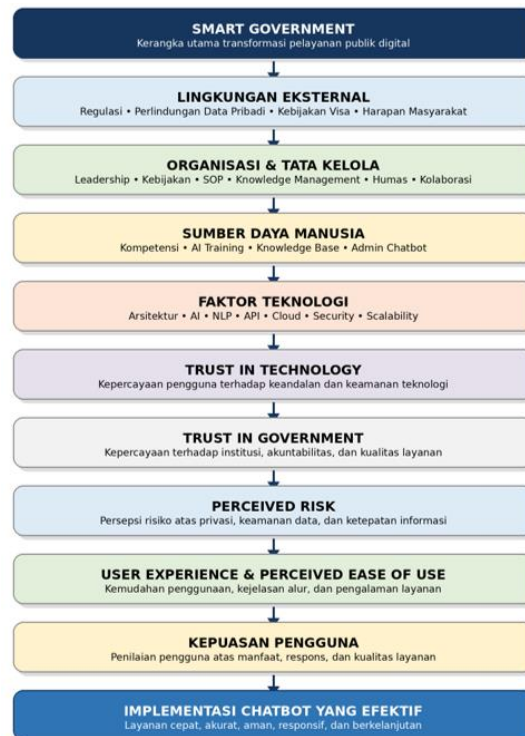


Figure 9. Conceptual Model of AI-Based Immigration Chatbot Implementation in Supporting Smart Government

The conceptual model integrates five dimensions within the Smart Government and Trust & Risk in E-Government Adoption perspectives. Technology provides the operational foundation, organization and governance provide strategic direction, human resources sustain system and content quality, users shape trust, perceived risk, and acceptance, while the external environment provides the regulatory and policy context. Trust is an important condition for chatbot acceptance and continued use. The official government channel, information consistency, accessibility, and response speed support user confidence, while complex questions, repetitive responses, and policy interpretation may create perceived risk. Human escalation therefore serves as an important mechanism for maintaining trust and limiting the risks of automated service delivery. The findings also show that implementation should correspond to the complexity of immigration services. Routine and informational inquiries are suitable for automation, whereas document verification, legal status, regulatory interpretation, personal-data protection, and administrative decisions require human involvement.

The theoretical contribution lies in integrating five implementation dimensions within the Smart Government and Trust & Risk perspectives, demonstrating that successful chatbot implementation depends not only on technology but also on governance, human-resource

capability, user trust and perceived risk, and regulatory adaptation. The findings further establish human-AI collaboration as a central feature of the implementation model: the chatbot handles routine inquiries, while human officers intervene in cases beyond its functional capacity, allowing automation to improve efficiency and accessibility while retaining human accountability. Overall, AI-based chatbot implementation in immigration services constitutes a socio-technical and governance process, whose contribution to Smart Government depends on the alignment of technological readiness, organizational governance, human capability, user trust, and regulatory adaptation.

CONCLUSION

The study concludes that the implementation of the AI-based immigration chatbot at the Directorate General of Immigration has supported Smart Government by transforming the chatbot from an information medium into a digital service component. Implemented through official immigration and e-Visa channels, the chatbot provides immigration information, receives public complaints, supports procedural guidance, and connects users with officers through escalation mechanisms. Its integrated architecture enables fast, consistent, and continuously available services while retaining human intervention for complex cases.

The study further concludes that chatbot implementation is shaped by interconnected technology, organization and governance, human resources, users, and the external environment. Successful implementation therefore depends not only on technological readiness but also on organizational integration, human competence, knowledge management, user trust, perceived risk, and adaptation to regulatory and service changes. The chatbot contributes to service efficiency, effectiveness, accessibility, and user satisfaction, particularly by handling routine inquiries and reducing repetitive workload, however, complex cases requiring verification, regulatory interpretation, or administrative decisions remain dependent on human officers.

The principal contribution of the study is the development of a conceptual model integrating five key factor groups with the Smart Government and Trust & Risk in E-Government Adoption perspectives. The findings position chatbot implementation as a socio-technical process in which AI and human competencies operate collaboratively rather than through the replacement of human service. This model contributes to the understanding of AI-based public-service implementation and provides a conceptual reference for developing government chatbots, particularly in services characterized by complexity, sensitivity, and the need to balance automation, accountability, and human involvement.

REFERENCES

- Androutsopoulou, A., & Karacapilidis, N. (2019). Transforming the communication between citizens and government through AI-guided chatbots. *Government Information Quarterly*, 36(2), 358–367. <https://doi.org/10.1016/j.giq.2018.10.001>
- Bélanger, F., & Carter, L. (2008). Trust and risk in e-government adoption. *The Journal of Strategic Information Systems*, 17(2), 165–176. <https://doi.org/10.1016/j.jsis.2007.12.002>
- Bircan, T., & Korkmaz, E. E. (2021). Big data for whose sake? Governing migration through artificial intelligence. *Humanities and Social Sciences Communications*, 8, 241. <https://doi.org/10.1057/s41599-021-00910-x>
- Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Chen Gascó-Hernandez M., T., & Esteve, M. (2024). The adoption and implementation of artificial intelligence chatbots in public organizations: Evidence from U.S. *State*

- Governments. *The American Review of Public Administration*, 54(3), 255–270. <https://doi.org/10.1177/02750740231200522>
- Cortés-Cediel Segura-Tinoco A. Cantador I., M. E., & Rodríguez-Bolívar, M. P. (2023). Trends and challenges of e-government chatbots: Advances in exploring open government data and citizen participation content. *Government Information Quarterly*, 40(4), 101877. <https://doi.org/10.1016/j.giq.2023.101877>
- Dechamps, M., & al., et. (2025). Citizen-centricity in digital government. *Government Information Quarterly*.
- Eom, S. J., & Lee, J.-W. (2022). Digital government transformation and citizen-centered services. *Government Information Quarterly*.
- Horvath, A., & al., et. (2023). Artificial intelligence acceptance in public services. *Government Information Quarterly*.
- Ju, J., & al., et. (2023). Citizen preferences for government chatbots. *Government Information Quarterly*.
- Lincoln, Y. S., & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. In *Naturalistic Evaluation* (pp. 73–84). <https://doi.org/10.1002/ev.1427>
- Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods*, 1(2), 13–22. <https://doi.org/10.1177/160940690200100202>
- Murni Gea, M. R., Rahawarin, M. A., & Y, I. (2023). Analisis Inovasi Pelayanan Publik Berbasis Digital Di Dinas Komunikasi Dan Informatika Di Maluku. *Professional: Jurnal Komunikasi Dan Administrasi Publik*, 10(1), 121–126. <https://doi.org/10.37676/professional.v10i1.3732>
- Parent, M., & Smyth, R. (2005). Citizen adoption of e-government: A literature review. *Information Systems Journal*, 15(1), 1–25.
- Pham, L., & Limbu, Y. B. (2023). E-government service quality, perceived value, satisfaction, and loyalty: Evidence from a newly emerging country. *Journal of Public Policy*, 43(4). <https://doi.org/10.1017/S0143814X23000296>
- Pimentel Bernardo M. R., L., & Rocha, T. (2025). *The implementation of public chatbots to raise awareness of computer crime*. *International Journal of Human–Computer Interaction*, 1–23. <https://doi.org/10.1080/10447318.2025.2508302>
- Poyares, M. (2025). Migrant data extractivism: Tech and borders at the limit of rights. *International Migration*, 63(4), e70065. <https://doi.org/10.1111/imig.70065>
- Qader, N. N., & Kheder, M. Q. (2016). Challenges and factors affecting the implementation of e-government in Iraq. *Journal of University of Human Development*, 2(3), 476–481. <https://doi.org/10.21928/juhd.v2n3y2016.pp476-481>
- Sinaga, E., Suwitri, S., & Mustam, M. (2014). Implementasi Instruksi Presiden No. 3 Tahun 2003 tentang Kebijakan dan Strategi Nasional Pengembangan Electronic Government di Kabupaten Semarang. *Journal of Management and Public Policy*, 3(4), 202–210. <https://doi.org/10.14710/jppmr.v3i4.6568>
- Sundberg, L., & Holmström, J. (2024). Citizen-centric digital government transformation. *Government Information Quarterly*.
- Wang Chen Y.-C. Chien S.-Y., Y.-F., & Wang, P.-J. (2024). Citizens' trust in AI-enabled government systems. *Information Polity*, 29(3), 293–312. <https://doi.org/10.3233/IP-230065>
- Welch, E. W., Hinnant, C. C., & Moon, M. J. (2005). Linking citizen satisfaction with e-government and trust in government. *Journal of Public Administration Research and Theory*, 15(3). <https://doi.org/10.1093/jopart/mui021>

- Yaya, R., & Sukardi, S. (2025). Pengaruh Implementasi E-Government dan Partisipasi Masyarakat Terhadap Kinerja Pemerintah Desa dengan Good Government Governance sebagai Variabel Pemoderasi. *Balance: Jurnal Akuntansi Dan Bisnis*, 10(1), 69–81. <https://doi.org/10.32502/balance.v10i1.600>
- Yun Yun S., L., & Xue, H. (2024). Improving citizen-government interactions with generative AI: Novel human-computer interaction strategies for policy comprehension. *PLOS ONE*, 19(12), e0311410. <https://doi.org/10.1371/journal.pone.0311410>
- Zuiderwijk, A., & Chen, Y.-C. (2021). Implications of the use of artificial intelligence in public governance. *Government Information Quarterly*.