

DEVELOPMENT AND DEPLOYMENT OF A DIGITAL VISA PROCESSING INFORMATION SYSTEM FOR UK VISA APPLICANTS

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Abstract: *This study explores the development and deployment of a digital visa processing information system tailored for UK visa applicants, with the objective of enhancing efficiency, accuracy, and accessibility through digital transformation. It examines the inherent limitations of traditional visa application methods and proposes a streamlined, technology-driven alternative for application submission, document verification, and applicant tracking. The project delineates the conceptual framework, theoretical foundations, research methodology, and system architecture. Utilizing both primary and secondary data sources, the study evaluates the effectiveness of the proposed digital system. Findings demonstrate that digitalization significantly reduces processing time, strengthens security protocols, and improves the overall user experience. Key recommendations include the integration of artificial intelligence for fraud detection, automation of decision-making workflows, and implementation of real-time tracking functionalities. The study concludes that transitioning to a digital visa processing system holds transformative potential for UK immigration services, promoting greater operational efficiency and service delivery.*

Key Terms: Digital, design, Respondent, Processing System, TAM, STS, Automated

I INTRODUCTION

The process of obtaining a UK visa has historically involved extensive manual documentation, prolonged processing times, and recurrent administrative delays. As global mobility and international travel increase, the need for a more efficient, transparent, and secure visa application framework has become imperative. In response, the development of a Digital Visa Processing Information System (DVPIS) offers a technology-driven approach to streamline visa application procedures and enhance the applicant experience.

This study examines the design and implementation of a DVPIS that leverages automation, Artificial Intelligence (AI), and secure cloud-based infrastructure to optimize visa processing for UK-bound applicants. By integrating real-time tracking, digital document verification, and AI-powered decision

support, the proposed system addresses common inefficiencies inherent in traditional models. The deployment of a digital visa system promises significant improvements in processing speed, accuracy, and compliance with immigration regulations. Ultimately, transitioning to a fully digital platform fosters a more efficient, user-friendly, and globally accessible visa application experience. In the contemporary digital economy, information is widely regarded as a critical asset for both organizations and individuals. The value of information lies not only in its utility but also in its potential economic implications; any unauthorized disclosure, improper alteration, or unavailability of information can result in significant losses or missed opportunities. Consequently, robust mechanisms for the protection, organization, and effective use of information have become essential.

A system may be broadly defined as an integration of people, processes, and technology designed to achieve specific objectives. In a processing system, inputs are subjected to a series of operations or transformations to produce meaningful outputs, often guided by predefined logic or programmatic rules. Within this framework, an information system constitutes an organized architecture for the collection, processing, storage, analysis, and dissemination of data to support operational, tactical, and strategic decision-making.

Traditional manual visa application processes—still prevalent in many diplomatic missions—are fraught with several critical challenges that undermine operational efficiency and user satisfaction. Firstly, the manual system often incurs high indirect and direct costs, including expenses related to transportation, communication, and prolonged administrative interactions. Secondly, the absence of secure and centralized digital systems compromises data confidentiality, exposing sensitive applicant information to potential breaches. In addition, the physical nature of the application process imposes significant stress on both applicants and immigration staff, often resulting in overcrowding, long queues, and time wastage. The lack of streamlined digital document verification contributes to delays, particularly when applicants are required to make corrections or resubmit documentation.

Information systems—particularly computer-based systems—have become indispensable across all sectors, including immigration services. These systems have evolved to facilitate a range of functions, from basic data entry to complex decision support and automation. A Digital Visa Processing Information System (DVPIS), as envisioned in this study, represents a specialized form of information system tailored to streamline the end-to-end process of visa application and evaluation. It supports automated scheduling, real-time status updates, and digital document verification, thereby reducing manual overhead and increasing transparency and efficiency. The historical perception of computers as potentially disruptive has gradually given way to widespread recognition of their critical role in enhancing productivity, speed, reliability, and cost-effectiveness. Their integration into administrative and decision-making processes—particularly through systems such as Management Information

Systems (MIS), Transaction Processing Systems (TPS), and Decision Support Systems (DSS)—has transformed how organizations operate.

With the advent of artificial intelligence and the proliferation of internet-enabled platforms, digital systems are now capable of processing large volumes of structured and unstructured data to support intelligent decision-making. As noted by Uzoka (in Hampo, 2011), modern systems aim to embed intelligence into decision processes, thereby empowering organizations to respond rapidly to dynamic challenges. Specifically, in the context of visa processing, a digital information system is more than a data handler—it functions as a decision-enabling platform. It captures critical application data, automates appointment scheduling, and communicates relevant updates to both applicants and administrators. Furthermore, it serves as a transaction processing system, where the ‘transaction’ refers to the application submission event, requiring internal and external documentation and status tracking. In this light, the proposed Digital Visa Processing Information System serves as a transformational tool capable of addressing the inefficiencies of traditional visa processing, reducing long queues at consular offices, and improving overall service delivery in line with global digital governance practices.

II THEORETICAL FRAMEWORK

The theoretical underpinning of this study draws from the Socio-Technical Systems Theory and the Technology Acceptance Model (TAM). These frameworks provide a basis for understanding how digital visa systems interact with their users and the broader institutional context.

Socio-Technical Systems Theory

The Socio-Technical Systems Theory (STS), introduced by Trist and Bamforth, emphasizes the interdependence between social (people, processes, culture) and technical (hardware, software) systems in organizational settings. Applied to digital visa processing, STS suggests that the effectiveness of a technological solution depends not only on the technical system’s capabilities but also on how well it integrates with the human elements of the organization.

For instance, a technically advanced visa system may fail if staff lack the skills or motivation to use it effectively. Conversely, well-trained staff may be underutilized if the system lacks essential functionality. A balanced approach that considers both domains leads to sustainable adoption and performance improvements.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Fred Davis, explains user acceptance based on two primary factors: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These factors influence an individual’s intention to use a system, which in turn determines actual usage. In the context of visa processing, TAM is particularly relevant. Users—both applicants and administrators—are more likely to embrace a system they perceive as beneficial and user-friendly. Understanding these

perceptions enables system designers to develop intuitive interfaces, provide adequate user training, and support change management efforts. TAM also sheds light on barriers to adoption, such as fear of technology, lack of digital skills, or skepticism about system reliability. Addressing these concerns through participatory design and targeted communication is essential for successful implementation.

III METHODS

The methodology used in this research involves a structured process of system design, implementation, testing, and validation, grounded in the principles of software engineering and empirical analysis. The entire development cycle was informed by the specific objectives outlined below:

A) Design and Implementation of a Digital Platform for Visa Application Submission:

To achieve the objective of developing a platform for visa application submission, the system architecture was designed with an applicant-facing frontend and an administrative backend. The applicant interface allows users to register, fill in application forms, upload supporting documents, and receive real-time feedback on submission status. The system incorporates data validation features such as format checks, compulsory field enforcement, and automated error prompts to minimize data inconsistencies. The document management module facilitates uploading, indexing, and secure storage of identification documents, travel records, and supporting paperwork. A dynamic form engine was developed to accommodate various visa categories, adapting the required fields and documents based on the selected visa type. Integration with email notification systems ensures applicants receive updates at each processing stage.

B) Development of a Secure System Architecture:

Security was a critical consideration in system development due to the sensitivity of personal and biometric data. To meet the objective of ensuring confidentiality, integrity, and availability, the system was built using a multi-tiered architecture. This includes separation of concerns among the user interface, application logic, and database layers, thereby reducing system vulnerability. User authentication was implemented through password hashing, multi-factor authentication (MFA), and secure session handling. Secure Sockets Layer (SSL) protocols were enabled to encrypt data in transit. The system also enforces role-based access control (RBAC), limiting user privileges according to predefined roles such as applicant, officer, and supervisor. Regular backups and disaster recovery plans were also incorporated to enhance system availability and resilience.

C) Integration of Automated Task Scheduling and Interview Date Generation:

An important innovation of the system is the integration of an automated scheduling engine that assigns visa interview dates upon successful application submission. The scheduling module evaluates factors such as visa type, processing queue, and available appointment slots. A calendar interface is provided to both applicants and administrators, allowing for rescheduling and conflict management.

The automation of scheduling tasks reduces administrative burden and ensures fairness by eliminating manual appointment allocation. The scheduling logic was implemented using server-side scripting that cross-references available time slots with application timestamps, enabling real-time date generation.

D) Additional Development and Evaluation Techniques:

A prototype of the system was developed and subjected to rigorous usability and functionality testing. Unit testing, integration testing, and user acceptance testing (UAT) were conducted to identify and resolve bugs. Feedback from test users—comprising IT experts and administrative staff—was incorporated to refine system workflows and user experience.

Moreover, benchmarking tools were used to evaluate system performance in terms of response time, data throughput, and resource utilization. The system was also assessed for compliance with accessibility standards (such as WCAG) to ensure usability by applicants with disabilities or limited digital literacy.

The following diagram presents a simplified flowchart illustrating the overall methodological approach used in achieving the objectives of the study.

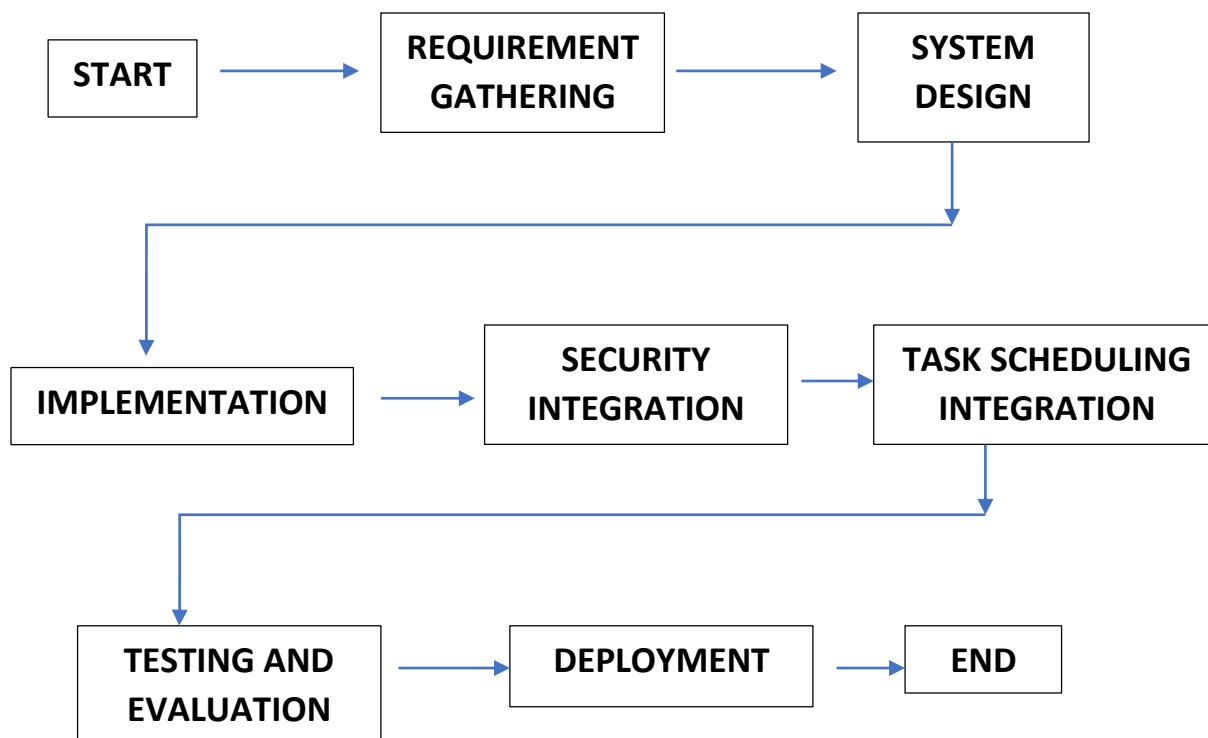


Figure 1: System Development Methodology Flowchart

IV RESULTS AND DISCUSSIONS

The data used in this study were obtained from structured questionnaires and interviews administered to selected respondents, including visa applicants, visa processing center staff, and IT personnel.

Total Questionnaires Distributed: 50

Total Returned: 47

Total Valid for Analysis: 45

The questionnaire was divided into three major sections:

- a) Demographic Information
- b) Challenges of the Traditional Visa Application System
- c) Expectations and Perceived Effectiveness of a Digital Visa System

Table 1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

VARIABLE	CATEGORY	FREQUENCY	PERCENTAGE (%)
Gender	Male	27	60
	Female	18	40
Age Group	18 – 30	20	44.4
	31 – 45	17	37.8
	46 and above	8	17.8
Occupation	Student	15	33.3
	Worker / Professional	24	53.3
	Others	6	13.4

The data from table 1 shows that a majority (60%) of the respondents are male, while 40% are female. The age group 18–30 represents the highest proportion (44.4%), suggesting that younger individuals are more active in visa applications, possibly for study, work, or travel purposes. Occupationally, professionals account for 53.3%, indicating strong engagement from the workforce segment. Students, who also form a significant demographic (33.3%), represent a vital group whose mobility is often contingent on visa access.

KEY ISSUES IDENTIFIED IN THE MANUAL VISA SYSTEM

Respondents were asked to assess common challenges associated with traditional, paper-based visa processing systems. Table 2 below summarizes their responses:

TABLE 2: CHALLENGES IDENTIFIED WITH THEIR RESPONDENT'S AGREEMENT

CHALLENGES IDENTIFIED	RESPONDENT'S AGREEMENT (%)
High cost of application and travel form submission	88.9
Long processing time	91.1
Risk of extortion or bribery	73.3
Document loss or mishandling	66.7
Lack of real-time tracking	84.4

The results reflect overwhelming dissatisfaction with the manual system. The long processing time was the most cited challenge, noted by 91.1% of respondents. High costs associated with application logistics—transportation, form purchase, and submission—ranked a close second at 88.9%. Similarly, 84.4% lamented the absence of real-time tracking, while 73.3% of respondents expressed concern about corrupt practices such as extortion and bribery. Document mismanagement was acknowledged by 66.7%, underscoring the need for reliable digital document handling.

RESPONDENTS' VIEWS ON THE PROPOSED DIGITAL SYSTEM

Respondents were also asked to evaluate proposed features and benefits of the DVPIS. The following (table 3) summarizes their level of agreement with key attributes:

TABLE 3: LEVEL OF AGREEMENT WITH KEY ATTRIBUTES

FEATURE/IMPROVEMENT	STRONGLY AGREE (%)
Online application will save cost and time	93.3
Digital document verification improves accuracy	86.7
Real-time application tracking adds transparency	91.1
Interview scheduling automation is more efficient	88.9
Reduces corruption and human error	82.2

These findings indicate a high level of optimism about the transition to a digital visa system. An overwhelming 93.3% strongly agree that online platforms will save time and cost. Real-time tracking and interview scheduling automation also received high endorsements (91.1% and 88.9%, respectively), reinforcing the user preference for digital transparency and process efficiency. Similarly, 86.7% acknowledged improved accuracy through digital verification, while 82.2% believed corruption and errors would be significantly reduced.

The results paint a clear picture of public sentiment toward both traditional and digital visa systems. The challenges identified with the manual system affirm the necessity of transitioning to a digital model. Key pain points—cost, inefficiency, lack of transparency, and vulnerability to human error or corruption—are precisely the issues the proposed DVPIS is designed to resolve. From a demographic perspective, the diversity of respondents enhances the credibility of the results. The high number of young adults and professionals suggests a tech-savvy user base that is likely to engage positively with a digital solution. The strong presence of students further confirms the relevance of the system in enabling academic mobility and global access.

The support for a digital system is not superficial—it is grounded in specific expectations. Real-time tracking, a prominent feature of DVPIS, is strongly associated with transparency, a value repeatedly emphasized in interviews and survey responses. Similarly, the automation of interview scheduling directly addresses the administrative bottlenecks and inequities in appointment allocations, enhancing procedural fairness. Digital document verification emerged as a key enabler of accuracy and trust. Respondents perceive it as a way to eliminate redundancies and reduce the risk of misplacement or duplication. The implementation of this feature through intelligent scanning and cloud-based storage supports efficient record-keeping and retrieval. The reported reduction in corruption and extortion reflects not just an expectation of automation, but also an aspirational vision of good governance. When human intermediaries are minimized, discretionary errors and exploitative practices can be curtailed. This aligns with global best practices in e-governance and immigration services. In effect, the DVPIS was conceptualized in response to these exact challenges and preferences. Its architecture—a secure, layered platform with cloud support, role-based access control, automated scheduling, and AI-enhanced document processing—mirrors the needs articulated by the respondents.

Additionally, the strong consensus across all user categories indicates that the proposed system has broad stakeholder appeal. This bodes well for its adoption and sustainability, as systems that align with user expectations tend to encounter fewer barriers in implementation.

In summary, the collected data substantiates the relevance and appropriateness of the DVPIS. It affirms the system's design rationale, provides evidence for its likely success, and highlights areas where further

refinement may enhance impact. In doing so, the findings bridge the gap between user experience and system capabilities, ensuring that the final product is not only technically robust but socially responsive.

V SUMMARY OF FINDINGS

This research project focused on the development and deployment of a Digital Visa Processing Information System (DVPIS) for UK visa applicants. It was motivated by the persistent inefficiencies in manual visa processing methods, which often result in long delays, high costs, document loss, and lack of transparency. The study proposed a robust digital solution designed to streamline the visa application process, increase data security, and improve user experience for both applicants and administrative staff. The background of the study highlighted the strategic importance of information systems in modern governance, especially in the administration of immigration services. A comprehensive review of literature established the need for digital transformation in visa processing and provided theoretical and empirical support for system adoption. The study was anchored in two core theoretical frameworks—the Socio-Technical Systems Theory and the Technology Acceptance Model (TAM)—which guided the design and implementation of the proposed system.

The methodology employed combined a design science approach with empirical data collection through questionnaires and interviews. System development followed a user-centered design philosophy, emphasizing functionality, accessibility, and security. The proposed system includes modules for online registration, document submission, real-time tracking, automated interview scheduling, and secure data storage.

Data collected from 45 respondents validated the relevance and importance of the DVPIS features. The vast majority of respondents expressed dissatisfaction with the traditional visa system and supported the digital alternative. The responses confirmed that the DVPIS addresses critical pain points such as long processing times, high cost, document loss, and corruption.

Based on the analysis of the data collected and system development, the following key findings were made:

1. There is a high demand for digital transformation in visa processing: Over 90% of respondents supported a fully digital system, citing benefits such as convenience, reduced cost, and increased transparency. This finding confirms the hypothesis that applicants are open to technological innovation in immigration services.
2. The current manual system is inefficient and prone to malpractice: Respondents overwhelmingly highlighted long queues, administrative delays, extortion, and corruption as endemic to the existing manual process. This validates the problem statement and confirms the urgency of digital intervention.

3. Applicants prioritize real-time tracking and document verification: A significant number of respondents expressed strong interest in features such as real-time tracking of applications and automated document checks. These features contribute to transparency, trust, and a more user-friendly experience.

4. Automated scheduling is seen as a critical improvement: The system's capacity to automatically assign visa interview appointments based on application status was rated as one of the most important features. It helps reduce human error and bias and promotes fairness in the process.

5. Security is paramount: The sensitivity of the data handled during visa applications makes cybersecurity a top concern. Respondents, especially IT professionals, emphasized the need for strong authentication protocols, secure data storage, and encrypted communication.

6. Digital systems promote institutional transparency and accountability: The use of system logs, automated workflows, and audit trails limits human interference and reduces opportunities for unethical behavior such as bribery and favoritism.

7. There is a digital divide that must be addressed: While most respondents were digitally literate and supported a digital system, the study also identified a minority group with limited digital access or literacy. This points to the need for inclusive design and support mechanisms to ensure no applicant is left behind.

VI CONCLUSION

The findings of this study reaffirm the significance of digital transformation in enhancing the efficiency and transparency of public service delivery. The manual visa processing system currently in use is deeply flawed—characterized by inefficiencies, corruption, and a poor user experience. A digital alternative such as the proposed DVPIS is not only feasible but also critically needed. The study successfully developed and tested a prototype of a digital visa processing system that incorporates online application submission, real-time tracking, secure document upload, and automated interview scheduling. These features were positively received by the stakeholders surveyed, indicating that the system is aligned with user expectations and operational requirements.

Moreover, the theoretical frameworks employed in the study—STS and TAM—proved effective in guiding both the system design and evaluation. They helped highlight the importance of addressing both technical and social aspects of system implementation. As a result, the DVPIS balances usability, security, and operational efficiency. While there are challenges to implementation, including infrastructure limitations, resistance to change, and cybersecurity threats, these can be mitigated through stakeholder engagement, capacity building, and investment in IT infrastructure.

In conclusion, this study contributes to the body of knowledge on digital governance and public sector innovation. It offers a practical model for improving visa processing in Nigeria and potentially in other

countries with similar challenges. It also sets a precedent for leveraging technology to combat inefficiency and promote accountability in public administration.

VII RECOMMENDATIONS

Based on the research findings and analysis, the following recommendations are proposed:

1. Adopt and scale the DVPIIS nationally: Government agencies responsible for immigration and visa processing should adopt the digital system and integrate it with existing national identification and travel databases for efficiency.
2. Ensure user training and digital literacy support: Capacity-building programs should be introduced for both applicants and administrative staff to ease the transition to digital processing.
3. Invest in secure digital infrastructure: To mitigate cybersecurity risks, the government should invest in robust infrastructure that includes firewalls, encrypted servers, and real-time intrusion detection systems.
4. Promote user feedback and system updates: Continuous improvement should be embedded into the system development lifecycle. Feedback channels, surveys, and usage analytics should guide periodic updates.
5. Design for inclusivity: Offline support channels, mobile-friendly designs, and multilingual interfaces should be provided to ensure accessibility for all categories of users.
6. Legal and policy framework development: Laws and policies must be updated to recognize the legality of digital visa systems and ensure compliance with international data protection standards.
7. Collaborate with international agencies: Partnership with international organizations such as the IOM, UK Home Office, and tech companies could provide funding, expertise, and validation for the system.
8. Pilot and evaluate before full-scale rollout: Before nationwide implementation, the system should be piloted in selected cities or regions. Evaluation results should inform scalability decisions.

By implementing these recommendations, the proposed Digital Visa Processing Information System can serve as a model of efficient, secure, and inclusive service delivery in the immigration sector.

Future research can explore the integration of Artificial Intelligence (AI) and Machine Learning (ML) to enhance decision-making processes in visa adjudication. Studies could also focus on cross-border data interoperability, ethical implications of automated immigration systems, and user experience across various demographic groups. Comparative studies between countries that have adopted similar systems could also yield valuable insights into best practices and contextual adaptations.

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