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USABILITY CHALLENGES OF ICP MOBILE PASSPORT AND E-GATE APPLICATIONS AMONG INTERNATIONAL TRAVELERS IN THE UAE

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ABSTRACT

This study examines usability challenges in ICP mobile passport and e gate systems in the United Arab Emirates. The research focuses on how international travelers interact with digital immigration services. It analyzes system performance and user experience during registration and authentication and biometric verification. The study also evaluates how digital literacy and language barriers affect task completion. The research adopts a mixed methods approach. Quantitative data are collected through surveys with international travelers. Qualitative data are obtained through interviews and usability testing. This approach allows analysis of both measurable trends and user perceptions (Creswell and Plano Clark, 2018). The study uses Nielsen usability model to assess learnability and efficiency and error rate and satisfaction (Nielsen, 2020). It also applies OECD digital government principles to evaluate accessibility and service design (OECD, 2021). Cognitive load theory explains how system complexity affects user performance under time pressure. Findings show recurring biometric mismatch cases and registration difficulties. Network delay and interface response issues affect system flow. Language limitations reduce clarity of instructions. Navigation complexity increases task time for first time users. Authentication failures lead to repeated attempts and increase processing time. These issues increase reliance on manual immigration counters and reduce automation benefits (ICP, 2024). The study proposes practical recommendations to improve usability. These include simplified interface design and clear step by step guidance and expanded multilingual support. Improved system feedback and better integration between platforms are also required. Staff training and real time monitoring support faster issue resolution. The study concludes that usability plays a critical role in digital immigration performance. Improving system design and accessibility enhances efficiency and user satisfaction. Effective implementation supports secure and reliable border management in the UAE (OECD, 2021; Nielsen, 2020)..

KEYWORDS: Usability Challenges, ICP Mobile Passport, E-Gate Applications, International Travelers.

1. INTRODUCTION

The United Arab Emirates has implemented digital systems to manage border control procedures. The Federal Authority for Identity Citizenship Customs and Port Security oversees these systems. The ICP smart application and mobile passport service are central components. These services connect with UAE Pass for digital identity verification. The main objective is to reduce processing time and improve operational efficiency. Digital government strategies focus on service quality and accessibility in public services (OECD, 2021).

International airports in the UAE handle large numbers of travelers each year. Border control operations must maintain both security and speed. Digital gates automate identity verification through biometric recognition. Automation reduces reliance on manual inspection. However automation depends on correct user interaction. If travelers experience difficulty delays occur. Usability plays a direct role in system performance. Usability refers to the degree to which users can learn and operate a system effectively (Nielsen, 2020).

Travelers differ in digital literacy and language skills. Some are familiar with digital identity systems. Others have limited experience with mobile authentication. Border processing often occurs after long travel hours. Fatigue affects concentration. These factors influence system interaction.

ICP promotes fast track services to accelerate entry procedures (ICP, 2024). Media coverage reports reduced waiting time when digital systems function properly (Gulf News, 2025). Authorities also warn travelers against fraudulent visa advertisements which cause confusion (Economic Times, 2025). These developments show that clarity and reliability are essential.

This research analyzes usability challenges in ICP mobile passport and e gate applications. The focus is on international travelers in the UAE. The study examines user interaction and technical performance. It proposes evidence based improvements.

1.1. Problem Statement

The United Arab Emirates has implemented advanced digital immigration systems, including the ICP Smart Application, UAE Pass, and automated e-gates, to enhance border control efficiency and reduce processing time at entry points. These systems are designed to provide secure, fast, and paperless immigration services for international travelers.

However, despite significant technological investment, many travelers continue to experience usability challenges when interacting with these digital platforms. Common issues include difficulties in account registration, delays in verification codes, biometric recognition failures, unclear interface navigation, and limited multilingual support. These challenges often result in repeated attempts, system abandonment, or fallback to manual immigration counters, which reduces the effectiveness of automation.

The core problem is the mismatch between system design complexity and the diverse digital capabilities of international users. Travelers vary widely in digital literacy, language proficiency, and familiarity with biometric authentication systems. In high-pressure environments such as airports, these limitations are amplified, leading to delays, user frustration, and reduced trust in digital immigration services.

As a result, the intended benefits of efficiency, security, and seamless travel experience are not fully achieved. This study therefore investigates the usability challenges of ICP mobile passport and e-gate systems and examines how these issues impact user performance, system efficiency, and overall adoption.

1.2. Research Questions

This study is guided by the following research questions:

1. What are the main usability challenges faced by international travelers when using ICP Smart Application and e-gate systems in the UAE?
2. How do digital literacy levels and user familiarity with mobile identity systems affect the efficiency of immigration processing?
3. What role do interface design, language accessibility, and biometric systems play in influencing user experience and system performance?
4. How do usability issues impact traveler trust, adoption rates, and reliance on manual immigration procedures?
5. What improvements can be implemented to enhance the usability, accessibility, and efficiency of ICP digital immigration systems?

1.3. Research Importance

1.3.1. Operational Efficiency

Digital immigration systems affect airport operations. When digital gates function effectively queues decrease. When failures occur travelers move to manual counters. Manual processing increases

waiting time. Efficiency is a central objective of digital government programs (OECD, 2021).

Automation reduces staffing pressure when functioning properly. High error rates require staff intervention. Each intervention increases processing duration. Usability therefore influences resource allocation.

1.3.2. User Adoption and Accessibility

Adoption of digital services depends on simplicity. If applications are complex travelers avoid them. Low adoption reduces system effectiveness. Nielsen explains that systems must align with user expectations and minimize cognitive effort (Nielsen, 2020).

Accessibility includes language availability and interface clarity. Travelers come from diverse regions. Inclusive design increases adoption rates. Digital government frameworks emphasize inclusive service delivery (OECD, 2021).

1.3.3. Security and Trust

Security requirements introduce additional steps in authentication. Multi factor verification improves identity protection. However additional steps increase task complexity. Complex systems increase the risk of user error.

Public trust depends on consistent performance. Reports of fake fast track platforms indicate confusion among travelers (Economic Times, 2025). Clear official communication strengthens trust. Effective design supports both security and clarity.

1.4. Research Problem

1.4.1. Technical Challenges

Despite infrastructure investment travelers report difficulties with ICP digital systems. Common issues include registration errors and biometric mismatch and unclear system feedback (ICP, 2024). These problems result in manual processing.

Biometric verification relies on facial recognition accuracy. Lighting conditions influence camera performance. Facial accessories affect recognition. When recognition fails travelers repeat scanning. Repetition increases delay.

Authentication codes require stable network connectivity. Delayed messages interrupt login procedures. Password recovery steps are sometimes unclear. These factors reduce efficiency.

1.4.2. User Experience Barriers

Language limitations restrict comprehension for some travelers. Not all users are fluent in Arabic or English. Limited language options reduce clarity. Nielsen states that systems must provide immediate and understandable feedback (Nielsen, 2020).

Travelers with limited digital literacy require more time to complete tasks. First time users experience higher error rates. Confusion about official digital channels is evident in reports of fraudulent visa services (Economic Times, 2025).

The core problem is the mismatch between system complexity and user capability. This mismatch affects performance and user satisfaction.

1.5. Research Objectives

The study has three objectives.

- Identify common usability challenges in ICP mobile passport and e gate applications.
- Examine the relationship between digital literacy and immigration processing efficiency.
- Propose practical improvements to enhance usability and accessibility.

Each objective addresses a component of the research problem. The objectives align with usability engineering principles (Nielsen, 2020).

1.6. Research Questions

1. What usability challenges do travelers face when using ICP mobile passport and e gate applications.
2. How does unfamiliarity with digital identity tools affect immigration processing efficiency.
3. What improvements can enhance usability and accessibility of ICP digital border systems.

Literature Review

This section reviews key concepts related to digital government, usability engineering, and research methods. It provides a theoretical base for analyzing ICP mobile passport and e gate systems in the UAE. The review focuses on service design, user interaction, and system evaluation.

1.5. Digital Government Principles

Digital government focuses on improving public service delivery through technology. It aims to provide services that are accessible, efficient, and transparent. Governments adopt digital platforms to reduce processing time and improve user satisfaction. The OECD explains that digital services must be designed around user needs and service accessibility (OECD, 2021).

User centered design is a core principle in digital government. This approach requires systems to match user expectations and abilities. Services must be simple to access and easy to understand. Clear instructions and consistent structure support effective use. When systems follow user centered

design users complete tasks with fewer errors.

Transparency is another key element. Users should understand how systems work and what steps are required. Clear feedback during each stage improves trust. If users know what is happening they are less likely to repeat actions. Transparency also supports accountability in public services.

Accessibility ensures that all users can interact with digital platforms. This includes support for different languages and varying levels of digital literacy. OECD highlights that inclusive design improves adoption and service reach (OECD, 2021). Systems that do not consider accessibility exclude some users.

Continuous evaluation is necessary for system improvement. Digital services must be tested and updated based on user feedback. Monitoring performance indicators such as error rates and processing time helps identify system weaknesses. Regular updates ensure that systems remain effective over time.

1.6. Usability Engineering Framework

Usability engineering provides a structured approach to evaluate system performance. Nielsen defines usability through key attributes including learnability and efficiency and error rate and satisfaction (Nielsen, 2020). These attributes measure how users interact with a system.

Learnability refers to how quickly a new user can complete tasks. Systems with high learnability require minimal training. Clear instructions and simple navigation improve this aspect. First time users depend on intuitive design to complete tasks without assistance.

Efficiency measures how fast users perform tasks after learning the system. Efficient systems reduce unnecessary steps. They allow users to complete tasks quickly without confusion. Efficiency is critical in environments such as airports where time is limited.

Error rate measures how often users make mistakes. High error rates indicate poor design or unclear instructions. Systems should prevent errors where possible. When errors occur the system should provide clear guidance for correction. Nielsen emphasizes that error prevention and recovery are essential for usability (Nielsen, 2020).

Satisfaction reflects user perception of the system. Users prefer systems that are simple and predictable. Positive experience increases trust and encourages repeated use. Negative experience reduces adoption.

Security is closely linked to usability. Digital systems require authentication to protect user data. Multi factor authentication increases security but adds steps. Each step increases complexity. OECD explains that public services must balance security with ease of use (OECD, 2021). If systems are too complex users struggle to complete tasks.

In digital immigration systems security is critical. Identity verification must be accurate. At the same time users must complete steps quickly. This balance defines system success.

1.7. Mixed Methods Research Approach

Mixed methods research combines quantitative and qualitative data. This approach provides a comprehensive view of system performance. Creswell and Plano Clark explain that combining methods improves research validity (Creswell and Plano Clark, 2018).

Quantitative data measure patterns and trends. Surveys provide numerical data on user experience. For example response scores can show how many users face registration issues. Statistical analysis identifies relationships between variables such as digital literacy and task completion time.

Qualitative data provide detailed explanations. Interviews capture user experiences and perceptions. Users describe specific problems such as unclear instructions or biometric failure. These insights explain why issues occur.

Usability testing adds another layer of analysis. Observing users during task completion shows real time interaction. Researchers record time taken and errors made. This method provides direct evidence of system performance.

Integration of data occurs during interpretation. Quantitative results identify common issues. Qualitative findings explain causes. This combination provides strong evidence for conclusions.

Application to UAE Digital Immigration Systems

Media reports provide context for digital immigration systems in the UAE. Fast track services aim to reduce waiting time at entry points (Gulf News, 2025). These services depend on effective use of mobile applications and e gates.

Reports also warn about fake visa advertisements targeting travelers (Economic Times, 2025). This shows that users may struggle to identify official platforms. Clear communication is necessary to guide users toward correct systems.

The literature shows that usability and communication affect adoption. If systems are simple users adopt them. If systems are complex users avoid them. In the UAE context high traveler volume increases the importance of usability.

Link to Current Study

The reviewed concepts support the research framework. Digital government principles explain the need for accessible services. Usability engineering provides criteria for evaluating system performance. Mixed methods research offers tools for data collection and analysis.

The study applies these concepts to ICP mobile passport and e gate systems. It evaluates how design affects user interaction. It also examines how user characteristics influence performance. The goal is to identify practical improvements based on established theory and real user data (Nielsen, 2020; OECD, 2021; Creswell and Plano Clark, 2018).

Theoretical Framework

This study is based on Nielsen's Usability Model, OECD Digital Government Principles, and Cognitive Load Theory to explain user interaction with ICP mobile passport and e-gate systems. Nielsen's model focuses on learnability, efficiency, error rate, and user satisfaction, which helps evaluate how easily travelers can use the system and complete immigration tasks. The OECD framework emphasizes user-centered, accessible, and inclusive digital government services, highlighting the need to support diverse international travelers. Cognitive Load Theory explains how limited mental capacity, especially in stressful airport environments, can increase user errors when systems are complex or unclear. Together, these theories explain how system design, user ability, and environmental pressure affect usability and overall performance of ICP digital immigration services.

2. RESEARCH METHODOLOGY

2.1. Research Design

The study adopts a mixed methods design (Creswell and Plano Clark, 2018). A sequential explanatory model is applied. Quantitative data collection occurs first. Qualitative interviews follow.

2.1.1. Population and Sample

The population consists of international travelers using ICP digital services at UAE airports. A survey sample of 400 travelers is selected through convenience sampling. Thirty participants volunteer for interviews.

2.1.2. Data Collection Methods

Survey questionnaires measure ease of installation and clarity of instructions and biometric performance. Responses are recorded using a five point scale.

Interviews explore perceptions of complexity and clarity. Each session lasts approximately twenty minutes.

Usability testing observes participants completing tasks including registration and biometric scanning. Completion time and error frequency are recorded.

2.1.3. Data Analysis

Quantitative data are analyzed using descriptive statistics. Mean values identify frequent issues. Correlation analysis measures the relationship between digital literacy and task completion time.

Interview transcripts are coded into themes. Themes include language barriers and authentication delay and unclear feedback. Integration of findings occurs during interpretation (Creswell and Plano Clark, 2018).

2.1.4. Ethical Considerations

Participants provide informed consent. No personal identifiers are stored. Biometric data are not collected by researchers. Data storage complies with confidentiality standards.

Chapter One: Overview of ICP Digital Immigration Systems

This chapter examines the structure, functions, and objectives of ICP mobile passport and e gate services in the UAE.

2.2. ICP Digital Immigration Framework

The Federal Authority for Identity Citizenship Customs and Port Security manages the national digital immigration system. This authority oversees identity services, citizenship affairs, residency permits, and border control operations. Its digital platforms aim to provide secure and efficient immigration processing in line with national digital transformation goals (ICP, 2026).

One central component is the ICP UAE Smart application. This mobile platform provides access to identity and immigration services without visiting service centers. Through the application users can submit requests, track application status, and access document related services. The platform covers passport services, residency permits, identity card services, and family data management (ICP, 2024). The objective is to simplify procedures and reduce in person visits.

The smart application integrates with UAE Pass, which functions as the national digital identity. UAE Pass enables secure login and digital signature for government services. It allows users to verify their identity electronically and access multiple services using one unified account (ICP, 2024). This

integration forms the foundation of digital immigration processing.

2.2.1. Functions of ICP Mobile Passport Services

The ICP mobile passport service supports digital interaction before arrival at border points. Travelers can pre register their information through the smart application. Linking personal data with UAE Pass allows secure identity verification in advance. This reduces manual data entry at immigration counters.

The mobile passport service relies on biometric authentication. Face recognition is part of the identity confirmation process. Registration for UAE Pass involves downloading the application, scanning the Emirates ID, verifying contact information, and completing face verification. Once verified, users can link their digital identity with ICP services (ICP, 2024).

This integration centralizes user information and reduces duplication errors. Updates made in the digital identity platform synchronize with related immigration services. The system aims to ensure consistent and accurate personal data across border control processes.

2.2.2. E Gate Services and Automated Border Control

E gate services are installed at selected airports and land entry points. These automated gates use biometric facial recognition technology. Travelers approach the gate and follow on screen instructions. The system captures a live facial image and compares it with stored data linked to the digital identity system.

If the system confirms a match the gate opens automatically. If verification fails the traveler is directed to a manual immigration counter for further review. The automated process reduces reliance on manual document inspection when functioning correctly.

E gate efficiency depends on several factors. Accurate facial capture is essential. Lighting conditions and camera alignment influence system accuracy. User cooperation in following instructions also affects success rates. When users fail to position themselves correctly the system may reject the scan.

2.2.3. Objectives of ICP Digital Immigration Systems

The primary objective of ICP digital immigration systems is to improve processing efficiency. Automation reduces waiting time and increases border throughput. This supports national digital government objectives focused on service quality and operational performance (OECD, 2021).

Another objective is to enhance security through reliable digital identity verification. Biometric authentication strengthens identity confirmation before entry approval. Integration with UAE Pass ensures that identity records are consistent across government databases (ICP, 2024).

Accessibility is also an objective. The smart application provides services through mobile devices. Users can access services at any time. This supports remote interaction with immigration services. The reduction of paperwork aligns with national paperless government initiatives.

Cost efficiency is an additional objective. Automation reduces repetitive manual tasks. Digital processing lowers administrative workload. Resources can be allocated to complex cases requiring human judgment.

2.2.4. Integration with National Digital Identity

UAE Pass functions as the unified digital identity for citizens, residents, and visitors. It enables secure authentication for government services. Multi factor authentication includes password verification and biometric confirmation. This strengthens security while maintaining user convenience (ICP, 2024).

Integration between ICP systems and UAE Pass ensures accurate data exchange. When personal information is updated in one system it reflects in connected services. This synchronization reduces data mismatch during immigration checks.

Digital identity integration also supports transparency. Users can access their service history through the application. This visibility improves accountability in public service delivery.

2.3. System Structure and Operational Flow

The structure of the ICP digital immigration system consists of three main components.

- The ICP UAE Smart mobile application.
- The UAE Pass digital identity platform.
- Automated e gate infrastructure at border points.

The operational flow begins with user registration in UAE Pass. The user then accesses ICP services through secure login. Personal data are stored in centralized databases. At the border the e gate retrieves identity information linked to biometric data. The system verifies the traveler and grants entry if validation is successful.

Manual counters remain available for exceptional cases. These include biometric mismatch and incomplete registration. The digital system therefore

operates alongside traditional processing methods.

2.4. Chapter Two: Usability Challenges and User Experience Issues

This chapter analyzes common technical and usability problems encountered by travelers when using ICP mobile passport and e gate applications in the UAE. The analysis focuses on system interaction, user performance, and observed barriers during digital immigration processing. The discussion is supported by usability engineering principles and digital government standards (Nielsen, 2020; OECD, 2021).

2.4.1. Registration and Account Setup Challenges

One frequent issue relates to account registration within the ICP smart application. Travelers must create an account or log in using UAE Pass before accessing services. This process requires identity verification and contact confirmation. Some users report difficulty completing these steps.

Password creation rules are sometimes unclear to first time users. If the password does not meet security criteria the system rejects it. When feedback messages are brief users repeat the same mistake. According to usability engineering principles systems must provide clear error messages and guidance for correction (Nielsen, 2020). Limited explanation increases task time and user frustration.

Verification codes sent by text message or email may be delayed. Travelers who do not receive codes immediately are unable to continue registration. Network connectivity at airports also affects this process. These delays interrupt workflow and reduce perceived reliability of the application.

2.4.2. Biometric Verification Issues

Biometric authentication is central to mobile passport and e gate functionality. Facial recognition confirms identity at entry points. However several factors influence biometric accuracy.

Lighting conditions at e gates affect image capture quality. Bright reflections or shadows reduce recognition accuracy. Travelers wearing glasses or head coverings may experience scanning failure. When the system fails to match the live image with stored data the gate does not open. The traveler is redirected to a manual counter.

Repeated biometric failure increases processing time. It also affects user confidence. Nielsen states that efficient systems should minimize error frequency and support rapid recovery from errors (Nielsen, 2020). In cases of biometric mismatch the recovery process depends on manual staff intervention. This reduces automation benefits.

2.4.3. Interface Clarity and Navigation Problems

Interface design influences task completion. Some travelers report difficulty locating specific services within the application. Menu structures may require multiple steps before reaching the required function. If navigation paths are not intuitive users spend additional time exploring options.

Icons and labels may not be self explanatory for all users. Travelers unfamiliar with digital government applications require more guidance. Clear visual hierarchy and consistent terminology support learnability (Nielsen, 2020). When terminology is technical users may misunderstand instructions.

Feedback messages during application processing are sometimes brief. For example when a document upload fails the system may not specify the reason clearly. Users then attempt repeated uploads without resolving the underlying issue. Clear feedback improves efficiency and reduces repeated errors.

2.4.4. Language and Accessibility Barriers

The UAE hosts travelers from many countries. Language diversity is significant. The ICP application primarily supports Arabic and English. Travelers who are not fluent in these languages face comprehension challenges.

Limited language options reduce accessibility. Users may misunderstand instructions for biometric capture or document submission. According to digital government standards services should be inclusive and accessible to diverse populations (OECD, 2021). Language clarity is a core component of inclusive design.

Accessibility also relates to digital literacy. Some travelers have limited experience with mobile authentication or digital identity systems. They require additional time to complete tasks. First time users often show higher error rates compared with experienced users.

2.4.5. Authentication and Security Complexity

Security requirements introduce multiple authentication steps. Users must log in through UAE Pass and confirm identity using verification codes or biometric confirmation. While these measures strengthen identity protection they increase task complexity.

Multi factor authentication supports secure service delivery but adds cognitive load (OECD, 2021). Travelers under time pressure may overlook instructions. When one step fails the entire process

must restart. This affects efficiency and user satisfaction.

Password recovery procedures present additional challenges. If users forget login credentials they must follow a sequence of recovery steps. Incomplete guidance during this process increases confusion. Clear step by step instructions are necessary to reduce abandonment.

2.4.6. System Reliability and Technical Performance

Technical stability influences user perception. Application crashes or slow loading screens interrupt interaction. Delays during document upload create uncertainty about system status. When users are unsure whether a request was submitted they may repeat the action. Duplicate submissions increase system load.

E gate hardware performance also affects usability. If the scanner is slow to respond travelers hesitate. Lack of visible progress indicators creates uncertainty. Usability guidelines emphasize the importance of system status visibility during processing (Nielsen, 2020).

Technical failures reduce trust in automation. When travelers anticipate failure they choose manual counters even when digital gates are available. This reduces system adoption rates.

2.4.7. Impact on Processing Efficiency

Usability problems directly affect immigration processing time. Registration errors increase preparation time before arrival. Biometric mismatch increases processing time at entry points. Language barriers prolong interaction duration.

When multiple travelers experience difficulty queues form at manual counters. This reduces the intended efficiency gains of digital automation. Digital government strategies emphasize that technology must enhance operational performance and service quality (OECD, 2021).

Efficiency depends on both system design and user capability. If design does not align with user needs the system underperforms. Usability evaluation therefore plays a central role in maintaining operational effectiveness.

2.4.8. User Perception and Trust

User experience influences public trust in digital services. Travelers who encounter repeated technical issues perceive the system as unreliable. Reports of fake online immigration services indicate that users may not clearly distinguish official platforms (Economic Times, 2025). Clear communication and simple design reduce confusion.

Trust increases when systems provide predictable outcomes. Immediate confirmation messages after successful registration improve confidence. Transparent error explanations support problem resolution.

Usability engineering emphasizes that satisfaction is a measurable component of system quality (Nielsen, 2020). In border control environments satisfaction relates to clarity and speed rather than comfort. When travelers complete tasks quickly without error satisfaction improves.

3. CHAPTER THREE: IMPROVING ACCESSIBILITY AND USER ADOPTION

This chapter proposes design, policy, and support improvements to enhance usability of ICP mobile passport and e gate services in the UAE. The recommendations focus on simplifying user interaction, increasing accessibility, and improving adoption rates among international travelers. The proposals are informed by usability engineering principles and digital government standards (Nielsen, 2020; OECD, 2021).

3.1. Simplifying Interface Design

The ICP smart application interface should be simplified to reduce cognitive load. Complex menus and multi-step navigation increase errors and delay task completion. Clear labeling and a logical hierarchy of functions support learnability for first-time users.

Icons and instructions should be consistent throughout the application. Visual guidance should accompany text instructions. This reduces confusion for travelers unfamiliar with digital identity systems. Nielsen emphasizes that clear visual feedback and intuitive design improve efficiency and error recovery (Nielsen, 2020).

Minimizing the number of steps required for key tasks, such as registration and document submission, can enhance usability. Shorter workflows reduce the probability of user mistakes and increase satisfaction. Simplified interfaces support both experienced and first-time users.

3.2. Enhancing Multilingual Support

Language barriers are a major challenge for international travelers. The current application primarily supports Arabic and English. Expanding language options to include widely spoken international languages improves comprehension and usability (OECD, 2021).

Multilingual support should apply not only to

menu items but also to instructions and error messages. Travelers must be able to understand system feedback to correct mistakes. Providing audio or visual instructions in multiple languages can further support users with limited literacy or reading difficulties.

3.3. Improving Biometric Guidance and Feedback

Biometric verification is critical for both mobile passport and e-gate services. Users often fail scans due to incorrect positioning, lighting conditions, or facial accessories. Clear instructions and visual cues at scanning points can reduce errors.

Real-time feedback during scanning, such as highlighting alignment issues, helps users adjust their position. Nielsen recommends immediate and actionable feedback to reduce repeated errors and enhance efficiency (Nielsen, 2020).

Staff should be available to assist travelers who experience repeated biometric failure. Providing support both digitally and physically ensures that travelers complete processing efficiently.

3.4. Strengthening Authentication and Security Support

Multi-factor authentication improves security but adds complexity. Simplifying authentication processes without compromising security can enhance usability. Step-by-step guidance for password creation, verification code entry, and account recovery reduces user frustration.

Clear instructions should be provided for travelers who forget credentials or encounter failed logins. Automated prompts and troubleshooting guides within the application improve efficiency. OECD emphasizes that accessible and user-friendly digital services increase public adoption rates (OECD, 2021).

3.5. Policy Recommendations for Digital Adoption

Authorities should implement policies to encourage consistent use of digital systems. Awareness campaigns can educate travelers about official platforms and the benefits of mobile passport services. This reduces reliance on manual processing and limits interaction with fraudulent services (Economic Times, 2025).

Training for immigration staff on system assistance is also essential. Staff should be able to guide travelers through digital procedures quickly, reducing delays at entry points.

Periodic system updates based on user feedback help maintain relevance. Collecting data on error patterns and user behavior enables authorities to make informed design improvements. Continuous evaluation supports adoption by ensuring the system meets user needs.

3.6. Accessibility Enhancements

Accessibility is not limited to language. Travelers with physical impairments should be able to interact with mobile applications and e-gates without difficulty. Interface elements should follow accessibility guidelines, such as providing large buttons and contrast-rich displays.

For users with visual or hearing limitations, audio instructions or haptic feedback can improve task completion. Inclusive design principles ensure that all travelers, regardless of ability, can use digital immigration systems effectively.

3.7. Encouraging User Confidence and Trust

Trust in digital services increases adoption. Clear communication about system reliability, secure authentication, and official channels reduces user anxiety. Confirmation messages after successful registration or e-gate processing reassure travelers that actions were completed correctly.

Highlighting official platforms and providing guidance to avoid fraudulent services improves user confidence. When users trust the system, they are more likely to adopt digital services consistently (OECD, 2021).

3.8. Monitoring and Continuous Improvement

System performance should be monitored continuously. Metrics such as error rates, processing times, and user satisfaction provide insight into usability challenges. Regular updates based on monitoring data ensure the system evolves to meet user needs effectively.

Testing with diverse user groups, including first-time travelers and those with limited digital literacy, identifies barriers that may not appear during routine operation. Iterative improvements based on empirical data sustain usability over time.

4. FINDINGS

This section presents the expected findings from the research on usability challenges in ICP mobile passport and e-gate services. The analysis is based on survey data, interview responses, and usability testing conducted with international travelers in the UAE. The findings focus on technical issues, user experience barriers, and factors influencing adoption of digital immigration systems (Nielsen, 2020; OECD,

2021).

4.1. Common Technical Issues

The research identifies several technical problems affecting system performance. Biometric verification failures are frequent, especially during e-gate processing. Variations in lighting, facial accessories, and improper positioning contribute to repeated scan failures. Travelers who experience multiple failures are redirected to manual counters, increasing overall processing time (ICP, 2024).

Application performance issues also affect usability. Delays during document uploads, slow page loading, and occasional system crashes disrupt workflow. Users report uncertainty about whether actions were successful, leading to repeated attempts. These technical issues reduce the reliability and efficiency of the system (ICP, 2024).

4.2. Registration and Authentication Challenges

First-time users face difficulties during account registration and login. Verification codes sent via SMS or email are sometimes delayed, preventing completion of registration. Password creation rules are not always clear, causing repeated errors. Multi-factor authentication steps, while necessary for security, increase cognitive load and prolong task completion (OECD, 2021).

4.2.1. User Experience Barriers

Interface complexity and unclear navigation are common usability problems. Travelers report difficulty locating specific functions within the smart application. Menu items and icons are not always self-explanatory. Inconsistent terminology further increases confusion. Users with limited digital literacy require additional time to complete tasks, resulting in longer processing times (Nielsen, 2020).

Language limitations are also significant. The application primarily supports Arabic and English, leaving travelers who speak other languages at a disadvantage. Misunderstanding instructions for biometric scanning or document submission leads to repeated errors and delays (OECD, 2021).

4.2.2. Impact on Processing Efficiency

Usability challenges directly affect immigration processing efficiency. Biometric failures and registration errors increase reliance on manual counters. Long queues form when multiple travelers encounter issues simultaneously. These delays negate some of the efficiency benefits expected from digital automation (ICP, 2024).

Travelers with low digital literacy or unfamiliarity with mobile authentication experience higher error rates and longer task completion times. Even experienced users may struggle with intermittent technical failures, reducing overall throughput.

4.2.3. Influence on User Trust and Adoption

User perception of the system affects adoption rates. Repeated technical failures and unclear instructions decrease confidence in digital services. Some travelers prefer manual processing even when e-gates are available, reducing system utilization (Economic Times, 2025).

Reports of fake visa platforms highlight the importance of clear communication and official guidance. Travelers who understand system procedures and trust official platforms are more likely to use mobile passport and e-gate services consistently (OECD, 2021).

4.2.4. Accessibility Concerns

The research finds that accessibility issues limit the usability of digital immigration systems. Travelers with physical impairments or visual and hearing limitations encounter difficulties interacting with mobile applications and e-gates. Interface design, screen readability, and lack of alternative input or feedback methods are contributing factors. Inclusive design and adaptive features are necessary to accommodate all user groups (OECD, 2021).

4.3. Analysis and Discussion

ICP digital immigration systems show recurring usability issues that affect performance. Biometric mismatch cases appear frequently during e gate use. These cases slow processing time and reduce system efficiency (ICP, 2024). When facial recognition fails travelers must repeat scanning or move to manual counters. This process increases delay and reduces automation benefits.

Network delay affects verification speed during peak hours. High user volume places pressure on system servers. Slow response interrupts user flow and increases waiting time. Users often repeat actions when the system does not respond quickly. Repeated attempts increase system load and reduce performance stability.

Interface delays also affect user experience. Slow loading screens create uncertainty about system status. Users are not sure if their request is processed. This leads to repeated submissions. Nielsen explains that systems must provide clear and immediate feedback to users (Nielsen, 2020). Lack of feedback increases user error and reduces confidence.

Registration steps create early barriers for

travelers. Many users face difficulty during account setup and identity verification. Complex steps and unclear instructions lead to incomplete registration. This results in early drop in system use. First time users are more affected due to limited familiarity with digital identity tools.

Language limitations reduce clarity of instructions. The system mainly supports Arabic and English. Travelers who do not understand these languages face difficulty completing tasks. Misinterpretation of instructions leads to errors in data entry and biometric scanning. OECD highlights that inclusive services require support for diverse user groups (OECD, 2021).

Navigation structure affects task completion time. Users require multiple steps to access services. This increases confusion for first time users. Complex navigation reduces learnability and slows interaction. Nielsen states that simple and consistent navigation improves usability (Nielsen, 2020).

Errors increase when feedback messages lack detail. Users repeat the same actions without understanding the cause of failure. This leads to repeated errors and longer processing time. Clear feedback messages are necessary to guide users toward correct actions.

Authentication failure increases total processing time. Users must restart login steps when verification codes fail or passwords are incorrect. This creates delays and increases frustration. Multi factor authentication adds security but also increases task complexity (OECD, 2021).

System interruptions affect workflow continuity. Application crashes and network issues force users to repeat processes. Repeated submissions increase workload on system servers. During peak periods manual counters receive higher demand. This slows overall passenger movement and reduces efficiency gains from automation.

Overall system performance depends on design and user interaction. When usability issues occur automation benefits decrease. Effective system design must reduce errors and support smooth interaction.

4.4. Policy Implications

Authorities need to improve interface design to reduce complexity. Simpler structures allow users to complete tasks with fewer steps. Clear instructions reduce confusion and support faster task completion. Nielsen emphasizes that simple design improves learnability and efficiency (Nielsen, 2020).

Consistent language improves accessibility for international travelers. Expanding language options supports users from different regions. Clear wording reduces misunderstanding and improves accuracy of input. OECD states that inclusive digital services increase adoption rates (OECD, 2021).

System feedback must support quick correction. Error messages should explain the problem and provide clear steps for resolution. Immediate feedback reduces repeated errors and improves efficiency.

Integration between platforms requires stable data exchange. Data mismatch between systems causes verification failure. Strong integration ensures accurate identity validation. Reliable data flow reduces system errors and improves performance.

Security measures must balance protection and usability. Multi factor authentication should be clear and easy to follow. Complex security steps increase user error. A balanced approach ensures both safety and efficiency (OECD, 2021).

Staff training is essential for system support. Trained staff can assist travelers during technical issues. This reduces waiting time and prevents congestion at entry points. Staff support also improves user confidence in digital systems.

Real time monitoring improves system performance. Monitoring tools detect faults and delays quickly. Early detection allows fast response and reduces system downtime. Support teams can resolve issues before they affect large numbers of travelers.

Policy updates should be based on performance data. Data on error rates and processing time help identify system weaknesses. Continuous evaluation supports informed decision making. This ensures that improvements match actual user needs.

4.5. Future Research Directions

Future research should focus on improving biometric accuracy. Studies can examine facial recognition performance under different lighting conditions. Environmental factors at airports require detailed technical analysis. Improved accuracy reduces mismatch cases and increases efficiency.

System response under peak conditions requires further testing. High user volume affects network performance and processing speed. Research should analyze system behavior during busy periods. This helps identify capacity limits and improvement areas.

Comparative studies across different airports can provide useful insights. Error patterns may vary by location. Comparing results helps identify consistent issues and best practices. This supports standardization of system performance.

User adaptation over time should be examined. Travelers who use the system repeatedly may improve performance. Studying this trend helps understand learning effects and system familiarity.

Digital literacy differences require further analysis. Research should include diverse user groups from different nationalities. This ensures that findings represent real user populations.

Behavioral analysis can explain user decision paths. Tracking how users interact with the system helps identify confusion points. This supports design improvements based on actual behavior.

Trust levels should also be measured. User trust influences adoption of digital systems. Surveys can assess how reliability and clarity affect user confidence. OECD highlights that trust is essential for successful digital services (OECD, 2021).

Future research supports continuous improvement of ICP digital immigration systems. It provides data for better design and policy decisions.

4.6. Recommendations

This section outlines practical recommendations to improve usability, accessibility, and adoption of ICP mobile passport and e-gate services. The recommendations are based on the findings from Chapter Two and align with usability engineering principles and digital government standards (Nielsen, 2020; OECD, 2021).

4.6.1. Simplified Interface Design

The ICP smart application interface should be streamlined to reduce complexity. Clear labeling and a logical menu hierarchy help travelers navigate quickly. Reducing the number of steps required for key tasks, such as registration, document submission, and biometric verification, minimizes errors and task completion time.

Visual guidance should accompany text instructions. Icons should be self-explanatory and consistent throughout the application. Feedback messages must clearly indicate errors and suggest corrective actions. Providing immediate, actionable feedback improves task efficiency and reduces repeated errors (Nielsen, 2020).

4.6.2. Improved Guidance for First-Time Users

First-time users often struggle with registration, account setup, and biometric verification. Providing step-by-step instructions during onboarding can reduce confusion. Tutorial videos or interactive guides within the application can help users understand procedures.

Support staff at entry points should be trained to assist travelers with the application and e-gates. Quick assistance reduces delays and prevents congestion at immigration counters. User guides should cover common troubleshooting scenarios, including password recovery, verification code delays, and biometric scan issues (ICP, 2024).

4.6.3. Enhanced Multilingual Support

Language limitations reduce accessibility for international travelers. Expanding the number of supported languages improves comprehension and reduces errors. Instructions, error messages, and system prompts should be available in widely spoken languages beyond Arabic and English.

Audio or visual guidance in multiple languages can assist travelers with limited literacy or reading difficulties. Multilingual support aligns with digital government standards promoting inclusivity and equitable access to public services (OECD, 2021).

4.6.4. Biometric Verification Improvements

Clear instructions at e-gates and within the application can reduce biometric failures. Visual cues should guide users on proper positioning, distance from the scanner, and lighting conditions. Real-time feedback during scanning, such as alignment indicators, helps travelers adjust their position immediately.

For users who experience repeated biometric mismatches, quick manual assistance should be available. This ensures efficient processing while maintaining system reliability.

4.6.5. Authentication and Security Enhancements

Authentication procedures should balance security and usability. Clear guidance for password creation, verification code entry, and account recovery reduces errors and cognitive load. Step-by-step prompts help travelers complete multi-factor authentication efficiently.

Automated troubleshooting messages for failed logins or expired codes should provide actionable instructions. Streamlining security steps without compromising safety increases system adoption and reduces user frustration (OECD, 2021).

4.6.6. Awareness and Policy Recommendations

Authorities should conduct awareness campaigns to educate travelers on official digital platforms. Clear communication about official applications reduces reliance on manual processing and discourages interaction with fraudulent services (Economic Times, 2025).

Periodic user feedback collection and analysis supports continuous system improvement. Monitoring error patterns, task completion times, and user satisfaction allows authorities to update the interface, procedures, and guidance effectively.

4.6.7. Accessibility Enhancements

Travelers with physical, visual, or hearing impairments require accessible solutions. Interface elements should include large buttons, high contrast displays, and support for screen readers. Audio instructions or haptic feedback can improve task completion for users with sensory limitations. Inclusive design ensures all travelers can access digital immigration services efficiently.

4.6.8. Monitoring and Continuous Improvement

Continuous evaluation of system performance is essential. Metrics such as error frequency, processing time, and user satisfaction should be tracked. Updates based on these insights maintain system effectiveness and improve traveler experience over time. Iterative testing with diverse user groups, including first-time users and those with limited digital literacy, ensures usability improvements are practical and effective (Nielsen, 2020).

5. CONCLUSION

Addressing usability challenges in ICP digital immigration systems is essential for efficient border management in the UAE. Travelers encounter difficulties during registration, biometric verification, and navigation of the smart application. These issues affect processing time, system reliability, and user satisfaction (ICP, 2024; Nielsen, 2020).

Simplified interface design reduces cognitive load and minimizes errors. Step-by-step guidance assists first-time users in completing registration and verification tasks. Multilingual support improves accessibility for international travelers. Clear visual and audio feedback during biometric scanning enhances task success rates. Streamlined authentication processes reduce delays while maintaining security standards (OECD, 2021).

Accessibility considerations ensure that travelers with physical, visual, or hearing limitations can interact effectively with digital systems. Continuous monitoring of performance, error rates, and user feedback enables iterative improvements. Training for support staff and awareness campaigns for travelers promote proper adoption of official platforms and reduce reliance on manual processing or fraudulent services (Economic Times, 2025).

Implementing these measures strengthens operational efficiency, improves user satisfaction, and maintains the integrity of border control processes. ICP digital systems can achieve their goals of fast, secure, and inclusive service delivery when usability, accessibility, and support mechanisms are integrated into system design and management (Nielsen, 2020; OECD, 2021).

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