© MAY 2026 | IRE Journals | Volume 9 Issue 11 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I11-1718380

# Development Of a Cross-Platform Visa Application Management System Using React Native and Firebase

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***Abstract-*** ***The rapid growth of digital service platforms has created a strong need for efficient and user-friendly systems in travel and administrative services. Traditional visa application processes often depend on manual documentation, repeated form filling, unstructured communication and limited tracking support. These limitations create inconvenience for applicants and increase the workload of service providers. This paper presents The Visa Manager, a cross-platform visa application management system developed using React Native and Firebase. The system is designed to digitize the visa workflow by providing user authentication, destination selection, passport and document upload, application detail capture, online payment support and visa status tracking within one mobile-based platform. The proposed system follows a modular structure in which the frontend handles user interaction and Firebase services manage authentication, database operations and document storage. The study explains the system architecture, methodology, functional modules, technology stack, results, limitations and future scope. The implementation shows that mobile technology and cloud-based backend services can improve accessibility, reduce paperwork, centralize records and make visa-related services more transparent and manageable.***

***Keywords: Visa Management, React Native, Firebase, Mobile Application, Digital Documentation, Cloud Backend, Authentication, Payment Integration, Travel Technology.***

## I. INTRODUCTION

Visa application processing is an important administrative function in international travel, education, employment and migration services. A visa applicant is required to submit personal details, passport information, travel purpose, supporting documents and payment information before the application can be processed. In many service environments, this workflow still depends on manual form filling, physical document collection and repeated communication between the applicant and the visa consultant.

Traditional methods create several operational problems. Applicants may not know the current status of their application, service providers may need to manage documents through different channels, and repeated manual verification may increase processing time. If passport documents or payment proofs are stored without a structured system, the chances of data loss and confusion also increase.

The growth of mobile applications has created an opportunity to make visa services more accessible. A mobile application can provide users with a single interface for login, document upload, country selection, application submission, payment and tracking. It also helps the service provider maintain centralized records and reduce dependency on paper-based communication.

The Visa Manager is developed as a mobile-based visa application management system using React Native for the frontend and Firebase for backend cloud services. The application includes Firebase Authentication, Firestore database, Firebase Storage, Google Sign-In and Razorpay payment integration. The system aims to simplify the visa workflow and improve transparency between applicants and service providers.

### 1.1 Objectives of the Study:

- To study the problems of traditional visa application workflows.
- To design a mobile-based visa application management system.
- To integrate authentication, document upload, payment and status tracking in one platform.

- To understand the role of React Native and Firebase in cross-platform application development.
- To evaluate how digital documentation can improve efficiency and user experience.

## II. LITERATURE REVIEW

Charland and Leroux (2011) [1]
Charland and Leroux discussed mobile application development approaches and compared native, web and hybrid development. Their study is useful because The Visa Manager uses a cross-platform development approach where reusable components reduce development effort and improve maintainability. The paper supports the idea that mobile applications can improve access to services when designed with usability and performance in mind.

Biørn-Hansen et al. (2018) [2]
Biørn-Hansen and colleagues studied cross-platform mobile development frameworks and highlighted the practical value of building applications for multiple platforms with shared code. Their work is related to this project because React Native allows developers to build mobile interfaces using reusable components and a JavaScript-based development model.

Hecht and Jablonski (2011) [3]
Hecht and Jablonski studied NoSQL databases and compared their usefulness for modern web and cloud applications. Their research is relevant because Firebase Firestore follows a cloud-based NoSQL model that supports flexible document storage, fast retrieval and scalable application data management.

Lian, Yen and Wang (2014) [4]
Lian, Yen and Wang examined cloud computing adoption and explained that cloud platforms can reduce infrastructure burden and improve service flexibility. The Visa Manager uses Firebase as a cloud backend, which avoids the need for maintaining a separate physical server and supports centralized management of application data.

Kumar and Sharma (2019) [5]
Kumar and Sharma studied mobile cloud computing and explained how cloud services can support mobile applications through storage, processing and synchronization. This literature supports the backend model of The Visa Manager, where documents and user records are stored securely in cloud services.

Patel and Patel (2020) [6]
Patel and Patel discussed digital document management systems and their role in reducing paperwork, improving record availability and supporting faster administrative decisions. Their work is relevant because visa services require organized handling of passports, identity documents, travel proofs and application records.

Rane and Kothari (2021) [7]
Rane and Kothari studied online payment gateway integration in service applications. Their research explains that secure payment integration can improve user convenience and transaction transparency. This is related to the Razorpay integration considered in The Visa Manager.

Kaur and Kaur (2021) [8]
Kaur and Kaur analyzed authentication and access control in mobile applications. Their study highlights the importance of secure login, identity verification and session management. The Visa Manager uses Firebase Authentication and Google Sign-In to support secure access for users.

Jain and Sharma (2022) [9]
Jain and Sharma studied travel technology platforms and found that digital systems improve accessibility, booking support and customer communication in the travel sector. Their work supports the need for a mobile-based visa support system as part of modern travel service management.

Singh and Gupta (2022) [10]
Singh and Gupta discussed the use of OCR and automated document extraction in administrative services. Their work is useful for future improvement of The Visa Manager because passport detail extraction can reduce manual data entry and minimize typing errors.

Verma and Deshmukh (2023) [11]
Verma and Deshmukh studied cloud-based workflow systems and explained that integrated dashboards, centralized storage and status tracking improve

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service transparency. Their findings are directly related to the proposed visa workflow where users need clear application status updates.

## III. RESEARCH GAP

Existing travel and administrative systems provide partial digital support, but many do not offer a complete mobile-based workflow for visa management. Some platforms allow users to fill forms online, while others provide document upload or payment separately. This fragmented approach does not fully solve the problem of repeated communication and scattered records.

Many systems also lack real-time application tracking and centralized profile management. Applicants often depend on calls or messages to know the progress of their visa application. Service providers also face difficulty when documents are received through multiple channels such as email, WhatsApp or physical submission.

There is a need for an integrated mobile system that combines authentication, digital document upload, application data capture, payment support and status tracking in one workflow. The Visa Manager attempts to fill this gap by using React Native and Firebase to create a structured, scalable and user-friendly platform.

## IV. METHODOLOGY

### 4.1 Research Method

This research follows an application-oriented methodology. The study focuses on designing and developing a practical mobile application for visa workflow management. The methodology includes requirement analysis, system design, frontend development, backend integration, third-party service integration and functional testing.

### 4.2 Requirement Analysis

The first phase identified major limitations of traditional visa processing such as manual documentation, repeated form filling, lack of status tracking and scattered communication. Based on these problems, the system requirements were defined for login, document upload, payment, application submission and tracking.

### 4.3 System Design

The system was designed using modular components. Separate modules were planned for authentication, country selection, application forms, passport upload, payment handling, admin review and status updates. This structure improves maintainability and allows new visa categories to be added later.

### 4.4 Development and Testing

The frontend was implemented using React Native and backend services were integrated using Firebase. Functional testing was performed for login, navigation, form handling, file upload, payment flow and status tracking. The system was evaluated based on usability, workflow efficiency and practical implementation capability.

## V. SYSTEM ARCHITECTURE

The architecture of The Visa Manager follows a layered structure consisting of a frontend layer, application logic layer, cloud backend layer and external-service layer. The frontend layer is responsible for mobile screens, form inputs, user interaction and validation messages. It provides an easy interface for applicants to complete visa-related tasks.

(Fig1. System Architecture of The Visa Manager)

The application logic layer controls the internal workflow. It manages user sessions, form progression, conditional navigation, Redux state management and data validation. This layer connects the frontend interface with backend services and ensures that the user journey remains consistent.

The backend layer is implemented using Firebase. Firebase Authentication manages secure login, Firestore stores structured application records and Firebase Storage stores passport files, photographs and supporting documents. The external service layer includes Google Sign-In, Razorpay payment gateway and future OCR support for passport extraction.

## VI. TOOLS / TECHNOLOGY USED

React Native
React Native is used for building the mobile frontend. It allows reusable components, faster development and cross-platform support. The framework is suitable for applications that require interactive screens and mobile-friendly navigation.

Firebase Authentication
Firebase Authentication provides secure login and user session management. It supports email login and Google Sign-In, making the application more convenient and secure for users.

Firestore Database
Firestore is used to store structured visa application data, user profile information, country details, payment status and application progress. It supports cloud-based access and scalable data management.

Firebase Storage
Firebase Storage is used to store uploaded passport images, identity documents and supporting files. It helps keep documents organized and accessible to authorized users.

Razorpay Payment Gateway
Razorpay supports online payment processing. Its integration helps users complete payment digitally and reduces dependency on offline payment confirmation.

Google Sign-In
Google Sign-In simplifies authentication and allows users to access the application using an existing Google account. This improves usability and reduces registration friction.

## VII. RESULT AND ANALYSIS

The developed system demonstrates that a mobile application can simplify visa application management by placing major workflow steps inside a single digital platform. The user can register, log in, select a destination, submit details, upload passport documents, complete payment and track the application status. This reduces dependency on manual paperwork and improves transparency.

- Centralized records reduce scattered communication and improve document management.
- Digital upload helps preserve passport and supporting documents in an organized way.
- Authentication improves secure access and separates user-specific records.
- Payment integration supports smoother transactions and better confirmation tracking.
- Status tracking improves user confidence and reduces repeated follow-up calls.

| Area | Positive Impact | Challenge |
|---|---|---|
| Authentication | Secure login and user profile access | Requires proper password and session management |
| Document upload | Centralized passport and file storage | Requires storage rules and privacy control |
| Payment | Fast online transaction support | Needs payment failure handling |
| Status tracking | Improves transparency for applicants | Requires timely updates from service provider |

## VIII. DISCUSSION

The Visa Manager shows how travel service workflows can be improved through mobile and cloud technologies. Instead of depending on physical forms and scattered messages, the system provides a structured digital path for applicants and service providers. This improves convenience for users and operational control for administrators.

The use of React Native supports faster development because the same component-based logic can be

reused across mobile environments. Firebase reduces backend complexity by providing ready-to-use authentication, database and storage services. This is useful for academic projects and small service businesses that want to create working applications quickly.

However, visa services involve sensitive personal documents, so security and privacy must be treated as core requirements. Storage rules, access permissions, encryption practices and secure payment handling are necessary before such a system is used at a large scale.

## IX. CHALLENGES IN IMPLEMENTATION

- Protecting sensitive documents such as passports and identity proofs.
- Maintaining accurate status updates from admin side.
- Handling failed or pending payment transactions.
- Ensuring the application works smoothly on different Android devices.
- Designing simple screens for users with limited technical knowledge.
- Scaling the backend when the number of applicants increases.

## X. FUTURE SCOPE

Future improvements can include OCR-based passport data extraction to reduce manual entry. The system can also include an admin dashboard for reviewing applications, assigning staff, updating status and generating reports. Push notifications can be added to inform users about document requirements, payment confirmation and visa progress.

The platform can be extended to support multiple branches, country-wise document checklists, appointment scheduling, chatbot assistance and analytics for service providers. In the future, AI-based document verification can also help identify missing or incorrect documents before submission.

## XI. ETHICAL CONSIDERATIONS

The system handles sensitive personal and travel-related information. Therefore, ethical use of data is important. User documents should be collected only for visa processing purposes and should not be shared without permission. The system should provide secure access control, clear privacy policies and proper data retention practices.

## XII. LIMITATIONS OF THE STUDY

This study focuses on the design and functional workflow of a mobile visa management system. It does not include large-scale deployment results or real visa authority integration. The current scope is limited to application-level workflow management, and future work is required for advanced security auditing, compliance checks and production-level testing.

## CONCLUSION

The Visa Manager is a practical mobile-based visa application management system that demonstrates how React Native and Firebase can be used to digitize an administrative travel workflow. The system combines authentication, document upload, application detail capture, payment support and status tracking in one platform.

The study concludes that mobile and cloud technologies can reduce manual effort, improve accessibility, organize documents and make visa services more transparent. With further improvements in security, admin control, OCR support and notification systems, the proposed solution can become a useful platform for travel agencies and visa service providers.

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