International Journal Software Engineering and Computer Science (IJSECS)
6 (1), 2026, 34-43
Published Online April 2026 in IJSECS (http://www.journal.lembagakita.org/index.php/ijsecs)
P-ISSN: 2776-4869, E-ISSN: 2776-3242. DOI: https://doi.org/10.35870/ijsecs.v6i1.6496.

RESEARCH ARTICLE Open Access

Implementation of Android-Based Futsal Court Booking Application Using Flutter (Case Study: Futsal Hayani Kopti, West Cengkareng)

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Received: February 1, 2026; Accepted: February 20, 2026; Published: April 1, 2026.

Abstract: The rapid development of information technology has encouraged service providers to improve efficiency and service quality, including in futsal court rental services. At Futsal Hayani Kopti Cengkareng Barat, the court booking process is still conducted manually through phone calls or direct visits, which often results in scheduling conflicts, limited access to information, and unstructured data management. These conditions reduce the effectiveness and efficiency of the booking process. This practical work aims to design and implement an Android-based futsal court booking application using the Flutter framework. The developed application provides real-time information on court availability, rental prices, facilities, and online booking features. In addition, the system assists administrators in managing booking schedules and transaction data in a centralized manner. The research method applied is qualitative, employing observation, interviews, documentation, and literature study. System development follows the System Development Life Cycle (SDLC) approach with an internet-based client–server architecture. The implementation results indicate that the application improves booking efficiency, reduces scheduling conflicts, and enhances service quality as well as user satisfaction.

Keywords: Futsal Court Booking; Android Application; Flutter; Information System.

1. Introduction

Futsal has grown into one of the most widely played sports across age groups in Indonesia. Unlike conventional football, it is played with fewer players on a smaller enclosed court, making it more accessible and affordable for casual players and organized teams alike. As the sport's popularity rises, so does the demand for court rental services. In West Cengkareng alone, multiple futsal venues now compete for the same pool of customers, each offering varying court types, pricing, and facilities. Yet despite this growth, the booking process at most of these venues has not kept pace with the demand.

At Futsal Hayani Kopti, court reservations are still handled manually — customers either call ahead or visit in person to check schedule availability. This approach has well-documented weaknesses. Sirajudin *et al.* (2025) found that manual booking systems are prone to unstructured queues, scheduling conflicts, and late payments. Ardani and Sani (2024) noted that paper-based records make data recapitulation difficult and

increase the risk of lost booking information. Pramono *et al*. (2021) observed that customers are forced to travel to the venue just to check whether a court is available — a process that wastes both time and money. These are not isolated findings; they describe a pattern that repeats across venues, including Futsal Hayani Kopti. Based on interviews conducted at the venue, customers frequently arrive only to find their preferred slot already taken, leaving them to search for alternatives elsewhere. The problem is structural, and a manual system cannot fix it.

Prior research confirms that Android-based mobile applications offer a direct solution. Laksono and Fachrie (2023) demonstrated that a booking application improves service efficiency and simplifies reservation data management. Kusumarini and Avito (2025) developed a Flutter-based application with Midtrans payment gateway integration and reported measurable gains in rental process efficiency. Florensal (2019) and Hidayat (2013) showed earlier that Android reservation systems can effectively replace manual recording. Mohd Zahibi *et al*. (2025) further identified real-time status updates and a user-friendly interface as the two factors most strongly linked to user satisfaction in digital booking systems. Several of these studies, however, focused primarily on queue management algorithms such as First Come First Served — FCFS (Sirajudin *et al*., 2025; Ramadhan *et al*., 2025; Hidayat, 2013; Tanjung *et al*., 2026) — with less attention given to information accessibility and overall user experience. This study addresses that gap. Using Flutter as the development framework and Android as the target platform, this research designs and implements a court booking application for Futsal Hayani Kopti that prioritizes real-time schedule visibility, online booking, and centralized data management for administrators. Flutter was selected for its cross-platform efficiency, while Android reflects the dominant smartphone platform among Indonesian users across all income segments.

2. Related Work

Research on mobile-based sports facility booking applications has grown steadily over the past decade, driven by the recurring failure of manual reservation systems across various venue types. The problems are consistent: scheduling conflicts, inaccurate records, and customers forced to visit a location just to check availability. Pramono *et al*. (2021) documented this pattern in a futsal venue in Karawang, where a conventional booking process left tenants with no way to check court schedules remotely. Hazami and Natsir (2021) reported the same issue at a sports hall in South Jakarta, where manual transactions led to miscalculations and inaccurate reporting. Amiruddin *et al*. (2023) similarly found that customers had to visit the venue in person before any reservation could be made. Across these studies, the conclusion is the same: manual systems are not just inconvenient — they are operationally unreliable.

Android has emerged as the dominant platform for addressing these problems, largely because of its widespread adoption across income segments in Indonesia and Southeast Asia. Saktiadji *et al*. (2023) built a sports field booking application for Usman Harun Sport Center using Android Studio and Firebase, enabling customers to check availability and make reservations without staff intervention. Tanjung *et al*. (2026) developed the "Futsal Kita" application using the Rapid Application Development (RAD) method, incorporating real-time availability, online booking, flexible scheduling, and integrated payment — features that directly mirror the needs identified at Futsal Hayani Kopti. Mahardika *et al*. (2024) took a different angle by implementing QR code verification within an Android-based futsal rental system, reducing data input errors and accelerating the check-in process. Parimanam and Harefa (2024) applied a similar Android-based approach to badminton court booking, addressing double-booking and scheduling inaccuracies through a structured availability calendar and secure payment system.

Flutter has gained traction as the preferred framework for building these applications, owing to its cross-platform capability and consistent UI rendering across Android devices. Sekoh *et al*. (2025) developed a sports field booking application using Flutter and Dart under the Agile SDLC methodology, with findings from 20 respondents confirming that the application improved schedule management efficiency and increased participation in sports activities. Rahma (2024) built an Android-based e-booking system for a government sports facility in North Sumatra using Flutter, Firebase, and the Waterfall development model, replacing a manual process that had caused tenant pile-ups. Radzuan *et al*. (2024) presented iSmashON, a Flutter and Dart-based application for badminton court booking evaluated using the Technology Acceptance Model (TAM), which confirmed strong user acceptance and a favorable attitude toward mobile booking. These studies collectively establish Flutter as a technically sound and user-accepted choice for sports facility applications — a finding that directly informs the technology selection in this research (Flutter Team, 2023; Android Developers, 2023).

What the existing body of work largely shares, however, is a focus on algorithmic queue management — particularly the First Come First Served (FCFS) method — as the primary technical contribution. While FCFS improves fairness in booking order, it does not address the broader user experience problem: customers still need a clear, accessible interface that shows real-time availability, supports online payment, and requires

minimal steps to complete a reservation. This study focuses on that dimension. Rather than proposing a new scheduling algorithm, it prioritizes system usability and operational practicality for a small-to-medium futsal venue — specifically Futsal Hayani Kopti, West Cengkareng — where the immediate need is replacing a broken manual process with a reliable digital one.

3. Methodology

This study adopts a qualitative research approach, which is suited to understanding processes, workflows, and user experiences that cannot be adequately captured through numbers alone (Moleong, 2017; Sugiyono, 2019). Data collection is the most critical step in this process — without reliable data, the resulting system design risks solving the wrong problem. Three techniques were used: observation, interviews, and documentation combined with literature review.

3.1 Subject, Object, and Research Location

The research subject consists of the venue owner and staff at Futsal Hayani Kopti, West Cengkareng, along with one court renter selected as a representative respondent. This sample size is appropriate for a qualitative case study, where depth of information matters more than breadth (Yusuf, 2017). The research object is the Android-based mobile booking application developed for futsal court rental in the West Cengkareng area. The study was conducted exclusively at Futsal Hayani Kopti, chosen as the single representative venue for this case study.

3.2 Data Collection Techniques

1) Observation
   Direct observation was carried out at the venue to document the actual booking workflow as it occurs in practice. A structured observation instrument covering both technical and non-technical service aspects was used to ensure consistency. Observation allows the researcher to witness the process firsthand — not as it is described, but as it actually happens — which often reveals problems that neither staff nor customers have explicitly articulated (Sugiyono, 2019).
2) Interviews
   Interviews were conducted with venue staff and a court renter to gather detailed, firsthand accounts of the booking process. In-depth interviews — where the conversation goes beyond surface-level answers — were particularly useful for uncovering pain points that routine observation might miss (Moleong, 2017). The interviewer maintained a clear and comfortable conversational structure: introducing the purpose of the session, building rapport, and recording all responses accurately to ensure the validity of the data collected.
3) Documentation and Literature Review
   Supporting data was gathered through photographs and existing records at the venue, used to verify and supplement findings from observation and interviews. Relevant academic literature — including books, journal articles, and technical documentation — was reviewed to establish the theoretical basis for system design (Jogiyanto, 2017; Kadir, 2014; Sutabri, 2012). References covering systems analysis and software engineering principles also informed the development approach (Dennis *et al.*, 2015; Kendall & Kendall, 2014; Whitten *et al.*, 2007; Pressman & Maxim, 2015).

3.3 System Development Method

The application was built using the System Development Life Cycle (SDLC) — a structured approach that guides software development from initial planning through long-term maintenance, ensuring the final product aligns with user requirements and quality standards (Pressman & Maxim, 2015; Sommerville, 2016). Development began with the planning phase, where system objectives, scope, timeline, and resource requirements were defined. This was followed by requirements analysis, during which functional and non-functional requirements were gathered based on observed user needs at Futsal Hayani Kopti (Dennis *et al.*, 2015). The design phase produced a set of UML diagrams, a database schema, and UI mockups to serve as the technical blueprint before any code was written (Nugroho, 2010; Rosa & Shalahuddin, 2018). During implementation, the application was built using Flutter (Flutter Team, 2023) with Android as the primary target platform (Android Developers, 2023). Once the build was stable, testing was conducted to verify system behavior against the defined requirements and to identify defects prior to deployment. The final phase, maintenance, covers post-deployment activities — bug fixes, feature updates, and adjustments required as the operating environment changes over time. The system follows a client–server architecture, where the mobile application acts as the client and communicates with a centralized backend server for data storage and

retrieval (Bass *et al.*, 2012). UI design adheres to Material Design principles to ensure a consistent and familiar experience for Android users (Google, 2023).

4. Result and Discussion

4.1 Results

4.1.1 Current System Analysis

The existing booking process at Futsal Hayani Kopti involves two parties: the customer (renter) and the admin (venue manager). As illustrated in Figure 1, the entire workflow is manual — conducted either in person or by phone — with no digital system in place.

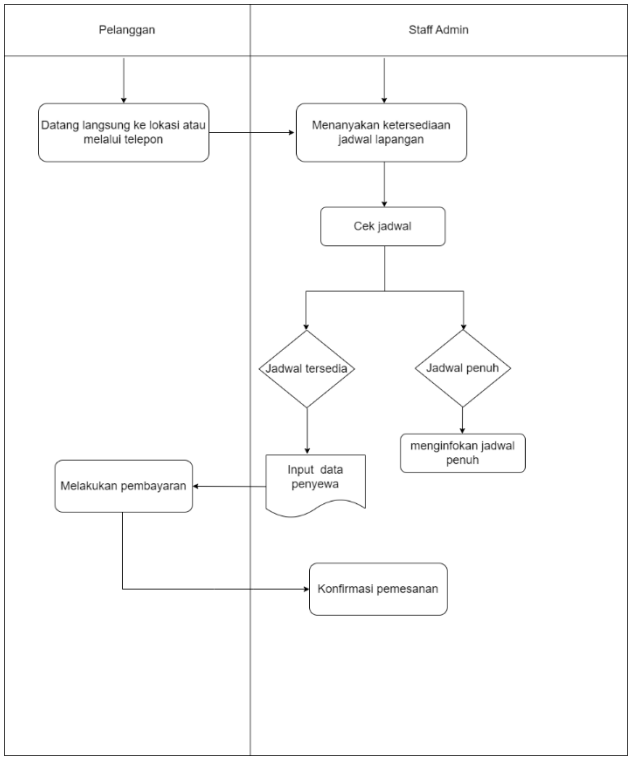

Figure 1. Current System Flowmap

The process runs as follows:

1) The customer contacts the admin by phone or visits the venue directly to ask about court availability.
2) The admin manually checks a handwritten schedule book to determine whether the requested time slot is open.
3) If the slot is available, the admin records the customer's details — name, rental time, and duration — and proceeds with the booking. If the slot is full, the admin informs the customer and the process ends.
4) If the slot is open, the customer makes payment in cash or by another agreed method.
5) The admin confirms the booking upon receiving payment, and the process is complete.

This workflow has clear structural weaknesses. There is no real-time visibility into court availability, no automated conflict detection, and all records are stored on paper. Double-bookings can occur if the schedule book is not updated promptly. These are not occasional errors — they are predictable outcomes of a system that relies entirely on manual coordination.

4.1.2 Application Development Method

The application was developed using the System Development Life Cycle (SDLC) model, a structured approach that guides the development of information systems through sequential phases to ensure the final product meets user requirements (Pressman & Maxim, 2015; Sommerville, 2016).

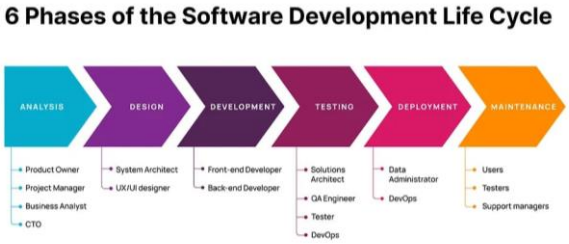

Figure 2. System Development Life Cycle (SDLC)

The six phases applied in this study are as follows. The planning phase covers the definition of system objectives, scope, schedule, and resource requirements before development begins. In the analysis phase, functional and non-functional requirements are identified based on user and system needs gathered directly from the venue. The design phase produces the technical artifacts needed to guide development — including UML diagrams (Use Case and Class Diagram), database schema, and UI mockups. Implementation involves writing the application code using Flutter and connecting it to a backend database. Testing is then conducted to detect defects and verify that system behavior matches the defined specifications. Finally, the maintenance phase addresses bug fixes, feature updates, and any adjustments required as the operating environment changes over time.

4.1.3 Proposed System

The proposed system replaces the manual process with a digital application serving two user roles: the User (Customer), who can register, log in, view court schedules, and place bookings; and the Admin (Venue Manager), who can verify bookings, manage court information, and review transaction data.

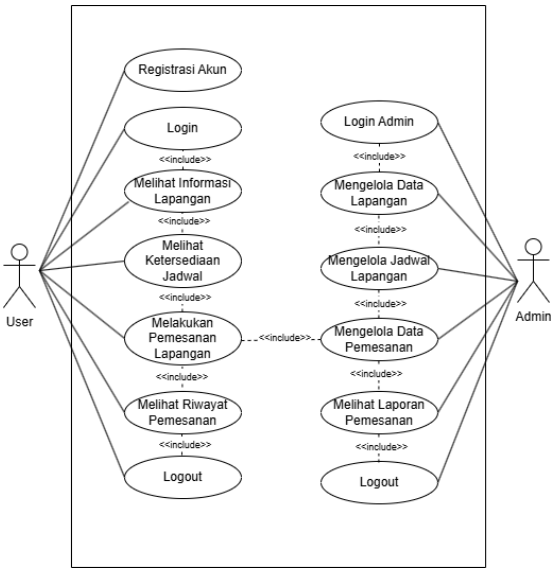

Figure 3. Use Case Diagram of the Proposed System

The system workflow operates as follows:

1) The user registers or logs in; credentials are authenticated against the server.
2) The user browses available courts, with schedule and pricing data displayed in real time.
3) The user selects a date and time slot. The system automatically checks for scheduling conflicts before confirming the selection.
4) If the slot is available, the booking is saved to the database and the user receives a confirmation. If the slot is taken, the system notifies the user immediately.
5) The admin logs in to verify bookings, manage schedules, and review reports.
6) All data is stored centrally on the server, accessible to both parties through the internet.

4.1.4 Application Interface

The login screen accepts an email or username and password. Users who have forgotten their password can request verification assistance through the *Forgot Password* option. New users are directed to an account registration form.

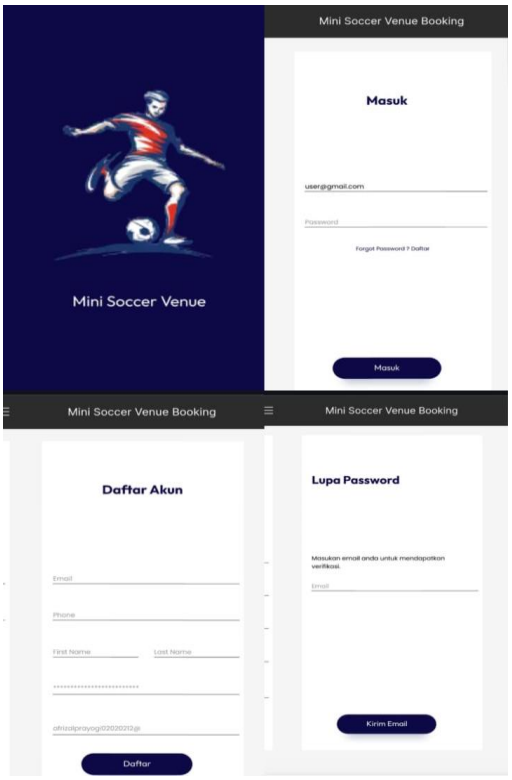

Figure 4. Login/Register Page

After logging in, users land on the home page, which displays a list of available futsal and mini soccer courts. Each listing shows a court photo, name, rating, and hourly price. Selecting a court opens a detail page with the following information:

1) Court photo
2) Court name and rating
3) Available facilities
4) Rental price
5) Date selector
6) Available time slots

Once a date and time are selected, the system displays a booking summary. The user confirms by pressing the *Book* button. Conflict detection runs at this stage — if the selected slot has already been taken, the system blocks the booking before it is submitted.

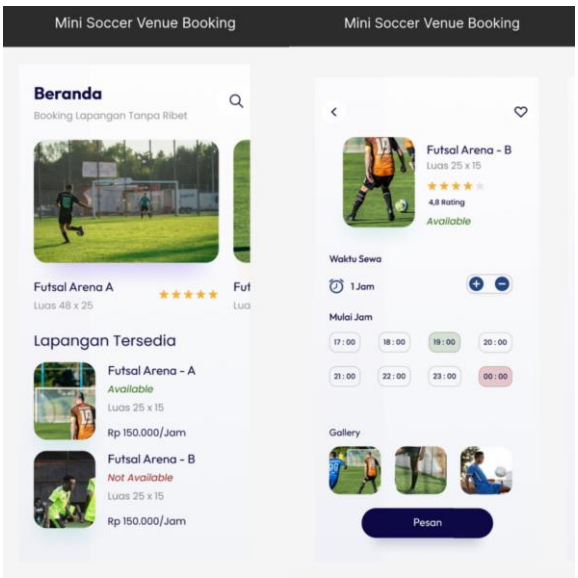

Figure 5. Home Page

The payment page displays:
1) Court details
2) Selected date and playing time
3) Total cost
4) Payment method (*e.g.*, bank transfer)

After completing the payment, the user uploads proof of transfer through the payment summary menu. The system verifies the payment and updates the booking status to *Confirmed*. The user can then review all booking history through the activity menu.

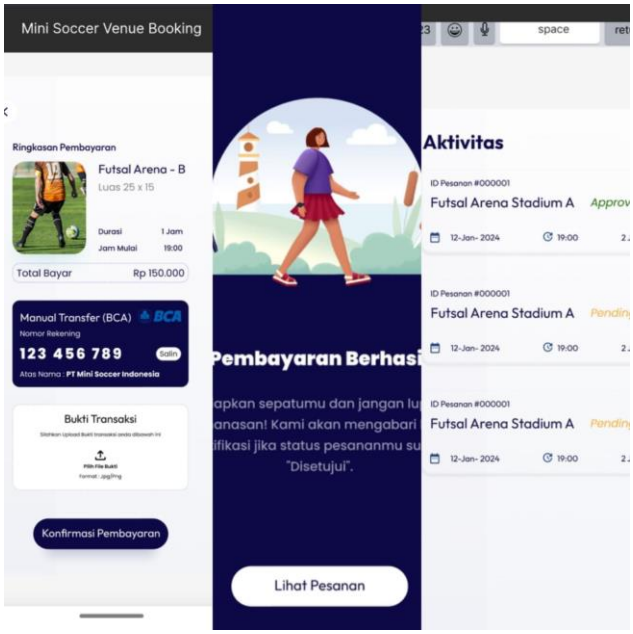

Figure 6. Payment Transaction Page.

4.2 Discussion

The most immediate finding is that the proposed system directly eliminates the core weaknesses of the current workflow. Under the manual system, customers had no way to check court availability without calling or visiting the venue, and the admin had no mechanism to prevent double-bookings beyond careful attention to a handwritten schedule book. The proposed application resolves both problems: real-time schedule visibility removes the need for customers to contact the venue before booking, and automated conflict detection at the point of reservation prevents overlapping bookings from being submitted. This outcome is consistent with Pramono *et al.* (2021) and Hazami and Natsir (2021), both of whom found that Android-based booking systems effectively eliminate the inefficiencies of manual, location-dependent reservation processes. The use of the SDLC model provided a structured development path that ensured each phase — from requirements analysis through to testing — was completed before the next began (Pressman & Maxim, 2015; Sommerville, 2016). This was particularly important during the analysis phase, where observation and interviews at Futsal Hayani Kopti revealed specific requirements that generic booking templates would not have captured: the need for payment proof upload, manual admin verification, and a simple interface suited to casual players rather than corporate users. The UML-based design phase, using Use Case and Activity Diagrams, translated these requirements into a clear system blueprint before any code was written (Rosa & Shalahuddin, 2018; Nugroho, 2010), reducing the risk of costly revisions during implementation.

Flutter was selected as the development framework because of its cross-platform efficiency and consistent rendering across Android devices (Flutter Team, 2023). This choice is supported by the literature: Sekoh *et al.* (2025) and Rahma (2024) both built sports facility booking applications using Flutter and reported that the framework produced responsive, functional applications with manageable development overhead. Android was chosen as the target platform because it remains the dominant mobile operating system among Indonesian users across all income segments (Android Developers, 2023), making it the most practical choice for a venue serving the general public in West Cengkareng. The application covers the full booking lifecycle — registration, schedule browsing, reservation, payment, confirmation, and history — within a single interface. This end-to-end coverage is significant because fragmented systems, where payment is handled separately from booking, introduce friction and increase the chance of unconfirmed reservations. Tanjung *et al.* (2026) identified integrated payment and digital invoicing as key features for booking efficiency, and Parimanam and Harefa (2024) demonstrated that a structured availability calendar with secure payment processing measurably

improves the user experience. The application developed in this study incorporates both. The Material Design interface guidelines (Google, 2023) were followed to ensure the UI is familiar and intuitive for Android users, reducing the learning curve for first-time users.

A feature that distinguishes this system from simpler booking tools is the admin verification layer. Rather than automatically confirming all bookings upon payment, the system routes each transaction through an admin review step. This design decision reflects the operational reality of a small venue where the owner wants to maintain oversight of all reservations and manually confirm payment before a booking is finalized. All data — bookings, payment records, and schedule updates — is stored centrally on the server, making it accessible in real time to both the customer and the admin. This centralized architecture addresses the data loss and recapitulation difficulties associated with paper-based records, as noted by Ardani and Sani (2024) and Sirajudin *et al*. (2025). As noted in the Related Work section, most prior studies in this domain focused on queue management algorithms — particularly First Come First Served (FCFS) — as their primary technical contribution. This study takes a different position. The contribution here is not algorithmic; it is architectural and experiential. The system is designed to be operationally complete, easy to use, and immediately deployable at a real venue with real constraints. By prioritizing usability, real-time data visibility, and centralized management over scheduling algorithm complexity, this application addresses the gap identified in the literature: that most existing systems solve the ordering problem without fully solving the accessibility and experience problem that drives customers away from manual systems in the first place.

5. Conclusion

The manual booking process at Futsal Hayani Kopti had one structural flaw that made everything else harder: customers had no way to check court availability without calling or showing up in person. From that single gap, other problems followed — scheduling conflicts, inaccurate records, and customers who left for competing venues rather than wait for an answer. The Android-based application developed in this study addresses each of these problems at the source. Real-time schedule visibility removes the need for customers to contact the venue before booking. Automated conflict detection prevents overlapping reservations from being confirmed, shifting that responsibility from human attention to the system itself. All booking data, user records, and transaction history are stored centrally on a server, replacing the handwritten logs that were prone to error and loss. For the venue management, the system consolidates reservation handling, schedule updates, and transaction reporting into a single platform — reducing manual workload and producing records that are accurate by design rather than by effort. The result is a booking process that is faster for customers and more manageable for the venue, built on a data structure that can support the operational needs of Futsal Hayani Kopti as demand continues to grow.

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