## Introduction

Effective management of sports facilities is crucial for optimizing the use of resources, enhancing user experiences, and ensuring smooth operations within sports organizations, educational institutions, and private sports clubs. In the current landscape, many sports facility booking systems suffer from significant limitations that impact both users and administrators. These include poor communication, lack of real-time support, missed notifications, and inadequate data analysis, all of which contribute to user frustration, inefficient resource utilization, and poor decision-making.

The SportsHub Management System aims to address these prevalent issues by providing a comprehensive, AI-powered solution that enhances both user experience and administrative efficiency. This system incorporates an intelligent, real-time AI chatbot that offers immediate assistance, ensuring that users can resolve their inquiries without delay. Additionally, it integrates an automated reminder system, which aims to eliminate the problem of missed bookings by notifying users of upcoming reservations via email, SMS, or push notifications. This feature is expected to significantly reduce booking errors, improve attendance, and boost user satisfaction.

On the administrative side, the SportsHub Management System features an advanced, data-driven dashboard that provides real-time insights into booking trends, revenue patterns, and facility usage. By applying algorithms to analyze these patterns, the dashboard equips administrators with valuable decision-making tools, enabling them to optimize resource allocation, identify trends in bookings, and improve the financial performance of the facility. This system is designed to support data-driven decisions, providing administrators with the tools they need to manage sports facilities more effectively and efficiently.

The purpose of this project is to develop a scalable, user-centric platform that not only addresses the existing pain points within current systems but also introduces innovative features that enhance user engagement and facilitate better management for administrators. The SportsHub Management System combines modern technologies such as AI chatbots, automated reminders, and data analytics to create a more connected, responsive, and efficient management solution.

Through this project, we aim to demonstrate that the integration of AI and intelligent data analysis can revolutionize sports facility management. The solution’s key objectives are to improve communication, reduce missed bookings, and empower administrators with actionable insights that enhance their ability to make informed decisions. The SportsHub Management System promises to bridge the gap between users and administrators, offering a streamlined, intuitive platform that improves the overall experience for everyone involved.

## Project Background

The efficient management of sports facilities is critical for ensuring seamless operations in sports organizations, educational institutions, and private sports clubs. However, existing sports facility management systems are often inadequate, primarily relying on manual methods, such as booking via WhatsApp, which results in various challenges. These manual systems are inefficient, prone to errors, and often fail to meet the needs of both users and administrators. Users often struggle with slow responses and lack real-time assistance, while administrators face difficulties in tracking bookings, managing schedules, and analyzing trends. The reliance on WhatsApp for booking complicates the process further, as it lacks any automated reminders or tools to help manage facility usage effectively.

The SportsHub Management System was developed to address these issues by providing a modern, user-friendly platform for sports facility management. The system aims to replace the manual booking process with an automated, intelligent solution that offers a streamlined experience for both users and administrators. The platform integrates an AI-powered chatbot to provide real-time support and instant responses to user inquiries, improving communication efficiency. It also incorporates an automated reminder system that ensures users are notified of their upcoming bookings, minimizing the chances of missed reservations and enhancing user engagement. Additionally, a data-driven dashboard will be introduced, enabling administrators to gain valuable insights into booking patterns, facility usage, and sales trends. These insights will support better decision-making, optimize resource allocation, and improve the overall management of sports facilities.

Current booking systems, including those relying on WhatsApp, often lack the necessary features to provide a comprehensive solution for sports facility management. They fail to offer integrated support for communication, reminders, and data analysis, which results in inefficiencies and missed opportunities. The SportsHub Management System seeks to overcome these limitations by leveraging modern technologies such as AI, automated reminders, and data analytics to create a more efficient, user-friendly system. This system will ensure better communication, improved user experience, and more effective management for administrators, ultimately leading to enhanced facility utilization and increased user satisfaction.

**Problem Statement**

The management of sports facilities plays a vital role in promoting active participation, community engagement, and overall well-being. However, the current methods used to manage sports facility bookings are outdated, inefficient, and fail to provide adequate support for both users and administrators. Specifically, many sports facilities continue to rely on manual booking systems using WhatsApp, which leads to several operational challenges that affect both user experience and the facility's management effectiveness.

1. **Inefficient Communication and Lack of Real-Time Support**
   One of the most pressing issues with the current system is the **inefficient communication** between users (e.g., athletes, students, or members) and facility administrators. Since WhatsApp is used as the primary platform for booking inquiries, users must wait for responses to their questions, which can cause delays in confirming bookings or understanding facility availability. This lack of real-time support often leads to confusion, misunderstandings, and frustration, as users are unable to instantly clarify their queries. Additionally, the absence of an automated system means administrators are overwhelmed with manual inquiries and responses, which can lead to errors, double bookings, or missed requests. This inefficiency in communication hampers the overall booking experience, making it difficult for users to quickly and easily book facilities.

2. **Poor User Engagement and Missed Bookings**
   Another critical issue arises from the lack of proactive user engagement. In the current system, users are not sent automatic reminders for their bookings. This lack of timely notifications means that users often forget about their scheduled bookings, leading to missed bookings, wasted time slots, and inefficient utilization of the sports facilities. Missed bookings also impact user satisfaction, as individuals may become frustrated with their inability to secure a slot when the system fails to remind them of their reservation. Furthermore, the lack of engagement features prevents administrators from easily reaching out to users with updates, changes, or additional information. This issue not only wastes valuable resources but also diminishes the overall user experience, as users are left to manage their schedules without proper support or assistance.

3. **Inadequate Insights for Decision-Making**
   The existing system is severely limited when it comes to providing data-driven insights for administrators. Since booking data and usage information are recorded manually through WhatsApp, administrators struggle to track important metrics such as booking trends, user preferences, peak times, and revenue patterns. Without these insights, administrators are unable to make informed decisions regarding resource allocation, facility maintenance, or

pricing strategies. For example, if a facility consistently experiences high demand at specific times, administrators are unable to optimize the scheduling to maximize usage and revenue. Additionally, the lack of a central data repository makes it difficult to identify underutilized resources or emerging trends, preventing administrators from taking a proactive approach to improve facility management. This leads to inefficient operations, missed revenue opportunities, and a lack of strategic planning in the long term.

Given these challenges, the current manual booking system is clearly inadequate to meet the needs of both users and administrators. The inefficiencies in communication, poor user engagement due to missed bookings, and the lack of actionable data insights severely hinder the effectiveness of the sports facility management process. To address these problems, there is an urgent need for a more integrated, automated system that enhances communication, improves user engagement, and provides valuable insights for administrators. The SportsHub Management System has been designed to fill this gap by introducing an AI-powered chatbot for real-time support, an automated reminder system to prevent missed bookings, and a comprehensive, data-driven dashboard that provides actionable insights for improved decision-making and optimized resource management.

**Project Objective**

The primary goal of this project is to develop the SportsHub Management System, a web-based platform aimed at improving the overall efficiency of managing sports facility bookings while enhancing the user experience. The system will address the key issues found in current manual booking systems by automating communication, increasing user engagement, and providing valuable data-driven insights. The specific objectives of the project are as follows:

1. **To Enhance Communication through Real-Time AI-Powered Chatbot**
   A key objective is to improve the communication between users and administrators by integrating an AI-powered chatbot. The current manual booking process relies heavily on WhatsApp for inquiries, which is inefficient and often leads to delayed responses and confusion. By implementing an AI chatbot, users will be able to get instant, real-time responses to their inquiries about booking availability, facility schedules, and policy clarifications. The chatbot will be capable of handling common queries, enabling users to quickly access information without waiting for an administrator's response. This not only improves the speed of communication but also enhances user satisfaction by providing them with continuous, on-demand support. Additionally, administrators will benefit from a reduction in repetitive inquiries, allowing them to focus on more complex tasks while maintaining a high level of user engagement and support. The success of this objective will be measured by the reduction in response times and an increase in user satisfaction and engagement.

2. **To Improve User Engagement with Automated Reminder and Notification System**
   Another major objective is to develop an automated reminder and notification system that will help improve user engagement and reduce missed bookings. The current manual system does not provide reminders to users about their scheduled bookings, resulting in missed appointments and underutilization of the sports facilities. The automated reminder system will notify users in advance about their upcoming bookings through email, SMS, or push notifications, ensuring they are always aware of their reservation. By automating this process, users will be reminded of their bookings without the need for manual intervention from administrators, which will help reduce errors and booking conflicts. This objective directly addresses the issue of poor user engagement and missed bookings, leading to better attendance rates and more efficient use of the facilities. Furthermore, the reminder system will enhance user experience by ensuring that users feel more connected and engaged with the sports facility's operations. The effectiveness of this system will be evaluated by tracking the reduction in missed bookings and improved attendance rates.

3. **To Provide Data-Driven Insights with a Sales Trend and Facility Usage Dashboard**
   The final objective is to develop a data-driven dashboard that will provide administrators with valuable insights into booking trends, facility usage patterns, and sales data. Currently, administrators face significant challenges in analyzing data from the manual system, which results in inefficient decision-making. The SportsHub Management System will include an interactive dashboard that visualizes key metrics such as booking frequency, peak usage times, user preferences, and revenue patterns. The dashboard will use algorithms to analyze historical data and generate actionable insights that can help administrators optimize scheduling, manage resources more effectively, and adjust pricing strategies based on demand. For example, the system will highlight peak booking times, identify underutilized facilities, and provide suggestions for optimizing facility use based on past trends. By incorporating these data-driven insights, the system will empower administrators to make informed, strategic decisions, ultimately improving facility management and profitability. The effectiveness of this objective will be assessed by evaluating the ease of use and accuracy of the dashboard, as well as its impact on decision-making and resource management efficiency.

### 1.5.1 Project Scope

This project involves the development of a web-based SportsHub Management System designed to streamline the management of sports facility bookings, enhance communication, and provide valuable insights for administrators. The system will incorporate a real-time AI-powered chatbot for instant support, an automated reminder and notification system to reduce missed bookings, and a data-driven dashboard for administrators to analyze booking trends and facility usage. Additionally, the system will feature role-based access to ensure that users and administrators can access appropriate functionalities.

The project will include the development of secure login mechanisms, user registration, booking management, notification systems, data analytics, and responsive web design. Functional testing, performance validation, and security measures will be implemented to ensure the reliability and efficiency of the system, particularly in handling sensitive user data.

### 1.5.2 Product Scope

The final product will include:

- **Secure login and role-based access** for users (athletes, staff, administrators, and facility managers).
- **AI-powered chatbot** for real-time communication, assisting users with booking inquiries and availability checks.
- **Automated reminder system** for users to receive timely notifications regarding their bookings via email, SMS, or push notifications.
- **Booking scheduling and management module** to streamline the booking process and facilitate easy tracking of facility reservations.
- **Data-driven dashboard** for administrators to visualize booking trends, facility usage patterns, and revenue insights.
- **User management features** for administrators to manage and track users, including athletes, staff, and facility managers.
- **Audit logs** to track all user activity and data modifications, ensuring transparency and security.
- **Responsive web interface** optimized for both desktop and mobile devices, ensuring usability across various platforms.
- **Security features** to protect user data and ensure compliance with relevant data protection regulations.

### 1.5.3 Target User

The primary users of the SportsHub Management System are:

**Sports Club Managers/Administrators:**

They are responsible for managing teams, scheduling facility bookings, and overseeing member registrations. They will use the system to monitor bookings, manage resources efficiently, and access the data-driven dashboard for insights on usage and revenue patterns.

**Players and Members:**

These users will interact with the system to book sports facilities, view schedules, track their booking history, and receive timely reminders for their upcoming bookings. They will also use the AI-powered chatbot for inquiries regarding availability or booking modifications.

**Facility Operators/Staff:**

They handle the day-to-day operations of the sports facilities, including verifying bookings, assisting with facility maintenance, and ensuring that resources are allocated according to the schedule. They will also support administrative tasks, such as managing user registration and responding to booking-related queries.

## 1.6 Overview of This Report

### Chapter 1: Introduction

An outline of the project's history and the driving forces behind its creation are given in this chapter. It highlights the primary issues with conventional clinic operations, including ineffective patient data management, manual record-keeping, and a lack of security. To guarantee that the system successfully handles these problems, the project's goals are spelled out in detail. By describing the main characteristics and constraints, the chapter also establishes the project's scope. It also outlines the system's intended users, who will directly benefit from it and include clinic administrators, physicians, and patients.

### Chapter 2: Literature Review

An extensive review of previous studies and research on clinic management systems is provided in this chapter. In order to offer suggestions for improvement, it examines the advantages and disadvantages of the current solutions on the market. The review also emphasizes the significance of cybersecurity regulations, stressing the need to safeguard private patient information from unwanted access. Additionally, it looks at pertinent technologies that aid in the creation of a safe and efficient clinic management system, including database management systems, web development frameworks, and security measures.

### Chapter 3: Methodology

The system's functional and non-functional requirements are covered in detail in this chapter. Features like patient registration, appointment scheduling, medical record management, and user authentication are examples of functional requirements. Aspects like system performance, data security, usability, and scalability are the focus of non-functional requirements. When combined, these specifications offer a clear framework for system development and guarantee that the finished product satisfies user needs.

### Chapter 4: System Requirements

The system's functional and non-functional requirements are covered in detail in this chapter. Features like patient registration, appointment scheduling, medical record management, and user authentication are examples of functional requirements. Aspects like system performance, data security, usability, and scalability are the focus of non-functional requirements. When combined, these specifications offer a clear framework for system development and guarantee that the finished product satisfies user needs.

**Chapter 5: System Analysis**

The system analysis completed during the project is presented in this chapter. Use case diagrams, which show how users interact with the system, are used to explain how the system will work. Additionally, process flow diagrams are provided to illustrate the system's logical sequence of operations. The system's functional behavior is precisely defined by this analysis, guaranteeing that the system design is founded on precise and well-organized requirements.

**Chapter 6: System Design**

The system design is covered in detail in this chapter, with particular attention paid to the underlying architecture and interface. By making sure that users can navigate and access system features with ease, the interface design places a strong emphasis on user-friendliness. Additionally, database modeling is shown, illustrating the organization of data storage and the connections between entities like patients, physicians, and appointments. The system's efficiency, security, and organization are guaranteed during the design phase.

**Chapter 7: Implementation**

The system's implementation process is covered in this chapter. It describes how the right programming languages, frameworks, and tools were used to turn the design into a functional system. The chapter also emphasizes how different modules and features are integrated to guarantee seamless operation. To give a clear understanding of how the system was developed from concept to execution, the implementation process is documented step-by-step.

**Chapter 8: Testing**

The testing techniques used on the system to guarantee its dependability and quality are covered in this chapter. To determine whether the system satisfies the requirements, a variety of testing techniques are used, including unit testing, integration testing, and user acceptance testing. The outcomes are displayed to demonstrate the security, stability, and performance of the system. Any mistakes or problems found during testing are talked about, along with the actions done to fix them.

**Chapter 9: Project Management**

The project management tasks that aided in the system's development are described in this chapter. Making a Gantt chart to display the project's timeline and milestones is part of it. In order to determine possible obstacles that might impact the project and the methods used to reduce these risks, risk analysis is also provided. The section on project management makes sure that the development process is planned, tracked, and in line with the goals.

## Chapter 10: Conclusion

This chapter wraps up the report by assessing whether the project's goals were met. It considers how well the system works to address the issues mentioned in the introduction. To give a clear picture of the project's shortcomings, the constraints encountered during its execution are also examined. Lastly, suggestions for future enhancements are made, outlining methods to improve the system's functionality, scalability, and security for sustained use.

# Chapter 2 **LITERATURE REVIEW**

## 2.1 INTRODUCTION

The proliferation of digital solutions has revolutionized service-based industries, setting new standards for efficiency, accessibility, and customer experience. Within the sports and recreation sector, there is a growing imperative to transition from fragmented, manual operational methods to integrated, automated systems. This chapter conducts a comprehensive literature review to establish the theoretical and practical foundation for the Sportshub Management System. It critically examines existing scholarly work, market-available platforms, and relevant technologies related to online booking systems, notification management, and analytics dashboards in sports facility ecosystems. The purpose of this review is to identify gaps in current solutions, justify the need for a tailored system like Sportshub, and inform the design and technological choices that will underpin its development, ensuring it is both academically grounded and pragmatically viable.

## 2.2 INVESTIGATION (4W 1H)

A structured investigation using the 4W 1H framework (What, Where, Who, Why, How) is employed to delineate the fundamental aspects of the Sportshub system, providing a clear contextual understanding of the project.

- **What is the Sportshub system?** Sportshub is a comprehensive, web-based sports management system designed to integrate and automate the core operations of sports facilities and clubs. It functions dually as a centralized booking and scheduling hub and an intelligent administrative tool. Its primary functions include an AI-powered chatbot for real-time user support, an automated reminder and notification system, and a data-driven dashboard for sales trend analysis, all aimed at creating a seamless workflow from booking inquiries to facility optimization.
- **Where will the system be implemented?** The system will be deployed as a live, responsive website accessible on various devices, including desktops, tablets, and smartphones. It will be hosted on a professional web hosting server (e.g., AWS or university server), ensuring constant availability for users to make bookings and receive notifications. Administrators will access the backend from any location to manage schedules, analytics, and communications.
- **Who are the primary users?** The system is designed for three distinct user groups with interrelated needs:

1. **Sports Club Managers and Administrators:** They will use the system to manage teams, schedules, bookings, and member information efficiently, leveraging dashboards for data-driven insights.
2. **Players and Members:** This group includes athletes and enthusiasts who will register for events, check schedules, track performance, and receive notifications.
3. **Clients:** This encompasses sports organizations, school/university sports departments, or private clubs seeking a centralized platform to oversee activities and maximize resource utilization.

- **Why is this system important?** The need for this system is driven by significant inefficiencies identified in current processes, as highlighted in the problem statements. These include inefficient communication and lack of real-time assistance, poor user engagement due to missed notifications, and inadequate insights for decision-making that hinder resource allocation and revenue optimization (Smith, 2020; Johnson, 2022; Patel, 2019). By automating these processes, Sportshub aims to reduce administrative delays, minimize missed bookings, enhance user satisfaction, and support data-informed strategies, thereby fostering operational efficiency and growth in sports management.
- **How will the system be implemented?** The system will be developed using the Agile methodology, allowing for iterative progress through structured sprints and continuous feedback. The implementation will leverage a modern technology stack selected for its robustness, scalability, and efficiency:
    - **Backend:** Laravel or Node.js (for handling user authentication, booking logic, and API integrations).
    - **Frontend:** React.js with HTML, CSS, and Bootstrap (for creating a responsive and user-friendly interface).
    - **Database:** MySQL or PostgreSQL (for reliable storage of bookings, user data, and analytics).
    - **Development Tools:** VS Code, Git, XAMPP, and Figma. The core features to be implemented, directly addressing the project objectives, are an AI chatbot integration module, an automated reminder system (via email/SMS/push notifications), and a sales trend dashboard with algorithmic analysis.

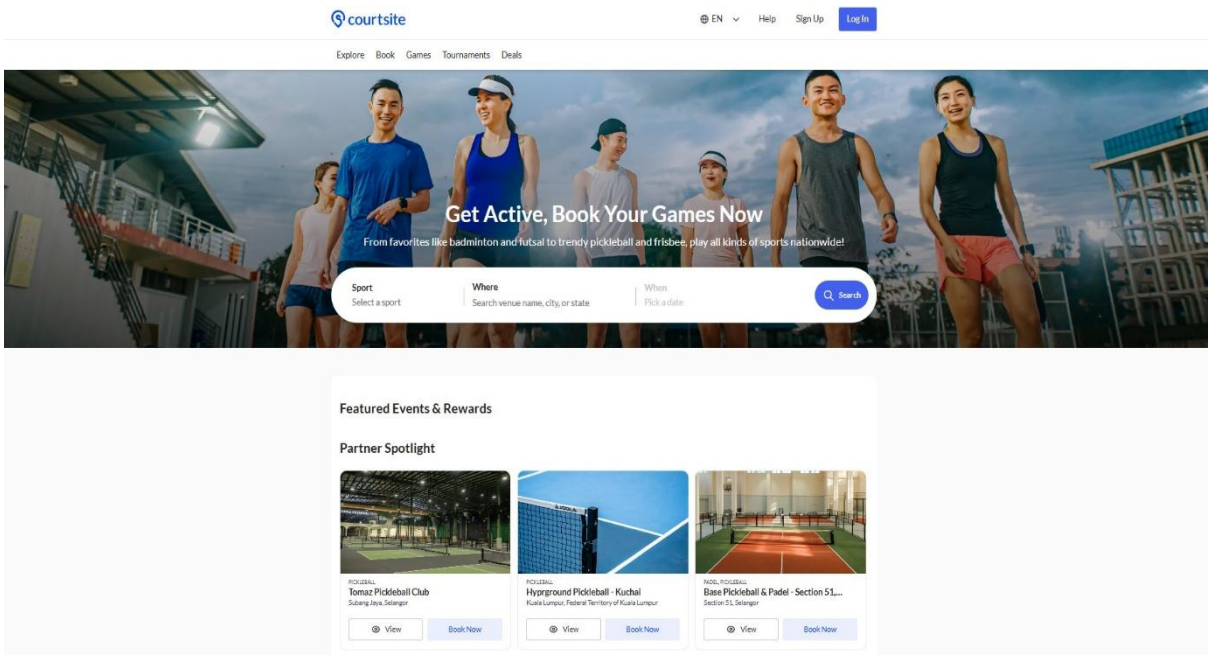
## 2.3 RELATED WORKS

To better position the Sportshub project within the existing landscape, this section analyzes three relevant Malaysian-based systems that offer solutions in the domains of sports facility booking, user communication, and administrative analytics. The analysis will focus on their core features, strengths, and limitations, thereby highlighting the specific gap that Sportshub aims to fill.

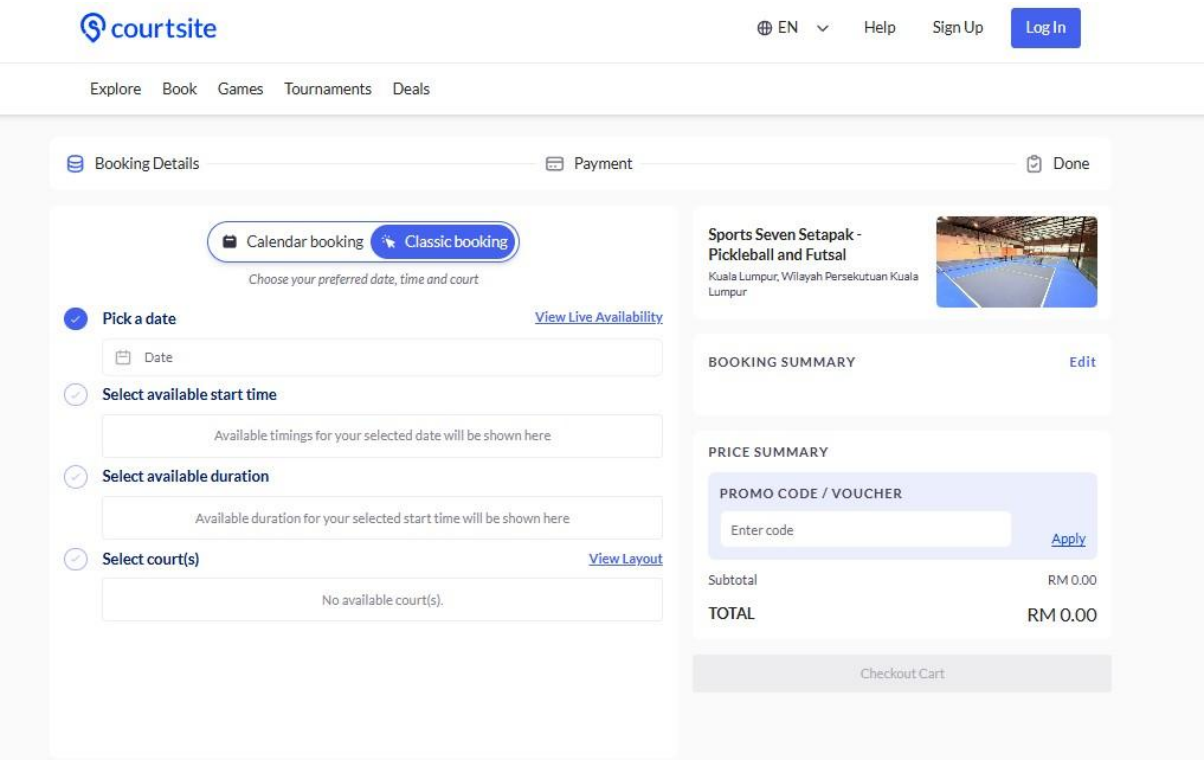
1. **MetaHub (metahub.my)** MetaHub is a Malaysian platform specializing in online bookings for sports like football, futsal, badminton, and pickleball, connecting users with venues nationwide. Key features include a venue search with live availability checks, manual booking confirmations via WhatsApp or calls, deposit payments, and support for extensions, monthly plans, and leagues with registration fees. Notifications are handled informally through admin WhatsApp chats, with no automated reminders. Analytics are absent, and user support relies on FAQs, WhatsApp (10 AM–12 AM), and direct admin contact for issues like receipts or opponent matching. Its strengths include a simple, flexible booking process with promotions (e.g., 10% league discounts) and comprehensive FAQs that reduce common queries, making it accessible for casual users. However, limitations are evident in the lack of automated notifications or reminders, leading to potential missed bookings, and no real-time chat or admin dashboards for trend analysis, relying on manual communication that can cause delays. Sportshub addresses this by integrating an AI-powered chatbot for instant support and automated multi-channel reminders, alongside algorithmic sales dashboards to enable proactive facility management.
2. **Futbola (futbola.my)** Futbola is a community-focused Malaysian app for futsal enthusiasts, allowing solo or team bookings at partnered venues like Uptown Sports Bangi and IOI City Mall. Core features encompass venue-integrated scheduling for specific slots (e.g., evening kickabouts), team/player profile management, tournament tracking, and real-time match updates. Notifications include basic confirmations and alerts for games, though details on reminders are limited. Analytics cover player stats and match tracking via a "Manage My Futbola" dashboard, with implied venue tools for monitoring schedules. User support is provided through WhatsApp chats and venue collaborations. Strengths lie in its seamless community integration, real-time tools that enhance engagement, and ease of booking without needing opponents, fostering a vibrant futsal ecosystem in areas like Putrajaya. Limitations include unclear notification reliability (e.g., no specified SMS/email reminders), shallow analytics lacking sales trend predictions, and no dedicated live support beyond WhatsApp, which may not scale for peak times. Sportshub extends this by adding automated reminder systems across channels and advanced dashboards with algorithms for broader booking insights, while incorporating AI chat for immediate query resolution.
3. **Courtsite (courtsite.my)** Courtsite is Malaysia's leading online booking platform for diverse sports facilities, including badminton, futsal, pickleball, and frisbee, serving over 600,000 users across 330+ nationwide venues. It features a search bar for venues by sport, city, or state, 24/7 online bookings with integrated payments, and management tools for facility owners to handle reservations hassle-free. Notifications and reminders are not explicitly detailed

but implied through booking confirmations. Analytics include basic venue dashboards for operations, though advanced insights like trends are limited. User support emphasizes partner center collaborations and a straightforward platform for players. Its strengths are in nationwide accessibility, seamless payment processing, and user-friendly search that simplifies finding and reserving courts, benefiting both players and owners. However, it lacks integrated real-time AI support, automated multi-format reminders, and robust data analytics for sales patterns, potentially leading to underutilized resources and manual oversight. Sportshub fills this gap with an AI chatbot for proactive assistance, reliable notification systems to boost attendance, and intelligent dashboards to drive data-informed decisions for administrators.

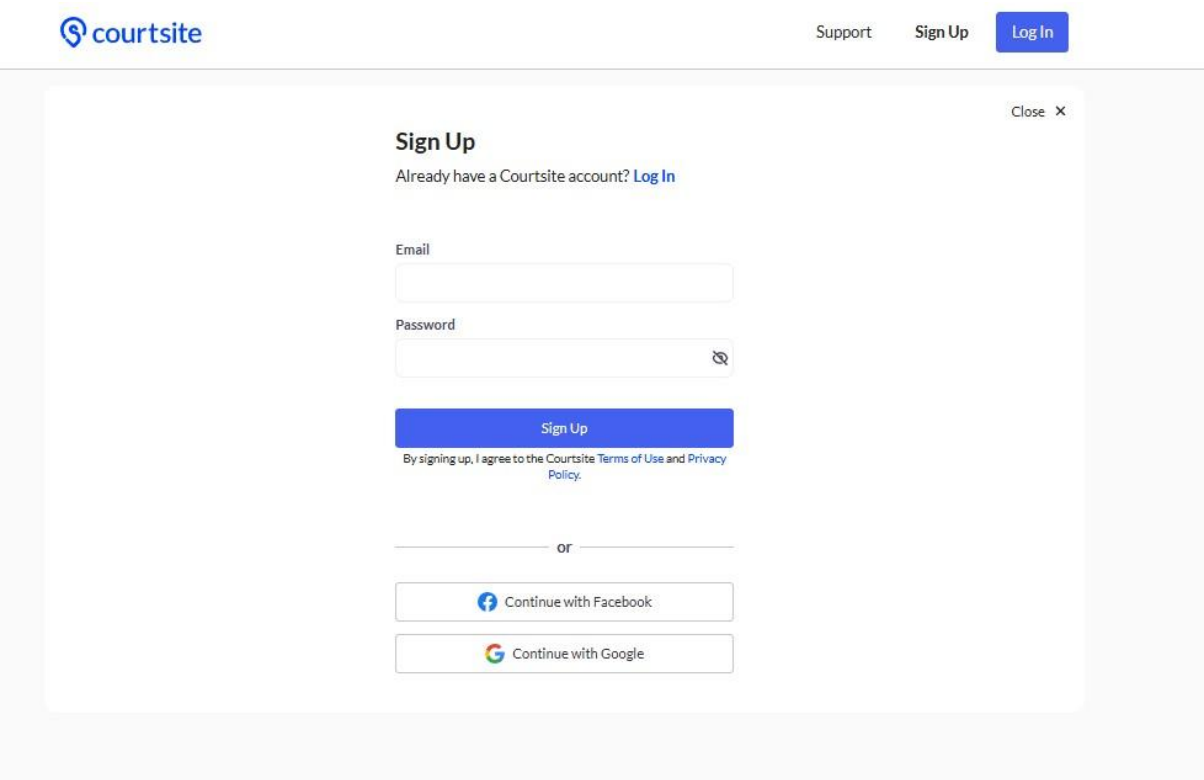
### 2.3.1 Courtsite.my




Courtsite is an online sports booking platform that allows users to easily search for and reserve courts for various sports such as badminton, futsal, and pickleball. Through its user-friendly interface, users can select their preferred sport, location, and date to find available venues nationwide. The website also features partner spotlights, upcoming events, and special deals, making it a convenient one-stop platform for discovering and booking sports facilities.




This page on Courtsite functions as the booking interface, where users can select a date, start time, duration, and specific court for their chosen venue. It provides two booking options calendar or classic view and displays live availability to make scheduling easier. Users can also view a booking summary, enter promo codes or vouchers, and see the total cost before proceeding to payment and checkout.



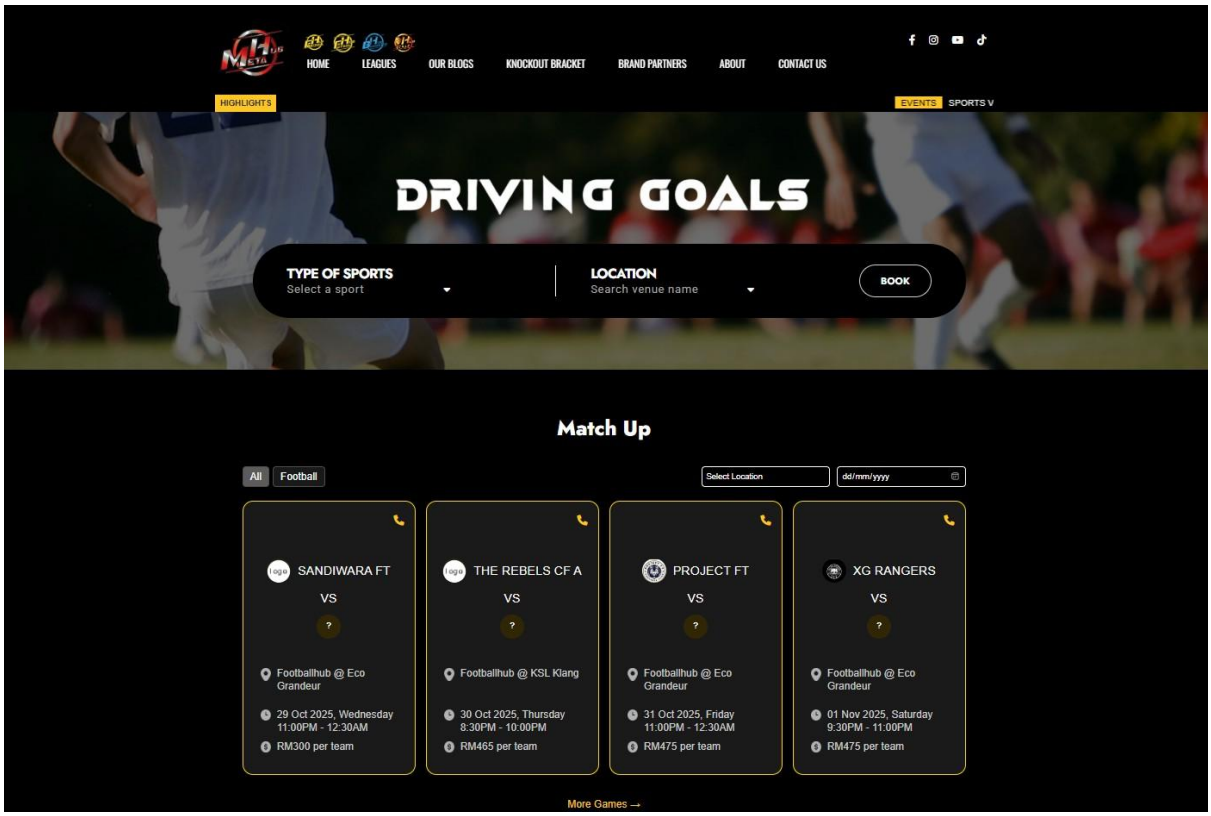

This page on Courtsite serves as the sign-up interface, allowing new users to create an account by entering their email and password or by signing up through Facebook or Google. It enables users to register quickly and securely to access features such as booking courts, managing reservations, and joining tournaments.

Proposed SportsHub Management System holds key strengths over a platform like courtsite.my primarily through its advanced, intelligent features aimed at strategic management. While systems like courtsite.my excel at the straightforward task of court booking, your proposal goes further by directly addressing critical operational pain points. Its main strengths lie in integrating an AI-powered chatbot for instant user support, a proactive automated reminder system to reduce missed bookings, and a sophisticated data analytics dashboard. This dashboard is a significant differentiator, as it provides administrators with actionable insights into sales trends and facility usage, transforming the system from a simple booking tool into a comprehensive decision-making platform for entire sports organizations.

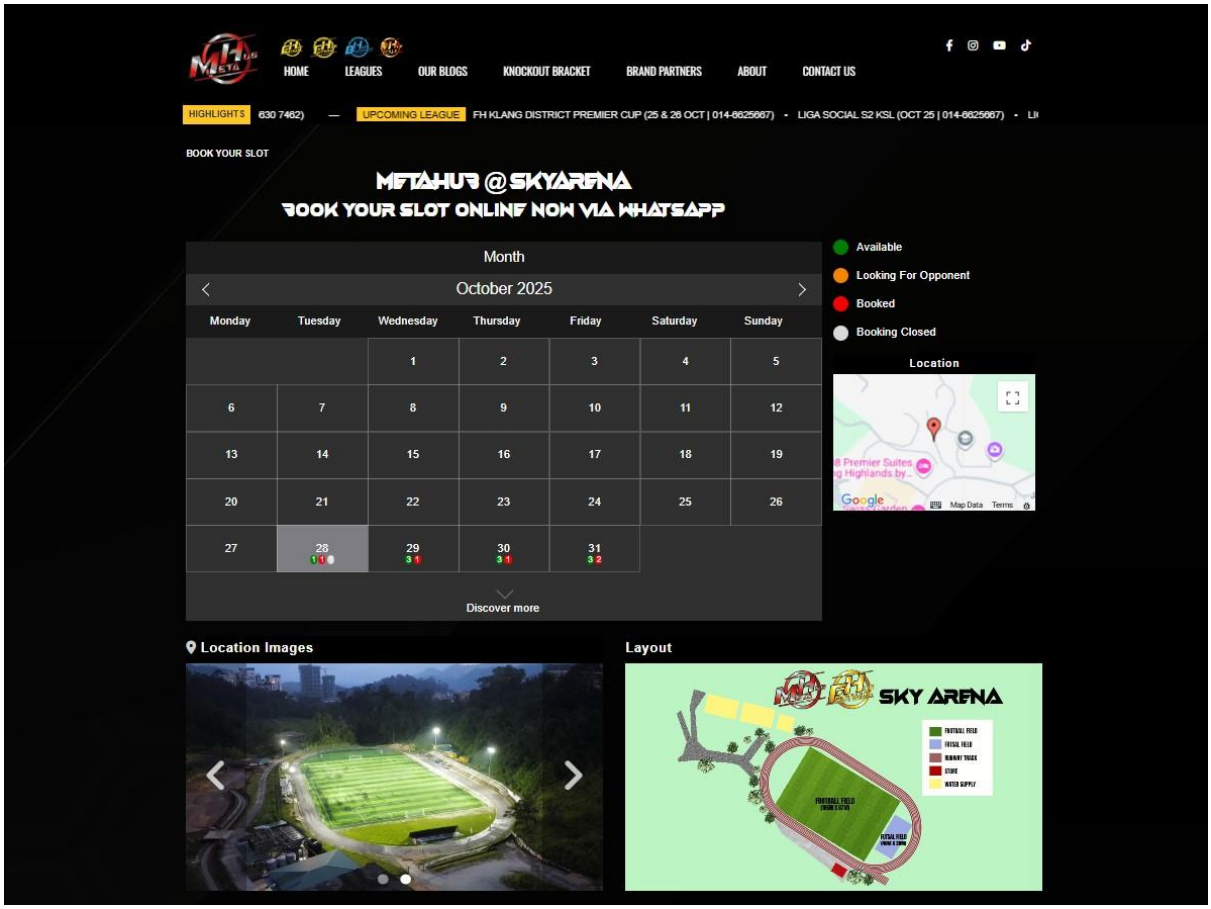
However, the primary weakness of SportsHub system, compared to the established courtsite.my, lies in its complexity and unproven real-world reliability. courtsite.my's strength is its refined, stable, and likely user-friendly execution of core booking

functions. Your proposed system, being far more ambitious, carries the risk of becoming over-engineered or suffering from integration challenges, potentially leading to a clunky interface, inaccurate analytics, or an underperforming chatbot. For an individual simply looking to book a court quickly, the simpler courtsite.my would be more straightforward. Your system's success is therefore contingent on executing its complex vision without compromising the simplicity and stability that users expect from a core booking service.

### 2.3.2 METAHUB.MY

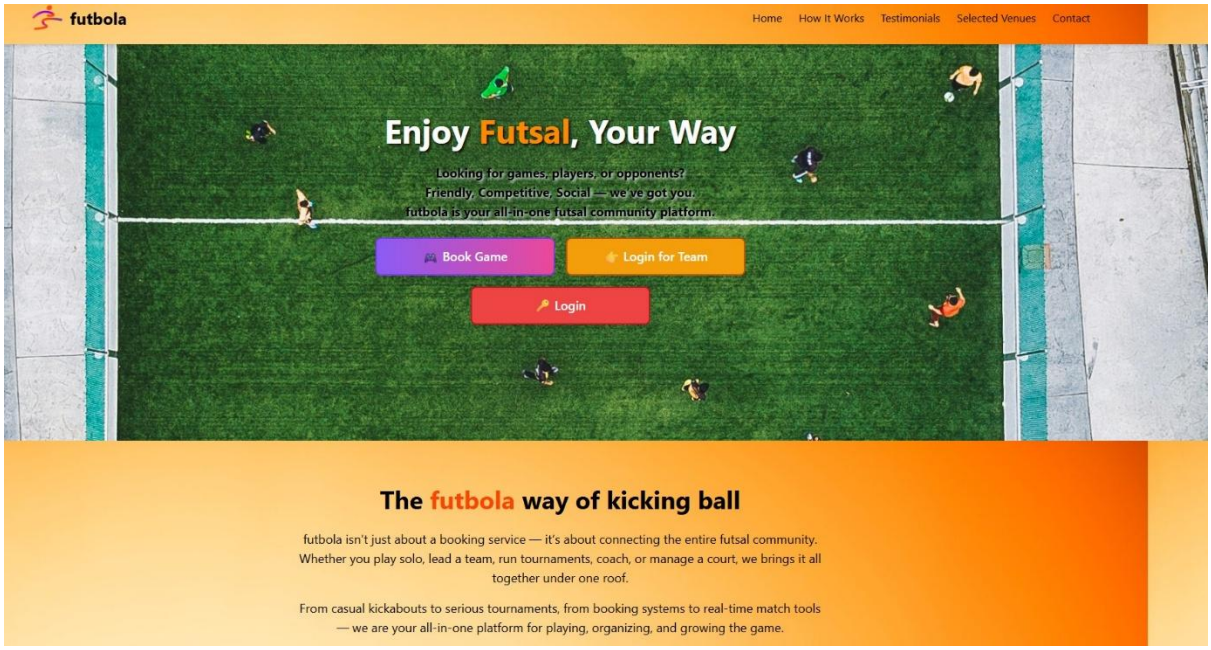



This screen from the "Match Up" app functions as a game-finding platform that connects teams for scheduled matches. Instead of just booking an empty venue, users can browse listings where one team has already reserved a facility and is specifically looking for an opponent to join them. Each listing displays all essential details including the host team's name, venue location, match date and time, and the cost per team, allowing other teams to easily find and join available games that match their preferences and schedule.

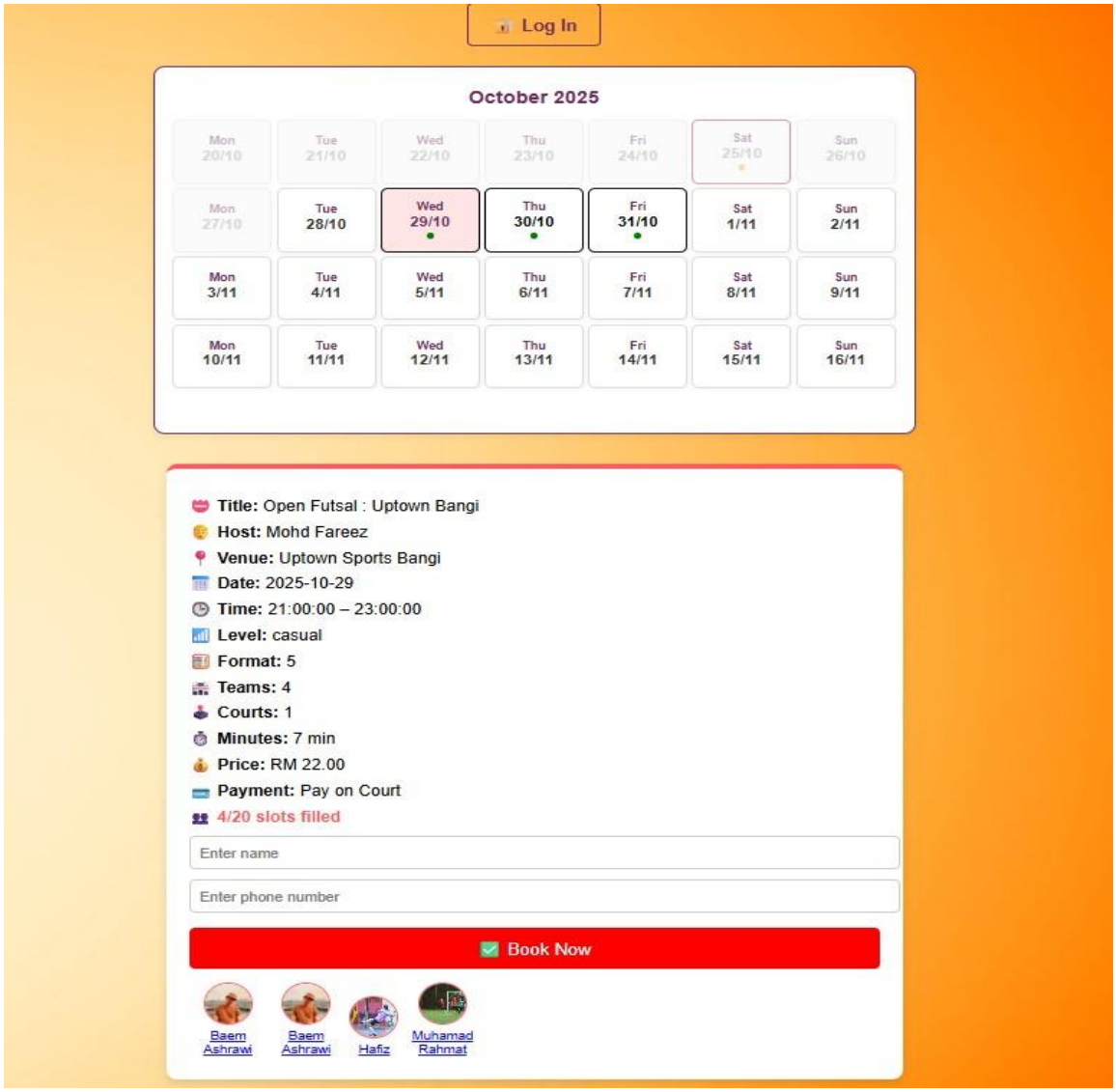



This is a booking interface for a venue called METAHUB @ SKYARENA. While the header instructs users to "BOOK YOUR SLOT ONLINE NOW VIA WHATSAPP," the core function is the opposite: selecting a date from the October 2025 calendar will likely direct you straight to their WhatsApp number, pre-filled with a message to book the chosen date, streamlining the process of reserving a slot through the messaging app.

Your proposed SportsHub Management System holds a significant strength over a platform like metahub.my by offering a fully integrated, automated online booking and payment system, which eliminates the manual, WhatsApp-dependent process that Metahub uses, thereby saving time and reducing errors for both users and administrators. Furthermore, your system's advanced features—like the AI chatbot for instant support, automated reminders to prevent missed bookings, and a data-driven dashboard for business insights—provide a comprehensive management solution that Metahub lacks. However, a potential weakness of your system is its higher complexity and development cost, whereas Metahub's simple, WhatsApp-based approach is low-cost and requires minimal technical setup, making it easier and cheaper for a venue to implement initially, albeit at the cost of long-term efficiency and scalability.




This is the homepage for a platform called "futbola," which presents itself as an all-in-one futsal community hub designed not just for booking courts but for connecting players and organizing the sport. Its key functions include allowing users to book games and log in as a team, with a core mission to serve everyone from solo players and teams to tournament organizers and court managers by integrating playing, organizing, and community growth into a single platform.




This is a booking page for a specific futsal event titled "Open Futsal : Uptown Bangi," hosted by Mohd Fareez, where after a user logs in, they can see the event details—including date, time, format, and price—and fill in their name and phone number to claim one of the remaining slots for this casual 5-a-side game, with payment to be made directly at the venue.

Your proposed SportsHub Management System's key strength over Futbola.my lies in its advanced, data-driven backend features designed for facility administrators—specifically the AI-powered chatbot for 24/7 user support and the intelligent sales trend dashboard for strategic decision-making, which Futbola's more user-facing, community-centric platform does not emphasize. However, Futbola's strength is its proven, specialized focus on building a vibrant futsal community with features like open game matching for individuals and teams, which presents a weakness for your system as it risks being a more generalized management tool that may not achieve the same level of user engagement and niche community loyalty in a specific sport like futsal.

## 2.4 COMPARISON OF RELATED WORKS

| Feature | metahub.my | futbola.my | courtsite.my |
|---|---|---|---|
| **Core Purpose** | Venue-specific booking page that directs users to WhatsApp. | Community-centric platform for connecting futsal players and organizing games. | Streamlined court booking marketplace for finding and reserving venues. |
| **Booking & Payment** | Manual via WhatsApp; no integrated payment. | Integrated booking; "Pay on Court" or online. | Fully integrated online booking and payment. |
| **User Engagement** | No automated engagement; reliant on manual WhatsApp chats. | Strong community features; open game listings for players to join. | Basic transactional engagement; focused on the booking process itself. |
| **Admin & Analytics** | Minimal to none; manual tracking via WhatsApp/Excel. | Likely basic booking reports; focused on community management, not deep analytics. | Basic sales and booking reports; lacks predictive analytics. |
| **Target Audience** | Individual venue owners seeking a simple, low-tech online presence. | Solo players, casual teams, and the futsal community. | Individual players and teams looking for the quickest way to book a court. |
| **Key Strength** | Extremely low technical barrier and cost for venue owners. | Powerful community-building and player matching for a specific sport. | Reliability, simplicity, and a polished user experience for core booking. |
| **Key Weakness** | Inefficient, manual process that doesn't scale and provides a poor user experience. | Sport-specific (futsal) and may lack advanced business intelligence tools. | Limited to transactional booking; lacks community and advanced management features. |
| **Market Position** | Basic Venue Listing & Contact | Niche Community Platform | Mass-Market Booking Marketplace |

## 2.5 DISCUSSION

Table shows the comparison aspects of three existing sports management platforms. The three platforms reviewed have significant connections to the SportsHub Management System project. Each of these platforms addresses different aspects of sports facility management, including venue booking, community engagement, and payment processing. These goals align with the SportsHub project's objectives of providing a comprehensive solution for managing sports facilities while enhancing user experience and administrative efficiency.

Additionally, the reviewed platforms highlight various strategies that could help develop a more robust and user-centered system for the SportsHub project. For instance, Metahub.my demonstrates the importance of a simple, low-cost solution for venue owners, while Futbola.my emphasizes community-building features for players. Courtsite.my showcases the effectiveness of a streamlined, transactional booking system. These insights will guide the development of the SportsHub project, ensuring it incorporates the strengths of these platforms while addressing their limitations.

The three existing platforms were chosen for this comparative analysis because they represent diverse approaches to sports facility management in different contexts. Metahub.my was selected for its simplicity and focus on directing users to WhatsApp for bookings, which highlights the need for an integrated booking system. Futbola.my was included for its strong community features, such as open game listings, which are essential for engaging users. Courtsite.my was reviewed for its efficient and reliable booking marketplace, demonstrating the importance of a seamless user experience. Collectively, these platforms provide a solid foundation for identifying effective strategies and potential gaps in the SportsHub project, ensuring it is well-supported by existing solutions and real-world implementations.

From the comparative analysis conducted, Futbola.my will serve as a key reference model for the SportsHub project's development. Its focus on community engagement and player matching aligns closely with the SportsHub project's objective of creating a platform that connects users and enhances their experience. For example, Futbola.my allows solo players to join open games, a feature the SportsHub project plans to adapt and expand upon. To improve this functionality, ideas from other

platforms, such as Courtsite.my's integrated payment system, will be incorporated to create a more seamless and comprehensive solution.

The reviewed platforms also underscored the importance of automated reminders and real-time support, which are currently lacking in systems like Metahub.my. The SportsHub project will address this gap by integrating an AI-powered chatbot for instant user assistance and an automated reminder system to reduce missed bookings. The success of such features in other contexts confirms their value in enhancing user satisfaction and operational efficiency, making them critical components of the SportsHub project.

Moreover, the reviewed platforms highlighted the need for data-driven insights for administrators, an area where existing systems like Courtsite.my and Futbola.my show limitations. The SportsHub project will include an advanced dashboard with sales trend analysis and facility usage reports, enabling administrators to make informed decisions. This feature, combined with community-building tools and a seamless booking process, will position the SportsHub project as a holistic solution for modern sports facility management.

## 2.6 Conclusion

This chapter has established a clear justification for the SportsHub Management System by critically analyzing the existing landscape of sports facility platforms. The review of Metahub.my, Futbola.my, and Courtsite.my revealed a common market gap: while each excels in specific areas like basic booking, community building, or transactional efficiency, none offer a unified solution that combines intelligent user support, automated engagement, and advanced data analytics for administrators. Therefore, the SportsHub project is positioned to fill this void by integrating an AI-powered chatbot, a proactive reminder system, and a data-driven dashboard, creating a comprehensive and intelligent management platform that addresses the limitations of current systems and leverages their collective strengths.

# 3.0 METHODOLOGY

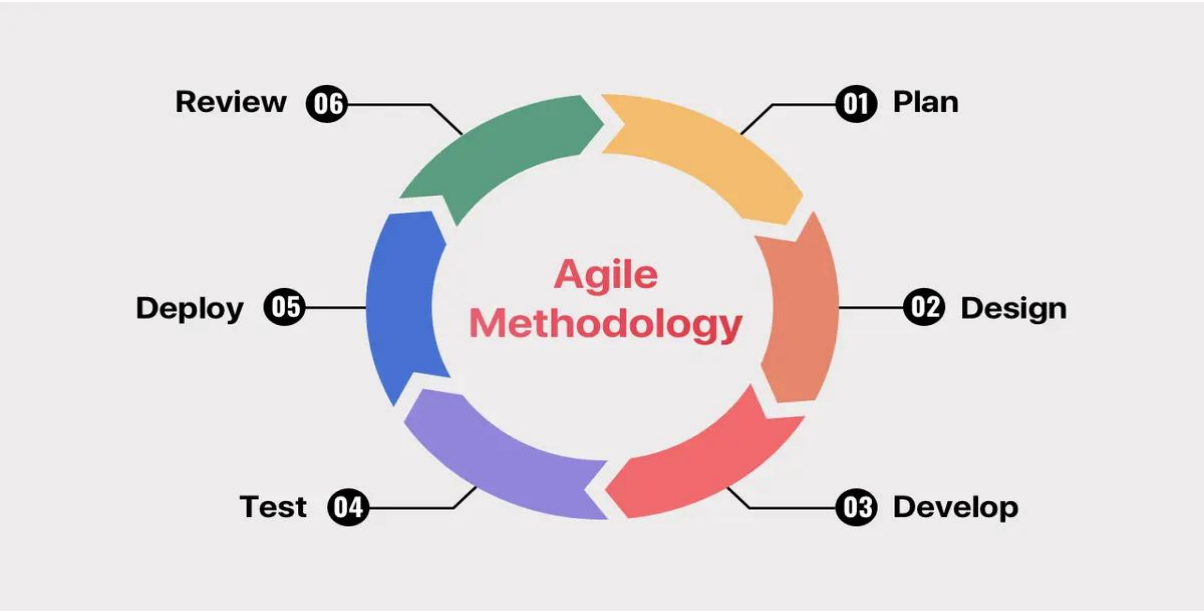
## 3.1 Introduction

In project management, a methodology is essential for managing, planning and executing the project. Day (2022) stated in Forbes that a methodology refers to a set of principles, guidelines, procedures and values that the project managers rely on for execution of the projects. It plays a crucial part that support in organizing the projects effectively, maximizing the performance and efficiency throughout the project life cycle (Adobe Experience Cloud Team, 2023). Moreover, a solid methodology gives a structured plan for managing tasks, ensuring that every phase of the project is carried out properly and aligns with the objectives of the project. Consequently, it implies that project's methodology adopted often become the deciding factor in achieving the project's success (Casucian, 2024).

As stated by Casucian (2024), project methodologies can be significantly different based on the nature of the project and specific industry involved. In IT industry, methodology serves as a roadmap, providing structured approach to guide managing the complex journey of and IT project (Agus Agung Pribadi, 2023). Having these approaches are especially important for projects that have multiple phases and ongoing client feedback, as they offer a straightforward plan and a flexible framework to handle any changing requirements. For Sportshub Management System, the methodology selected is Agile Methodology, popular and versatile approach in IT that supports continuous changing.

## 3.2 Agile Methodology

According to Grzegorz and Bartosz (2021), Agile methodology for development is one of the most commonly used frameworks for managing IT project, surpassing Waterfall methodology in terms of popularity (Adobe Experience Cloud Team, 2023). This methodology is characterized by flexibility, adaptability, interactive progress, and emphasis on customer collaboration and satisfaction (Casucian, 2024). Established in 2001, Agile outlines 12 principles and values, structuring in the form Agile Manifesto (Coursera Staff, 2024).




Agile methodology works well and is very suitable for the SportsHub Management System project because it is adaptable and focuses on user requirements. Since the project involves developing a comprehensive management platform with an AI chatbot, automated reminders, and an analytics dashboard, it requires constant feedback from sports facility administrators, club managers, and end-users like players for continuous adjustments. Agile's iterative phases allow for consistent input and evaluation, which helps refine each module of the system according to real-time feedback. This process supports the evolving demands of the project, ensuring elements such as the booking interface, notification system, and data-driven insights remain effective, user-friendly, and aligned with stakeholder needs.

### 3.3 Phases in Agile Methodology

Agile methodology is divided into six main phases: Plan/Requirement, Design, Development, Testing, Deployment, and Review. Every phase of the development is structured to be flexible and iterative, enabling the SportsHub project to easily incorporate feedback and make adjustments throughout the entire development lifecycle.

#### 3.3.1 Plan/Requirement

The Plan/Requirement phase focuses on establishing goals, gathering necessary requirements, and drafting the project roadmap. This involves identifying what sports facility administrators, club managers, and players require for an efficient booking system, real-time support, and administrative insights. Findings from the literature review will help outline the importance of an AI chatbot, automated reminders, and a sales trend dashboard. The deliverables are the Project Plan and Project Roadmap.

### 3.3.2 Design

The Design phase focuses on developing a comprehensive blueprint for the system's architecture and user experience. This involves designing the database schema, user interface mockups for the booking system and admin dashboard, and planning the integration of the AI chatbot and notification services. Referring to approaches used in existing projects, features such as an intuitive booking flow and a clear data visualization dashboard will be prioritized. The deliverables are the System Architecture Diagram and Detailed UI/UX Design Specifications.

### 3.3.3 Development

The Development phase focuses on building the core modules of the SportsHub Management System. This involves coding the user booking interface, the administrative dashboard, integrating the AI chatbot for real-time support, and implementing the automated reminder system (email/SMS) and sales trend algorithms. These features will be developed in iterative sprints to create a functional and user-centric web application. The deliverables are the Functional Booking Module, Integrated AI Chatbot, Automated Reminder System, and Sales Trend Dashboard.

### 3.3.4 Testing

The Testing phase focuses on ensuring that all developed components of the SportsHub system function correctly and meet user requirements. This involves conducting unit, integration, and usability testing for the booking process, chatbot responsiveness, reminder delivery, and dashboard accuracy. Feedback from facility administrators and end-users will be crucial to assess the system's ease of use, reliability, and effectiveness in solving the identified problems. The deliverables are Test Reports and User Feedback Reports.

### 3.3.5 Deployment

The Deployment phase focuses on launching the live SportsHub Management System and making it accessible to end-users. This includes setting up the hosting environment, deploying the database, and migrating all functional modules including the booking system, chatbot, and admin dashboard to the production server. A user guide and training manual will be provided to administrators, assisting them in managing the system effectively. The deliverables are the Deployed Live System, Database Deployment Scripts, and User Training Manuals.

### 3.3.6 Review

The Review phase focuses on monitoring and evaluating the system's performance post-deployment. This includes gathering ongoing user feedback on features like the AI chatbot's helpfulness, the reliability of the reminder system, and the usefulness of the analytics dashboard. This feedback will highlight what aspects are working well and identify any areas that need refinement or additional features for future iterations. The deliverables are the Post-Implementation Review Report and a User Feedback Report with an Improvement Plan.

## 3.4 CONCLUSION

Agile methodology has been identified as the preferred methodology for the SportsHub Management System project, emphasizing its flexibility and suitability for projects requiring ongoing feedback and continuous improvements. Agile's structured phases Plan/Requirement, Design, Development, Testing, Deployment, and Review guide the project in systematically developing crucial components like the AI powered chatbot, automated reminder system, and data-driven dashboard. Each phase is designed to incorporate feedback from key stakeholders, particularly sports facility administrators and end-users, ensuring the final product meets user requirements and aligns with the project's objectives. By implementing Agile methodology, the SportsHub project can create a flexible, user-centric platform that allows for continuous refinement, ultimately enhancing the system's functionality, reliability, and overall impact on sports facility management.

# 4 REQUIREMENTS

## 4.1 Introduction

The requirement phase is a crucial part of system development, focusing on identifying and understanding the needs and expectations of users and stakeholders. Requirements gathering defines what the system should accomplish and serves as the foundation for the project's design, development, and evaluation (Landau, 2022). It ensures that the final product aligns with the objectives and minimizes misunderstandings or costly errors during later stages.

For the Sportshub Management System, requirement analysis plays a significant role in ensuring that the system effectively addresses the issues faced by sports facility users and administrators. The process involves collecting requirements from sports club managers, administrators, and players to design a system that manages facility bookings, communication, and analytics efficiently. These requirements help determine both functional and non-functional aspects of the system, such as the need for an AI-powered chatbot for instant support, automated reminder systems for users, and a data-driven dashboard for administrators. The ultimate goal is to develop a web-based platform that enhances operational efficiency, user engagement, and decision-making for sports facilities.

## 4.2 Data Gathering Technique

Data gathering techniques are essential for collecting information needed to define accurate project requirements. These methods help developers understand the needs and expectations of the end users, ensuring that the system design meets real-world demands (Arumugam, 2018). The choice of data collection method depends on factors such as time, cost, and the depth of information required (Indeed Editorial Team, 2024).

For the Sportshub Management System, two primary data collection methods were used — interviews and questionnaires. These techniques allowed the developer to gather both qualitative and quantitative insights from targeted participants, including sports facility administrators and users.

### 4.2.1 Interview

Interviews are a qualitative technique that involves direct communication with individuals or groups to obtain in-depth information on their needs, preferences, and challenges (University of Bath, 2023). For the Sportshub Management System, structured interviews were conducted with sports administrators and facility managers. These discussions provided valuable insights into the current issues within existing booking systems, such as slow response times, lack of reminders, and poor data visibility.

The interviews aimed to identify system requirements such as the integration of an AI chatbot for real-time assistance, automated notifications for upcoming bookings, and a comprehensive dashboard to track sales and usage patterns. The data obtained from the interviews served as a basis for refining the system's core functionalities and aligning them with user expectations.

### 4.2.2 Questionnaire

Questionnaires are a quantitative data collection method designed to gather responses from a large group efficiently, often using structured questions (Bhandari, 2021). For this project, online questionnaires were distributed to students, athletes, and frequent facility users through Google Forms. The questionnaire was designed to evaluate users' experiences with existing booking systems and gather their opinions on desired improvements.

The responses helped assess user awareness, satisfaction levels, and preferences regarding booking features, communication, and reminder systems. The data collected from the questionnaires supported the identification of critical functional requirements and ensured that the Sportshub Management System was tailored to meet the users' actual needs.

| **Functional Requirement** | **Description** |
|---|---|
| User Registration and Login | The system shall allow users (administrators, managers, players, and members) to register, log in, and manage their accounts securely. |
| Facility Booking Management | The system shall enable users to view available facilities, make new bookings, modify existing bookings, and cancel bookings as needed. |
| AI Chatbot Integration | The system shall include an AI-powered chatbot to provide instant responses to user inquiries, assist with booking processes, and offer system guidance. |
| Automated Reminder System | The system shall automatically send reminders and notifications via email, SMS, or push notification to alert users about upcoming bookings or events. |
| Administrator Dashboard | The system shall provide administrators with a dashboard to monitor bookings, facility usage, and user activity in real-time. |

| | |
|---|---|
| Sales and Booking Analytics | The system shall analyze and display booking trends, sales performance, and usage statistics using data visualization tools. |
| User Feedback Collection | The system shall allow users to submit feedback and ratings for booked facilities or system usage experience. |
| Report Generation | The system shall allow administrators to generate reports on bookings, revenue, attendance, and facility performance. |
| Search and Filter Function | The system shall enable users to search and filter facilities, schedules, or bookings based on criteria such as date, type, and availability. |
| Multi-User Role Management | The system shall support multiple user roles (admin, manager, player/member) with different access levels and permissions. |
| Notification Management | The system shall allow users and administrators to manage notification preferences (email, SMS, or in-app). |
| System Security and Data Protection | The system shall ensure data privacy, secure authentication, and protection of sensitive information using encryption methods. |
| Responsive Web Interface | The system shall be accessible and functional across different devices (desktop, tablet, mobile) with a user-friendly interface. |
| Facility Schedule Display | The system shall display real-time schedules and availability for each sports facility. |
| Admin Control Panel | The system shall allow administrators to add, edit, and remove facilities, manage users, and oversee system maintenance activities. |

| Non-Functional Requirement | Description |
|---|---|
| Performance | The system shall handle multiple user requests simultaneously without noticeable lag, ensuring smooth booking operations and chatbot responses. |
| Usability | The system shall have an intuitive, user-friendly interface that is easy to navigate for both administrators and end users. Clear menus, buttons, and icons will improve accessibility. |
| Reliability | The system shall maintain consistent performance with minimal downtime, ensuring that bookings and notifications operate without interruption. |
| Availability | The system shall be available 24/7 for users to access, with scheduled maintenance conducted during off-peak hours. |
| Scalability | The system shall be capable of supporting an increasing number of users, bookings, and facilities without degradation in performance. |
| Security | The system shall implement secure authentication, authorization, and data encryption methods to protect user credentials and confidential information. |
| Data Integrity | The system shall ensure that all user, booking, and payment data are accurately recorded, processed, and stored without corruption or loss |
| Maintainability | The system shall be developed with clean, modular code to allow easy updates, debugging, and feature enhancements in the future. |
| Compatibility | The system shall be compatible with major web browsers (e.g., Chrome, Edge, Firefox) and devices (desktop, tablet, mobile). |
| Portability | The system shall be easily deployable on different web servers or hosting platforms such as AWS or a university server. |
| Response Time | The system shall provide chatbot responses and booking confirmations within 2–3 seconds to ensure a smooth user experience. |
| User Privacy | The system shall comply with relevant data protection standards, ensuring that |

| | |
|---|---|
| | users' personal information is only used for authorized purposes. |
| Accessibility | The system shall comply with accessibility standards (e.g., text readability, color contrast) to accommodate users with disabilities |
| Auditability | The system shall maintain detailed logs of user activities, bookings, and administrative actions for tracking and accountability. |

### 4.5 System Requirement

System requirements define the essential hardware and software components needed for the successful development and operation of the Sportshub Management System (Requirements, 2024). These requirements ensure that the system performs efficiently and meets both functional and non-functional specifications throughout the development and deployment phases.

Since the Sportshub Management System involves features such as AI-powered chat support, automated reminders, data analytics, and web-based facility management, it is crucial to have suitable hardware and software to support these integrated components. The software requirements include tools such as React.js for frontend development, MySQL for database management, and Dialogflow for chatbot integration, supported by deployment through AWS hosting services.

On the hardware side, high-performance specifications such as an Intel Core i7 processor, 16–32 GB RAM, and 1 TB SSD storage are recommended to ensure smooth execution of development tasks, local server operations, and database handling. Additionally, a stable high-speed internet connection is essential for seamless access to cloud-based services like Firebase, GitHub, and Trello used during project management and deployment.

Together, these system requirements provide the necessary foundation for building a reliable, scalable, and efficient Sportshub Management System that enhances user engagement, communication, and data-driven decision-making for sports facility operations.

### 4.5.1 Hardware Requirement

| Hardware Component | Minimum Specification | Recommended / High Specification | Purpose / Functionality |
|---|---|---|---|
| Processor (CPU) | Intel Core i5 (10th Gen) / AMD Ryzen 5 | Intel Core i7 (12th Gen) or AMD Ryzen 7 5800X | Handles multi-threaded processes for system development, database management, and running local servers. |
| Memory (RAM) | 8 GB DDR4 | 16–32 GB DDR4/DDR5 | Ensures smooth multitasking while running IDEs, databases, browsers, and AI tools simultaneously. |
| Storage (SSD) | 512 GB SSD | 1 TB NVMe SSD | Provides fast read/write speeds for quick code compilation, data storage, and database access. |
| Graphics (GPU) | Integrated Graphics | NVIDIA GeForce GTX 1660 / RTX 3060 | Supports advanced visualization, data analytics rendering, and potential AI model processing. |
| Operating System | Windows 10 / macOS Catalina | Windows 11 Pro / macOS Ventura (latest) | Compatible with all development tools and software environments. |
| External Storage / Backup | 1 TB HDD or Cloud Drive | 2 TB External SSD or AWS Cloud Backup | Used for data backup, version storage, and project documentation. |
| Server / Hosting Environment | Shared Hosting | Cloud Server (AWS EC2, 8 vCPUs, 32 GB RAM, 500 GB SSD) | Hosts the live system for deployment, user testing, and performance evaluation. |

### 4.5.2 Software Requirement


**React.js**

Used to develop the web-based user interface for both administrators and users, ensuring a dynamic and responsive experience.


**MySQL**

Serves as the database system to store and manage all project data including users, bookings, and facility information.


**Dialogflow**

Provides the AI chatbot functionality that enables real-time automated responses and user assistance.


**Firebase Cloud Messaging**

Sends automated reminders and notifications to users about upcoming bookings or important updates.


**Python**

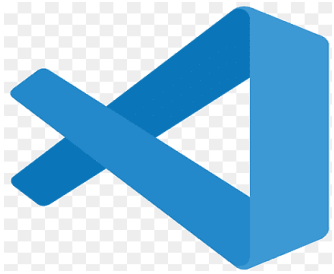
Used for data analytics and generating reports on sales trends and facility usage within the admin dashboard.


**AWS (Amazon Web Services)**

Hosts and deploys the live version of the system, ensuring scalability and high availability.


**GitHub**

Manages version control, allowing efficient collaboration, tracking of code changes, and backup of the project repository.



**Visual Studio Code (VS Code)**

Acts as the main code editor for writing, debugging, and testing the system's source code.


**Postman**

Used for testing APIs and verifying communication between the frontend, backend, and external services.

### 4.6 Conclusion

The requirements outlined for the Sportshub Management System form a solid foundation for its successful development and implementation. Through the use of data gathering techniques such as interviews with sports administrators and questionnaires distributed to facility users, the project ensures that the system meets the specific needs and expectations of its intended users.

The functional requirements define the core features necessary for managing bookings, automating reminders, and providing real-time support through an AI chatbot, while the non-functional requirements emphasize performance, reliability, security, and usability ensuring the system operates efficiently and provides a smooth user experience.

Furthermore, the system requirements, which include both hardware and software components, establish the essential infrastructure for effective development. The use of appropriate software such as React.js, MySQL, and Dialogflow, combined with reliable hosting and development tools, will support the system's functionality and long-term maintainability. Altogether, these requirements ensure that the Sportshub

Management System is well-structured, user-centered, and capable of enhancing the management and user experience of sports facilities effectively.

# 5 ANALYSIS

## 5.1 Introduction

The analysis phase is a critical part of the development process for the Sportshub Management System, focusing on evaluating and refining the requirements gathered during the earlier stages. According to Alvarez et al. (1999), the analysis phase represents the foundation of software development, where user requirements are examined and translated into models such as use case diagrams and flowcharts that define the system's functionality and flow.

In this phase, the requirements collected through interviews with sports administrators and questionnaires distributed to facility users are analyzed to ensure a clear understanding of user needs and expectations. The analysis helps in verifying that the system's objectives such as improving booking efficiency, enhancing communication through AI chatbot support, and providing insightful analytics are aligned with the real issues faced by both users and administrators. By conducting this analysis, the Sportshub Management System can be designed to deliver an effective, user-centered, and goal-oriented solution.

## 5.2 Data Gathering Analysis

Data gathering analysis refers to the process of examining and interpreting collected information to derive meaningful insights that guide system design and development (Talabis & Martin, 2012). For the Sportshub Management System, this analysis focuses on data obtained from interviews with sports administrators and questionnaires completed by facility users and players.

The purpose of the analysis is to identify user challenges, preferences, and expectations related to sports facility management. The feedback gathered reveals common problems such as missed booking reminders, poor communication channels, and lack of data-driven insights for administrators. Through careful evaluation of these findings, the essential system requirements were determined such as implementing an AI-powered chatbot for instant assistance, developing automated reminder notifications, and providing a dashboard for booking and sales analytics.

This analysis ensures that the final design of the Sportshub Management System accurately reflects the needs of its users, thereby improving communication, operational efficiency, and decision-making processes within sports facility management.