*J-INTECH (Journal of Information and Technology)*
**Accredited Sinta 4 Ministry of Higher Education, Science and Technology Republic of Indonesia SK No. 10/C/C3/DT.05.00/2025**
**E-ISSN: 2580-720X || P-ISSN: 2303-1425**

# Design and Implementation of FitSphere as an Android Application for Gym Membership Management at Chain Gym

Aria Anggit Purnawan[1*], Sulistyo Dwi Sancoko [2]

[1,2]*Universitas Teknologi Yogyakarta, Fakultas Sains & Teknologi, Jl. Siliwangi, Sendangadi, Kec. Mlati, Kab. Sleman, Daerah Istimewa Yogyakarta, Indonesia*

***Keywords***

*Firebase; FitSphere; Kotlin; Membership Management; Mobile Application; Operational Efficiency.*

***Corresponding Author:***
*ariaanggit12@gmail.com*

***Abstract***

The advancement of information technology in the digital era has driven transformation across various sectors, including the fitness industry. Chain Gym, located in Klaten, faces challenges in managing data and membership services that are still handled manually and separately, causing inefficiencies in class registration, fitness tracking, and member information management. To address these issues, this study developed an Android application called FitSphere, built using the Kotlin programming language and Firebase as the backend, to create an integrated membership management system.The development process adopted the Rapid Application Development (RAD) methodology, consisting of requirements planning, system design using UML, construction, and a cutover phase involving testing and deployment. FitSphere offers key features such as member registration, gym news, membership subscription, consultation, workout history, class registration, and BMI calculation.The results of Black Box Testing showed a 100% success rate, indicating that all features functioned properly. The application improves operational efficiency, facilitates service access for members, and provides management with deeper insights into user needs. Overall, FitSphere serves as an effective digital solution that enhances Chain Gym's competitiveness in the modern fitness industry.

## 1. Introduction

The digital era, with advances in information technology, has brought significant changes across various sectors, including the fitness industry [1]. Technologies such as mobile-based applications have enabled more efficient data management and provided a more personalized user experience [2], [3]. In the fitness industry, mobile applications allow members to access information, register for classes, and monitor their fitness progress [4].The integration of features such as class registration, membership management, consultations, workout history tracking, and Body Mass Index (BMI) calculation enhances service quality [5]. Previous studies have shown that service quality affects customer satisfaction by 73.44%, while the remaining 26.56% is influenced by other factors [6], and improved satisfaction can increase customer loyalty by up to 90.44% [7] [8].

However, most existing gym management applications still have limitations in data integration across features, usability, and real-time analysis of member activities. Some do not fully support flexible access for both users and administrators within a unified system. This highlights the need for a solution capable of integrating data management, services, and interactions between members and administrators efficiently. Previous studies have emphasized that service quality significantly affects customer satisfaction in the fitness industry, with dimensions such as reliability, responsiveness, and assurance being the main determinants [9], [10][11]. These findings align with Polyakova and Mirza (2016), who highlighted the importance of the co-creation aspect in fitness services [9], and Lee et al. (2023), who demonstrated that core service and servicescape factors strongly influence customer satisfaction [10].Chain Gym is a modern fitness facility in Klaten that provides comprehensive amenities, including complete fitness equipment, fitness classes, and personal training. The main challenges faced include inefficiencies in class registration, monitoring member progress, and the absence of an integrated system, which affects both satisfaction and operational efficiency [12]. Therefore, an integrated system-based solution is required to address these issues.

This study develops an Android-based application called FitSphere to assist in managing member data at Chain Gym. The application allows users to register, join classes, consult with trainers, record workout history, and calculate BMI [13]. Mobile technology was chosen for its flexibility, enabling access anytime and anywhere for both users and administrators. The application is expected to improve operational efficiency and member satisfaction [5].The objective of this study is to create a comprehensive solution for Chain Gym to manage member data and enhance user experience. The application is expected to streamline administrative processes, provide insights for management, and serve as a reference for developing similar applications in the fitness industry [8], [13]. Through the implementation of FitSphere, Chain Gym is expected to increase member loyalty and strengthen its competitiveness in the market.

## 2. Research Method

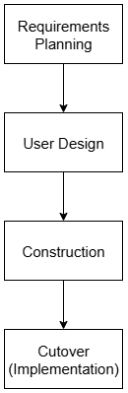


*Figure 1. RAD method*

The development method used in this study is Rapid Application Development (RAD). This model was chosen because it enables faster application development through iterative processes involving active user participation at each stage. The structure of the RAD method used in this study is illustrated in Figure 1, which shows the workflow from requirements planning to system implementation. The FitSphere application was developed using the RAD method, involving active collaboration between the researchers and gym management to ensure an efficient and timely development process [14], [15]. During the Requirements Planning phase, observations and interviews were conducted with Chain Gym to identify essential features such as BMI calculation, member data management, and news delivery [16]. The data obtained from these observations and interviews were then analyzed qualitatively, examining user needs and existing challenges to determine the most relevant features for the application. In the User Design phase, Unified Modeling Language (UML) was used to visualize the system's structure through *Use Case Diagrams* and *Activity Diagrams*,

illustrating user interactions and process flows within the application [17], [18]. The Construction phase involved implementing the design into a functional Android application using Kotlin and Firebase, along with integration of the Midtrans Payment Gateway to enable fast and secure transactions [19]. Finally, in the Implementation stage, Black Box Testing was conducted to verify that core features such as payment processing, BMI calculation, and data management functioned according to the design. In addition, usability testing was carried out with both Chain Gym administrators and members to evaluate the application's ease of use, interface design, and overall user satisfaction [20].

## 3. Result and Discussions

### 3.1 Requirements Planning

Based on qualitative data analysis obtained through observation, interviews, and document analysis, several key features were identified for implementation in the FitSphere application, with two types of interfaces: one for members and one for administrators. The member interface includes features such as registration and login, membership purchase, class booking, latest news access, class tracking, a BMI calculator, personal trainer consultation, and workout history tracking. Meanwhile, the admin interface includes member data management, transaction reports, consultant, class, and news management, and a QR code scanning system for verifying member attendance.The usability testing conducted with Chain Gym's admins and members indicated that the application is user-friendly, supports data management, and improves operational efficiency[21][22]. However, this study has a limitation, as the testing was conducted only within a single gym, meaning the results may not be generalizable to other fitness centers.

### 3.2 User Design (Workshop)

In this phase, the user design for Chain Gym members and admins is illustrated using Unified Modeling Language (UML), specifically through Use Case Diagrams and Activity Diagrams[18]. The following Use Case Diagram is used to visualize the interactions between the main actors, namely the members and the admin, with the various features available in the FitSphere application, as shown in Figure 2.

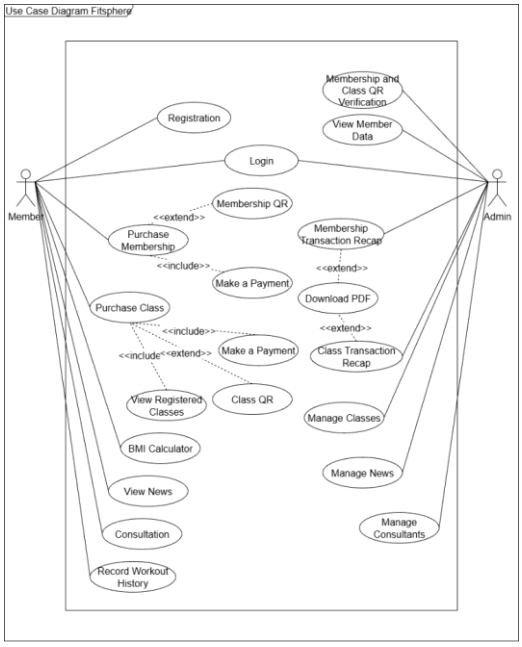


*Figure 2. Use Case Diagram*

Meanwhile, the following Activity Diagram is used to illustrate the process flow within the application, which includes the stages of membership and class purchase, Body Mass Index (BMI) calculation, consultation, and workout history recording.

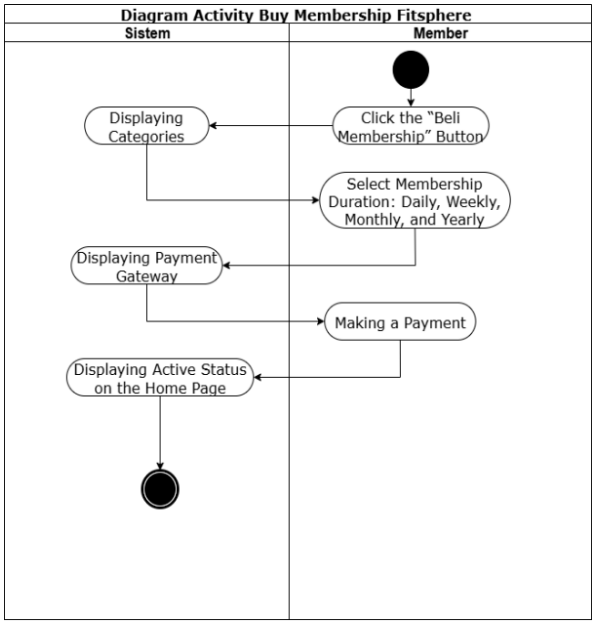


*Figure 3. Buy Membership*

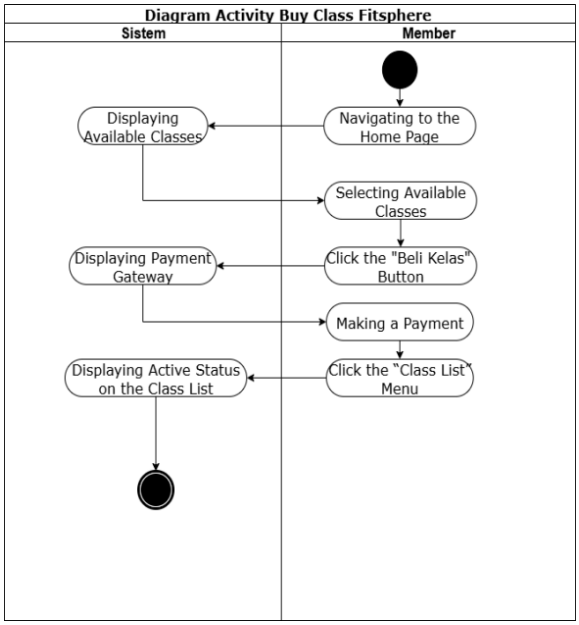


*Figure 4. Buy Class*

This activity diagram illustrates the interaction between the member and the system in purchasing memberships through the payment gateway, as shown in Figure 3, which provides a visualization of the steps taken by the member during the membership purchase process, and the class purchase process is shown in Figure 4, which provides a visualization of the steps taken by the member during the class purchase process.

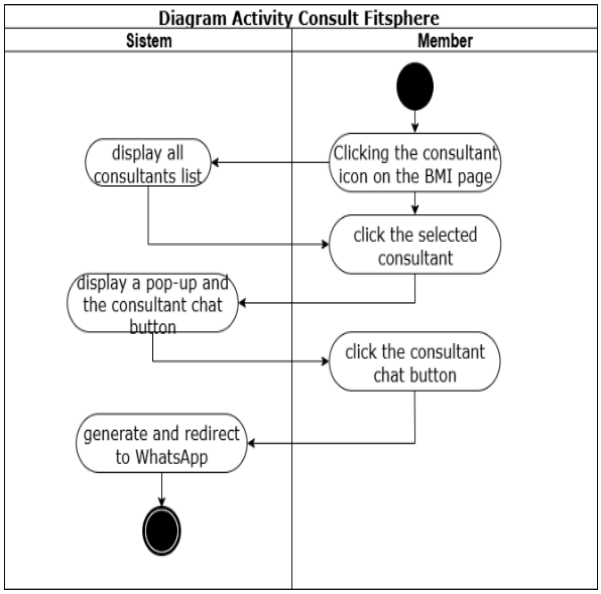


*Figure 5. consult*

This activity diagram illustrates the interaction of a member with the system when the member wants to consult with a personal trainer at Chain Gym. Figure 5 visualizes the steps taken by the member in the process of consulting with a personal trainer.

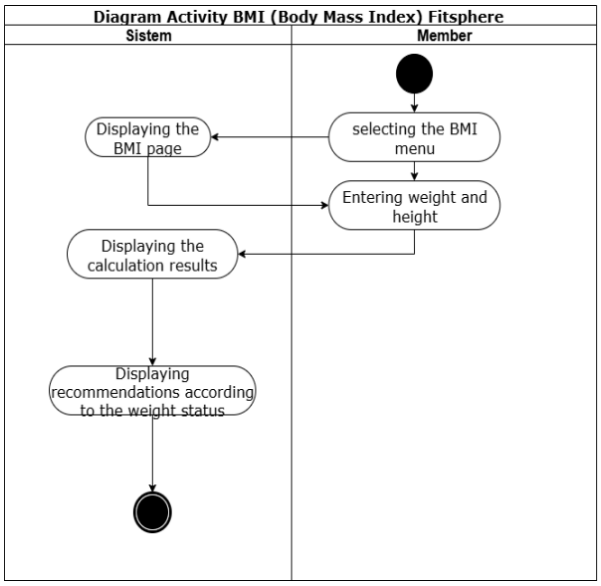


*Figure 6. BMI (Body Mass Index)*

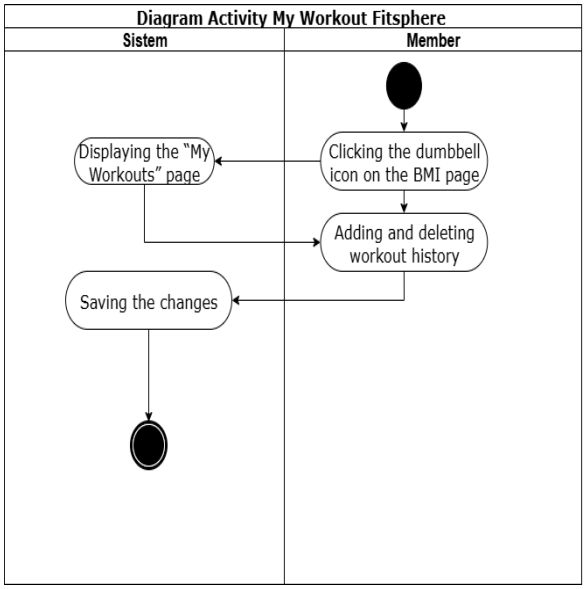


*Figure 7. My Workout History*

This activity diagram illustrates the interaction between the member and the system in calculating the ideal body weight using the BMI calculator, as shown in Figure 6, which provides a visualization of the steps taken by the member in the process of calculating the Body Mass Index (BMI), and recording the member's workout history, as shown in Figure 7, which visualizes the steps taken by the member in monitoring daily workouts.

### 3.3 Construction

At this stage, the coding was carried out according to the plans made during the user design phase by the researcher. The code implementation of the FitSphere application is as follows:


*Figure 8. login page*

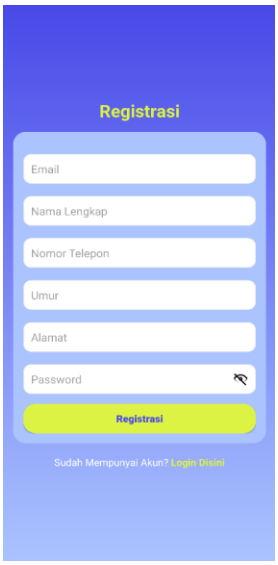


*Figure 9. registration page*


*Figure 10. Home Page*

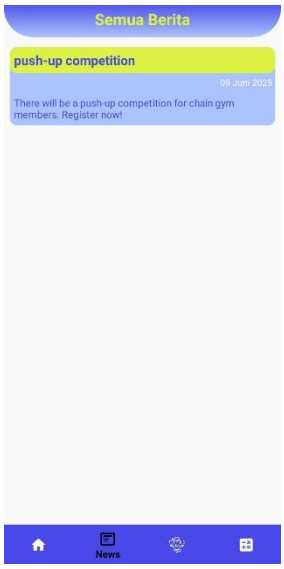


*Figure 11. News Page*

Figure 8 shows the login page of the application, where users enter their email and password. Figure 9 shows the registration page, which allows members to create a new account by filling out a form containing their email, full name, phone number, age, address, and password. Figure 10 shows the home page, which enables members to easily purchase memberships or classes and displays the latest news at the bottom of the page. Figure 11 shows the news page, which allows members to view all news available at Chain Gym.

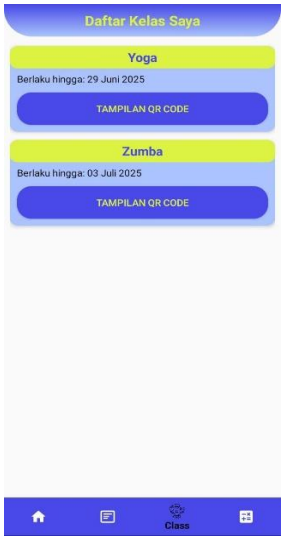


*Figure 12. My Class Page*

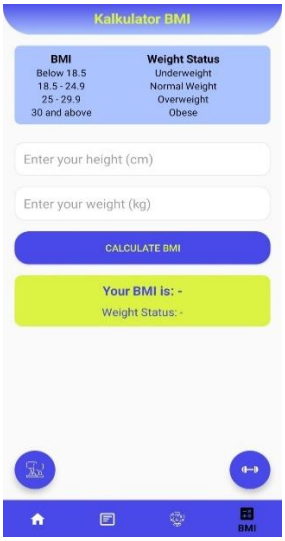


*Figure 13. BMI Page*

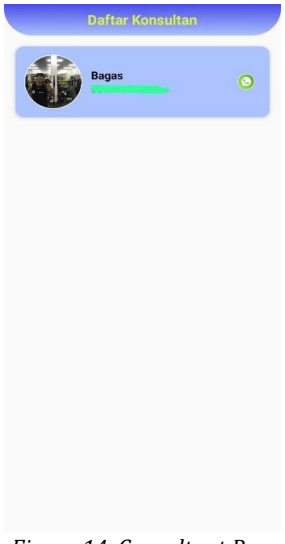


*Figure 14. Consultant Page*


*Figure 15. Workout History Page*

Figure 12 shows the "My Classes" page, where members can monitor the classes they have purchased and present a barcode to the admin for verification when attending Chain Gym. Figure 13 shows the BMI page, where members can track their weight and compare it with their ideal weight. Figure 14 shows the Consultant page, which displays a list of consultants that members can contact for consultation. Figure 15 shows the Workout History page, which allows members to conveniently record their training results.


*Figure 16. Admin Home Page*


*Figure 17. Class Management Page*

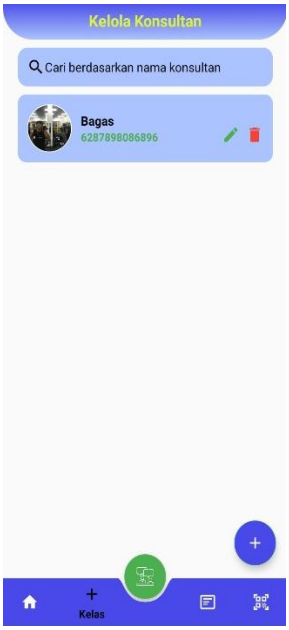


*Figure 18. Consultant Management Page*

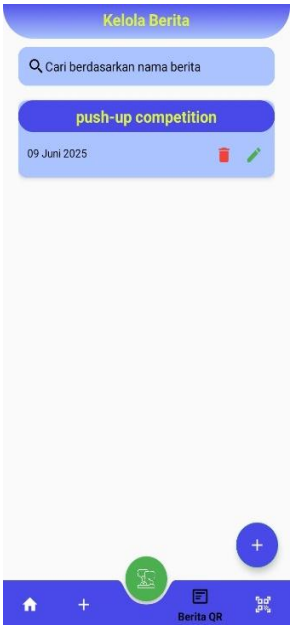


*Figure 19. News Management Page*

Figure 16 shows the admin home page, which allows the admin to monitor member data and check whether a member's membership is still active. This page also includes a transaction recap button to help the admin record all transactions. Figure 17 shows the Class Management page, which makes it easier for the admin to manage the available classes. Figure 18 shows the Consultant Management page, which allows the admin to organize consultant data. Figure 19 shows the News Management page, which enables the admin to share news from Chain Gym with members.


*Figure 20. QR Scan Page*

Figure 20 shows the QR Scan page, which helps the admin scan when members arrive at the gym to verify their membership data.

### 3.4 Cutover (Implementation)

The final stage of this method is the cutover, in which testing using the Black Box technique was conducted on the FitSphere application [19]. At this stage, the application's functions and features were tested to ensure that the system operates according to the specified requirements and is free from errors that could disrupt the user experience, ensuring that the application is ready to be used by Chain Gym members and admins. In addition, usability testing was also conducted with Chain Gym administrators and members to evaluate the application's ease of use, interface design, and overall user satisfaction.

*Table 1. Black Box Testing of the FitSphere Application Member*

| Testing | Expected Results | Test Results | Results |
|---|---|---|---|
| Member Account Registration | Members can register an account | Member account successfully registered | ✓ |
| Member Login | Members can log in to the application | Members successfully access the home page | ✓ |
| Membership Purchase | Members can purchase a membership | Members successfully purchased a membership | ✓ |
| Class Purchase | Members can purchase a class | Members successfully purchased a class | ✓ |
| Select the News menu | Enter the News page | Successfully accessed the News page and displayed all news articles | ✓ |
| Select the “My Classes” menu | Can access the “My Classes” page | Successfully accessed the “My Classes” page and displayed all purchased classes | ✓ |

| Testing | Expected Results | Test Results | Results |
|---|---|---|---|
| Select the BMI Calculator menu | Can access the BMI Calculator page and determine the ideal body weight | Successfully accessed the BMI Calculator page and successfully determined the ideal body weight | ✓ |
| Select the Consultant menu | Can access the Consultant page and conduct a consultation | Successfully accessed the Consultant page, displayed the list of consultants, and successfully conducted a consultation | ✓ |
| Select the Workout History menu | Can access the Workout History page and record workout history | Successfully accessed the page and successfully recorded the workout history | ✓ |

Based on the results of testing all FitSphere application features for members, it can be concluded that all features functioned as expected. Each tested feature ranging from account registration, login, membership and class purchase, access to the News menu, the "My Classes" menu, BMI Calculator, Consultant menu, to the Workout History menu was executed successfully without any issues. The test results indicate that members can interact with the application smoothly and obtain results according to the intended purpose of each feature. Therefore, the FitSphere application is considered successful and ready for use by Chain Gym members.

*Table 2. Black Box Testing of the FitSphere Application Admin*

| Testing | Expected Results | Test Results | Results |
|---|---|---|---|
| Admin Login | Admin can log in to the application and monitor member data | Admin successfully accessed the application and monitored member data on the home page | ✓ |
| Select the Class Management menu | Can access the Class Management page and manage classes | Successfully accessed the Class Management page and successfully performed CRUD operations on classes | ✓ |
| Select the Consultant Management menu | Can access the Consultant Management page and manage consultants | Successfully accessed the Consultant Management page and successfully performed CRUD operations on consultants | ✓ |
| Select the News Management menu | Can access the News Management page and manage news articles | Successfully accessed the News Management page and successfully performed CRUD operations on news articles | ✓ |
| Select the Scan QR menu | Can access the QR Scan page and scan members' barcodes | Successfully accessed the QR Scan page and successfully scanned barcodes to verify members | ✓ |

Based on the testing results using the *Black Box Testing* method on the FitSphere application features for the admin, it can be concluded that all features functioned as expected. All tested features, including admin login, class management, consultant management, news management, and QR scanning for member verification, were successfully executed without any issues. The testing results show that the admin can smoothly access the application, monitor member data, perform CRUD operations on classes, consultants, and news, as well as scan QR codes to accurately verify membership status. Furthermore, usability testing was conducted by the admin and several Chain Gym members, yielding positive results with all features operating properly. With all functions performing as intended, the testing success rate reached 100%, indicating that the FitSphere application is ready to be used by Chain Gym admins.

## 4. Conclusions and Future Works

Based on the research conducted, the researcher successfully developed the FitSphere application, achieving the study's main objective of enhancing membership management efficiency and user experience through an Android-based system. The system enables admins to manage member data efficiently and in an organized manner, while also allowing members to register for memberships and classes without having to visit Chain Gym in person. The application also includes a consultation feature that allows members to communicate directly with personal trainers, a workout history feature to record daily exercise activities, and a BMI calculator to help members monitor their body mass index.For future development, the application can be improved by focusing on interface enhancements, feature expansion, and security improvements. One possible direction is to broaden the application's scope so it can serve as a platform for multiple gyms. Further improvements may include integrating a real-time chat feature to facilitate direct communication between members and trainers, implementing AI-based health and workout tracking to provide personalized exercise or nutrition recommendations, and expanding integration with digital payment systems and data analytics to help admins monitor member activities, class effectiveness, and health trends. With continued development, FitSphere has the potential to evolve into a comprehensive fitness management platform that serves multiple gym branches in the future.

## 5. References


[1] E. I. H. Saputri, I. Hariadi, N. R. Fadhli, dan P. Widiawati, "Kualitas Layanan terhadap Member Gym Perempuan di Fitness Zone Malang," *Jurnal Kejaora (Kesehatan Jasmani dan Olah Raga)*, vol. 9, no. 2, hlm. 170–177, 2024.

[2] Z. H. Irawan, S. Lestanti, dan U. Mawaddah, "Rancang Bangun Sistem Informasi Manajemen Administrasi Pada Gym Berbasis Web Menggunakan Metode Pengembangan Agile," *JATI (Jurnal Mahasiswa Teknik Informatika)*, vol. 8, no. 5, hlm. 10460–10468, 2024.

[3] G. V. D. Udayana dan I. I. N. T. A. Putra, "Perancangan User Interface Aplikasi Liftz untuk Mendukung Manajemen Keanggotaan Gym Berbasis Mobile," *Jurnal Informatika dan Teknik Elektro Terapan*, vol. 13, no. 3, 2025.

[4] N. Sururi, I. Thoib, dan D. S. Nugraha, "Perancangan Aplikasi Membership Gym Berbasis Web untuk Optimalisasi Layanan Pelanggan," *Jurnal Komputer Teknologi Informasi Sistem Informasi (JUKTISI)*, vol. 4, no. 2, hlm. 1121–1132, 2025.

[5] N. A. Salsabila, P. Sudibjo, dan Y. Miftachurochmah, "Pengaruh Tingkat Kualitas Pelayanan Fitness Center Health and Sport Center (HSC) UNY terhadap Kepuasan Member," *Majalah Ilmiah Olahraga (MAJORA)*, vol. 29, no. 2, hlm. 46–56, 2023.

[6] F. Nurzaman dan L. A. Hermawan, "Dampak fasilitas dan pelayanan berkualitas terhadap kepuasan pelanggan di pusat kebugaran Sukamandi," *Idarah: Jurnal Manajemen Pemasaran*, vol. 1, no. 1, hlm. 1–10, 2024.

[7] P. R. Syarifuddin dan D. Sari, "Pengaruh Kualitas Pelayanan Terhadap Kepuasan Pelanggan dalam Membentuk Loyalitas Pelanggan Fitness Center (Studi pada Galby Gym Muscle Building and Fitness Club Jl. Peta Bandung) The Influence of Service Quality on Customer Satisfaction in Establishing F," 2015.

[8] C. Thungasal dan H. Siagian, "Pengaruh Kualitas Layanan Dan Harga Terhadap Loyalitas Pelanggan Melalui Kepuasan Pelanggan Pada Hotel Kasuari," *Agora*, vol. 7, no. 1, hlm. 287133, 2019.

[9] O. Polyakova dan M. T. Mirza, "Service quality models in the context of the fitness industry," *Sport, Business and Management: An International Journal*, vol. 6, no. 3, hlm. 360–382, 2016.

[10] Y. Huang dan D. Kim, "How does service quality improve consumer loyalty in sports fitness centers? The moderating role of sport involvement," *Sustainability*, vol. 15, no. 17, hlm. 12840, 2023.

[11] F. A. Adut dan V. P. Ramadhan, "Pengaruh Kualitas Layanan terhadap Kepuasan dan Loyalitas Pengguna Brimo Menggunakan Model E-Service Quality," *J-INTECH*, vol. 12, no. 02, hlm. 219–227, 2024.

[12] D. Setiawan, "Perancangan Sistem Informasi Pada JJ Gym Menggunakan Metode Waterfall," *Jurnal SANTI-Sistem Informasi dan Teknik Informasi*, vol. 3, no. 3, hlm. 144–152, 2023.

[13] G. ferdinand Bahari dan N. L. W. S. Telagawathi, "Pengaruh Kualitas Pelayanan dan Citra Merek terhadap Kepuasan Pelanggan Victory Gym Singaraja.," *Bisma: Jurnal Manajemen*, vol. 11, no. 2, hlm. 845–851, 2025.

[14] F. Amrullah, M. Andarwati, G. Swalaganata, dan H. E. Rosyadi, "Pengembangan aplikasi android MVTE dengan metode RAD," *Jurnal Teknologi Dan Manajemen Informatika*, vol. 7, no. 2, hlm. 122–130, 2021.

[15] E. R. Subhiyakto, F. Agustina, dan C. V. Reswara, "Pengembangan Aplikasi Evaluasi Kegiatan Berbasis Android menggunakan Metode RAD (Rapid Application Development)," *Jurnal Ilmiah Intech: Information Technology Journal of UMUS*, vol. 5, no. 1, hlm. 49–59, 2023.

[16] S. Sondang, "Penerapan Metode RAD Dalam Pengembangan Sistem Informasi Pemesanan Jasa Percetakan Berbasis Web pada Percetakan Karya Sehati Jaya," *Remik: Riset dan E-Jurnal Manajemen Informatika Komputer*, vol. 8, no. 3, hlm. 871–881, 2024.

[17] M. Fadli, "Analisis Perancangan Berbasis Uml Pada Sistem Web Profil Video Animasi 2D Dan Man'Qosit Syariah," *JUSIM (Jurnal Sistem Informasi Musirawas)*, vol. 7, no. 1, hlm. 37–46, 2022.

[18] M. F. Huwaidy, "Pemanfaatan UML dalam Perancangan Website Sistem Informasi Alumni Pesantren La Tansa Angkatan Tenacious," *Jurnal Informatika dan Teknik Elektro Terapan*, vol. 13, no. 3, 2025.

[19] S. H. Hasibuan, M. I. P. Nasution, dan S. S. A. Sundari, "Development Of Payment Gateway Digitalization Using Midtrans In The Use Of Halodoc," *Management*, vol. 1, no. 2, hlm. 3, 2023.

[20] M. Zen dan M. D. P. Ananda, "Implementasi dan Pengujian Menggunakan Metode BlackBox Testing Pada Sistem Informasi Tracer Study," *Bulletin of Computer Science Research*, vol. 4, no. 4, hlm. 327–340, 2024.

[21] C. A. Figueroa, L. Gomez-Pathak, I. Khan, J. J. Williams, C. R. Lyles, dan A. Aguilera, "Ratings and experiences in using a mobile application to increase physical activity among university students: implications for future design," *Univers Access Inf Soc*, vol. 23, no. 2, hlm. 821–830, 2024.

[22] S. Paganini *dkk.*, "Quality of physical activity apps: systematic search in app stores and content analysis," *JMIR Mhealth Uhealth*, vol. 9, no. 6, hlm. e22587, 2021.