A Comparative Analysis on Appointment Booking System: A review

1st Aman Yadav
Department of Information Technology
Babu Banarasi Das Institute of Technology and Management
Lucknow, India
amanyadav5131168@gmail.com

2nd Ms. Nida Hasib
Department of Information Technology
Babu Banarasi Das Institute of Technology and Management
Lucknow, India
nidaintegral@gmail.com

3rd Abhishek Kumar
Department of Information Technology
Babu Banarasi Das Institute of Technology and Management
Lucknow, India
kabhi7235@gmail.com

4th Adarsh Singh
Department of Information Technology
Babu Banarasi Das Institute of Technology and Management
Lucknow, India
thakuradarsh5455@gmail.com

5th Priyanshu Singh
Department of Information Technology
Babu Banarasi Das Institute of Technology and Management
Lucknow, India
ps8448373@gmail.com

***Abstract*—This study explores how appointment systems are used in today's fast-paced society. To conduct this analysis, 20 different research articles, journals, and review papers were reviewed. Data from these sources was examined to understand trends in appointment scheduling and the role of features like doctor recommendations. The findings reveal that online appointment systems are highly effective in saving both time and effort, and suggest that adding a few additional features could further enhance healthcare services. The goal of this research is to move away from traditional, manual methods and automate the appointment booking process. Patient information is securely stored in a database, which administrators can access when needed. Overall, the study highlights the critical role of appointment systems, not only in cities but also in rural areas.**

***Index Terms*—appointment, recommendation, scheduling, healthcare, database, medicine, notification, consultation**

I. Introduction

The move toward digital solutions in healthcare has brought about the rise of online systems that make it easier for patients to engage with their providers and book appointments. Doctor appointment websites are a great example of this—they allow people to check available times, schedule visits, and securely access their health records. Beyond simply helping reduce missed appointments, these platforms also make the healthcare experience smoother for patients. With online access to medical histories, test results, and the ability to message providers, patients can stay more informed and connected to their care teams, leading to better outcomes and overall satisfaction. These days, the market is full of different apps that help doctors manage appointments. However, most of these tools focus mainly on appointment booking and sometimes on selling medications. There is still a gap when it comes to offering personalized reminders for patients. Custom notifications can make a real difference by reminding people to take their medication or schedule routine check-ups. This not only benefits the patient, ensuring they stay on track with their care, but also lightens the load for doctors, who no longer have to remember every reminder for each individual. Tailored reminders can be scheduled according to the treatment plans prescribed, making healthcare more organized and responsive. In the further review paper, the deep analysis of multiple research papers is conducted, gaps are mentioned in Graph & Pie chart and also describe the future scope of Appointment Booking system.

II. Literature Review

According to a study by Ms. Sanjeevani P. Avhale and her team (2018), an online doctor appointment booking system can make scheduling and managing medical visits much easier. Patients are able to book, view, or cancel their appointments, while doctors can efficiently handle their schedules and keep track of earnings. The system stands out for its helpful features, such as automated notifications, the ability to search for doctors by specialty, and an easy-to-use interface. Built with ASP.NET and SQL, the platform helps reduce administrative work and boosts overall efficiency in healthcare settings[1].

According to the findings of Moulya S et al. (2024), it is observed that the appointment system aims to simplify the scheduling and management process for patients and doctors. It automates traditional processes, thereby reducing waiting time and increasing accessibility, especially for remote

patients. Key features include booking, rescheduling, user authentication, and secure data storage. This system improves healthcare efficiency and patient satisfaction through convenient and efficient service delivery[2].

The study conducted by Neeraj Agarwal et al. (2020) highlights on the use of mHealth apps in India, with online consultation by doctors and offline booking of appointments. Popular applications include Practo, mfine, and Lybrate, which offer video consultation and management of health records. Challenges identified include limited access to smartphones and low health literacy. It further advocates for policy measures for the increased usage of mHealth, filling rural health gaps[3].

A recent study by Hongxun Jiang and colleagues (2024) sheds light on how online medical consultation platforms and recommendation systems can be adapted to better meet patient needs while reducing doctors' workloads. The research highlights the importance of using interpretable and personalized approaches—like knowledge graphs—to boost the accuracy of their recommendations. The authors suggest that there's a need for dedicated digital service frameworks that not only enhance user satisfaction but also help evenly distribute the responsibilities among healthcare providers. This, in turn, could make the delivery of care in online health communities more effective and sustainable.[4]

In their 2021 study, Abid Haleem and his team highlighted how telemedicine can enhance healthcare with tools like remote consultations, wearable technology, and artificial intelligence. These advancements have proven especially helpful in managing chronic illnesses, supporting mental health care, and reaching patients in rural areas. Despite these benefits, the researchers pointed out ongoing challenges such as data security, accessibility, and regulatory concerns. Overall, the paper emphasizes telemedicine's potential to positively transform patient care and make healthcare delivery more efficient[5].

F. Pietrantonio and colleagues (2024) explore how telemedicine is being used in new ways to manage pain, especially since the COVID-19 pandemic sped up its adoption. By offering options like video visits and remote monitoring, telemedicine has made it easier for people with chronic pain or mobility issues to get the help they need, often resulting in better health outcomes and lower costs. Despite these advances, there are still hurdles to overcome, such as the difficulty of performing physical exams remotely and challenges some patients face with technology. Looking ahead, the researchers point to the potential of connecting telemedicine with electronic health records and experimenting with virtual reality to further enhance care[6].

El-Tallawy and colleagues (2024) carried out an online survey, making sure participants were fully informed about the study and that their responses would remain confidential. Out of all the people contacted, 102 completed the survey, most of whom were men (70.6%) aged between 35 and 54 (92.2%). The researchers used SPSS for their data analysis, applying both descriptive and inferential statistics. Participants' answers were sorted into agree, neutral, or disagree categories according to a Likert scale. Although the overall response rate was low at just 1%, the team found little evidence of nonresponse bias, and there were no notable demographic differences between those who responded early versus late[7].

According to research by N. Yankappa and colleagues (2024), the clinicodemographic characteristics and clinical outcomes of children using telemedicine at a tertiary care center in India were examined. The study included 79 children and found that after two weeks, 83.5% showed improvement in their symptoms. The most frequently reported issues were respiratory problems and fever. As mentioned in the Table I, The findings highlight the effectiveness of telemedicine in enhancing access to pediatric care, reducing morbidity, and supporting preventive healthcare measures, suggesting its potential as a valuable resource for underserved populations[8].

Muhammad Atif Waheed and his team (2024) explored how family physicians at Qatar's Primary Health Care Corporation view the use of AI in primary care. Most doctors see AI as a positive tool that can enhance healthcare delivery and help manage daily tasks more efficiently. At the same time, they raised some important concerns, particularly around ethical issues such as data protection and the question of accountability[9].

Jothydev Kesavadev and colleagues (2021) discuss how digital health technologies are expanding quickly in India, especially for managing diabetes among its large population. Their analysis points to the increasing use of connected glucose meters, continuous glucose monitors, and diabetes management apps. While these tools have significant potential to enhance diabetes care, the authors also highlight ongoing challenges, including concerns about data privacy, unequal access to technology, and the need for supportive policies[10].

III. Comparative Data Analysis

TABLE I
Analysis of Research Papers: Overview of Ideas, Benefits, and Challenges

Author	Research Paper	Idea	Methodology	Benefits	Challenges
Ms.Sanjeevani P.Avhale[1]	Doctor Appointment Online Booking System	Online booking system. Automated scheduling.	Client-server model. Patient and doctor modules. Registration and login. Notification and reminders	Easy booking and cancellation Real-time updates Efficient scheduling	Limited technical features Reliable internet needed Scalability requirement
Moulya S [2]	Mobile Application for Doctor's Appointment	Mobile app for doctor appointments Automate manual scheduling	Secure login and user authentication Real-time doctor's Availability Option for rescheduling and cancellation	Shorter wait times Less paper work Easy access and management for user	Data security and privacy Regular update needed Require tech familiarity
Neeraj Agarwal [3]	Doctor consultation through Mobile Application in Indian and an Overview Challenges and the way forward	Use mHealth apps for online consultation and appointment booking	Web- based study of popular health app available Features include patient data input, consultation	Reduces patient travel and wait time Tracks health records	Limited smartphone and internet access in rural areas
Hongxunjiang [4]	Online Medical Consultation Service-oriented recommendations	Develop an Online Medical Consultation recommendation system	recommendation feature, knowledge graph, deep learning	Provide customized recommendation for patients, Balance physician workload	Difficulty in balancing two-sided preferences (patients and physician)
Abid Haleem [5]	Telemedicine for healthcare	Telemedicine delivers remote healthcare via technology	Virtual appointments with AI, IOT,And digital tools	Cost-effective, accessible, safe, and efficient	Technical privacy,regulatory barriers
F.pietrantonio, M.Florczak, S.kuhn,, K.karberg, T.Leung, I.Said Criado [6]	Applications to augment patient care for Internal Medicine specialists: a position paper from the EFIM working group on telemedicine, innovative technologies and digital health	Enhancing Patient Care through Telemedicine.	Delphi method and SWOT analysis for assessing applications and challenges.	Improved access, cost efficiency, continuity of care, and pandemic resilience.	Technological barriers, ethical concerns, regulatory gaps, and low digital literacy.
Salah N.El-Tallawy, Joseph V.Pergolizzi, Ingrid Vasiliu-Feltes[7]	Innovative Applications of Telemedicine and Other Digital Health Solutions in Pain Management: A Literature Review	Use telemedicine and digital health to access and deliver pain management in an effective and efficient way	Review telehealth tools and studies to evaluate them	Increased access, cost savings, and patient engagement.	Limited exams, tech barriers, and regulatory hurdles
N. Yankappa, Anil Kumar, Arun Prasad, Lokesh Tiwari, Pradeep Kumar [8]	Clinicodemographic Profile and Clinical Outcome of Children Presenting to Telemedicine Center at Institute of National Importance of India: A Prospective Observational Study	Telemedicine will fill the gap in health provision to benefit outcomes	Conduct a pediatric-led study in which an online mode is provided for consultation and follow-up	Affordable care, accessed early with less strain at tertiary centers.	Gaps in infrastructure, complete privacy issues, and internet connectivity depends.
Muhammad Atif Waheed, Lu Liu[9]	Perceptions of Family Physicians About Applying AI in Primary Health Care: Case Study From a Premier Health Care Organization	Integrate AI into primary healthcare for operational efficiency, decision-making, and service delivery	Conduct a family physician survey about the implications of AI on their clinical, administrative, and public health roles	Increased efficiency, proper management of resources and physician roles supplemented	Data privacy, ethical issues and decline in patient satisfaction.
Kesavadev J, Krishnan G, Mohan V[10]	Digital health and diabetes: experience from India.	Explore digital health technologies	telemedicine, mHealth, and AI-driven solutions with real-time	Improved outcome, greater access, cost-effective	high cost, data privacy, skill gaps.

TABLE II
COMPARATIVE STUDY OF FEATURES OF WEBSITES

Apps & Website	Appointment Booking	Video Consultation	Order Medicine	Medicine Reminder
MFine	✓	✓	✓	-
Netmeds	-	-	✓	-
1mg	✓	✓	✓	-
Medlife	✓	-	✓	-
Medibudy	✓	✓	-	-
WayuMD	✓	✓	-	-
vHealth	✓	-	✓	-
Practo	✓	✓	-	-
seekmed	✓	✓	-	-
docOPD	✓	✓	✓	-

This bar chart (Fig. 1) illustrates the count of websites that we used offering specific features related to healthcare services. The most frequently offered feature is Appointment Booking, followed by Video Consultation. Table II shows features like Order Medicine and Medicine Reminder are comparatively less common, highlighting the focus on direct patient-doctor interactions over auxiliary services.

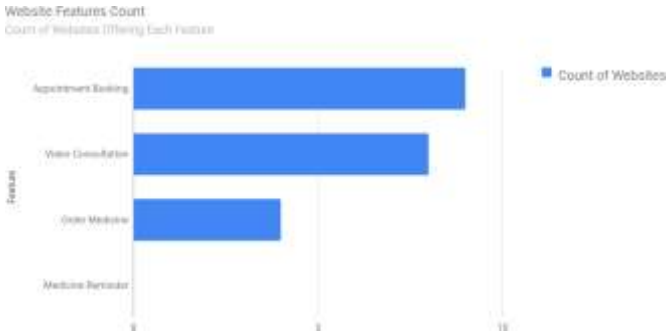

Fig. 1. Bar Graph of Website and their Features

IV. GAPS IN RESEARCH PAPER

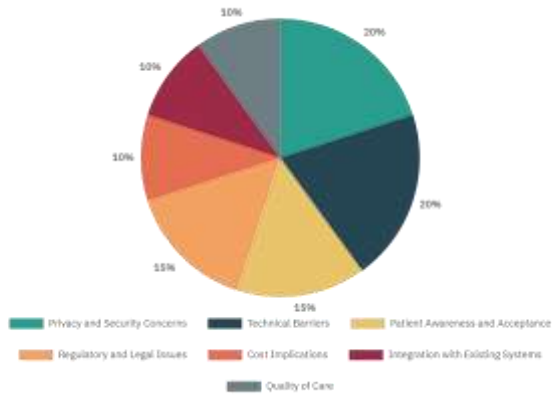

Fig. 2. Pie chart of gaps in Research Papers

The pie chart (Fig. 2) highlights the key challenges faced by digital healthcare platforms. According to Table I, The challenges are distributed across several factors, including Privacy and Security Concerns, Technical Barriers, and Patient Awareness and Acceptance, among others. Integration with Existing Systems and Regulatory and Legal Issues also pose significant hurdles, indicating a need for robust frameworks to overcome these barriers.

V. RESULT

The study emphasizes how telemedicine, mHealth apps, and artificial intelligence (AI) are reshaping healthcare by making remote patient care more efficient and accessible. Platforms like Practo and mfine in India are helping to overcome barriers such as distance and shortages of healthcare professionals by offering video calls and online consultations. Meanwhile, AI is increasingly being used to support doctors in making clinical decisions, streamline administrative tasks, and proactively manage chronic illnesses. These technologies have shown particular promise in diagnosing conditions like diabetic retinopathy and breast cancer, further enhancing the quality and reach of healthcare services. Table I shows these innovations are widely acknowledged for their benefits, challenges persist, including technological infrastructure deficits, ethical concerns, and data privacy issues. These barriers underline the need for secure, standardized systems and inclusive frameworks to ensure equitable access and the widespread adoption of these technologies.

VI. CONCLUSION & FUTURE SCOPE

The latest evolving technologies that have transformed healthcare delivery are the telemedicine, mHealth applications, and AI. Telemedicine, mHealth applications, and AI are the technological innovations that ease some of the major barriers such as difficulty in access and inefficiencies and scarcity in providing service (Table I). However, such development has barriers like technological preparedness, ethical issues along with privacy regarding data involved. There is a basic need for systems that ought to be secure and user-friendly which also bridge gaps toward trusts between stakeholders.

In the case of sustained success, coordination between healthcare providers, policymakers, and technology developers will be required. Such coordination is likely to enable the formation of inclusive frameworks that facilitate equitable access and maximize the societal benefits from such innovation.

The future scope of appointment booking systems in healthcare lies in further enhancing patient engagement and treatment adherence. Integrating a robust medicine reminder feature can significantly improve the outcomes of prescribed medication by ensuring timely consumption. Additionally, a review analysis (Fig. 1) highlights critical gaps such as the need for improved user interfaces and seamless integration with electronic health records, paving the way for future innovation.

REFERENCES

[1] Ms. Sanjeevani P. Avhale,Ms.Wrushali R. Ajabe,Ms. Pallavi A. Chinchole ,Ms.puja T. Changade,Mr. Nitin k. Bhil, "DOCTOR APPOINTMENT ONLINE BOOKING SYSTEM", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.6, Issue 2, pp.934-943, April 2018, Available at :http://www.ijcrt.org/papers/IJCRT1812133.pdf

[2] Moulya S,Priyanka M,Karthik N U "Mobile Application For Doctor Appointment", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.11, Issue 1, page no.c798-c804, January-2024, Available :http://www.jetir.org/papers/JETIR2401287.pdf

[3] Neeraj Agarwal, Bijit Biswas, "Doctor Consultation Through Mobile Applications In India" Healthcare Informatics Research 2020;26(2):153-158. Published online: April 30,2020, DOI:https://doi.org/10.4258/hir.2020.26.2.153

[4] Jiang H, Mi Z, Xu W "Online Medical Consultation Ser- vice–Oriented Recommendations: Systematic Review" J Med Internet Res 2024;26:e46073 URL: https://www.jmir.org/2024/1/e46073 DOI: 10.2196/46073.

[5] Abid Haleem, Mohd Javaid, Ravi Pratap Singh, Rajiv Suman, "Telemedicine for healthcare: Capabilities, features, barriers, and applications", Sensors International, Volume 2, 2021, 100117, ISSN 2666-3511, https://doi.org/10.1016/j.sintl.2021.100117.

[6] Pietrantonio F, Florczak M, Kuhn S, Ka¨rberg K, Leung T, Said Criado I, Sikorski S, Ruggeri M, Signorini A, Rosiello F, Drago C, Vinci A, Barreto V, Montano N, Dicker D and Gomez Huelgas R (2024) "Applications to augment patient care for Internal Medicine specialists: a position paper from the EFIM working group on telemedicine, innovative technologies and digital health. Front. Public Health", 12:1370555. doi: 10.3389/fpubh.2024.1370555.

[7] El-Tallawy, S.N., Pergolizzi, J.V., Vasiliu-Feltes, I. et al. "Innovative Applications of Telemedicine and Other Digital Health Solutions in Pain Management: A Literature Review". Pain Ther 13, 791–812 (2024). https://doi.org/10.1007/s40122-024-00620-7 .

[8] N. Yankappa, Anil Kumar, Arun Prasad, Lokesh Tiwari, Pradeep Kumar, Nadeem Sarwar, "Clinicodemographic Profile and Clinical Outcome of Children Presenting to Telemedicine Center at Institute of National Importance of India: A Prospective Observational Study", International Journal of Telemedicine and Applications 2024-01-31 — Journal article DOI: 10.1155/2024/5341988

[9] Waheed MA, Liu L, "Perceptions of Family Physicians About Applying AI in Primary Health Care: Case Study From a Premier Health Care Organization", JMIR AI 2024;3:e40781 doi: 10.2196/40781 PMID: 38875531 PMCID: 11063883 .

[10] Kesavadev J, Krishnan G, Mohan V. "Digital health and diabetes: experience from India. Therapeutic Advances in Endocrinology and Metabolism", 2021;12. doi:10.1177/20420188211054676

[11] Arora S, Huda R K, Verma S, et al. (August 21, 2024) "Challenges, Barriers, and Facilitators in Telemedicine Implementation in India: A Scoping Review", Cureus 16(8): e67388. doi:10.7759/cureus.67388