*Healthy Tadulako Journal* (Jurnal Kesehatan Tadulako)
Vol. 12 No. 1, January 2026
P-ISSN : 2407-8441/e-ISSN : 2502-0749

Original Research Paper

# Analysis of Waiting Time and Outpatient Satisfaction on the Use of APM Machines for Online Reservations at Bandung City Hospital

**Annisa Ulfah, Gusti Basyiro Afwana**

*Department of Medical Record and Health Information, Politeknik Piksi Ganesha, Indonesia*

*Access this article online*
*Quick Response Code :*

*DOI : 10.22487/htj.v11i4.1958*

**Email Corresponding:**
gustibasyro@gmail.com

**Page :** 159-166

**Article History:**
Received: 2025-07-30
Revised: 2025-10-15
Accepted: 2026-01-31

**Published by:**
Tadulako University,
Managed by Faculty of Medicine.

**Website :**
https://jurnal.fk.untad.ac.id/index.php/htj/index



**Abstract**

**Background:** The adoption of digital technologies in hospital services is an important step toward improving patient flow and administrative efficiency. Self-Service Registration Machines (APM) offer an alternative to conventional queuing systems that often lead to delays and patient dissatisfaction. **Objectives:** This study aims to evaluate the impact of APM integrated with the Pangestu online reservation system on outpatient waiting time, patient satisfaction, and administrative workflow at Bandung City Hospital. **Methods:** A descriptive qualitative design was applied using three data collection methods: participatory observation, semi-structured interviews with 15 respondents from different age groups, and analysis of hospital documentation. **Results:** The use of APM reduced average registration time from 15–30 minutes (manual) to 2–5 minutes. Patients, especially millennials, expressed high satisfaction with the speed and ease of use of the system, while older adults required assistance. Administrative staff reported reduced workload and improved focus on complex tasks. System integration with SIMRS ensured data accuracy and service continuity. **Conclusions:** APM improves the efficiency of outpatient registration services, enhances patient experience, and contributes to a more responsive and sustainable digital health system. Its scalability to other service units such as pharmacy, laboratory, and inpatient departments is highly recommended.

**Keywords:** Self-service registration; waiting time; outpatient services; patient satisfaction; hospital digital transformation.

## Introduction

The healthcare sector has undergone major transformations in the delivery of public services, including outpatient services in hospitals. In an effort to improve service quality and efficiency, the government has initiated various healthcare reform programs, one of which is the implementation of self-service digital systems such as the Automated Registration Machine (Anjungan Pendaftaran Mandiri/APM). APM was introduced to address long-standing issues in hospitals, such as lengthy queues and extended waiting times in outpatient registration counters[1].

Long waiting times significantly influence patient satisfaction. Patients are more likely to experience stress, fatigue, and even develop a negative perception of the overall quality of hospital services when wait times are not well managed[2]. In many referral hospitals with a high patient load, long queues often discourage people from seeking regular medical check-ups. To overcome this, some hospitals have integrated online reservation systems with APM, allowing patients to self-register without having to queue at the counter.

Pangestu Application in Bandung City Hospital has been directly integrated with the hospital's patient database and APM system. According to previous studies, the use of APM

can reduce waiting times by 30 to 40 minutes compared to manual methods[3]. However, this efficiency depends on patients' understanding of the technology and the readiness of healthcare staff to assist patients who need help navigating the system. In addition to time-saving benefits, patient satisfaction with APM is influenced by other factors such as ease of use, interface comfort, and clarity of information displayed during the check-in process[4]. This aligns with the Technology Acceptance Model (TAM), which states that perceived usefulness and perceived ease of use significantly affect users' acceptance of a technology[5].

Despite its benefits, the implementation of APM must consider both technical and human factors. A holistic approach is necessary, taking into account patients' digital literacy, system socialization, and on-site support staff. Hospitals are encouraged to provide assistance especially for elderly patients, who may encounter difficulties in accessing APM services due to limited experience with technology[6].

Therefore, the purpose of this study is to examine and evaluate the impact of APM usage on outpatient waiting time and patient satisfaction at Bandung City Hospital. In addition, the study aims to assess the effect of APM on administrative staff efficiency and service accessibility, as part of the broader effort to transform healthcare services into an inclusive, efficient, and sustainable digital system.

## Materials and Methods

### *Study Design*

This study employed a descriptive qualitative design to investigate patient and hospital staff experiences in using the Self-Service Registration Machine (Anjungan Pendaftaran Mandiri/APM) in the outpatient department of Bandung City Hospital. The qualitative approach was chosen because the research does not focus on statistical outcomes, but rather aims to explore meanings, perceptions, and social interactions occurring during APM usage[7]. This design is suitable for understanding user interactions with technology in a healthcare setting.

### *Sample*

Participants were selected purposively to represent different user perspectives. A total of 15 respondents participated in the study, consisting of outpatients across three age groups millennials (25–39 years), middle-aged adults (40–59 years), and older adults (60 years or above). In addition to patients, administrative officers and hospital information system (SIMRS) staff were also included to gain broader insight into the technical and service aspects of APM implementation.

### *Data Collection Technique*

Data were collected using three primary methods. First, participatory observation was conducted to directly compare waiting times and registration processes between patients using APM and those using conventional methods. Second, semi-structured interviews were carried out with the 15 selected respondents, allowing for in-depth exploration of user experiences across age groups and job functions. Finally, documentation analysis was conducted using internal performance reports from Bandung City Hospital. These documents included average waiting times, daily outpatient volume, and usage statistics of the Pangestu application and its integration with the APM system[8].

A semi-structured interview guide was developed based on the Technology Acceptance Model (TAM). The guide focused on two key TAM variables: perceived usefulness and perceived ease of use. The

model was chosen to help identify variables influencing users' acceptance of APM technology. TAM has been widely used in health information system research to evaluate user behavior and technology adoption[9,10]. The guide was tested in a pilot interview to ensure clarity and relevance.

### *Data Analysis Technique*

Data were analyzed using the Miles and Huberman method[11], which consists of three main components: data reduction (organizing and simplifying data from interviews and observations), data display (presenting patterns using direct quotations from participants), and conclusion drawing or verification (triangulating findings, confirming with key informants, and researcher reflection). This method is appropriate for qualitative research that aims to understand the social context of user-technology interaction.

### *Ethical Consideration*

The study protocol received ethical approval from the Ethics Committee of Bandung City Hospital. All participants provided informed consent before data collection, and confidentiality was maintained throughout the study.

## Results

This study found that the implementation of the Automated Registration Machine (APM) significantly reduced outpatient waiting times at Bandung City Hospital. Observations showed that patients using APM spent approximately 3 to 5 minutes registering, whereas those using manual methods required between 30 to 45 minutes. This reduction reflects substantial improvement in service efficiency. One patient, ML (33 years), stated, “I prefer using APM because it’s fast just tap your ID card and print the queue number instantly.” These findings align with a previous study conducted at Hermina Arcamanik Hospital, where 46% of BPJS patients used APM, and both system quality and information quality showed a strong correlation with patient satisfaction[12]. The decrease in administrative workload was also notable, especially during peak hours, due to the shorter queues at registration counters.

The data analysis also revealed that younger patients, particularly millennials, reported that APM was easy to use, fast, and clearly presented instructions. However, older adults (≥60 years) tended to need assistance, highlighting digital literacy disparities among different age groups. Some elderly patients recommended that APM include clearer visual or audio guides to make the system more accessible. Several hospitals have responded to similar challenges by providing on-site training for basic staff and patients, which has proven effective in increasing user understanding of APM[13].

Additionally, APM has been integrated with the hospital’s Management Information System (SIMRS), allowing automatic synchronization of patient data, visit schedules, and BPJS (National Health Insurance) records. Hospitals such as RS Ortopedi Soeharso Surakarta and RSUD Denpasar also use integrated digital systems like SIMETRIS to provide automated SEP (Eligibility Letters) without the need to queue, demonstrating the broader scalability of APM systems for government hospitals[14].

**Table 1.** Online Reservation Usage via Pangestu App

| Period | Total Patients | Online Reservations/Month |
|---|---|---|
| January–February 2025 | 20,734 | 555 |
| March–April 2025 | 19,505 | 2,022 |

Data in Table 1 indicate that patient interest in using the Pangestu online reservation application has increased significantly from

555 reservations in January–February to 2,022 in March–April 2025. This trend suggests a growing acceptance and adoption of digital services among the hospital's patient population.

As shown in Table 2, registration via the Pangestu app or APM is significantly faster than the manual method. Patients were able to complete the check-in process in less than 5 minutes, whereas manual registration could take up to half an hour. This improvement contributes to better queue management and time efficiency.

**Table 2.** Comparison of Average Registration Time

| Registration Method | Time Required (minutes) |
|---|---|
| Pangestu App / APM | 2 – 5 |
| Manual Registration | 15 – 30 |

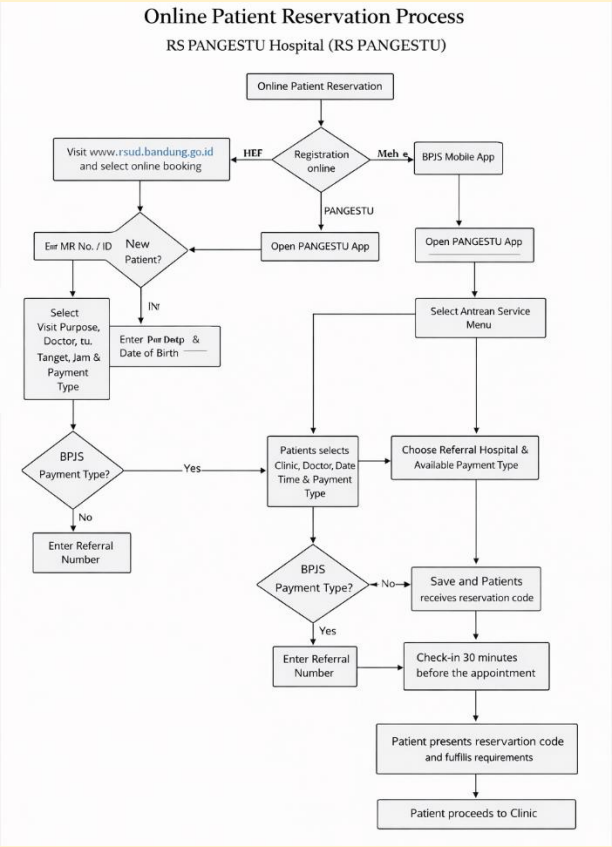


**Figure 1.** Flowchart of Outpatient Registration and Online Reservation

Figure 1 illustrates the online outpatient registration flow, from platform selection to check-in and final verification before entering the clinic. The flowchart clarifies the step-by-step process implemented in the field, which has streamlined the hospital's operational procedures.

The satisfaction of APM users was measured across four main dimensions: ease of use, speed, comfort, and clarity of information. Interviews revealed that most millennial respondents found the system intuitive and reliable. This is consistent with findings from Hasinuddin et al. (2022), who applied the End-User Computing Satisfaction (EUCS) model, showing high satisfaction levels in dimensions such as content (72%), information accuracy (81%), and timeliness (65%)[15]. Conversely, elderly users reported difficulties navigating the APM interface and frequently required assistance from family members or staff.

In-depth interviews with administrative and SIMRS staff showed that the use of APM reduced the manual registration workload and improved queue control. Administrative officers reported that with APM, they could focus more on assisting elderly or first-time users, which improved the quality of interpersonal service. One staff member shared: "Queues at the counter are easing. Those who already reserved online just scan, print a number, and head straight to the clinic. It really helps us organize registration flow."

From the technical side, SIMRS officers confirmed that APM machines were fully integrated with the Pangestu online reservation system. Patient data from APM was automatically recorded in the hospital database, with minimal system errors or downtime. These findings align with Wulandari (2021), who stated that the success of digital systems in healthcare settings depends on the interoperability and reliability of the digital infrastructure[16]. Overall, both hospital staff and patients expressed strong support for the continued implementation of the APM system.

## Discussion

### *Efficiency of Outpatient Services through Self-Service Registration Machines (APM)*

This study confirms that the implementation of the Self-Service Registration Machine (APM) has significantly improved outpatient registration efficiency at Bandung City Hospital. Observational data and patient interviews indicate that registration using APM takes approximately 2 to 5 minutes, compared to 15 to 30 minutes for manual registration, especially during peak hours. These findings are consistent with research by Kiatpanabhikul, which reported that self-registration kiosks reduced queue times by up to 35% and shortened registration processes by more than 50%[17].

Field observations showed a decrease in manual re-registration at hospital counters since APM was fully deployed. Increased usage was particularly noticeable among millennials, who tend to be more technologically literate. Consequently, APM has contributed not only to time savings but also to more efficient staff resource allocation. Staff can now focus on supporting elderly or special-needs patients who require more assistance. Similar findings were reported by Tan, Chew, and Ng, who highlighted the importance of real-time patient data integration and interface clarity in the success of APM implementation[18]. Nonetheless, older patients often struggle with the system, reinforcing the need for a user-friendly interface and enhanced staff support.

To ensure equitable access, hospitals must design inclusive systems by adding features such as larger fonts, voice-guided assistance, and visual prompts. Training for support staff and routine socialization are essential to improve digital literacy among elderly patients. Overall, the APM system not only facilitates administrative efficiency but also reflects a targeted digital transformation in healthcare services.

### *User Acceptance in the Implementation of APM*

Patients' behavioral responses to digital health services have shifted with the introduction of APM at Bandung City Hospital. Most users expressed a preference for APM over manual queuing, citing its ease of use and perceived usefulness. These results support the findings of Ashary et al., who demonstrated that initial impressions regarding system usability and benefit strongly influence patient willingness to adopt technology-based services[19]. According to the Technology Acceptance Model (TAM), technology acceptance is shaped by perceived ease of use and perceived usefulness[20].

Patients reported that scanning their ID card or entering their medical record number to obtain a queue number without staff assistance contributed to their satisfaction. This perceived convenience plays a crucial role in the success of public service technology adoption, particularly in a society increasingly expecting fast and efficient services.

### *Impact of APM on Administrative Staff Performance*

In-depth interviews with administrative staff revealed that APM significantly alleviated their workload. The number of patients registering manually has decreased since the integration of APM with the Pangestu online reservation system. This resulted in shorter queues and fewer direct counter interactions, allowing staff to focus on complex administrative tasks such as BPJS verification and data updates.

These findings align with research by Gustina and Prabawati, who reported that APM reduced queue volumes by 40% and enhanced administrative productivity[21]. Staff from Bandung City Hospital affirmed that APM enabled them to prioritize patients who

genuinely needed assistance, thereby increasing job efficiency. Similarly, Sari and Nugroho emphasized that digital transformation in hospital services not only streamlines workflows but also improves job satisfaction among staff by shifting their roles toward more strategic and less repetitive tasks[6].

These outcomes are in line with the Ministry of Health's 2024 policy on administrative digitalization, which promotes efficiency and reduces data entry errors due to manual workload[22].

### *Positive Impacts on Operational Efficiency and Patient Accessibility*

The study demonstrates that APM not only increases operational efficiency but also improves patient access to services at Bandung City Hospital. By enabling faster, more autonomous check-ins, APM reduces congestion at manual counters and enhances patient flow. This aligns with modern healthcare values of accessibility, speed, and service optimization. These results echo Ramadhany Nugroho et al., who argued that APM could serve as a foundation for broader digital health transformation strategies in Indonesia[23-25].

The study also suggests that APM systems can be extended beyond outpatient registration to other hospital departments such as laboratories, pharmacies, and inpatient services. Vulnerable populations, including the elderly and those with mobility limitations, benefit from simplified access points. Furthermore, real-time queue monitoring, barcode-based check-in systems, and electronic health record (EHR) integration are feasible innovations that build upon the current APM infrastructure[26-28]. Such innovations are aligned with responsive and adaptable health service models needed in the era of evolving digital demands.

### *Strengths and Limitations*

A major strength of this study lies in its use of a qualitative design with triangulated data sources observations, interviews, and documentation to generate rich, contextually grounded insights. The involvement of multiple respondent types (patients, staff) added depth to the findings. However, this study also has limitations. First, the sample size is relatively small and may not fully represent all demographic groups, particularly patients with limited digital literacy. Second, the results are specific to one urban hospital and may not be generalizable to smaller or rural hospitals with different infrastructures.

### *Recommendations for Future Research*

Future research should explore the longitudinal impact of APM on hospital performance indicators, such as average length of stay and service throughput. In addition, mixed-methods studies incorporating quantitative data on patient flow and satisfaction scores could strengthen the evidence base for broader policy adoption. Studies on elderly-specific interface designs and technology-assisted inclusivity are also recommended to ensure equitable access across age groups.

## Conclusion

This study demonstrates that the implementation of the Self-Service Registration Machine (APM), integrated with the Pangestu online reservation system, significantly enhances the efficiency and quality of outpatient services at Bandung City Hospital. The use of APM has led to a notable reduction in registration waiting times, decreased congestion at manual service counters, and improved user perceptions, particularly among older patients.

From an operational perspective, APM has effectively reduced the administrative workload of hospital staff, enabling them to

focus on more complex and critical service tasks. These findings support the broader concept of systemic efficiency as a key goal of digital transformation in public healthcare services.

Despite some challenges faced by elderly users, particularly related to interface complexity and digital literacy, the overall success of APM implementation is strongly influenced by supportive human factors, such as trained assistants, clear interface design, and user guidance. This highlights that successful health digitalization not only depends on technology but also on inclusive support mechanisms.

Overall, APM has proven to accelerate the outpatient registration process while contributing to the development of a more responsive, patient-centered, and digitally enabled service ecosystem. As part of the national health digital transformation roadmap, APM holds strong potential to be expanded to other hospital services, including inpatient care, pharmacy, and laboratory services. It represents a best-practice model for efficient, modern, and sustainable outpatient administrative reform driven by health information technology.

## Acknowledgment

The authors would like to express their sincere gratitude to the management and staff of Bandung City Hospital (RSUD Kota Bandung) for their support and cooperation throughout the research process. Special thanks are extended to the hospital's Information Systems Management (SIMRS) team and outpatient administrative staff who provided valuable insights during the data collection phase.

## References

1. Fazri M, Zahran I. Evaluasi efektivitas APM dalam mengurangi waktu antrean layanan rawat jalan. J Manaj Pelayanan Kesehatan. 2023;10(2):100-108.
2. Aisyah R, Putri S. Pengaruh waktu tunggu terhadap kepuasan pasien di rumah sakit umum daerah. J Kesehatan Masyarakat. 2022;7(1):45-53.
3. Nasution H, Kusumawati T. Implementasi sistem reservasi digital untuk layanan pendaftaran rawat jalan. J Teknologi Informasi Kesehatan. 2022;9(3):215-223.
4. Hasanah L, Wibowo A, Sari M. Faktor-faktor yang memengaruhi kepuasan pengguna Anjungan Pendaftaran Mandiri. J Sains Kesehatan. 2023;8(2):112-120.
5. Yuniarti D, Hamdani R. Technology acceptance model dalam adopsi sistem informasi rumah sakit. J Inform Kesehatan. 2022;6(4):87-94.
6. Nugroho F, Latifah A. Pendekatan holistik dalam pemanfaatan teknologi APM di layanan publik. J Kebijakan Kesehatan. 2022;11(1):55-63.
7. Sugiyono. Metode Penelitian Kualitatif, Kuantitatif dan R&D. Bandung: Alfabeta; 2021.
8. RSUD Kota Bandung. Laporan Kinerja Internal Sistem Pangestu dan APM. Bandung; 2023.
9. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly. 1989;13(3):319–340.
10. Yuniarti D, Hamdani R. Technology acceptance model dalam adopsi sistem informasi rumah sakit. J Inform Kesehatan. 2022;6(4):87–94.
11. Miles MB, Huberman AM, Saldaña J. Qualitative Data Analysis: A Methods Sourcebook. 3rd ed. Thousand Oaks, CA: SAGE Publications; 2014.
12. Ayuni N. Pengaruh sistem dan informasi APM terhadap kepuasan pasien BPJS di RS Hermina Kemayoran. J Teknol Pelayanan Kesehatan. 2024;12(1):44-52.
13. Hasanah R, Sari LN, Wibowo H. Sosialisasi dan pelatihan penggunaan

APM dalam meningkatkan pemahaman pengguna. J Manaj Kesehatan Publik. 2023;7(2):77–84.
14. Kemenkes RI. Implementasi SIMETRIS dan sistem APM di RS pemerintah. Laporan Nasional Inovasi Digital Rumah Sakit. 2024;1(1):11-19.
15. Hasinuddin T, Wijaya A, Haris M. Penilaian sistem APM dengan pendekatan EUCS. J Teknologi Informasi Kesehatan. 2022;8(3):203–210.
16. Wulandari S. Interoperabilitas sistem digital dalam layanan kesehatan berbasis SIMRS. J Inform Medis. 2021;9(2):130–138.
17. Kiatpanabhikul P. The role of self-service kiosks in hospital queue management. Asian Health Informatics J. 2024;11(1):34–41.
18. Tan W, Chew J, Ng L. Evaluating self-service health kiosks: Interface clarity and real-time integration. Int J Med Tech Systems. 2024;9(2):67–74.
19. Ashary L, Widodo B, Farhan S. Initial perception and user intention on digital health services. J Teknol eHealth. 2022;6(3):134–141.
20. Yuniarti D, Hamdani R. Technology acceptance model in hospital information systems. J Inform Kesehatan. 2022;6(4):87–94.
21. Gustina D, Prabawati Y. Implementation of APM in reducing registration queues. J Informatika dan Komputer. 2023;8(1):56–65.
22. Sari W, Nugroho H. Digital transformation in administrative workflows and job satisfaction. J Adm Rumah Sakit. 2021;7(2):101–108.
23. Kementerian Kesehatan RI. Digitalisasi layanan administrasi di rumah sakit: Kebijakan dan implementasi. Laporan Kemenkes. 2024.
24. Nugroho R, Hidayat M, Ramadhany S. Policy strategies for public health digitalization. J Kebijakan Kesehatan Publik. 2023;10(4):200–213.
25. Lee SH, Kim JS, Yoon C. Barriers to self-service kiosk adoption among elderly patients. BMC Geriatrics. 2021;21(1):142.
26. Arifuddin A, Rochmiyati S, Nur AF, Dyastuti NE, Arifuddin H, Vidyanto. Peranan clinical governance terhadap penjaminan mutu rumah sakit: systematic review. Healthy Tadulako Journal (Jurnal Kesehatan Tadulako). 2022;8(2):84-96. doi:10.22487/htj.v8i2.530
27. Bariya UK, Rosyidah R, Hidayat MS. Pengaruh mutu pelayanan terhadap kepuasan pasien unit rawat jalan di rumah sakit: literature review. Healthy Tadulako Journal (Jurnal Kesehatan Tadulako). 2024;10(4):547-555. doi:10.22487/htj.v10i4.1213
28. Ramadhani S, Sutiningsih D, Purnami CT. Implementasi standar pelayanan minimal bidang kesehatan pada penderita hipertensi di puskesmas Kota Surakarta. Healthy Tadulako Journal (Jurnal Kesehatan Tadulako). 2024;10(2):316-323. doi:10.22487/htj.v10i2.832