

Research Article

Analysis of Determinants of Successful Digitalisation of Registration Services at Primary Healthcare Facilities in East Java on Patient Satisfaction Among JKN Participants: A Systematic Review

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Abstract: This study analyses the challenges of digitalising registration services at Primary Healthcare Facilities (Fasilitas Kesehatan Tingkat Pertama, FKTP) in East Java, including limitations in human resources, technological infrastructure, and public digital literacy, all of which affect the satisfaction of National Health Insurance (Jaminan Kesehatan Nasional, JKN) patients. Utilising the Systematic Literature Review (SLR) methodology with the PRISMA approach, the study reviews literature from 2024–2025 sourced from databases such as Google Scholar, using keywords related to digitalisation, FKTP, and patient satisfaction. The analysis is based on the ADO (Antecedent, Decision, Outcome) framework. The findings identify three key factors: (1) Antecedents (human resource competence, infrastructure, digital literacy); (2) Decisions (human resource training, facility modernisation, public outreach); and (3) Outcomes (increased patient satisfaction through time efficiency and ease of access). The study emphasises the need to strengthen human resources, provide adequate infrastructure, and educate the public to ensure the sustainability of digital healthcare services at FKTPs in East Java.

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1. Introduction

In the era of digitalisation of healthcare services, technological innovation has become one of the main pillars for improving the quality of primary care services. The implementation of digitalisation systems for registration services at Primary Healthcare Facilities (FKTP) in Indonesia, including in East Java, represents a strategic step to address challenges of efficiency, transparency, and enhanced patient experience. Online registration systems, digital queuing, and the use of other digital-based applications at FKTPs are expected to accelerate administrative processes, reduce waiting times, and increase the comfort and satisfaction of JKN participant patients. This condition aligns with national policies that promote the



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digitalisation of health services as part of public service system reform efforts in Indonesia (Ministry of Health of the Republic of Indonesia, 2024).

The implementation of digital systems is not only a technological innovation but also part of efforts to improve the quality of health services comprehensively. Data from the Ministry of Health of the Republic of Indonesia (2024) demonstrate that the use of digital systems in primary healthcare services can improve service process efficiency, reduce physical queues, and accelerate patient waiting times. This directly enhances patient experience and satisfaction with primary health services. Conversely, the success of digitalisation implementation in registration services is significantly influenced by various antecedent factors, including readiness of human resources, technological infrastructure, and the level of public digital literacy.

The use of digital technology in healthcare services in Indonesia continues to develop alongside increasing demands for services that are fast, efficient, and integrated. Online registration systems at FKTPs have become one of the innovations expected to overcome various classical problems, such as long queues, slow administrative processes, and uncertainty in waiting times. Research by Wulandari et al. (2024) demonstrates that technological infrastructure readiness, including stable internet connectivity and adequate devices, can accelerate registration and significantly reduce patient waiting times. Furthermore, public digital literacy also becomes an essential factor influencing the adoption rate of this online system (Nurul, 2024).

However, despite various innovations being implemented, the success of registration service digitalisation at FKTPs still faces significant challenges. Several studies indicate that the main constraints stem from a lack of human resource competence in operating digital systems, limitations in technological infrastructure, and varied levels of public digital literacy. Research by Holidaya and Manggalau (2025) confirms that the shortage of human resources capable of managing online systems becomes the main obstacle to successful implementation. Additionally, inadequate infrastructure, including unstable internet connectivity and obsolete hardware, slows and suboptimizes registration processes, thereby affecting the patient experience.

Another challenge that influences the success of registration service digitalisation is the still low level of public digital literacy in several regions, particularly in rural areas and amongst elderly age groups. Research by Husni and Aini (2024) reveals that low digital literacy causes patients to struggle in accessing and utilising online systems optimally, which impacts their experience and satisfaction levels. Therefore, the success of digitalisation of the registration service depends not only on technological and human resource factors but also on external factors, such as public digital literacy levels.

The main problems encountered in implementing digitalisation of the registration service at FKTPs are the unpreparedness of human resources and inadequate infrastructure. The lack of continuous training and inadequate technological facilities are the main obstacles preventing online registration processes from operating optimally. Additionally, the still-low level of public digital literacy contributes to slower adoption of online systems and reduced patient satisfaction. The research problem formulation is: How do the determinants influence the success of digitalisation of the registration service at FKTPs in East Java, and what is the impact on patient satisfaction amongst JKN participants?

There remains a lack of empirical data that comprehensively measures antecedent factors and their impact on patient satisfaction levels in East Java. Therefore, systematic review-based research is essential to integrate previous research findings and provide a comprehensive, in-depth picture of the determinants of successful digitalisation of registration services at FKTPs.

2. Literature Review

Service Quality Theory in Digital Healthcare

Service quality theory provides a fundamental framework for understanding patient satisfaction in healthcare contexts. Parasuraman, Zeithaml, and Berry (2023) developed the SERVQUAL model, which identifies five critical dimensions of service quality: tangibles (physical facilities and equipment), reliability (ability to perform the promised service dependably), responsiveness (willingness to help customers promptly), assurance (knowledge and courtesy of employees), and empathy (caring individualised attention). In the context of digitalised healthcare services, these dimensions translate into infrastructure readiness, system reliability, responsive technical support, data security assurances, and user-friendly interface design.

The application of SERVQUAL dimensions to digital health services requires adaptation to technological contexts. Research by Wulandari et al. (2024) demonstrates that infrastructure readiness and human resource competence significantly influence the speed of online registration processes and the reduction of waiting times, thereby directly affecting patient experience and satisfaction. The tangible dimension in digital services encompasses not only physical infrastructure but also the quality and accessibility of digital platforms. Reliability in this context refers to system stability, minimal downtime, and data accuracy. Responsiveness involves rapid technical support and swift problem resolution. Assurance relates to data privacy protection and cybersecurity measures, whilst empathy manifests through intuitive user interface design that accommodates varying levels of digital literacy.

Technology Adoption and Innovation Diffusion Theory

Rogers' (2003) Diffusion of Innovation theory provides insights into how new technological systems are adopted within organisations and communities. The theory identifies five key stages in the innovation-decision process: knowledge, persuasion, decision, implementation, and confirmation. In the context of FKTP digitalisation, successful adoption depends on organisational readiness and adequate policy support. Key attributes that influence adoption rates include relative advantage (perceived benefits compared to existing systems), compatibility (consistency with existing values and practices), complexity (ease of use), trialability (ability to experiment with the innovation), and observability (visibility of results).

The Technology Acceptance Model (TAM), developed by Davis (1989) and extended by Venkatesh and Davis (2000), further elucidates factors influencing user acceptance of information systems. TAM posits that perceived usefulness and perceived ease of use are primary determinants of technology adoption. In healthcare contexts, additional factors such as facilitating conditions, social influence, and effort expectancy significantly impact adoption success. Research by Husni and Aini (2024) confirms that adequate training and supportive

policies can enhance staff confidence and capability in operating online registration systems effectively.

Digital Literacy and Health Information Systems

Digital literacy represents a critical factor in successful healthcare digitalisation, encompassing not only technical skills but also cognitive abilities to evaluate, apply, and create information using digital technologies. The digital divide remains a persistent challenge in developing countries, with significant variations in digital literacy levels across urban and rural areas, age groups, and socioeconomic strata. Norman and Skinner (2006) introduced the concept of eHealth literacy, defined as 'the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem'.

Research demonstrates that low digital literacy significantly impedes adoption of online health services. Wulandari et al. (2024) found that whilst technological infrastructure readiness can accelerate registration processes, the benefits remain unrealised if patients lack the digital skills to navigate online systems. This finding underscores the importance of comprehensive public education and training programmes to enhance digital literacy alongside technological infrastructure development. Strategies to improve digital literacy must be tailored to specific demographic groups, with particular attention to elderly populations and rural communities .

Organisational Factors in Digital Transformation

Successful digital transformation in healthcare organisations requires more than technological implementation; it necessitates comprehensive organisational change management. Research by Holiday and Manggalau (2025) emphasises that human resource shortages capable of managing digital systems constitute the primary obstacle to successful implementation. Organisational factors influencing digitalisation success include leadership commitment, organisational culture, change management strategies, staff training and development, and inter-departmental coordination.

Leadership plays a pivotal role in driving digital transformation initiatives. Effective leaders champion innovation, allocate necessary resources, and foster an organisational culture that embraces change. Change management strategies must address potential resistance from staff accustomed to traditional systems, providing adequate support and training throughout the transition period. Research indicates that organisations implementing phased rollouts, accompanied by comprehensive training programmes and ongoing technical support, achieve higher success rates in digitalisation initiatives than those attempting rapid, wholesale system changes.

Patient Satisfaction and Healthcare Service Quality

Patient satisfaction represents a critical outcome measure in healthcare service evaluation, influenced by multiple dimensions of service quality. Oliver's (2024) Expectation-Confirmation Theory posits that satisfaction results from the comparison between expected and perceived service performance. When perceived performance exceeds expectations, positive disconfirmation occurs, leading to high satisfaction. Conversely, when performance falls short of expectations, negative disconfirmation results in dissatisfaction.

In the context of digitalised registration services, patient satisfaction is influenced by factors such as ease of access, speed of service delivery, system reliability, data security, and the quality of technical support. Research by Nurul (2024) demonstrates that clarity and ease of service significantly influence patient satisfaction levels, with online systems capable of reducing waiting times and improving service efficiency. Digital systems that provide transparent, easily accessible services significantly enhance the patient experience, with implications for improved loyalty and trust in FKTPs. The relationship between service quality and patient satisfaction extends beyond immediate transaction satisfaction to encompass long-term loyalty and positive word-of-mouth referrals.

Integrated Healthcare Service Delivery Models

The integration of digital systems within broader healthcare delivery frameworks represents an essential consideration for sustainable digitalisation. Integrated service delivery models emphasise coordination across multiple levels of care, seamless information sharing, and patient-centred approaches. Digital registration systems serve as entry points to integrated care pathways, facilitating efficient patient flow and information continuity across different healthcare providers.

Research in developing country contexts highlights particular challenges in implementing integrated digital health systems, including fragmented infrastructure, limited interoperability among systems, and insufficient coordination among healthcare providers. Successful integration requires not only technological solutions but also policy frameworks that promote information sharing, standardised protocols, and collaborative governance structures. The development of national health information systems, such as Indonesia's expanding digital health infrastructure, offers opportunities for greater integration while posing challenges in ensuring equitable access and maintaining data privacy and security.

Theoretical Framework: ADO Model

This study employs the ADO (Antecedent, Decision, Outcome) framework as its theoretical foundation. The ADO model provides a comprehensive analytical framework for examining the determinants of successful digitalisation and their impacts on patient satisfaction. Antecedents encompass pre-existing conditions that influence implementation success, including human resource competence, technological infrastructure readiness, and public digital literacy levels. Decisions represent strategic interventions and policy choices made by healthcare organisations and policymakers, such as training programmes, infrastructure investments, and public outreach initiatives. Outcomes reflect the results of these antecedents and decisions, primarily measured through patient satisfaction levels, service efficiency improvements, and system sustainability.

The ADO framework enables systematic analysis of the complex interrelationships amongst factors influencing digitalisation success. It recognises that outcomes are not determined solely by technological capabilities but result from the interaction between pre-existing conditions, strategic decisions, and implementation processes. This holistic perspective is particularly relevant in healthcare contexts where multiple stakeholders, complex organisational structures, and diverse patient populations must be considered. By employing the ADO framework, this study aims to identify not only which factors influence

success but also how they interact and which interventions are most effective in improving patient satisfaction.

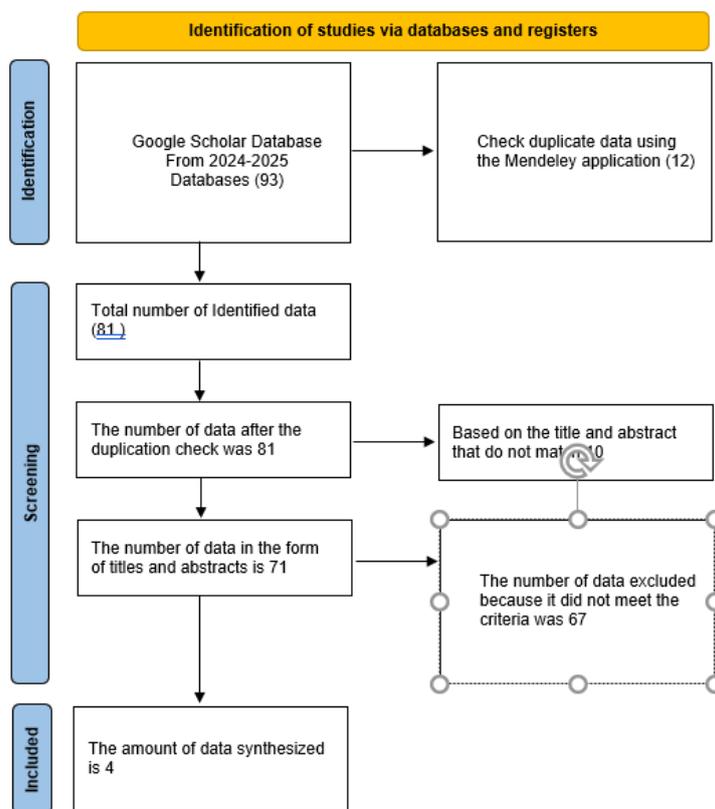
3. Method

This research utilises the Systematic Literature Review (SLR) approach to synthesise and analyse previous research findings regarding factors determining the success of service digitalisation at FKTPs in East Java and its impact on patient satisfaction amongst JKN participants, with the SLR method selected for its ability to provide clear systematisation in tracing, selecting, and synthesising relevant literature whilst producing a comprehensive overview of the issues examined (Snyder, 2019). This research follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure methodological rigour and transparency in the review process (Page et al., 2021). The research question underpinning this SLR is: How do the determinants influence the success of digitalisation of the registration service at FKTPs in East Java, and what is its impact on patient satisfaction amongst JKN participants? This formulation aligns with the ADO (Antecedent, Decision, Outcome) framework employed in the analysis, enabling structured examination of pre-existing conditions, strategic interventions, and resulting outcomes.

The literature search was conducted across international databases, particularly Google Scholar, using specific search strings combining keywords related to digitalisation, FKTP, patient satisfaction, and JKN, with the publication timeframe limited to 2024-2025 to ensure data are relevant and up to date, reflecting the rapid evolution of digital health technologies. Inclusion criteria comprised peer-reviewed journal articles and conference proceedings published in 2024-2025; studies focusing on the digitalisation of healthcare services at FKTPs; research conducted in East Java or similar Indonesian contexts; studies examining patient satisfaction or related outcome measures; and publications in Indonesian or English. Exclusion criteria included grey literature without peer review, studies focusing solely on tertiary care settings, research conducted outside Indonesia that lacked contextual relevance, studies that did not address digitalisation or patient satisfaction outcomes, and duplicate publications or preliminary reports subsequently published in full. This systematic approach ensures that only high-quality, relevant studies are included in the final analysis, thereby strengthening the validity and reliability of the research findings.

Data from each article were extracted into a matrix encompassing information about authors, publication year, research location, methodology, key findings, and relevance to the variables of determinant factors and their impact on patient satisfaction, with synthesis conducted narratively and thematically with reference to the ADO (Antecedent, Decision, Outcome) framework, enabling identification of trends, patterns, and inconsistencies in the literature (Haddaway et al., 2020). Thematic analysis involved coding extracted data according to the three ADO dimensions, identifying recurring themes within each dimension, and examining relationships amongst themes across dimensions. To maintain validity and reliability, the selection and extraction processes were conducted independently by two researchers, with disagreements resolved through discussion, and quality appraisal of included studies was performed using appropriate assessment tools relevant to each study design, considering factors such as methodological rigour, sample representativeness, data collection

methods, and analytical approaches. This systematic approach to data extraction, synthesis, and validation ensures the trustworthiness and credibility of the research findings.



Source: Processed by researchers (2025)

Figure 1. Scientific Article Selection Process using Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

4. Results and Discussion

Study Selection and Characteristics

The systematic search identified four primary studies meeting the inclusion criteria, selected based on their relevance to the topic, the appropriateness of the methodology employed, and their capacity to address the research question regarding the determinant factors influencing the success of registration service digitalisation at FKTPs in East Java and its impact on patient satisfaction levels amongst JKN participants. Holidaya and Manggalau (2025) evaluated public service delivery at Puskesmas Sidodadi through the Public Service Performance Monitoring and Evaluation system (PEKPPP), revealing that the facility had not fully achieved success indicators due to human resource shortages, inadequate facilities, and slow administrative processes, with recommendations for capacity enhancement, facility modernisation, and service digitalisation implementation. Ningtyas, Khoiron, and Rahmawati (2024) analysed healthcare service quality at Malang City Regional Hospital using Zeithaml's five indicators, demonstrating that the Responsiveness dimension received the lowest score, attributed to human resource shortages, which led to time-consuming service processes and consequent low patient satisfaction levels. These studies collectively emphasise that human

resource capacity and infrastructure adequacy constitute critical determinants of service quality and patient satisfaction in healthcare digitalisation contexts.

Husni and Aini (2024) reviewed patient satisfaction with WhatsApp and telephone-based online registration at RSUD Anna Medika Madura using a quantitative approach with 82 outpatients, revealing that patients were generally satisfied with online registration services with an average score of 80.22%, whilst the assurance and empathy dimensions demonstrated the highest satisfaction levels, and clarity and ease of service significantly influenced satisfaction. Dwiantoko and Rahmawati (2024) investigated the quality of BPJS Health services at Puskesmas Sukodono Sidoarjo, examining relationships between healthcare facility actions and referral services, and found that service quality required improvement, particularly in waiting times and communication among healthcare personnel, recommending facility improvements and more efficient referral systems. Both studies demonstrate that properly implemented digital registration systems can enhance patient satisfaction. However, success depends on service clarity, ease of access, and effective communication between healthcare providers and patients. Collectively, these four studies provide robust empirical evidence supporting the applicability of the ADO framework for analysing the determinants of digitalisation success and their impacts on patient satisfaction in East Java's primary healthcare facilities.

Antecedent Factors

Antecedent factors encompass internal and external conditions supporting successful digitalisation implementation, with competent and trained human resources representing the primary internal factor, as research by Holiday and Manggalau (2025) demonstrates that shortages of human resources capable of operating digital systems and insufficient training constitute the main obstacles, aligning with broader literature on digital health implementation in developing countries where human resource capacity frequently represents a critical bottleneck. Furthermore, adequate technological infrastructure, including stable internet networks, complete hardware, and integrated information systems, is an essential factor, as research by Wulandari et al. (2024) confirms that infrastructure readiness can accelerate registration processes and reduce waiting times, thereby enhancing the patient experience. The importance of infrastructure extends beyond mere availability to encompass system reliability, data security, and technical support capabilities. Inadequate infrastructure causes system disruptions, unstable connections, and slow, inefficient registration processes, consequently reducing patient satisfaction levels and damaging FKTP's service reputation. These internal factors demonstrate that both human resource competence and technological infrastructure readiness are fundamental prerequisites for successful digitalisation implementation.

External factors such as public digital literacy levels also exert significant influence on digitalisation success, as high digital literacy levels facilitate public access, understanding, and optimal utilisation of online systems, whilst populations with low digital literacy experience difficulties in operating online registration systems, creating obstacles in technology adoption processes, with research by Wulandari et al. (2024) revealing that digital literacy levels amongst East Java populations vary considerably, necessitating appropriate education and socialisation strategies to enhance technology adoption rates. Beyond these internal and external factors,

organisational culture and FKTP internal policies also play roles in supporting digitalisation success, with management support, commitment to innovation, and clear, firm policies strengthening adaptation processes and digital system implementation. Research by Husni and Aini (2024) demonstrates that FKTPs with internal policies that support digital innovation and continuous training can enhance human resource readiness and accelerate technology adoption. These antecedent factors collectively establish the foundational conditions that determine whether digitalisation initiatives will succeed or encounter significant implementation barriers in primary healthcare facilities.

Decision Factors (Policies and Interventions)

Beyond antecedent factors, the decision aspect encompasses policies and strategies adopted by FKTP management, local government, and JKN administrators to support the successful digitalisation of the registration service, representing strategic steps to overcome antecedent obstacles and enhance the likelihood of successful online system implementation. Firstly, continuous human resource training constitutes one of the central policies adopted, encompassing not only technical aspects of digital system usage but also user-friendly digital service aspects and technical problem-solving, with research by Husni and Aini (2024) demonstrating that adequate training can enhance staff confidence and capability in operating online registration systems effectively, making registration processes faster, more accurate, and capable of providing positive experiences to patients. Secondly, facility and technological infrastructure modernisation policies are implemented through the procurement of the latest hardware and software, and the enhancement of internet networks at FKTPs, with support from local governments and JKN administrators who allocate special funds for digital infrastructure development to ensure systems operate smoothly and stably, and remain accessible to patients at all times. These strategic decisions regarding human resource development and infrastructure modernisation directly address the antecedent barriers identified in previous analyses, creating enabling conditions for successful digitalisation implementation.

Thirdly, socialisation and public education regarding online system usage are conducted actively and continuously to help communities understand online registration procedures, benefits, and methods for overcoming potential obstacles, with research by Nurul (2024) demonstrating that intensive education and socialisation can enhance online system adoption rates and accelerate registration processes, thereby increasing patient satisfaction. Additionally, regular monitoring and evaluation systems are part of strategic policies, enabling performance measurement, obstacle identification, and appropriate, timely, and continuous corrective action to ensure digitalisation systems remain relevant and capable of optimally meeting user needs. These decision-oriented interventions encompass comprehensive policy responses addressing human resource competence, technological infrastructure, public digital literacy, and system sustainability through monitoring mechanisms. The integration of these strategic policies creates a supportive ecosystem that facilitates successful digitalisation whilst continuously improving service quality and responsiveness to stakeholder needs.

Outcome: Impact on Patient Satisfaction

The successful implementation of digital registration services at FKTPs in East Java demonstrates a significant impact on patient satisfaction amongst JKN participants, as

effective and efficient online registration systems can directly enhance the patient experience, increasing satisfaction and loyalty towards primary healthcare services whilst contributing to the sustainability of national JKN programmes. One primary aspect influencing satisfaction is ease of access and speed of registration processes, as patients capable of utilising online systems effectively feel more comfortable with faster and more practical registration processes compared to manual systems, no longer needing to queue extensively at registration counters, with research by Nurul (2024) confirming that clarity and ease of service dimensions significantly influence patient satisfaction levels as online systems present clear, transparent, and easily understood procedures. Beyond speed and ease aspects, online systems also improve overall service efficiency by creating more organised and integrated administrative processes, reducing possibilities of data input errors and accelerating verification processes, directly affecting patient experience with perceptions of receiving more professional and responsive services whilst assisting healthcare personnel and FKTP administration in managing patient data more accurately. These operational improvements demonstrate that digitalisation delivers tangible benefits in both service delivery efficiency and patient experience.

Positive impacts from successful registration service digitalisation extend beyond operational aspects to influence psychological aspects and patient trust, as patients perceiving online registration systems as capable of providing fast, transparent, and easily accessible services tend to feel more trusting and satisfied with provided services, feeling valued and treated professionally, thereby increasing trust in FKTPs and JKN programmes generally. Furthermore, increased patient satisfaction through online systems also impacts long-term loyalty, as satisfied patients tend to return to using FKTP services and recommend them to others, with this trust and loyalty being crucial for ensuring the sustainability of the JKN programme and increasing community participation in primary healthcare services. These positive impacts also contribute to FKTP's reputation in the community, as FKTPs that effectively adopt digital innovation will be viewed as modern, professional institutions responsive to community needs, attracting more patients to utilise online services and increasing community trust in national healthcare service systems. Collectively, these outcomes demonstrate that successful digitalisation implementation generates multiple benefits, including operational efficiency, patient satisfaction, institutional trust, and long-term programme sustainability, validating the importance of comprehensive digitalisation approaches in primary healthcare contexts.

5. Conclusion

The success of the digitalisation of the registration service at FKTPs in East Java is significantly influenced by determinants that can be categorised within the ADO framework. Antecedent factors comprise internal and external readiness, such as human resource competence to operate digital systems and adequate technological infrastructure. Research by Holidaya and Manggalau (2025) confirms that human resource shortages and suboptimal facilities constitute the main obstacles, whilst infrastructure readiness can accelerate registration processes and reduce waiting times, as confirmed by Wulandari et al. (2024).

External factors such as public digital literacy levels also play significant roles in implementation success. The decision aspect encompasses policies and strategies adopted by

FKTP management, including continuous training, facility modernisation, and socialisation of online system usage. Research by Husni and Aini (2024) demonstrates that policies supported by adequate training and systems can enhance patient satisfaction. Consequently, the success of these factors increases patient satisfaction, with patients feeling that registration processes are easier, faster, and more comfortable through online systems. This not only enhances patient experience but also contributes to loyalty and trust in FKTPs, supporting sustainable implementation of JKN programmes.

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