Implementation of Agile Scrum in the Digital Transformation of Insurance Claims Services at Integrated Ports

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Abstract.

Purpose: This study develops a web-based insurance claim information system at PT Jasaraharja Putera within an integrated port environment. The conventional claim process, which relies on manual communication such as WhatsApp and email, often causes verification delays, document loss, lack of transparency, and risks of duplicate claims or fraud. The system aims to accelerate and simplify claim submission, particularly during reporting and initial verification by field officers, through real-time integration with the company's core systems. Additionally, digital monitoring features enhance oversight of the claims process, reducing duplication and fraud potential.

Methods: This research employed a descriptive qualitative method with an Agile Scrum system development approach. Data collection involved interviews with field officers and the claims team, analysis of existing business processes, system trials, and distribution of questionnaires to users. System development was conducted iteratively over several sprints, with each sprint producing features that were tested and evaluated based on user feedback.

Results: Accelerate the claims input and verification process in the field. Increase transparency of claims status through a real-time monitoring dashboard. Reduce the risk of lost documents, human error, and potential duplicate claims. Achieve high user satisfaction levels based on questionnaire results at each development sprint.

Novelty: This research introduces a real-time, integrated web-based claims system for port operations, applying Agile Scrum and monitoring features to prevent fraud. It offers practical solutions to public insurance claim inefficiencies and theoretical insights for advancing insurance information systems.

Keywords: Information systems, Claims services, Insurance, Agile scrum, Integrated port

Received January 2026 / Revised March 2026 / Accepted March 2026

INTRODUCTION

The insurance industry is a service sector that relies heavily on service quality. In today's technologically advanced world, service quality is not solely measured by face-to-face interactions. Service quality also focuses on customer retention strategies, such as cohort and churn analysis, to proactively address issues and increase satisfaction [1]. Research shows that customer trust and satisfaction significantly influence service quality in health insurance [2], [3]. One of the key services in this industry is claims handling. Research states that claims service significantly negatively impacts insurance company profitability [4]. Therefore, the claims process is a key factor in determining customer trust in insurance companies.

The insurance claims process involves several stages and can be quite complex and time-consuming. Policyholders notify the insurance company of damage or loss [5]. In the operational context of an integrated port area characterized by high mobility and unlimited service hours, the challenges of providing responsive claims services are even more complex. Interviews with field officers revealed that the initial claims submission process is often delayed due to manual document verification and lack of centralized communication with branch offices.

PT Jasaraharja Putera, as a national insurance company, has a responsibility to provide optimal claims services, particularly in emergency situations such as accidents in port areas. However, the conventional or traditional claims process still relies on high personnel costs and lengthy processes [6], [7]. Limited monitoring and data integration from the field to the central system hinders the delivery of fast and transparent services. Without effective monitoring, the potential for delays and fraud in the claims process increases, which can ultimately reduce customer satisfaction and damage the company's reputation [8]. Based on interviews with the claims team, delays often occur because documents sent via WhatsApp or email are easily lost, incomplete, or not immediately opened, which affects the speed of verification.

According to research, digitizing the insurance claims process not only improves operational efficiency but also minimizes the risk of data mismatch and speeds up processing times [9], [10]. Furthermore, the concept of web-based claims management has been widely implemented by global insurance companies to support service systems, real-time integration, and more accurate monitoring of the claims process [11]. This is reinforced by interview findings, which indicate that disparate claim documents sent through various channels lead to data inconsistencies and delays in the input process to the core system.

The urgency of developing a web-based claims service information system is increasingly relevant in today's era of digital transformation [12]. Web-based systems offer advantages in terms of accessibility, flexibility, and ease of integration with other systems, including the company's core system. These systems allow users to access and manage claims from anywhere and at any time, which is particularly beneficial for staff who need to submit claims remotely [13]. Practically, such applications can enable field officers to directly report and verify claims in real time, while management can monitor the process more effectively [9]. Companies face potential delays in claims settlement, increased risk of fraud, and low transparency without a real-time web-based system. These conditions can ultimately erode customer trust and damage the company's reputation. Interviews with officers and the claims team confirmed that the lack of an integrated dashboard and the lack of duplicate claims detection make the claims monitoring process difficult and prone to irregularities.

This research presents a solution to a real-world problem that impacts PT Jasaraharja Putera's service performance. By developing a web-based claims service information system application that is digitally accessed by field officers and integrated with the central system, it is hoped that the claims process will be faster, more efficient, and more transparent. Furthermore, the implementation of this system also contributes to preventing potential fraud through process monitoring based on verified data [14]. Interview results support this need, as both field officers and the claims team believe that a centralized system that allows direct input from the field will speed up the process and reduce the risk of human error and duplicate claims or fraud. From a theoretical perspective, this research contributes to the development of knowledge in the field of information systems and enterprise architecture, particularly in the context of public insurance services. Furthermore, this study provides an overview of the practical implementation of integration between front-end systems and core systems in a dynamic and critical work environment such as a port.

METHODS
This research phase is structured based on the Software Development Life Cycle (SDLC) approach with the Agile model, which is an iterative and incremental method in software development. Agile is highly suitable for the development of claims service information system applications because it provides flexibility to respond to changing user needs, enables ongoing collaboration between developers and stakeholders, and emphasizes the rapid and regular delivery of features that have business value. The Agile methodology is implemented through the Scrum framework, which consists of planned sprints, each lasting two to four weeks. Each sprint aims to produce an increment of a functional and testable part of the system.

Conceptual Framework
This study originates from core issues in claim services at the integrated port environment of PT Jasaraharja Putera, including limited service access outside working hours, slow verification processes, exposure to human error, and the absence of real-time claim monitoring that increases fraud risk. These operational constraints reduce service responsiveness in a port setting that demands continuous availability and rapid decision-making. The research proposes a web-based claim service information system that can be accessed 24 hours by field officers and supports operational continuity. The proposed system is designed to integrate directly with the company's core system to ensure centralized and consistent data management. Real-time dashboards and monitoring features are embedded to support oversight and early detection of irregular

claims. Structured digital verification workflows are also incorporated to accelerate claim decisions while maintaining control accuracy.

Research Stages
The research stages follow a Software Development Life Cycle approach using an Agile model that emphasizes iterative and incremental system development. Agile is applied because it accommodates changing user needs, supports continuous collaboration between developers and stakeholders, and prioritizes rapid delivery of functional features. The Scrum framework is adopted through planned sprints lasting between 2 and 4 weeks, each producing a testable system increment [15]. The process begins with requirement analysis based on interviews with port officers and claim teams to identify delays, repetitive tasks, and lack of real-time data. These findings are translated into user stories that guide the product backlog, sprint backlog, and detailed task lists. Each sprint concludes with a review and retrospective to refine features based on direct user feedback and operational performance.

Population and Sample
The research population includes parties directly involved in the claim process at PT Jasaraharja Putera, particularly field officers at the integrated port and claim and supervision staff at branch and head offices. The sample consists of system users involved during the pilot testing phase to validate system functionality and relevance. The selected sample includes 2 field officers responsible for claim data input and 2 claim office staff handling verification and monitoring activities. Sample selection uses a purposive technique based on direct operational involvement in the claim workflow. This approach aligns with the Agile principle emphasizing customer collaboration over contract negotiation [16]. A limited number of representative users is considered sufficient to validate system suitability before broader implementation.

Data Collection and Analysis Techniques
Data analysis in this study applies a qualitative descriptive approach focusing on user feedback and interview results gathered during system implementation. Analysis aims to evaluate feature effectiveness, usability, and obstacles encountered during system use. Primary data are collected through stakeholder interviews, system trials involving actual users, and questionnaires measuring user satisfaction after system utilization. Secondary data are obtained through literature studies, internal company documents on claim procedures, and historical claim data from the integrated port environment. Academic references related to insurance claim information systems, Agile methods, and fraud monitoring practices support analytical interpretation. The combination of these techniques provides a comprehensive assessment of system performance and its contribution to operational improvement.

RESULTS AND DISCUSSION
In the following section, results will be reported and discussed. The results consist of the system requirement analysis based on identified operational issues, the development of product and sprint backlogs using the Agile Scrum methodology, and the iterative implementation and evaluation of the Eazy Claim system across four sprints. This chapter ends with a summary of findings from the sprint reviews as well as the team performance improvements identified in the retrospectives

Requirement Analysis
This study gathered system requirements through in-depth interviews with port field officers, the claim team of PT Jasaraharja Putera, and claim unit supervisors to capture operational realities at the port. The interview findings were complemented by an analysis of existing business procedures to map the current claim workflow and identify critical points associated with delays and operational risks. The ongoing claim process involves three main actors, namely field officers, the claim team, and supervisory personnel, who interact through largely manual and semi-digital mechanisms. The process begins when customers report incidents such as accidents or damage to field officers stationed at the port area. Field officers collect initial information including incident chronology, location, victim or vehicle identity, and supporting evidence such as photographs and official statements. These data are compiled into a structured incident report and transmitted to the claim team using communication channels such as WhatsApp or email. The flow of the claim process is depicted in Figure 1.
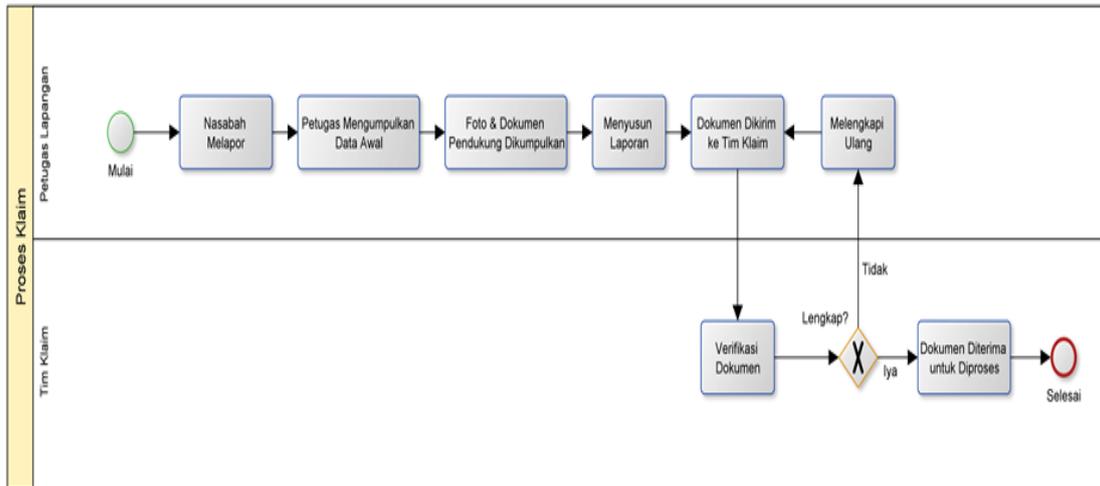
Figure 1. Claims process

After receiving the submitted documents, the claim team conducts an initial verification to assess document completeness, data consistency, and the validity of supporting evidence provided by field officers. At this stage, a decision point determines whether the submitted documents meet the required standards for further processing. Incomplete documentation triggers a return process, requiring field officers to revise and resend the necessary information, which reintroduces delays into the workflow. Complete submissions allow the claim to proceed into the internal claim system for further processing. The claim team then logs into the corporate core system, inputs policy data, validates customer and risk information, and generates a policy number as a formal reference. Claim registration follows, involving detailed input of claim chronology, damage classification, estimated losses, and uploaded documents until a claim number is automatically issued. As shown in Figure 2, the claim team is responsible for the verification registration stages outlined above.
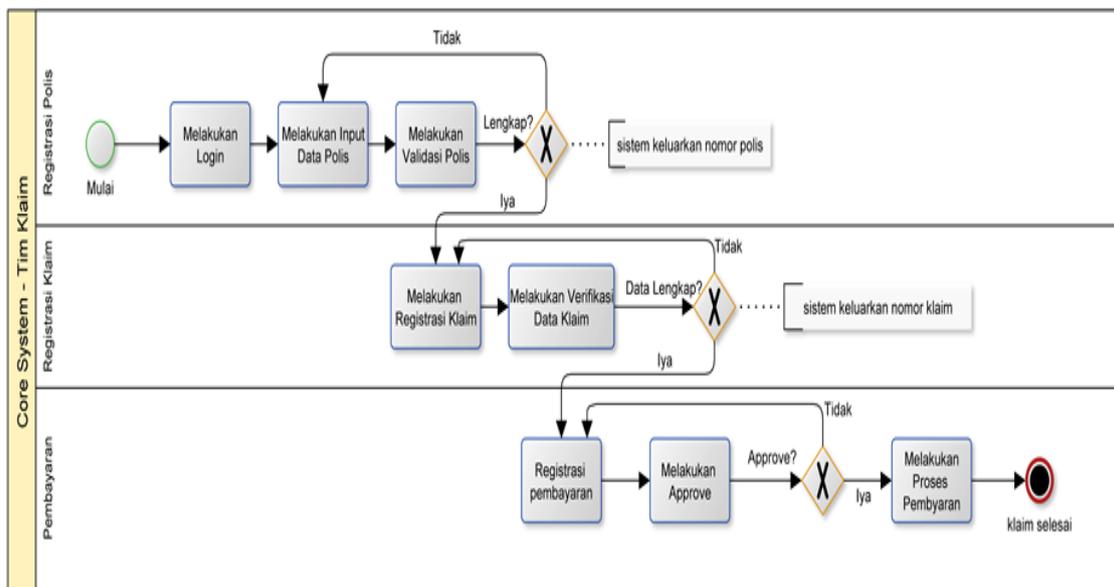

Figure 2. Claim team

The final phase of the existing process involves payment registration and approval, where the claim team inputs compensation values, verifies bank account details, and submits the claim for authorization. Claims that fail approval are returned for correction, while approved claims proceed to payment execution through internal systems. Despite its structured appearance, the traditional claim system exhibits notable limitations

within the port operational environment. These conditions align with the findings of Penira et al. [17] and Molnár et al. [18], which associate manual claim handling with inefficiency, data inaccuracies, and verification delays. At PT Jasaraharja Putera, critical issues include document exchange via WhatsApp and email, limited claim status transparency, and the absence of real-time integration between field operations and the central system. The analysis also revealed weak monitoring capabilities, data re-entry redundancy, and limited mechanisms for detecting duplicate claims, which collectively heighten operational and fraud risks as noted by Verma [19]. The identified issues and their operational impacts are summarized in Table 1.

Table 1. Existing claim process issues and impacts

| No	Identified Issue	Operational Impact
1	Manual document submission	Risk of data loss and delayed verification
2	No real-time status tracking	Low transparency and weak supervision
3	Lack of duplicate claim detection	Increased fraud potential
4	Re-entry of claim data	Redundant work and longer processing time
5	No field-level digital platform	Slower response and low-quality initial reports
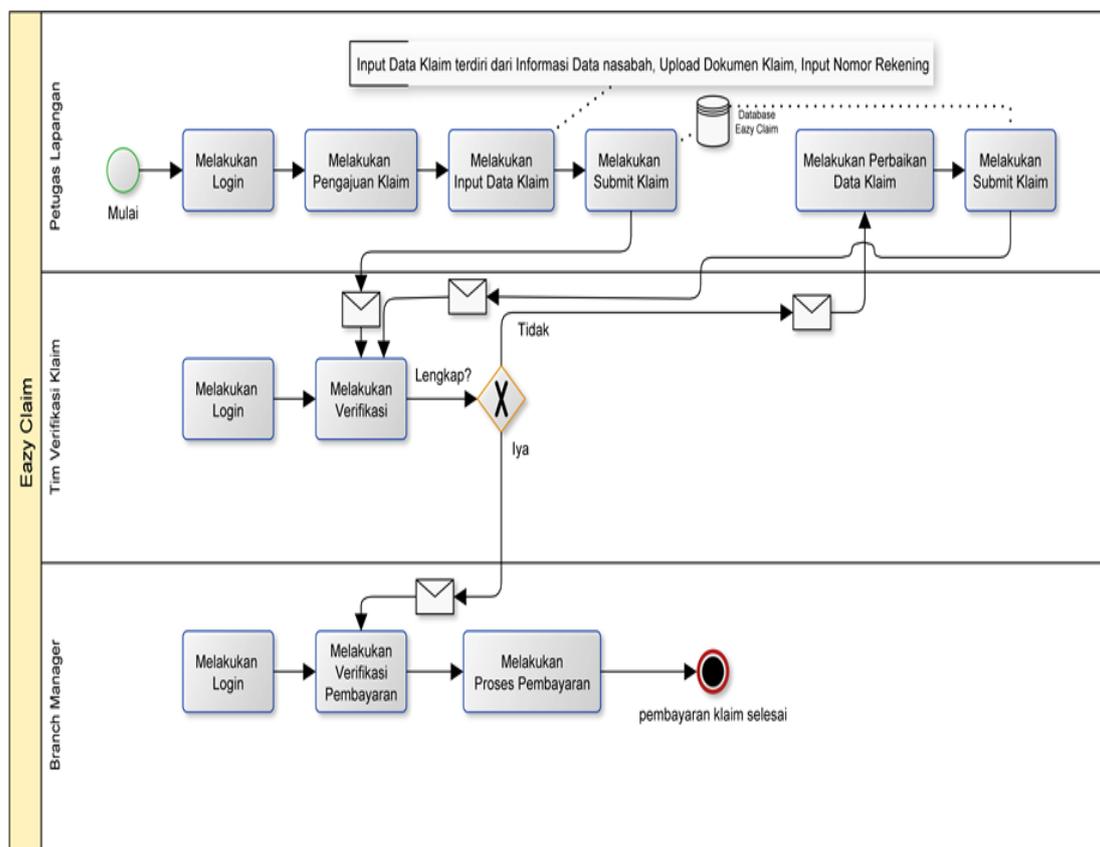
Figure 3. Easy claim

Based on the identified issues, functional and non-functional requirements were formulated to support the design of a web-based Eazy Claim system that digitizes the entire claim lifecycle. Functional requirements were structured according to user roles, ensuring that field officers, verification teams, and the system itself support operational needs without excessive manual intervention. Field officers require secure login access, digital claim submission forms, draft-saving capabilities, and dashboards displaying real-time claim status updates. Verification teams require prioritized claim lists, detailed claim views, document validation tools, and mechanisms to return or forward claims for approval. The system must automatically store claim data and documents, record audit trails, process payments, and detect duplicate claims based on predefined variables. These requirements aim to eliminate fragmented communication and reduce processing time

across operational units. The functional requirements outline above are summarized in Figure 3, which illustrate the Eazy Claim system architecture.

Non-functional requirements were defined to ensure system performance, security, and usability within a high-mobility port environment. The Eazy Claim platform must be web-based and accessible in real time from multiple devices used by field officers. Role-based access control and document encryption are required to protect sensitive claim information. System reliability must support 24/7 operations with centralized data storage to prevent loss. The user interface must remain intuitive and efficient, recognizing time constraints faced by port personnel during data entry. Integration with the PT Jasaraharja Putera core system and acceptable response times below 3 seconds were defined as essential performance benchmarks.

All requirements were translated into user stories to guide Agile Scrum-based product backlog development and iterative implementation. Field officers require the ability to log in, submit claims digitally, review drafts, monitor claim progress, and save incomplete submissions without data loss. Verification teams require access to incoming claims, detailed verification tools, return mechanisms, and forwarding features for payment approval. The system itself must ensure secure data storage, automatic document management, audit trail generation, payment processing, and duplicate claim detection. These user stories ensure that development aligns with actual operational workflows rather than abstract system assumptions. The proposed Eazy Claim system integrates submission, verification, approval, and payment into a single digital workflow. This design supports faster response times, improved data quality, and traceable claim processing across all stages.

Table 2. Functional and non-functional requirements of the easy claim system

Category	Key Requirements
Functional	Digital claim submission, verification workflow, payment processing, duplicate detection
Non-Functional	Web accessibility, security, reliability, usability, system integration, response time <3 seconds

Table 3. Summary of user stories for easy claim development

User Role	User Story Objective
Field Officer	Submit, review, and track claims digitally
Verification Team	Verify, return, and forward claims efficiently
System	Store data securely, log activities, process payments, detect duplicates

As shown in Table 2 and Table 3, the Eazy Claim system design integrates operational needs with Agile Scrum development practice.

Product Backlog Definition

The Product Backlog was developed based on user stories that reflect the perspectives and operational needs of each user involved in the insurance claim service system. These user stories translate daily operational activities into structured system requirements that guide iterative development. Priority levels were assigned to each backlog item to ensure that critical functionalities supporting claim submission, verification, and payment were addressed first. Field officers were prioritized for access, claim submission, monitoring, and draft management features to support rapid incident reporting at port locations. Verification teams were prioritized for claim review, validation, return, and forwarding functionalities to maintain process control and data accuracy. System-level backlog items focused on automated data storage, document management, audit logging, payment processing, and duplicate claim detection to ensure process continuity and integrity. The product backlog items derived form these user stories are summarized in Table 4.

Table 4. Product backlog of the easy claim system

User Role	User Story	Priority
Field Officer	Log in to access submission features	High
Field Officer	Create a claim submission	High
Field Officer	View submitted claim list	High
Field Officer	View and complete draft submissions	High
Field Officer	Monitor claim status via dashboard	High
Field Officer	Save submissions as drafts	Medium
Verification Team	View incoming claims	High

Verification Team	View claims pending verification	High
Verification Team	View detailed claim data	High
Verification Team	Verify documents and claim data	High
Verification Team	Return claims for revision	Medium
Verification Team	Forward valid claims for payment	High
System	Store claim data	Medium
System	Store claim documents automatically	Medium
System	Record verification activities (audit trail)	Medium
System	Process claim payments automatically	High
System	Detect duplicate claims	Medium

Sprint Backlog Planning

The Sprint Backlog represents selected Product Backlog items committed for completion within a single sprint cycle. Backlog selection for each sprint considered feature urgency, inter-feature dependencies, and team capacity during the development period, consistent with Agile Scrum principles [20]. The development process was structured into four sequential sprints that incrementally built and refined the Eazy Claim system. Early sprints focused on core access, submission, and data storage capabilities to establish a functional foundation. Subsequent sprints introduced monitoring dashboards, verification workflows, and audit mechanisms to strengthen operational control. The final sprint emphasized payment automation and duplicate claim detection to complete the end-to-end digital claim process. The sprint backlog distribution across the four development cycles is summarized in Table 5.

Table 5. Sprint backlog distribution across development cycles

Sprint	Key User Stories Implemented
1	Login, claim submission, draft detail view, claim data storage
2	Dashboard status view, draft saving, incoming claim list, document storage
3	Verification list, detailed verification view, document validation, audit trail
4	Claim forwarding, automated payment processing, duplicate claim detection

Sprint To-Do List Definition

The To-Do List for each sprint detailed the technical activities required to complete selected backlog items. Task breakdowns were managed using a kanban board on miro.com with 3 workflow columns consisting of To Do, In Progress, and Done. Each sprint's task allocation was determined through analysis of technical complexity, feature dependencies, and balanced workload distribution among team members. Sprint 1 focused on authentication, database structure, claim input forms, document uploads, and initial usability testing. Sprint 2 emphasized dashboard development, draft functionality, and evaluation preparation for iterative feedback. Sprint 3 and Sprint 4 concentrated on verification modules, payment integration, interface refinement, and final user evaluation to ensure system readiness. As shown in Table 6, each sprint's to-do-list reflects prioritized technical activities for iterative development

Table 6. Sprint-based technical to-do list overview

Sprint	Main Technical Tasks
1	UI/UX login design, authentication, database setup, claim form, document upload
2	Dashboard development, draft submission feature, sprint evaluation
3	Verification module, claim detail pages, audit features, performance metrics
4	Payment integration, confirmation interface, UI/UX refinement, final evaluation

Sprint Implementation and Evaluation

The sprint phase describes the complete workflow across Sprint 1 to Sprint 4, covering feature development, user evaluation, and incremental achievements until the release of version 1.0. Sprint 1 focused on establishing the system foundation through login, claim submission, submission list, detailed claim view, and an initial questionnaire, where testing involving 4 respondents confirmed that the system accelerated claim reporting, simplified document uploads, and improved real-time status tracking, while also generating feedback related to time input precision and multi-document uploads. Sprint 2 emphasized refinement of earlier features and introduced dashboards for Field Officers and Claim Teams, draft submission management, and structured monitoring, with evaluation results showing maximum user satisfaction scores of 5 and strong relevance ratings, alongside suggestions related to average claim processing time visibility and enhanced document upload flexibility. Sprint 3 concentrated on Claim Team workflows through claim

lists, detailed views, and verification features, including early implementation of average claim completion time, and questionnaire results indicated relevance scores of 4–5 with no additional criticism, reflecting stable functionality and improved transparency. Sprint 4 finalized the claim payment processing feature, completed system refinements, and released version 1.0 to the sandbox environment, where evaluation results showed very high relevance, satisfaction scores of 5, and strong confidence in future development potential without significant revision requests. Across all sprints, the Eazy Claim system demonstrated consistent progress, strong user acceptance, and effective alignment between iterative development outcomes and operational needs. The sprint activities and evaluation result are summarized in Table 7.

Table 7. Summary of sprint activities and evaluation results

Sprint	Main Focus	Key Results
1	Core features and initial testing	Faster submissions, clear workflow, improvement inputs identified
2	Dashboards and feature refinement	Satisfaction score 5, high relevance, minor enhancement requests
3	Claim verification workflows	Relevance 4–5, no criticism, improved transparency
4	Payment processing and release 1.0	Satisfaction score 5, very high relevance, system accepted

Sprint Review

Sprint Review was conducted at the end of each sprint to assess feature readiness and alignment with real operational needs through direct interaction between the development team and primary users, including field officers and claim staff. During Sprint 1, the team demonstrated core features such as Login, Claim Submission, Submission List, Submission Detail pages, and an initial questionnaire, allowing users to observe the full basic claim flow from access to detailed review. Feedback highlighted the need for more precise time input through hour and minute fields and improved document upload capability supporting multiple files in a single process. Sprint 2, reviewed on 14 December 2025, presented refined Sprint 1 features alongside dashboards for Field Officers and Claim Teams and a draft submission page, where users requested visibility of average claim completion time to support clearer monitoring. Sprint 3, reviewed on 28 December 2025, showcased claim lists, detailed views, and verification pages, where users acknowledged functional relevance while suggesting clearer verification flow presentation. Sprint 4 focused on the Claim Payment Processing page and final refinements, with evaluation results showing very high relevance, satisfaction scores of 5/5, and confirmation that the system met user expectations and was ready for broader testing. The outcomes of the Sprint Review are summarized in Table 8.

Table 8. Summary of sprint review outcomes

Sprint	Reviewed Features	Key Feedback
1	Login, Submission, List, Detail	Time precision, multi-document upload
2	Dashboards, Drafts	Average completion time visibility
3	Verification Features	Clearer verification flow
4	Payment Processing	High relevance, no major revision

Sprint Retrospective

Sprint Retrospective sessions were conducted to evaluate team performance, workflow consistency, and improvement actions across all sprints. In Sprint 1, a 1.5-hour session confirmed that velocity estimation was accurate since all backlog items were completed, while remaining backlog items were refined to support subsequent development. Sprint 2 reflection showed balanced task distribution, timely completion, and solid output quality, leading to a focus on increasing team-wide engagement rather than correcting workflow issues. Sprint 3 continued this positive pattern, with stable work rhythm and on-time delivery, while emphasizing more careful backlog verification to avoid misinterpretation during implementation. Sprint 4 maintained consistent coordination and delivery, confirming maturity in sprint execution and adaptability to project demands. New focus areas included reviewing Version 1.0 quality and preparing system socialization for pilot ports such as Merak and Bakauheni. Across all retrospectives, no critical practices required termination, indicating that the team workflow progressed in a stable and productive direction. The outcomes of Sprint Retrospective are summarized in Table 9.

Table 9. Summary of sprint retrospective results

Sprint	Continue	Start
1	Accurate velocity, full completion	Backlog refinement
2	Balanced workload, on-time delivery	Broader team involvement
3	Stable rhythm, quality output	Backlog verification accuracy
4	Consistent coordination	Version 1.0 review, pilot preparation

CONCLUSION

The study in PT Jasaraharja Putera concludes that conventional claim processes relying on manual document delivery through non-integrated media generate verification delays, data loss risks, limited process transparency, and higher exposure to duplicate claims or fraud. Such operational patterns create structural barriers to delivering claim services that are fast, accurate, and responsive, particularly within port operations characterized by high mobility and continuous service demands. The research successfully designed and developed a web-based claim service information system integrated with the company's core system, enabling field officers to submit claims directly from incident locations without procedural bottlenecks. The system supports real-time verification and supervision, allowing claim officers and management to monitor claim progress more effectively throughout each processing stage. Application of the Agile Scrum method proved effective in aligning system features with actual user needs, since development was carried out iteratively based on user stories and continuously evaluated through sprint reviews and sprint retrospectives involving relevant stakeholders. As a result, the implemented system demonstrates functional alignment with operational requirements while maintaining flexibility for ongoing refinement. Beyond improving operational efficiency and accelerating claim settlement timelines, the developed system also delivers added value through strengthened supervisory mechanisms supported by monitoring dashboards, audit trails, and duplicate claim detection features. These capabilities enhance internal control functions by providing structured visibility over claim activities across different operational levels. Recommendations from this study suggest that PT Jasarharja Putera extend system implementation beyond integrated port areas to other operational units with high service velocity and elevated claim risk profiles. Sustained benefits also depend on internal policy support, continuous user training, and deeper integration with supporting systems such as finance and risk management platforms. Future research is encouraged to develop advanced features including historical data-based claim analytics and artificial intelligence-driven fraud detection to improve accuracy and preventive capacity. Subsequent studies may also incorporate quantitative performance evaluations and broader operational locations to generate a more comprehensive assessment of digital claim system impacts on organizational performance and customer satisfaction.

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