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Evaluation and Improvement Recommendations for the Development of an Informal Job Seeker Application Using the Scrum Maturity Model (Case Study of the ABC Application at PT XYZ)

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Abstract: PT XYZ developed the ABC application to support informal job seekers through Scrum framework implementation during redevelopment. Implementation obstacles including inadequate backlog management, ambiguous Definition of Done (DoD) criteria, and irregular Scrum event execution prevented optimal framework adoption. We assess Scrum practice maturity levels through the Scrum Maturity Model (SMM) while proposing specific enhancement strategies. Our mixed-methods investigation combined KPA-based questionnaires with semi-structured interviews across development teams. Results indicate the project operates at Maturity Level 2 (Managed), achieving an 81.8% average KPA rating. Software Requirements Engineering emerged as the sole Level 2 Key Goal reaching Fully Achieved status (86.25%), whereas goals spanning Levels 3-5 maintained Largely Achieved classifications. Strategic recommendations encompass DoD clarification, enhanced Product Owner engagement, standardized performance metrics implementation (burndown and velocity charts), Sprint Review optimization, and Work in Progress (WIP) limit application. Management validation at PT XYZ resulted in 62.5% recommendation acceptance, revealing that several practices existed pre-assessment yet lacked optimization. The research delivers practical guidance for Scrum adoption enhancement and process maturity advancement, specifically within software development projects serving informal labor markets.

Keywords: Agile Assessment; Informal Employment Platforms; Process Enhancement; Scrum Maturity Framework; Agile Development Practices.

1. Introduction

More than 59% of Indonesia national workforce is employed in the informal sector as of 2025, according to data from BPS (Indonesian Central Bureau of Statistics) cited by Antaranews.com [1]. This sector plays a crucial role in the country's economic structure. In today's digital era, professions such as streamers, content creators, master of ceremonies (MC), and event crews also fall under the informal services category. These workers typically operate outside formal organizational structures, offering entertainment, digital content, or event management services [2]. Despite the sector's rapid growth, informal workers still face limited access to relevant job opportunities and often struggle to keep up with rapid technological advancements [3].

To address this gap, PT XYZ, an information technology company, developed an informal job seeking application named ABC. The app aims to connect job seekers particularly event crews, content creators, MCs, sales promotions, and ushers with potential employers. In Indonesia, similar applications such as Freelancer.co.id, Sribulancer, and Projects.co.id have become major players in the freelance ecosystem. According to a Ken Research market report, the Indonesia freelance platforms market was valued at USD 6.50 billion in 2023, with Freelancer.co.id, Sribulancer, and Projects.co.id as leading brands [4]. While these platforms primarily serve digital freelancers, there remains a gap in services catering to offline, event-based informal workers, positioning the ABC app as a unique solution in Indonesia's gig economy landscape. The first version of the ABC application was launched in 2019, but it was built using outdated technology, had limited interactivity, and lacked optimal functionality and user interface. In 2024, the Chief Technology Officer of PT XYZ initiated a complete redevelopment of the application using a modern, responsive, and multiplatform approach. The Agile methodology was chosen for the development process due to its flexibility in handling dynamic and evolving project requirements [5]. Agile, as a modern approach to the System Development Life Cycle (SDLC), emphasizes adaptability, collaboration, and rapid iteration to accelerate software development [6]. Among Agile methods, PT XYZ adopted Scrum as the primary framework, enabling the team to work in fixed-length development cycles known as sprints [7]. Although Scrum is widely adopted in software development globally, studies such as [8][9],reveal that many organizations in Indonesia still struggle to implement Scrum consistently due to unclear roles and inadequate training. Scrum provides clearly defined roles—Product Owner, Scrum Master, and Development Team—who collaborate to deliver high-value products within a short time frame [7].

According to data provided by the company, the new version of the ABC application was scheduled for release within five months for the Minimum Viable Product (MVP) stage. The development team consisted of 16 members, including a Product Owner, a Scrum Master, and developers across mobile and web platforms. The mobile development was planned across 10 sprints, while the web version was planned over 7 sprints. However, during the last two sprints of each platform, the teams experienced significant delays, failing to complete key MVP features on time. This situation highlighted the gap between the company's expectations and the actual implementation on the ground.

To identify the root causes of these issues, the team conducted a fishbone diagram analysis, a visual tool used to examine root causes through a 6M approach[10]. The findings revealed several critical problems as illustrated in Figure 1. The analysis identified issues across six dimensions: Man (team members lacked comprehensive understanding of Scrum practices and had limited formal training), Method (Scrum events such as sprint planning and retrospectives were not conducted effectively), Machine (project management tools like Trello were underutilized), Material (backlogs were not well-organized or prioritized), Milieu (the work culture did not fully support Agile principles such as discipline and collaboration), and Measurement (no clear metrics or performance indicators were used to track sprint progress).

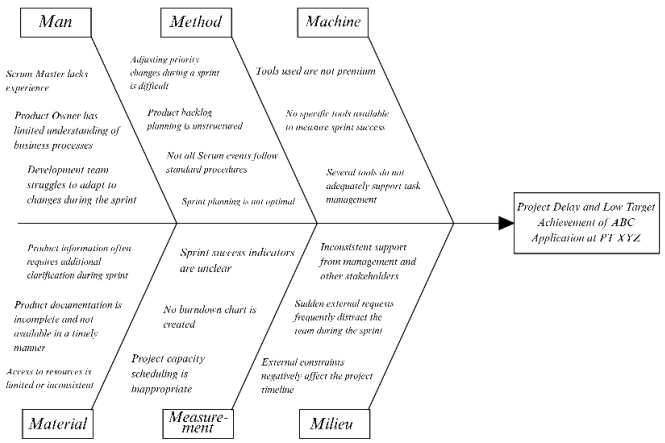

Figure 1. Fishbone Diagram of Root Cause Analysis in ABC Application Development

These findings suggest that although Scrum was adopted, its implementation was not ideal. Therefore, an evaluation was necessary to measure the effectiveness of the Scrum process and identify improvement areas. Several previous studies have examined Scrum maturity in various organizations using the Scrum Maturity Model, including in telecommunications [11], government [9], software houses [12], and public institutions [12]. Most found maturity levels at the initial stage and provided general recommendations, often lacking contextual focus. This study differs by first identifying root causes using interviews and a fishbone diagram, then evaluating Scrum maturity with a mixed-methods approach in a single case study of the ABC project at PT XYZ. It aims to guide the company in formulating targeted process improvement strategies. Accordingly, this research focuses on the following key questions:

1) What is the maturity level of Scrum implementation in the development of the ABC application at PT XYZ?
2) What recommendations can be provided to improve the maturity level of Scrum implementation?.

2. Related Work

The Scrum Maturity Model (SMM) serves as a framework for evaluating Scrum implementation across diverse organizational environments. Previous research provides foundational understanding for assessing Scrum practice maturity and identifying improvement opportunities. Multiple studies have examined SMM application in software development projects within various organizational settings. Research findings offer valuable references for evaluating Scrum practice maturity and pinpointing areas needing enhancement. Setiyawan *et al*. (2020) employed SMM to evaluate Scrum implementation across two divisions in a telecommunications company. Results indicated low maturity (Level 1 – Initial), primarily attributed to ineffective backlog management and inaccurate time estimation. The research proposed 38 specific recommendations targeting Scrum event improvements, team training enhancement, and backlog handling optimization [11]. Government ICT unit evaluation revealed how overlapping responsibilities and unclear role definitions impeded effective Scrum adoption. Through qualitative methods including questionnaires and document analysis, researchers determined the organization achieved Maturity Level 2 (Managed). Authors emphasized team training importance and structured implementation processes for further advancement [9].

Panjaitan and Legowo (2022) assessed a media monitoring company using focus group discussions and project documentation reviews to evaluate Scrum implementation. Analysis demonstrated the project remained at Level 1 due to poor Scrum artifact adherence, undefined team roles, and inconsistent Scrum event execution. Researchers recommended improving role clarity, event execution, and artifact management [8]. Software house research examined large-scale Scrum adoption, identifying insufficient team commitment and coordination challenges. While the study recommended Scrum at Scale adoption for enhanced large team performance, maturity remained at Level 1, suggesting structural changes alone proved insufficient [12]. Anggraeny *et al*. (2024) assessed Scrum maturity across three projects under a government directorate. Despite Scrum introduction in 2021, only one project achieved Level 2, while two others remained at Level 1. The study proposed improvements regarding documentation practices, sprint goal standardization, and consistent Definition of Done (DoD) usage [13].

While these studies provide valuable findings, two primary limitations emerge. First, they evaluated multiple projects without analyzing specific root causes of Scrum implementation issues. Second, their recommendations remained generic, lacking alignment with individual team challenges. The present research addresses these gaps through several distinctive approaches. Rather than examining multiple projects superficially, the study focuses on a single real-world application—the ABC app—enabling detailed analysis of specific organizational challenges. The methodology integrates root cause analysis through fishbone diagrams with SMM-based evaluation using mixed methods. The approach facilitates targeted, contextual recommendation development for Scrum process improvement in informal job-related software projects. The research methodology combines quantitative KPA ratings with qualitative insights, developing improvement strategies tailored to specific organizational settings and maturity gaps. By integrating systematic root cause analysis into the evaluation process, the study offers practical applications to Scrum practice evaluation and enhancement methodologies.

3. Research Method

3.1 Research Design

This study adopts a mixed methods approach to integrate the strengths of both quantitative and qualitative data, thereby enhancing the validity of the findings [14]. The research begins with quantitative data collection using a questionnaire to measure the maturity level of Scrum implementation based on the Scrum Maturity Model (SMM). The questionnaire was developed based on seven goals and multiple objectives

outlined in the SMM, providing measurable numerical insights. Subsequently, qualitative analysis through interviews is conducted to explore contextual factors behind the implementation [15]. Interview questions were derived from recurring challenges found in similar studies and were piloted with two non-respondent developers before the main data collection [8][9]. This qualitative phase supported the interpretation of quantitative scores and provided insights into team dynamics, cultural constraints, and training gaps.

In evaluating software development maturity, several models exist, such as the Capability Maturity Model Integration (CMMI), which follows a top-down approach and suits large, formal organizations [16]. The Agile Maturity Model (AMM) was later developed to integrate Agile principles into process improvement, using Key Process Areas (KPA) as evaluation criteria [17]. However, since this study focuses exclusively on Scrum, the Scrum Maturity Model (SMM) developed by Yin (2011) is considered the most appropriate [18]. Among the available models, SMM offers a Scrum-specific structure and is well-suited for small to mid-sized teams due to its flexible, bottom-up approach. It emphasizes continuous improvement through transparency, collaboration, and incremental progress across five maturity levels and seven evaluation goals. The overall research procedure based on this model is illustrated in Figure 2.

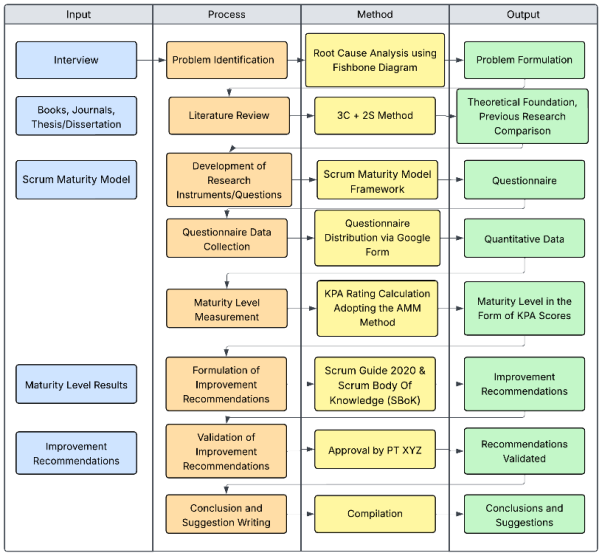

Figure 2. Research Procedure

3.2 Data Collection Techniques

Quantitative data were collected via a closed-ended questionnaire based on the Scrum Maturity Model, consisting of 83 items. Each item has four response options: "Yes," "Partially," "No," and "Not Applicable." The questionnaire was distributed using Google Forms, and a response rate of 100% was achieved from 16 team members involved in the ABC application development. To enhance respondent understanding, a detailed written guide accompanied the questionnaire, explaining the purpose and content of each section. Qualitative data were obtained through semi-structured interviews conducted via Zoom Meeting, each lasting approximately 20-30 minutes. The interviewees included the Product Owner, Scrum Master, and developers from both mobile and web teams. All sessions were recorded and transcribed manually for thematic analysis using Microsoft Word's comment and highlight features.

3.3 Data Analysis Techniques

This study applies the Key Process Area (KPA) Rating method, adapted from the Agile Maturity Model by Patel and Ramachandran (2009), since the Scrum Maturity Model does not include a detailed calculation method [17]. The rating is calculated using the following formula:

$$\text{KPA Rating} = \frac{\sum(\text{Yn}) + \frac{1}{2}\sum(\text{Pn})}{\sum(\text{Tn}) - \sum(N\ An)} \times 100 \quad (1)$$

Where:
Yn = Number of "Yes" answers
Pn = Number of "Partially" answers
Tn = Total number of questions
NAn = Number of "Not Applicable" answers

The interpretation of KPA rating is categorized as follows [17]:

Table 1. Interpretation of KPA Rating

No.	Score	Category	Descriptions
1.	86% - 100%	Fully Achieved	All practices are fully implemented; no significant weaknesses exist.
2.	51% - 85%	Largely Achieved	Practices are generally applied but vary across areas.
3.	16% - 50%	Partially Achieved	Inconsistent application; several aspects need improvement.
4.	0% - 15%	Not Achieved	No strong evidence that practices are applied effectively.

The results were visualized using Microsoft Excel to generate bar charts and summary tables per maturity level. A KPA is considered acceptable only if the score reaches at least Fully Achieved (≥ 86%) [19]. Following the evaluation, improvement recommendations are formulated based on best practices from the Scrum Guide 2020 and the Scrum Body of Knowledge [7][20].

4. Result and Discussion

4.1 Results

4.1.1 Scrum Maturity Level Assessment

The analysis involved grouping and quantifying each questionnaire response, followed by a qualitative cross-check through interviews with relevant team members. Each goal defined in the Scrum Maturity Model (SMM) was evaluated based on its respective objectives. Ratings were calculated using the Key Process Area (KPA) formula, and the average scores were used to interpret the maturity level of the ABC application project. The overall average KPA rating across all levels was 81.8%, with the highest score achieved in Software Requirements Engineering at 86.25% and the lowest in Definition of Done clarity at 78.13%.

4.1.2 Results per Maturity Level

1) Level 2 – Managed

There were two goals evaluated at this level. The first was Basic Scrum Management, which focused on the implementation of Scrum roles, artifacts, events, and sprint execution. The results showed that this goal achieved an average KPA rating of 83.59%, which is categorized as Largely Achieved. The second goal was Software Requirements Engineering, which examined the Product Owner's role, backlog management, and the success of sprint planning. This goal obtained an average score of 86.25%, which is categorized as Fully Achieved.

Table 2. Achievement at Maturity Level 2

Level Maturity	Goals	Objectives	KPA Rating
2	Managed	Basic Scrum Management	Scrum roles exist
			Scrum artifacts exist
			Scrum meetings occur and are participated
			Scrum process flow is respected
		Average	83.59%
		Software Requirements Engineering	Clear definition of Product Owner
			Product Backlog Management
			Successful Sprint Planning Meetings
		Average	86.25%

2) Level 3 – Defined

At this level, two goals were also measured. The first goal was Customer Relationship Management, which included indicators such as clarity of the Definition of Done, the availability of the Product Owner during the sprint, and the effectiveness of the Sprint Review. The average KPA rating for this goal was 84.64%, falling into the Largely Achieved category. The second goal was Iteration Management, which covered the creation of the Sprint Backlog, proper iteration planning, effective Daily Scrum practices, and the ability to measure sprint velocity. This goal scored 78.50% and was also categorized as Largely Achieved.

Table 3. Achievement at Maturity Level 3

Level Maturity	Goals	Objectives	KPA Rating
3	Defined	Customer Relationship Management	Definition of "Done" exists
			Product Owner available
			Successful Sprint Review Meeting
		Average	84.64%
		Iteration Management	Sprint Backlog Management
			Planned iterations
			Measured velocity
			Successful Daily Scrum
		Average	78.50%

3) Level 4 – Quantitatively Managed

The assessment at this level included two goals. The first was Standardized Project Management, which aimed to evaluate the consistency of Scrum implementation across multiple projects. This goal received a score of 75.00%, categorized as Largely Achieved. The second goal was Process Performance Management, which focused on how performance measurements were used in the Scrum process. The result showed a score of 76.56%, also in the Largely Achieved category.

Table 4. Achievement at Maturity Level 4

Level Maturity	Goals	Objectives	KPA Rating
4	Quantitatively Managed	Standardized Project Management	Quantitative Project Management
		Average	75.00%
		Process Performance Management	Measurement and Analysis
		Average	76.56%

4) Level 5 – Optimizing

This level consisted of one goal, which was Performance Management. This goal aimed to measure the effectiveness of the retrospective process and how the team uses it to continuously improve performance. The KPA score for this goal was 82.81%, categorized as Largely Achieved.

Table 5. Achievement at Maturity Level 5

Level Maturity	Goals	Objectives	KPA Rating
5	Optimizing	Performance Management	Successful Sprint Retrospective
			Positive Indicators
		Average	82.81%

4.1.3 Summary of Maturity Level Achievement

The KPA ratings for each goal were interpreted to determine whether they fall into the categories of Fully Achieved, Largely Achieved, Partially Achieved, or Not Achieved. The summarized results are presented in Table 6.

Table 6. Summary of Maturity Level Achievement

Level Maturity	Goals	Objectives	KPA Rating
2	Managed	Basic Scrum Management	Scrum roles exist
			Scrum artifacts exist
			Scrum meetings occur and are participated
			Scrum process flow is respected
		Average	83.59%
		Software Requirements Engineering	Clear definition of Product Owner
			Product Backlog Management
			Successful Sprint Planning Meetings
		Average	86.25%
3	Defined	Customer Relationship Management	Definition of "Done" exists
			Product Owner available

			Successful Sprint Review Meeting
		Average	84.64%
		Iteration Management	Sprint Backlog Management
			Planned iterations
			Measured velocity
			Successful Daily Scrum
		Average	78.50%
4	Quantitatively Managed	Standardized Project Management	Quantitative Project Management
		Average	75.00%
		Process Performance Management	Measurement and Analysis
		Average	76.56%
5	Optimizing	Performance Management	Successful Sprint Retrospective
			Positive Indicators
		Average	82.81%

As shown in Table 6, the average KPA Rating for each goal under each maturity level is presented. At Level 2 (Managed), the goal Basic Scrum Management achieved an average KPA Rating of 83.59%, which is interpreted as Largely Achieved (LA). Meanwhile, the goal Software Requirements Engineering achieved an average KPA Rating of 86.25%, which is categorized as Fully Achieved (FA). According to the criteria defined by Ridha and Hegarini [19], a project is considered to have reached a certain Scrum maturity level if all goals within that level are categorized as Fully Achieved, or at least one of the goals achieves a KPA Rating of ≥86%. Since at Level 2 there is one goal that meets the Fully Achieved threshold, the evaluation result indicates that the ABC application development project at PT XYZ meets the criteria to be classified at Maturity Level 2.

4.2 Discussion

Based on the maturity level assessment, several areas were identified that require improvement in order for PT XYZ to advance beyond its current Scrum Maturity Level 2. Improvements are particularly needed in the practices associated with Levels 3 (Defined), 4 (Quantitatively Managed), and 5 (Optimizing). Therefore, a set of targeted improvement recommendations has been formulated to enhance the effectiveness of Scrum practices across these maturity levels, as summarized in Table 7.

Table 7. Improvement Recommendations

Level Maturity	Goals	Objectives	Identified Challenge	Improvement Recommendation
3	Defined	Customer Relationship Management	Definition of "Done" exists	The definition of Done (DoD) was not clearly defined or uniformly applied across tasks, leading to inconsistency in feature completion
			Product Owner available	The Product Owner (PO) was not consistently available during Sprint activities, resulting in communication delays
			Successful Sprint Review Meeting	Sprint Review Meetings lacked stakeholder engagement and did not effectively meet expectations
		Iteration Management	Sprint Backlog Management	The Sprint Backlog was not regularly updated or accessible to all team members, limiting collaboration and visibility
			Planned iterations	Sprint planning often failed to consider team capacity or external interruptions, affecting delivery
			Measured velocity	Team progress was difficult to measure due to unclear indicators or visual representation

			Successful Daily Scrum	Daily Scrum meetings lacked structure and often did not contribute to synchronization
4	Quantitatively Managed	Standardized Project Management	Quantitative Project Management	Development processes differed significantly across teams and projects, creating inconsistency and scalability issues
		Process Performance Management	Measurement and Analysis	Metrics for measuring project progress and team performance were either absent or not reviewed regularly
5	Optimizing	Performance Management	Successful Sprint Retrospective	Sprint Retrospectives were conducted informally and were not sufficiently documented, which limited follow-up and continuous improvement
			Positive Indicators	Recognition, motivation, and feedback mechanisms were insufficient to sustain long-term team performance and engagement

This activity involved presenting the proposed recommendations to the company's management to document their responses and intended actions. The validation process included assessing whether each recommendation was approved, already implemented, not yet implemented, or rejected. Based on the validation results, the Chief Technology Officer (CTO) of PT XYZ acknowledged that several of the recommended practices had actually been implemented prior to the assessment. These include:

1) Clarifying and enforcing the Definition of Done (DoD) by strengthening the Scrum Master's role in reviewing and ensuring task completion standards.
2) Conducting Sprint Reviews with live product demonstrations, improving stakeholder visibility and feedback.
3) Improving Sprint Backlog management to maintain transparency and ensure a smooth development process.
4) Establishing clear Sprint Goals to provide direction and focus for each iteration.
5) Ensuring the consistency of Daily Scrum implementation, focused and timeboxed.
6) Standardizing development practices across projects through shared guidelines and alignment efforts.
7) Adjusting the duration of Sprint Retrospectives to optimize reflection time without reducing quality.
8) Leveraging tools (*e.g.*, Trello, Miro, video demos) during Sprint Reviews to enhance communication and clarity of product outcomes.

However, these practices had not yet been fully optimized or formally structured, which led to their reemergence as key recommendations based on the current assessment. The company accepted these updated recommendations as relevant and constructive. Nevertheless, the implementation of each recommendation will remain subject to internal policy and strategic considerations, and thus is at the discretion of the management. In addition, several recommendations were approved for future consideration and potential implementation, such as:

1) Improving the Definition of Done (DoD) by ensuring that each task includes clear and specific success criteria before being marked as complete.
2) Enhancing Product Owner participation across all Scrum Events to improve decision-making speed and clarity.
3) Making Sprint Reviews more interactive, with active discussion and engagement from stakeholders beyond basic product demonstration.
4) Strengthening the use of project metrics, including Burndown Charts, Velocity Charts, and Cumulative Flow Diagrams, to enable more accurate performance analysis.
5) Standardizing Sprint Retrospectives by focusing on root cause analysis and aligning follow-up actions with team priorities.
6) Improving decision-making effectiveness by integrating feedback from both team members and stakeholders in a structured way.
7) Applying Work in Progress (WIP) Limits to optimize workflow, reduce bottlenecks, and avoid excessive multitasking.
8) Systematically documenting Sprint Retrospectives using automated tools to ensure traceability and continuous improvement tracking.

The validation process confirmed that most of the proposed recommendations were well received and are planned for implementation, either immediately or in the near future, depending on organizational readiness and strategic alignment.

5. Conclusion and Recommendations

The analysis presented in this study provides answers to the research questions. In response to the first question, the findings indicate that the ABC application development project at PT XYZ is currently at Scrum Maturity Level 2. The conclusion is supported by the achievement of the key goal at the level, namely Software Requirement Management, which achieved KPA rating of 86.25%, interpreted as Fully Achieved (FA). Meanwhile, the Basic Scrum Management goal at the same level scored 83.59%, categorized as Largely Achieved (LA). According to Ridha and Hegarini [19], a project may be classified at a certain maturity level if at least one goal in that level attains a KPA rating of ≥ 86%. Therefore, the project meets the criteria to be categorized at Level 2. To address the second research question, several improvement areas are recommended to help the organization progress to higher maturity levels. To reach Level 3, the team must enhance the consistency of the Definition of Done, ensure transparent backlog management, improve Product Owner availability, strengthen team collaboration, and implement more effective progress monitoring. At Level 4, standardizing processes across projects and optimizing the use of metrics such as velocity tracking and burndown charts becomes necessary to evaluate and improve performance. Finally, to achieve Level 5, the organization should focus on continuous improvement, including effective time management, increased motivation through rewards and feedback, and transparent communication supported by structured documentation.

Practically, organizations seeking to implement the Scrum Maturity Model (SMM) should begin by investing in internal training, clarifying Scrum roles, and introducing simple performance metrics such as velocity charts and sprint burndown charts. Strong stakeholder involvement and structured sprint reviews are key to advancing maturity levels. The study has limitations due to its case-specific scope and inability to directly implement and monitor the recommendations. Implementation outcomes depend on the internal policies and decisions of the case organization, and were therefore outside the researcher's control. Future studies are encouraged to validate the effectiveness of these recommendations through longitudinal or multi-team evaluations. Combining SMM with other frameworks such as the Agile Maturity Model (AMM) or CMMI may also provide richer insights into software process improvement efforts in various organizational settings.

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