

Achieving ISO 9001 Compliance in Agile Software Development Projects at Indonesian Research Institute

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Abstract

In the modern era, e-government provides comprehensive online services. Currently, there is no standardized quality management regulation in development projects. Therefore, it is crucial for Indonesia, especially in one of the Indonesian Institute of Sciences, to consider implementing ISO 9001:2015 in project development. By doing so, it can demonstrate its dedication to efficient project management and quality assurance to improve quality and customer satisfaction, as it can significantly enhance the reputation and credibility of the Institute in the eyes of the public. The main objective of this study was to examine the integration of ISO 9001:2015 standard with Agile methodology. This study evaluated the critical documentation required to fulfill ISO 9001:2015 in Agile-based projects. This research utilizes triangulation methods, which include interviews, observations, and field notes in qualitative research. Aligning Agile practices with the rigorous quality management standards of ISO 9001 is essential when incorporating ISO 9001:2015 principles into Agile project development. This research recommends standard operating procedures for implementing the documentation prerequisites of ISO 9001:2015 in advancing Agile projects in the public sector, particularly at the Indonesian Institute of Sciences, to realize the benefits of integrating Scrum and ISO 9001 in improving the quality of public services.

Keywords: ISO 9001:2015, Quality Management, Agile Project, Development Project, Government.

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1. Introduction

Modern e-government allows for digital interactions, replacing traditional face-to-face meetings [1]. The public now expects government agencies to be Agile, responsible, and attentive to their requirements [2]. Agile organizations are flexible and adaptable, able to adjust to new situations and maintain their success over time [3]. The Agile approach offers benefits such as streamlined bureaucracy, speed, convenience, uniqueness, and innovative thinking, embodying dynamic governance [4].

The Agile methodology directs developers' attention toward the working environment, the effectiveness of the software, customer needs, and alterations in requirements [5]. Indonesia's e-government development fosters Agile governance principles to leverage the potential of e-government in enhancing governance agility [6]. Scrum, a widely recognized framework in the Agile methodology, was created by Schwaber & Sutherland [7]. Scrum is a flexible and efficient framework that fosters transparent communication, continuous progress, and collective accountability. Scrum designs processes to deliver significant value quickly across various industries and projects [8]. Scrum is a framework that enables teams and organizations to continuously improve performance by addressing inefficiencies and generating value through adaptive solutions to complex problems consisting of three categories, namely roles, deliverables, and meetings [5], [9], [10], [11].

Agile is a best practice with great potential to improve information technology (IT) project delivery, and management methods must be customized for the public sector [12]. Governments worldwide are adopting Agile software development (ASD) to foster innovation in creating digital solutions [13]. Agile is regarded as a crucial element in the digital transformation of public service delivery in Denmark, serving as a critical mechanism to enhance user focus [14].

A literature study found that the Agile approach is more effective in small, experienced teams in Spain [13]. Another study reported a failed adoption of Agile by a government entity in the United Arab Emirates [15]. Similarly, on other study identified challenges related to requirements and stakeholders in Thailand [16].

A research institution in Indonesia uses Agile software development to create user-friendly applications that improve efficiency and streamline processes for the public and internal staff. By prioritizing key features and continuously updating the software, they ensure it remains relevant and effective in meeting changing needs. Scrum is the specific Agile framework they employ.

Utilizing an Agile practice can enhance the efficiency of the software development cycle, guaranteeing that the project remains on track with the predetermined

timeline, financial plan, and objectives [5]. Two researchers suggest that Agile enables governments to adapt quickly to changed circumstances, aligning services with citizens' evolving needs and expectations [17].

Based on an interview with one of the Scrum Masters from an Indonesian Research Institute, the obstacle faced is often sudden changes from users without clear requirements. Public sector organizations possess traits that make adopting Agile development more challenging than the private sector [18]. One of the biggest challenges in Agile transformation within government is the lack of trust and support from top management and team members. This condition can obstruct the process, as they often focus solely on customer satisfaction by seeking solutions to improve the current system without understanding the necessary steps [5].

Researchers observe that the organizational culture within the government sector is predominantly hierarchical, necessitating adherence to specific policies and rules [19]. They emphasize the importance of formal communication and the need to document and store records whenever a change is proposed [18]. Another researchers found that the challenge of implementing Agile methodologies in the public sector is deciding to what degree documentation needs to be done [18], [20].

Embracing a quality management system is an organization's strategic choice, which can enhance its comprehensive performance and establish a solid foundation for sustainable development efforts. Quality is a crucial performance indicator in the private and public sectors [21]. Similarly, international guidelines have focused on the continuous enhancement of public services, prompting government agencies to pursue quality certification for the services provided in each department [21], [22].

Implementing a Quality Management System (QMS) within governmental bodies and organizations aims to establish a methodical approach grounded on empirical evidence that guarantees ongoing enhancement of processes and outcomes [9], [23]. The QMS, defined by the ISO 9001:2015 standard, is crucial for success across business and governmental sectors [24]. ISO 9001 mandates that information documentation should be done in a way that can be understood by all relevant individuals [25]. Several countries, including Kenya, Italy, Poland, Jamaica, and Malaysia, have implemented ISO 9001:2015 in government agencies. In these nations, various sectors, including central and local governance, administration, defense, public utilities, education, and the national health system, actively apply the ISO 9001 standard [26], [27], [28], [29], [30].

To ensure standardized quality management practices, Indonesia should consider implementing ISO 9001:2015 in project development. Currently, the Minister of Communication and Information Technology Regulation on Technical Standards and Procedures for Developing and Applying Electronic-Based Government Systems is still in draft form and has not yet been ratified [31]. As a result, there are no standardized regulations governing quality management in development projects. By adopting ISO 9001:2015, government institutions, particularly research agencies, can showcase their commitment to enhancing quality and customer satisfaction. This can improve public trust, reputation, and credibility [28], [30].

Quality management principles encompass a focus on the customer, leadership, involvement of individuals, a process-oriented approach, continual enhancement, decision-making based on evidence, and management of relationships [23]. Applying a QMS can ensure the quality of its applications, improve efficiency, and ultimately provide better services to its users and stakeholders. This condition ensures that processes and procedures adhere to established standards, thereby delivering quality public services in line with the principles of the ISO 9001:2015 specification. ISO 9001 is a quality system that attempts to ensure efficient processes are defined and followed throughout production are defined and followed throughout the production process. This condition is based on quality by ISO 9001 standards [32]. ISO 9001:2015 aims to instill quality management at various levels of an organization and connect the QMS to the overall strategy and mindset prevailing in an organization [33].

ISO 9001:2015 requires specific mandatory documentation to provide evidence that employees (or software professionals working on Scrum projects) adhere to standardized processes to ensure the production of quality goods and services. Implementing the ISO 9001:2015 standard of quality public service is important to enhancing e-government services, making processes quicker, more user-friendly, and more effective while bolstering the government's transparency and accountability [24], [28].

Five related works from previous studies explored Agile practices aligned with ISO 9001. The following is a summary of the key findings.

- a) Implementing ISO 9001:2015 improves public service quality and performance, enhancing process performance, organizational capabilities, and customer satisfaction. QMS positively influences response, reliability, and guarantee in public service. It also improves coordination, communication, and human capital in public organizations and encourages government entities to implement ISO 9001 for better results [24].

- b) Agile practices aligned with ISO 9001 for quality management. ISO ensures compliance with Agile practices without heavy documentation. Procedure documentation under 20 pages, with minimal impact on development schedules. QMS benefits: improved processes, training, defect reduction, and customer response [34].
- c) The conflict between ISO 9001 and Agile Methodology: ISO 9001 is based on a positivist ground, while Agile follows a more subjectivist and post-positivist paradigm, leading to conflict world-views. This study suggests a dichotomy between the philosophies of formal quality systems like ISO 9001 and Agile development, particularly in documentation and auditing [32].
- d) Scrum and ISO 9001 documentation practices can conflict. Scrum teams prioritize operational documents over management reporting. Agile Scrum projects need better integration with ISO 9001 documentation [11].
- e) Agile software methodology with Scrum is effective for the Quality Assurance System (QAS). Scrum enhances efficiency and effectiveness in QAS application development [35].

2. Research Method

A case study in software engineering is an empirical inquiry that draws on multiple sources of evidence from contemporary software engineering phenomena in real-life contexts to investigate the various complex interactions among technologies, people, and projects [36], [37]. In this research, the authors analyzed the integration of ISO 9001:2015 with Agile methodology and investigated the requirement documentation practices for ISO 9001 compliance in Agile software development at Indonesian Research Institutes. This research covers two contextual areas: Agile

methodology integrated with ISO 9001:2015 management system and the current state of ISO 9001:2015 requirements documentation on Agile projects at Indonesian Research Institutes.

Triangulation means using various techniques or sources of data in qualitative studies to increase accuracy and strengthen the validity of empirical research. Triangulation means taking multiple perspectives on the object under study. Triangulation of methods used in qualitative research can include interviews, observations, and field notes [36], [38]. Practitioners who implement governance functions related to application development at the Indonesian Research Institute participated in this study to provide triangulation of data sources—moreover, the interview questions aimed to understand their perspectives concerning aligning Agile with ISO 9001:2015 documentation.

This qualitative research analyzes an unavoidable reality, such as documentation based on Indonesian Research Institutes' ISO 9001: 2015 standards for Agile development projects. This research is also observational because the aim is to describe the phenomenon without intervening or manipulating the variables that determine the research process.

3. Result and Discussion

3.1 Integration of ISO 9001:2015 and Agile Practice

ISO 9001:2015 does not explicitly mention agility or Agile practices. Instead, it incorporates concepts that align with the core values and principles of the Agile Manifesto [25]. Scrum is an incremental and iterative Agile software development framework for generating value through adaptive solutions to complex problems. It consists of three categories: roles, deliverables, and meetings [9], [10], [11]. Table 1 displays categories of Scrum components.

Table 1. Scrum Components

Primary Components	Components	Explanation
Roles	Product Owner (PO)	As the Product Backlog documents, the PO sets priorities for project tasks. The PO is responsible for the product's vision, gathering and prioritizing the requirements, controlling the budget, and maximizing the ROI.
	Scrum Master (SM)	The Scrum Master manages problems, ensures proper adherence to Scrum guidelines, and provides developers training.
	Developers	A self-governing team is accountable for the development and quality of the product. Members of a diverse skill set team (5-9 members) plan their tasks for each sprint (2-4 weeks).
Deliverables	Product Backlog (PB)	Product Backlog is a prioritized list of all the desired features or functionalities for a product.
	Release Plan (RP)	The Release Plan contains the release goal and key prioritized elements in the Product Backlog.
	Sprint Backlog (SB)	SB comprises the highest-priority items or features from the Product Backlog scheduled for sprint completion.
	Burndown Charts (BC)	BC is a visual representation that tracks the progress of each sprint. Sprint Backlog Burndown is a graph that depicts the remaining work in the Sprint Backlog throughout the Sprint.
Ceremonies	Sprint Planning (SP)	SP is carried out to choose tasks from the PB for completion during a sprint. It involves deciding on the work to be done in the Sprint and strategizing how the Team will construct the product increment during the Sprint.
	Sprint Review (SR)	During the SR, the Developer communicates to the PO about the tasks completed in the sprint. The PB will then be updated for the upcoming sprint cycle.
	Sprint Retrospective (SRR)	The SRR meeting, a session lasting one to two hours, is held after the SR. This meeting is used to re-evaluate sprint progress and share insights gained.
	Daily scrum meeting	In daily Scrum meetings, each team reports on the progress of their tasks using visual aids or boards.

ISO 9001:2015 provides a framework for achieving consistent quality in products and services. Several quality management principles form its foundation: strong customer focus, top management involvement, process approach, and continuous improvement [11], [23], [24], [25], [32], [34], [35],

[40]. Integrating ISO 9001:2015 principles with Agile project development involves aligning Agile practices with the structured quality management requirements of ISO 9001. However, as shown in Table 2, there are more conflicting aspects at a deeper philosophical level.

Table 2. List of ISO 9001 Documents Relevant to Agile Projects [11], [23]

Document	Purpose	Output	Responsible Person	Usefulness
Quality Policy	Outline the organization's commitment to quality and customer satisfaction. Based on the product and target market, applicable industry standards and regulations and relevant regulations for PO are listed.	Standards and regulation	Top Management, Head of Data and Information Center, Relevant stakeholder	Product Owner, Scrum Master
Quality Objectives	Establish specific, measurable goals for quality improvement. Set quality objectives at relevant functions, levels, and processes for the quality management system.	Quality Objective Statement Performance Metrics Action Plans Monitoring and Review Schedule Continuous Improvement Records	Top Management, Unit Heads, Quality Assurance Team	Product Owner, Scrum Master
Scope Statement	The scope of the Quality Management System (QMS) defines the boundaries and applicability of the QMS. This document aims to enhance customer satisfaction through the effective application of the system, including the process for improving the system and assurance of customer conformity.	Road map items Features are the smallest units of work (referred to as user stories)	Product Owner	Scrum Master, Scrum Team
Documented Information to Support the QMS Process	Maintaining a product backlog: List requirements that may be required in the product.	Stakeholder/ customer requirements Maintained product backlog	Product Owner, Scrum Master	Product Owner, Scrum Master, Scrum Team
Procedure Documentation	Describe the processes needed for the QMS and their interaction. Business flow illustrates the start-to-end processes that take place in a business	Business Flows	Scrum Master, Scrum Team	Product Owner, Scrum Master
Roles and Responsibilities Document	Define the roles, responsibilities, and authorities within the QMS. Top management should ensure that responsibilities and authorities for appropriate roles are assigned.	Roles and Responsibilities Document	Scrum Master	Product Owner, Scrum Master, Scrum Team
Risk Management Plan	Identify and address risks and opportunities related to quality. This condition involves applying risk-based thinking to plan and implement quality management system processes, understanding risks, and suggesting risk mitigation activities.	Risk Analysis Report	Product Owner, Scrum Master	Product Owner, Scrum Master
Resource Management	Ensure that necessary resources are available for the QMS to deliver results that meet customer needs. Resources consist of general, people, infrastructure, and environment for the operation of the process.	Resource Plan	Scrum Master	Product Owner, Scrum Master
Competence and Training Records	Ensure personnel are competent and aware of their roles in the QMS. Provide internal staff with online documents to learn about new products or practices.	Training Material User Manuals	Scrum Master	Scrum Team
Documented Information	Control the documents and records required for the QMS. Documents include technical design, database design, developer documentation, and source code files.	Technical Design Database design Developer documentation Source code files	Scrum Team	Scrum Team
Monitoring and Measurement Plan	Outline how processes and products/services will be monitored and measured. The team conducts monitoring and measurement activities at the right stage to meet the ensuring of the process or output control and product and service acceptance criteria.	Requirements Traceability Matrix Unit test and test reports Test plans Bug verifications report	Scrum Master, Scrum Team	Scrum Team
Internal Audit	The team planned and conducted internal audits to ensure QMS effectiveness. The organization should plan, establish, implement, and maintain an audit program that includes frequency, methods, responsibilities, planning, and reporting requirements.	Internal Audit Program	Product Owner, Scrum Master, Scrum Team	Top Management
Nonconformance Report and Corrective Action Plan	Address nonconformities by documenting occurrences, including those from complaints, and implementing corrective actions to eliminate their causes.	Bug tickets Company-wide quality procedures	Product Owner, Scrum Master	Scrum Team

Table 3 shows conflicts on different levels between ISO 9001:2015 and Agile, divided into several areas.

Table 3. Conflicts between ISO 9001 and Agile [5], [23], [32], [35], [42]

Area	ISO 9001:2015	Agile
Driver	Plan-driven.	Value-driven.
Requirements	Define requirements for products and services. Requirements are viewed as unambiguous specifications of what needs to be developed and should be assessed for their feasibility of implementation.	Unclear requirements and requirements are seen as subjective according to customer needs, emergent and context-driven, and the perspective.
Quality	Deliverables must comply with established requirements, and changes must be planned.	Quality is perceived as subjective, hence the necessity for feedback cycles and the promotion of alterations to address evolving requirements.
Control	Management is accountable for controls. The organization must define the controls to be applied to externally provided processes, products, and services, and management is held accountable for those controls.	All team members truthfully identify collaboration issues and focus on enhancing the team's internal work processes. Teams are self-organized, and external control during the sprint is discouraged.
Metrics	Metrics should be accumulated to show the potential of realizing the desired results.	Working in requires a lot from its participants. Functional software is the main measure of progress.

The ISO 9001:2015 and Agile approaches may not be perfect or contradict each other, but accepting the existence and benefits of each approach can be useful. It allows for the coexistence of different paradigms in a discussion and can help better understand software development's reality [32]. Using different methods together can give you a better understanding of the whole picture. ISO 9001 lets you do different things for control as long as you can show that your Agile work is doing what it should. Companies need to decide who is responsible for what and what things they need to control based on how risky or good the situation is. How you do these things can be different. You need to understand your company well to find the right balance between the good things about Agile methods, like being able to change quickly and having happy employees, and the risks that come with them. When managed well, agile practices and ISO 9001 can complement each other effectively [25]. Research found that QMS adoption in Agile software development projects is uncommon in Central America. While Agile frameworks can benefit such projects, they often lead to unrealistic expectations. Combining Agile with QMS, like ISO 9001:2015, can create a more structured Agile approach, ensuring better quality and meeting client needs more effectively [41].

3.2 Documentation for ISO 9001:2015 Compliance in Agile Projects

Agile methods should not be an excuse to ignore important information. ISO 9001 does not say how much detail is needed in documents, but those documents should be easy for everyone to understand [25]. In Agile projects, it is important to make documents work with Agile's iterative and incremental nature. This means simplifying documents, keeping them up-to-date, and using them in Agile processes like planning sprints and reviewing work. Table 4 lists the required documents for Agile projects based on ISO 9001:2015.

3.3 Implementing ISO 9001:2015 Compliance in Agile Practices at Indonesian Research Institutes

3.3.1. Implementing Agile Practice

An Indonesian Research Institute uses an Agile method called Scrum to develop software. They start with the most important parts and keep improving the software as needed. The people in charge of the project are the Head of the Data and Information Center or the Coordinator of Information Systems. The team includes developers, testers, and a Scrum Master. Since there are no official rules for developing government software in Indonesia, the Institute made its own rules for how to do it. These rules explain how the work should be done, who is involved, what documents are needed, and how long each step should take.

3.3.2. Current Practice ISO 9001:2015 Documentation Requirements for Agile Projects

Table 5 shows the results of interviews with people who work at the Data and Information Center. The interviews were conducted to learn how they use ISO 9001:2015 rules for documents in their Agile projects. The organization's efforts to meet quality management standards involve identifying areas where policies are compliant or need improvement. The Indonesian Research Institute has fully implemented its quality policy, quality objectives, procedure documentation, risk management plan, documented information, internal audit, nonconformance report, corrective action plan, performance report, and continuous improvement.

Since the Indonesian research institute does not follow ISO 9001, its documents don't fully meet ISO standards. It needs to improve its documents regarding the scope of the project, what information it needs to keep, who is responsible for what, how it will use resources, how it will train people, how it will measure progress, and how it will make things better to follow ISO 9001.

Table 4. ISO 9001 Principles in Agile Development [5], [23], [24], [42]

Principles	ISO 9001:2015	Agile	Integration
Customer Focus	Focuses on understanding and meeting customer needs, and always trying to do better than they expect.	Emphasizes customer collaboration and feedback through regular iterations and reviews.	In Agile, customer feedback is always important. This is done through reviews and talking with customers. This matches what ISO 9001 says about customer satisfaction: customer needs should always be met and changed if needed.
Leadership	Highlight the importance of leadership in establishing unity of purpose and direction.	Promote servant leadership, where leaders support and facilitate the team's work.	Agile leaders can ensure that team goals are aligned with the quality objectives outlined in ISO 9001. Leaders should facilitate an environment where team members are empowered to achieve high-quality results.
Engagement of People	Emphasize the importance of involving people at all levels and recognizing their contributions.	Values individuals and interactions over processes and tools, encouraging team collaboration and self-organization.	Teams should be involved in defining and improving processes, ensuring that everyone understands their role in achieving quality goals. Regular Agile ceremonies (e.g., daily stand-ups and retrospectives) can encourage engagement and continuous improvement.
Process Approach	Support the management of activities and resources as a process that functions together.	Using iterative cycles (sprints) to provide incremental improvements.	Each Agile iteration can be treated as a process with predefined inputs (e.g., user stories, backlog items), activities (development, testing), and outputs (working software). This ensures the process is consistently followed and improved.
Improvement	Focuses on continuous improvement of the organization's overall performance to meet customer needs and improve customer satisfaction.	Emphasizes continuous improvement through regular retrospectives and incremental enhancements.	Agile retrospectives should be used to identify areas for improvement in processes and products. This practice aligns with ISO 9001's emphasis on continuous improvement, ensuring that each iteration builds on the previous iteration to improve quality.
Evidence-based Decision Making	Emphasizes making decisions based on identifying, measuring, and monitoring key indicators.	Encourages empirical process control, where decisions are based on observations, i.e. transparency, inspection, and Adaptation.	Agile teams should use metrics (e.g., velocity and defect rates) to inform their decisions. These metrics provide evidence to support changes and improvements, ensuring that decisions are data-driven and aligned with quality objectives.
Relationship Management	Encourage relationship management with interested parties to optimize performance.	Value collaboration with stakeholders, including customers and team members.	Agile development should involve regular communication and stakeholder collaboration to meet their needs and expectations. This relationship management aligns with ISO 9001's focus on optimizing performance through effective stakeholder engagement.

Right now, each part of the company documents its work separately. This means the documents are in different places, making it hard for managers to see what's happening and for the auditors to check things. Also, training records are only kept at the beginning, so what people learn is not saved. The plan for checking progress has no reports because you can only see the progress in the TAIGA app. So, managers must use the TAIGA app to see how the project is going.

The application of ISO 9001: 2015 documentation requirements in Agile project development needs to be carried out in the public sector, especially Indonesian Research Institute, to achieve the following benefits:

- Integrated Scrum & ISO 9001 enhance public service quality [24].
- Scrum improves response capacity and reliability in government organizations [24].
- Scrum emphasizes face-to-face communication and less reliance on in-process documents [11].
- Agile development with Scrum enhances efficiency in quality assurance systems [35]

Scrum framework integration with ISO standards improves accreditation processes [35].

Table 5. Interview Result

Document	Compliance	Current Condition	Recommendation
Quality Policy	Fully implemented	Electronic-based government system (SPBE, in Indonesia) Performance Determination Institution	-
Quality Objectives	Fully implemented	Application Preparation and Development SOP (includes quality control process, duties and responsibilities, product testing, and improvement plan).	ISO standards, e.g., ISO 9001, have not yet been implemented.
Scope Statement	Partially implemented	Currently, there is only documentation about the suitability of requirement specifications with applications from SOPs and application business process diagrams.	The recommendation is to identify internal and external issues relevant to the organization's goals, strategic direction, and ability to achieve results.
Documented Information to Support the QMS Process	Partially implemented	Product Backlog has been documented in the TAIGA application.	There is no documentation governing the quality policy and quality objectives.
Procedure Documentation	Fully implemented	SOP for Application Preparation and Development.	-
Roles and Responsibilities Document	Partially implemented	The tasks for each role can be found in the Scrum document and Application SOP Institution.	There is no documentation of the responsibilities of the Scrum Team and Internal Auditor.
Risk Management Plan	Fully implemented	SPBE Risk Management Document Institution.	-
Resource Plan	Partially implemented	Team identification and management in the Scrum document Institution.	There is no documentation of the training needs of team members and rewards and recognition within the project.
Competence and Training Records	Partially implemented	SPBE People Competency Management Documents and Training Documents that the team has attended.	There is no training record storage yet.
Documented Information	Fully implemented	The Information Systems team has documented the technical design, database design, developer documentation, and source code files.	-
Monitoring and Measurement Plan	Partially implemented	Monitoring the progress of application development can be seen in real time on the TAIGA application.	There is no documentation of the measurement plan.
Internal Audit	Fully implemented	Annually, internal audits determine that two applications will be carried out.	-
Nonconformance Report and Corrective Action Plan	Fully implemented	Follow-up plan document of audit recommendations.	-
Management Review	Partially implemented	Implementation of weekly management review meetings and 3-monthly reports	There is no standardized template for management review according to certain standards.
Performance Report	Fully implemented	Quarterly ongoing report development report	-
Continuous Improvement	Fully implemented	Monitoring Follow-up Report	-

It is necessary to create new SOPs (Standard Operating Procedure) to achieve Quality Management in Agile Projects, as follows:

- a) The purpose is to establish a systematic approach to quality management in Agile projects, ensuring compliance with ISO 9001:2015 standards.
- b) Scope: This SOP applies to all Agile projects within the organization and outlines the processes for planning, executing, monitoring, and improving quality.
- c) Responsibilities
 - i) Quality Manager: Ensures adherence to the QMS and ISO 9001:2015 standards.
 - ii) Product Owner: Maintains the product backlog and ensures that the team delivers value to the customer.
 - iii) Scrum Master: Facilitates the Agile process and removes impediments.

- iv) Development Team: Responsible for delivering product increments.

d) Quality Management Processes

i) Planning

Quality Policy and Objectives: The quality policy and objectives must be documented and communicated to all team members.

Risk and Opportunity Assessment: Identify and assess risks and opportunities related to quality at the start of the project and during each sprint.

ii) Documentation and Record Keeping

Maintain essential documentation such as the project scope, quality policy, quality objectives, risk assessments, and audit reports.

Use digital tools (e.g., JIRA, Confluence) to keep documentation concise and accessible.

iii) Training and Competence

Ensure all team members are trained on the QMS and understand their roles in achieving quality objectives.

Keep records of training and competencies.

iv) Sprint Planning and Execution

Quality objectives and risk assessments should be incorporated into Sprint's backlog during Sprint planning.

Use Definition of Done (DoD) to ensure all acceptance criteria and quality standards are met before considering a user story complete.

v) Monitoring and Measurement

Monitor quality using velocity, defect rates, and customer satisfaction metrics.

Conduct regular sprint reviews to assess the quality of deliverables and gather feedback.

vi) Internal Audits

Schedule and conduct internal audits to ensure compliance with the QMS and ISO 9001:2015.

Document audit findings and corrective actions.

vii) Nonconformance and Corrective Actions

Document nonconformances and use root cause analysis to determine corrective actions.

Implement corrective actions promptly and monitor their effectiveness.

viii) Management Review

Conduct management reviews at planned intervals to evaluate the effectiveness of the QMS.

Discuss audit findings, customer feedback, and performance metrics to identify areas for improvement.

ix) Continuous Improvement

Use retrospectives to identify and implement process improvements.

Encourage a culture of continuous improvement where team members are empowered to suggest and implement changes.

e) Tools and Techniques

i) Digital Kanban Boards: These are used to track work items and progress.

ii) Automated Testing Tools: To ensure consistent quality in software development.

iii) Continuous Integration/Continuous Deployment (CI/CD): To streamline development and deployment processes.

iv) Feedback Mechanisms: Regular feedback loops with stakeholders and customers.

f) Review and Revision

This SOP must be reviewed and updated annually or as needed to reflect changes in project management processes or ISO standards.

3.4 Discussion

This study found that Agile methods can be used for a quality assurance system. QMS can help software projects, especially when using Agile. QMS ensures everything is done well, reduces problems, and makes things work faster. QMS can also help stop mistakes from happening. This result is also consistent with another researchers, who revealed that implication using the Scrum concept in Agile Software Development for quality assurance can be quickly and efficiently with used standard documents of ISO 9001:2008 and accreditation standards from BAN-PT in the Ministry of Research and Technology-Higher Education [35]. QMS and Agile can work together to provide better services and quality by adopting quality standards to prevent quality loss in the software development industry, meet stakeholder needs, and mitigate overall company failure [41]. To use ISO 9001:2015 in Agile projects, public service organizations should train their employees on ISO 9001 and Agile, make documents for a good QMS, start small with a test project, and keep checking and reviewing how it's going.

4. Conclusion

This research assesses the compliance of ISO 9001:2015 requirement documents on Agile projects at the Indonesian Research Institute. Indonesian research institutes increasingly adopt Agile methodologies to develop user-friendly software that enhances operational efficiency. However, Indonesia's absence of standardized quality management practices poses a challenge. To improve quality and customer satisfaction, these institutes should consider implementing ISO 9001:2015, a widely recognized quality management standard. While ISO 9001:2015 requires documentation, it can be adapted to the iterative nature of Agile methodologies through lightweight documentation, accessibility, regular updates, and integration into Agile workflows. Integrating ISO 9001:2015 principles with Agile practices can ensure compliance without excessive bureaucracy. Developing a standard operating procedure (SOP) for applying ISO 9001:2015 documentation requirements to Agile projects in the public sector can facilitate the adoption of these practices and improve public service quality. However, implementing such an SOP requires careful consideration and approval from relevant stakeholders. Future research should explore areas like auditing Agile processes using ISO 9001:2015 and risk-based

thinking to enhance quality management in Agile projects further.

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