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REVIEW

FRAMEWORK ANALYSIS USING THE RAPID EVIDENCE ASSESSMENT (REA) METHOD IN HUMAN RESOURCES INFORMATION SYSTEM DEVELOPMENT

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Abstract

The framework application in the first phase of the Human Resources Information System (HRIS) development at X Company, which is a mining company, has so far been considered to have encountered many problems, with bugs and defects frequently being found that occurred when the project was deployed to a production environment. This happens due to frequent changes in project requirements in the middle of the development process, so many features become less relevant to business systems. So making decisions quickly and precisely before the first phase ends is necessary. The Rapid Evidence Assessment (REA) method was taken because it is a rapid review, which only a few weeks can decide based on field objective evidence. The use of a questionnaire involving project members was compared with the literature review results, namely that five aspects affected the time to develop: organizational aspects, process aspects, project aspects, people aspects, and technical aspects. The Scrum framework is a framework that is much more relevant to the current project conditions, with 3.6-point results and 3.1 points for the waterfall..

KEYWORDS:

Framework Analysis, Human Resources Information System, Project Condition, Rapid View, Rapid Evidence Assessment (REA), SCRUM

1 | INTRODUCTION

Company X is a mining and oil palm plantation company located in East Kalimantan which is currently carrying out a restructuring in human resource management, especially Human Resources Information System development using the Waterfall framework and collaborating with company Y as a partner within the organizational structure of project X and Y have almost the same team which consists of a project manager, business analyst, and a team of developers who work together on this project.

The current condition of the project is that the first phase is running, which ended in March 2023, where Partner Y is the core project with the scope of work starting from the administration process, employee recruitment, and training development to compensation and benefits process while X company is in charge of managing databases and system migration, while work for auditing, planning and industrial relations according to the agenda was carried out in the next phase. Currently, the company is carrying out a restructuring or efficiency internal process company's, and during Human Resources Information System (HRIS) development process uses the waterfall framework. Still, projects often experience changes in requirements in the middle of the development process, so the features built become less relevant to the business system. In addition, many bugs and defects occur when the project has been deployed to a production environment due to a mismatch between the developer's understanding of the business value that he wants to convey to users. These things cause the project schedule to be not on time, experiencing cost overruns.

The Waterfall framework is a traditional framework which is a systematic framework where each step must be followed sequentially. The waterfall framework requires definite agreement at the start, this method allows for departmentalization and control, and the development process is a one-by-one phase model, thereby minimizing errors that might occur [1]. The agile method trend, namely a lightweight software development method by prioritizing programs rather than documentation, emerged a decade ago and has proven to help several companies improve their efficiency [2]. One of the Agile methods is Scrum. The Scrum framework is a lightweight framework that helps people, teams, and organizations generate value through adaptive solutions to complex problems [3]. Scrum is an agile framework for volatile product development processes that have a relatively fast time to market. In considering the use of Scrum, the need for a survey aims to gather information about how the actual task (waterfall) is carried out compared to standard Scrum practices.

In this research, the Rapid Evidence Assessment (REA) method was used, one of the methods of Evidence-Based Management, which is a fast decision-making method based on a literature review and real evidence in the field. This method was used because previous research was based on something other than real evidence, resulting in biased results [4]. It takes a long time to decide. Rapid Evidence Assessment (REA) hoped to make the right and fast decision in determining the framework for this research project. Rapid Evidence Assessment (REA) research used a combination of interviews (questionnaires), literature searches related to success metrics for scrum and waterfall frameworks, and a search for real field evidence targeted to produce reports within a few days or a few weeks. This is evidenced by Nussbaumer-Streit et al. [5] about dealing with COVID-19.

Due to inaccuracy in Human Resources Information System timing project on X Company, this research is expected to identify the factors that influence the Time to Develop in the development of the Human Resources Information System (HRIS) on X Company so that the goals of this project can be achieved. In addition, this research is expected to be able to produce a recommendation of what framework is relevant to the conditions of the Human Resources Information System (HRIS) development project at this mining company, in addition to similarities in perceptions, needs, activities, and problems of the various roles involved so that it can provide benefits in carrying out similar projects in the future and become an added value in performance measurement.

2 | PREVIOUS RESEARCHES

For previous research, the researcher conducted a literature study related to relevant theories through previous studies as a basis for the need to improve what had been done in previous research. According to previous research conducted by Prasetya et al. [4], regarding the comparison of development using the waterfall framework and the proposed Scrum framework in developing applications with third-party vendors who have many problems when running using the waterfall framework, problems arise due to using third-party vendors such as communication challenges, lack of control, and lack of trust. The results of this study show that the proposed model has a greater success rate so that third-party vendors can use this method. However, this research still needs improvement even though it has used real evidence in its measurements, but the aspects studied still need to be completed, such as quality.

In another research from Varker et al. [6] regarding evidence-based practice, policymakers in the hospital environment with the Rapid Evidence Assessment (REA) method, the problem studied is the lack of transparency and limitations of critical assessment in policy-making, research produced several policies, but the results of this study only produced several policies that could help

TABLE 1 The PICOC questions.

Element	Question	Answer
Population	Who would be affected by this research?	Human Resources Information System (HRIS) project team in X Company and similar companies.
Intervention	What methods are used in Human Resources Information System (HRIS) development in mining companies?	Waterfall framework
Comparison	What is the comparison framework with what has been the framework implemented?	Scrum framework
Outcome	What do your results expect?	1. Factors that affect system time development (time to develop) 2. Success metrics for waterfall and scrum frameworks
Context	How is the company's condition now?	A closed project environment related to the scope of work and frequent changes in user requirements that have an impact on projects and products

Of course, it can be said that it is biased even though it is based on real evidence because there is no validation of the results of data extraction.

The third research by Thesing et al.[7] regarding the right method for a project from a practitioner's point of view in dealing with rapidly changing market conditions, new technologies, and short time-to-market cycles, that requires a different procedural model to achieve project success, this research resulted in make decision model provides a concept that is simple and can be easily understood and appropriate for concrete projects based on following dimensions: scope, time, cost, organization, and project team. However, in several analyzes, the researchers judged that this study could still be said to be biased, as the results of expert interviews were not representative and could only be linked to several industries, were less specific in interpreting the framework, and were less validated due to the limited number of validators, and approach taken was not in accordance with real evidence and seemed biased. So that from the three previous studies, this became the basis for researchers to conduct this research based on the background in X Company.

3 | MATERIAL AND METHOD

This type of research is descriptive analysis research, and the method used is a literature review. The steps taken are conducting a Rapid Evidence Assessment (REA).

3.1 | Research Questions

Conducting Research Questions, making questions that later serve as a guide for researchers to search for literature studies by dividing them into impact or non-impact questions, as follows: Main question: (1) What are the factors that influence the Time to Develop Human Resources Information System (HRIS) X Company to goals achieve of the project? (2) What is the most relevant framework for Human Resources Information System development project in X Company based on project waterfall and Scrum success metrics? Additional questions: (1) What is Human Resources Management? (2)What is an Information System? (3) What is a Human Resources Information System (HRIS)? (4) What is Software development? (5) What is a framework? (6) What is the meaning of the waterfall framework? (7) What is the meaning of the Scrum framework? (8) What is Time to Develop? (9) What influences waterfall'swaterfall's success? (10)What influences the success of Scrum?

3.2 | PICOC List

The next step is to use the PICOC list as a Mnemonic guide in searching the review literature described in Table 1.

3.3 | Inclusion and Exclusion Criteria

After PICOC as a constraint in search, they are creating inclusion and exclusion criteria. The inclusion criteria in this study can be described as follows: (1) Literature publication with ranges 2019-2022, (2) Literature in the English language, (2) Literature search is a case study type and is qualitative research, (3) The research measurement used is Discusses Scrum and Waterfall frameworks, Discusses the factors that affect time to develop, (4) The research context related to time to develop parameters

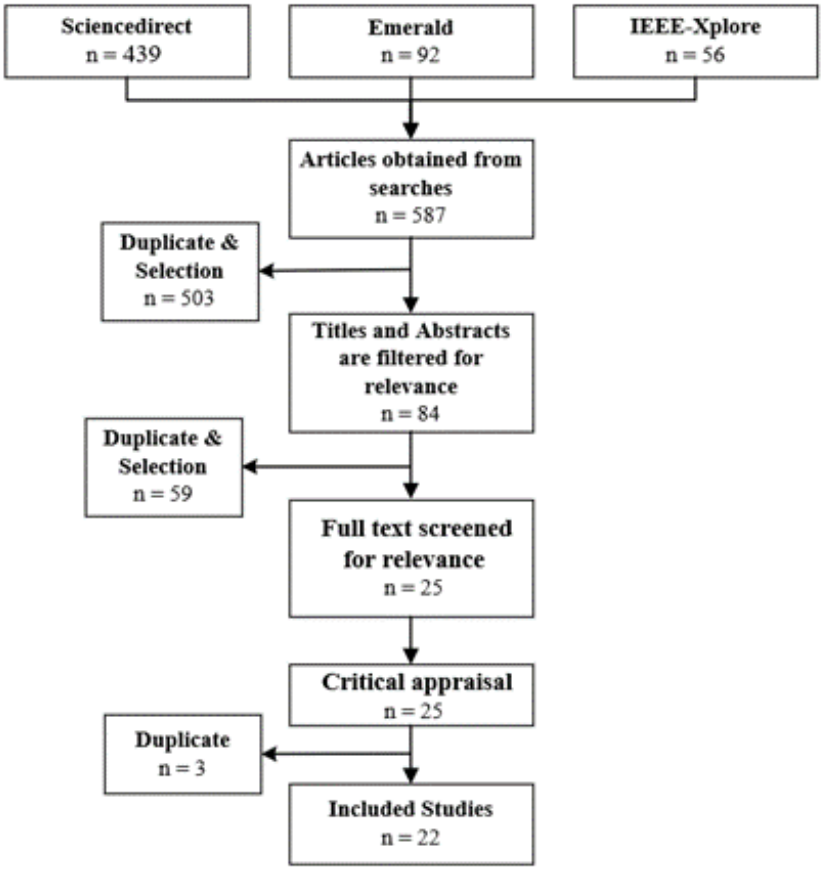

FIGURE 1 The search documentation.

and success parameters of waterfall and scrum frameworks. The exclusion criteria in this study can be described as follows: (1) Research topics that discuss how to develop a system with waterfall and Scrum development methods, (2) Types of applied research, (3) Literature topics other than Informatic Technology.

3.4 | Search and Selection Strategy

The literature search strategy used ranges from how to search for literature from popular sources and free sources with international publication types and popular keywords to find what a waterfall framework, scrum framework, and factors that affect the time to develop a project success factors identified in the project which can be explained in Fig. 1 .

In Fig. 1 , it is explained that research sources used are Scient direct, Emerald, and IEEE-Xplore with the search keywords Waterfall Methodology, or Traditional Methodology, or Waterfall SDLC, Scrum Framework, or Scrum, or Agile Methodology, Time to Develop metric or Time to Develop or Time to Develop parameters or Development Time or Time to Develop Factors. Relevance based on timeframe found in 587 literature searches, relevance based on titles and abstracts discussed obtained 84 literatures, relevance based on the contents of an article obtained 25 literatures. The next step is to carry out a critical appraisal based on CEBM.org[8] can be explained in Table 2 .

The critical assessment results obtained are shown in Table 3 .

Table 3 , it is explained for Waterfall Methodology result, Traditional Methodology, or Waterfall SDLC assessment. A is three literatures, and B is four literatures. Whereas for Scrum Framework, Scrum, or Agile Methodology, the assessment of AA is three literatures, A is ten literatures, and B is two literatures. As for the time to develop metrics, Time to Develop, Time to Develop parameters, or Development Time or Time to Develop Factors, the A rating is one literature, and B is two literatures.

TABLE 2 The design of critical judgment.

Design	Level
Systematic review or meta-analysis of randomized controlled studies	A A
Systematic review or meta-analysis of non-randomized controlled and/or before-after studies	A
Randomized controlled study	
Systematic review or meta-analysis of controlled studies without a pre-test or uncontrolled study with a pre-test	B
Non-randomized controlled before-after study	
Interrupted time series	
Systematic review or meta-analysis of cross-sectional studies	C
Controlled study without a pre-test or uncontrolled study with a pre-test	
Cross-sectional study (survey)	D
Case studies, case reports, traditional literature reviews, theoretical papers	E

TABLE 3 The critical judgment result.

Search Terms	Level	Total
Waterfall Methodology, OR Traditional	AA	0
Methodology, OR Waterfall SDLC	A	3
	B	4
Scrum Framework, OR Scrum,	AA	3
OR Agile Methodology	A	10
	B	2
Time to Develop metric OR Time to Develop	AA	0
OR Time to Develop parameter OR Development Time	A	1
OR Time to Develop Factors	B	2

Note: ScienceDirect (ScD), Emerald (Em), IEEE-Xplore (IE) peer review scientific journals, December 2022

3.5 | Data Extraction and Parameters Result

From the steps that have been carried out, the results are obtained through data extraction as follows:

1. 85% indicate agile management tools improve project visibility (transparency, there is no business world without projects, and there are no projects success without transparency [9].
2. Software testing is a vital component of software Quality Assurance (QA) since it serves as the final review of the specification, design, and code [10].
3. According to a study conducted mainly in the Americas and Europe [11], having an efficient and effective team is one of the critical requirements for Agile adoption in software development. Therefore, Agile requires motivated, talented, and knowledgeable teams [12].
4. Chow and Cao [11] conducted a survey study that identified the most impactful factors in Agile software projects from 109 Agile professionals' perspectives, mainly from the Americas and Europe. They identified six factors, from the many identified in the literature, affecting the success of Agile, namely delivery strategy, Agile software techniques, team capability, project management process, team environment, and customer involvement [12].
5. The empirical study by Misra et al. [13] utilized a mixed-method approach using a survey with software practitioners worldwide to explore influential factors on Agile adoption. The results revealed that customer satisfaction, collaboration and commitment, decision time, corporate culture, control, personal characteristics, societal culture, and training and learning are critical factors influencing Agile adoption [12].
6. The 'people factor in agility is highlighted in the Agile Manifesto, which is the primary basis for agile software development with its value of "individuals and interactions over processes and tools" [14].
7. A clear management vision creates focus and helps us align on business priorities and timelines across the company [15].
8. Agile methods in R&D lead to improved communication in the team, increased reaction speed as well as increased flexibility to changes, and increased transparency in the company [16].

TABLE 4 The factor types.

Factor Type	Description	Sub-Themes
People	People factors, such as mobile app practitioners and customers, relate to individuals and teams.	Team capability; Customer involvement; Training and learning; Awareness and knowledge
Organizational	Organizational factors relate to the firm level and how organizations operate.	Organizational culture; Management support, Communication, and collaboration.
Environmental	Environmental factors relate to the context in which organizations and teams operate.	Organizational environment, Physical environment, and National culture.
Technical	Technical factors related to the process, tools, and technologies that support Agile work.	Tools and technologies; Delivery strategy; Agile software techniques.

TABLE 5 The dimension of time to development.

Dimension	Factors	Dimension	Factors
Organizational	Organizational Alignment	People	Team stability
	Organizational Politics		Skill and knowledge
	Geographic distribution		Team familiarity
	Executive support		Team commitment
	Organizational Stability		Communication
Process	Requirement refinement	Technical	Technical dependencies
	Agile maturity		Poor code documentation
	Regular delivery		Unreliable Infrastruktur
	Work in progress		Bugs or incidents
	User involvement		Lack of code quality
Project	Task dependencies		Insufficient testing
	Project size		
	Project Newness		
	Project security		

9. Agile methods in developing physical products have several advantages, such as improved communication, increased responsiveness and flexibility, greater transparency, and increased commitment and motivation [16].

10. All software projects are developed and delivered under some constraints. The Triple Constraint defines the legal constraints imposed on all software projects: Scope, Time, and Cost. It is a crucial consideration in project management [17].

11. For the success of any software, quality is a very important factor. Software quality is an abstract concept. Quality makes a small difference in successful and failed software projects [18].

12. Three values are at the core of the approach: transparency, review, and adaptation, which are implemented through different roles, events, and artifacts in the development process [19].

13. Scrum is built on empiricism control theory which is managed by: Artifacts, Values, Pillars, Roles, and Events. Adaptation, Inspection, and Transparency are core pillars of Scrum that uphold the empiricism theory of Scrum. Successfully implementing Scrum depends on its core five values: courage, commitment, openness, respect, and focus [20].

14. The knowledge of important risk factors can be crucial for tracking and managing flexible project plans [21].

15. Proposes the management of success as a new area of project management knowledge, along with the management of scope, cost, schedule, quality, communication, risk, etc. [22]

Table 6 shows the Development Time factor consists of five main factors: Organizational, which has sub-metrics Organizational Alignment, Organizational Politics, Geographic distribution, Executive Support, and Organizational Stability. Then for the second factor is a process that consists of Requirement refinement, Third Party Integrations, Understanding The Business Logic, and User involvement. The third factor is the project which consists of Task dependencies, Project size, Project Newness, Security & Publishing. Furthermore, the fourth factor is People, which consists of Team stability and commitment, skills and knowledge, team familiarity, and communication. Furthermore, the last factor is the technical factor which consists of Technical dependencies, Poor code documentation, Unreliable Infrastructure, Bugs or incidents, and Insufficient testing.

Table 7 shows that the waterfall framework comprises Cost, Quality, Time, Risk, Resource, and Communication Management.

TABLE 6 The factors affecting development time.

Aspect	Parameter	Definition	References
Organizational	Organizational Alignment	Process of aligning an organization's goals and actions to support the achievement of the company's vision and goals	(5), (8), (9)
	Organizational Politics	Politics of the company	
	Geographic distribution	Geographical landscape conditions of the company	
	Executive support	Stakeholder support for the project	
	Organizational Stability	The level of stability of the company from an economic standpoint	
Process	Requirement refinement	Relationships between Requirements and other model elements that add enhancements or additional information to help clarify requirements so their meaning is clearer	(5), (9),
	Third-Party Integrations	Extra time in integrating third parties during the development	
	Understanding The Business Logic	The time needed to understand and know the business processes of what would be developed.	
	User involvement	Active participation of users in the system development process to ensure that the system design meets user requirements	
Project	Task dependencies	Relationship of a process with the next process	(5), (9),
	Project size	The process of defining and estimating the degree to which project management practices are formally applied throughout the project	
	Project Newness	Projects that are part of the company's transformation process	
Security	Publishing	Security of data and users and publications related to existing regulations	
People	Team stability and commitment	Conditions where the team has the same members and is committed to achieving goals	(5), (7), (9),
	Skill and knowledge	The need for skills and knowledge in software development projects	
	Team familiarity	Conditions where the team is familiar with and understands what processes and projects are being carried out	
	Communication	A collection of processes that help ensure that the right messages are sent, received, and understood by the right people	
Technical	Technical dependencies	In reaching wider and more users, it uses various platforms, devices, and types of operating systems	(5), (9)
	Poor code documentation	Unclear documentation	
	Unreliable Infrastructure	Unreliable infrastructure conditions	
	Bugs or incidents	The number of bugs or incidents during the development process	
	Insufficient testing	Weak and inadequate software testing often results in a poor user experience.	

TABLE 7 The waterfall parameter.

Parameter	Definition	Reference
Cost Management	Costs Management is incurred during project development in progress by comparing what has been budgeted.	(12), (17)
Quality Management	The quality level is based on the number of defects and bugs found after the product enters the production environment stage	(2), (12), (17)
Time Management	Time management of the amount of time required for project development from a predetermined amount of time	(12), (17)
Risk Management	Handle the risks of products that have been released and when the product is under development.	(16), (17)
Resources Management	How to manage and plan project resources	(17)
Communication Management	A collection of processes that help ensure the right messages are sent, received, and understood by the right people.	(17)

Table 8 above shows that the parameters of the Scrum framework consist of Transparency, Inspection, Adaptation, Commitment, Focus, Openness, Respect, and Courage.

3.6 | Preparation of Research Instrument

The questionnaire contains statements that are parameter results obtained from a literature review to determine whether the metrics obtained are needed in the development of the Human Resources Information System (HRIS) at X Company and how the current situation is related to the project based on previously obtained metrics. In the questionnaire, respondents can choose a value with a Likert scale of 1 – 5. With a description, one means Strongly Disagree, 2 means Disagree, three means Neutral, four means Agree, and five means Strongly Agree[23].

TABLE 8 The Scrum parameter.

Parameter	Definition	Reference
Transparency	All processes work, and artifacts must be transparent and visible to all parties	(1), (10), (14), (15)
Inspection	Checking each approved product's progress in detecting unwanted possibilities and problems	(2), (14), (15)
Adaptation	Adjustments to reduce discrepancies and risks that may arise later	(3), (10), (14), (15)
Commitment	The Scrum team is committed to achieving mutually agreed-upon goals	(15)
Focus	Focus on work that has been determined at the beginning of each sprint planning within a mutually agreed timeframe	(15)
Openness	The Scrum team and stakeholders must be open to each other regarding conditions, work, and challenges faced	(15)
Respect	Each member of the Scrum team must also instill respect for one another by giving each member confidence in their work, with the hope that they would become more independent and able to cope with their work.	(15)
Courage	Team members also need the courage to express opinions and do the right thing when facing a problem.	(3), (15)

TABLE 9 The summary role experience and experience in scrum development.

Role	Description	Total Employees
Experience	1-3 years	20
	4-5 years	2
	6-10 years	1
Experience in Scrum Development	0 year	18
	1-3 years	4
	4-5 years	1
	6-10 years	0

3.7 | Validation

Instrument validation was carried out in two stages. Stage one is expert validation, and stage two is the pilot testing method. Expert validation, there are five experts. Three are project managers, one is a scrum master, and one is a product owner. Five experts are used according to current organizational conditions. Then these experts provided scores and comments regarding assessments and descriptions examined by researchers. After that, pilot testing was carried out. Pilot testing is one of the methods used to validate respondents' understanding of the words written on the questionnaire and to determine the time required for respondents to complete the questionnaires. For the pilot test, there were ten testers to check questionnaires.

3.8 | Data Collection

Data collection of research collected as many as 23 respondents for each framework. Structured data retrieval is taken, where the respondent is a project member. Twenty-three respondents can be said to be accurate and stable in research[24, 25].

3.9 | Data Processing

After data collection, the results were obtained, explained in Table 9 as follows.

Table 9 shows that employee experience for 1-3 years has 20 employees, 4-5 years, two employees, and 6-10 years, one employee in his current position. For experience in scrum development, 18 employees have no experience in the field of scrum development, then four employees have 1-3 years of experience, and one employee has 4-5 years of experience. In determining the framework score, a Likert scale of 1-5 is used[23]. The description according to Table 10 and Table 11 is as follows

From the questionnaire results obtained, the average of each parameter can be calculated using Eq. 1.

$$Parameter = \frac{\sum_{k=1}^{n} Questions}{\sum Respondent} \quad (1)$$

TABLE 10 The framework scoring.

Scale	Value	
	Number	Verbal
Strongly agree	1	Very less
Disagree	2	Not enough
Neutral	3	Enough
Agree	4	Well
Strongly agree	5	Very good

TABLE 11 The time to develop a scoring.

Scale	Value	
	Number	Verbal
Strongly agree	1	Very Little Influential
Disagree	2	Less Influential
Neutral	3	Influential Enough
Agree	4	Influential
Strongly agree	5	Very Influential

TABLE 12 The average parameters of each framework.

Framework	Rank	Parameter	Score	Level	Average
Waterfall	1	Resources Management	3.5	Well	3.1
	2	Quality Management	3.5	Well	
	3	Communication Management	3.1	Well	
	4	Cost Management	2.8	Enough	
	5	Time Management	2.7	Enough	
	6	Risk Management	2.7	Enough	
Scrum	1	Adaptation	3.9	Well	3.6
	2	Transparency	3.9	Well	
	3	Courage	3.9	Well	
	4	Respect	3.8	Well	
	5	Openness	3.6	Well	
	6	Commitment	3.5	Well	
	7	Focus	3.4	Well	
	8	Inspection	2.9	Enough	

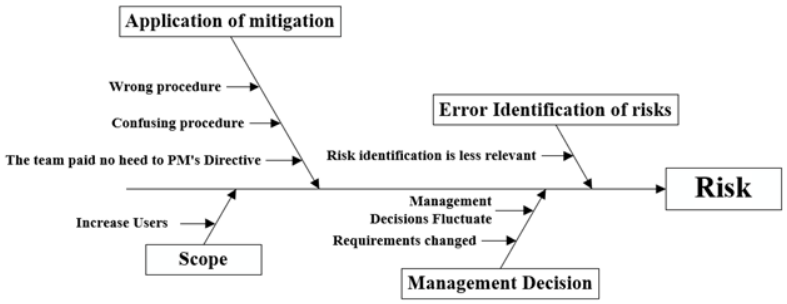

FIGURE 2 The identify risk issues.

Based on Table 12 , the waterfall has three parameters in the sufficient zone. Hence, the researchers conducted group discussions to find the causes of this problem which are explained in Figure 2. Identify risk issues. And Figure 3 is as follows:

Based on Table 13 , it was found that project size and communication have the highest results, with 4.3 points.

4 | RESULTS AND DISCUSSION

4.1 | Literature Review

Based on the results of data processing described in Fig. 4 and Fig. 5 . From three sources, ScienceDirect is centered on data from Elsevier, Emerald sources originated from the Emerald group, and the IEEE-Xplore sources originated from the IEEE group. There are 587 literatures, where IEEE-Xplore was 9% of the total or as many as 56 literatures, emerald 92 literature or 16%, and the most ScienceDirect with 439 or 75% results.

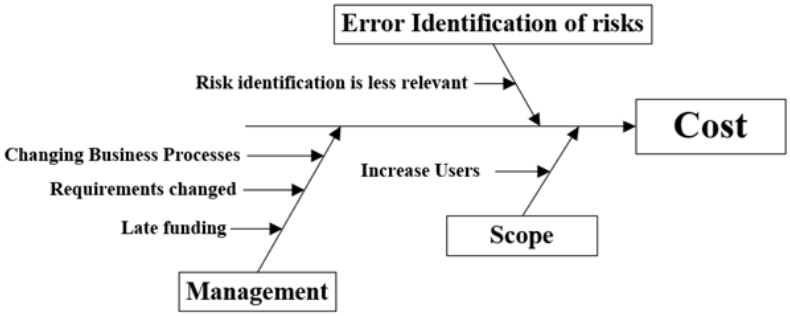

FIGURE 3 The identify cost issues..

TABLE 13 The average parameters of time to develop.

Rank	Aspect	Parameter	Score	Average
1	Project	Project size	4.3	3.7
2	People	communication	4.3	
3	Technical	Bugs or incidents	4.2	
4	Organizational	Organizational Alignment	4.2	
5	Organizational	Organizational Stability	4.1	
6	Technical	Technical dependencies	4.0	
7	Process	Requirement refinement	4.0	
8	Project	Project Newness	4.0	
9	Project	Task dependencies	3.9	
10	People	Team stability and commitment	3.9	
11	Technical	Unrelieble Infrastruktur	3.8	
12	Technical	Poor code documentation	3.7	
13	Process	Third-Party Integrations	3.7	
14	Project	Security & Publishing	3.7	
15	Organizational	Executive Support	3.4	
16	People	skill and knowledge	3.3	
17	People	team familiarity	3.2	
18	Organizational	Organizational Politics	3.1	
19	Process	User involvement	3.0	
20	Organizational	Geographic distribution	2.9	
21	Process	Understanding The Business Logic	2.9	

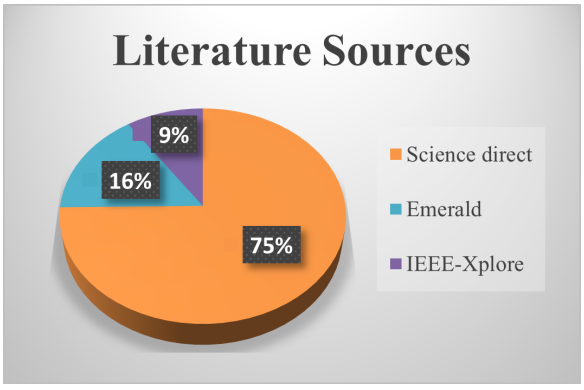

FIGURE 4 The literature resources.

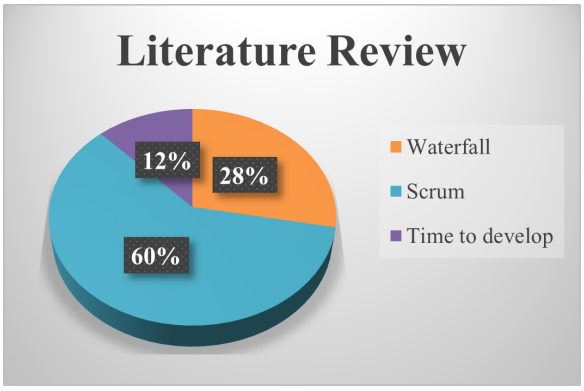

FIGURE 5 The literature review.

Search for Waterfall Methodology, Traditional Methodology, or Waterfall SDLC, or is a parameter search for the waterfall framework, three literature had systematic reviews of non-randomized controlled studies, and four literature produced systematic review assessments with pre-test or not with a pre-test.

TABLE 14 The guidelines time to develop.

Aspect	Parameter	Definition	Score
Organizational	Organizational Alignment	Process of aligning an organization's goals and actions to support the achievement of the company's vision and goals	Very Influential
	Organizational Politics	Politics of the company	Influential
	Geographic Distribution	Geographical landscape conditions of the company	Influential Enough
	Executive Support	Stakeholder support for the project	Influential
	Organizational Stability	The level of stability of the company from an economic standpoint	Very Influential
Process	Requirement Refinement	Relationships between Requirements and other model elements that add enhancements or additional information to help clarify requirements so their meaning is clearer.	Influential
	Third-Party Integrations	Extra time in integrating third parties during the development	Influential
	Understanding the Business Logic	The time needed to understand and know the business processes of what would be developed.	Influential Enough
	User Involvement	Active participation of users in the system development process to ensure that the system design meets user requirements	Influential Enough
Project	Task Dependencies	Relationship of a process with the next process	Influential
	Project size	The process of defining and estimating the degree to which project management practices are formally applied throughout the project	Very Influential
	Project Newness	Projects that are part of the company's transformation process	Influential
	Security & Publishing	Security of data and users and publications related to existing regulations	Influential
People	Team Stability and Commitment	Conditions where the team has the same members and is committed to achieving goals	Influential
	Skill and Knowledge	The need for skills and knowledge in software development projects	Influential
	Team Familiarity	Conditions where the team is familiar with and understands what processes and projects are being carried out	Influential
	Communication	A collection of processes that help ensure that the right messages are sent, received, and understood by the right people	Very Influential
Technical	Technical dependencies	In reaching wider and more users, it uses various platforms, devices, and types of operating systems.	Influential
	Poor Code Documentation	Unclear documentation	Influential
	Unreliable Infrastruktur	Unreliable infrastructure conditions	Influential
	Bugs or Incidents	The number of bugs or incidents during the development process	Very Influential
	Insufficient Testing	Weak and inadequate software testing often results in a poor user experience.	Influential Enough

Search for Scrum Framework, Scrum, Agile Methodology, or a parameter search for a Scrum framework. There were three systematic reviews with randomized studies, ten literature that had systematic reviews of non-randomized controlled studies, and two that resulted in systematic reviews with pre-assessments—pre-test or not with a pre-test.

Search for Time to Develop metrics or Time to Develop or Time to Develop parameters or Development Time or Time to Develop Factors or is a search for Time to Develop factor parameters, it was found that one literature had a systematic review of non-randomized controlled studies, and two literatures produce a systematic review assessment with a pre-test or not with a pre-test.

4.2 | Identification of Factors Affecting Time to Develop

From the data processing result in Table 14. five parameters influenced the time to develop the Human Resources Information System development project: Project size, communication, Bugs or incidents, Organizational Alignment, and Organizational Stability. The project team stated that scope management, alignment of the vision and mission of the project, Communication between employees, and Organizational Stability were very influential with a total of 4.3 points; 4.3; 4.2; and 4.1.

4.3 | Relevant Framework

From data processing, Table 15 found that the Scrum framework is far more relevant to the current project conditions. This is evidenced based on data result collection in a field where the Scrum framework earns 3.6 points, 0.5 points greater than the waterfall framework with an acquisition of 3.1 points. The main cause of implementation is several aspects and factors that cause the lack of the current waterfall.

TABLE 15 The guideline framework.

Framework	Rank	Parameter	Score	Level	Average (Level)
Waterfall	1	Resources Management	3.5	Well	3.1 (Well)
	2	Quality Management	3.5	Well	
	3	Communication Management	3.1	Well	
	4	Cost Management	2.8	Enough	
	5	Time Management	2.7	Enough	
	6	Risk Management	2.7	Enough	
Scrum	1	Adaptation	3.9	Well	3.6 (Well)
	2	Transparency	3.9	Well	
	3	Courage	3.9	Well	
	4	Respect	3.8	Well	
	5	Openness	3.6	Well	
	6	Commitment	3.5	Well	
	7	Focus	3.4	Well	
	8	Inspection	2.9	Enough	

The first aspect is risk. There are causes such as irrelevant risk identification, implementation of mitigation with wrong procedures, confusing procedures, or because team members do not pay attention to the direction of the project manager, additional users during the development process, changes in management policies such as changing requirements, and decisions that change because the business is transforming. The second aspect is cost. There are several reasons why cost management needs to be managed properly, such as less appropriate risk identification, users being added during the development process, and management policy change, such as changing requirements, which ends late funding.

The third aspect is time. When the specific search was carried out, it was found that five parameters influenced the time to develop the Human Resources Information System development project: Project size, communication, Bugs or incidents, Organizational Alignment, and Organizational Stability. The project team stated that scope management, alignment of the vision and mission of the project, communication between employees, and organizational stability were very influential.

Suppose viewed based on demographics according to Table 9. Suppose viewed based on demographics according to Table 5. Summary of role experience and experience on scrum development, it can be concluded that only three employees who joined the human resources information system development project had an experience of more than three years, and five employees had experience in the field of scrum development. So according to previous research data on the relationship between work experience and employee work productivity[26], this project needs more experienced resources.

4.4 | Managerial Implication

From the analysis of the results, this research is expected to provide future benefits for the Human Resources Information System project X Company. According to research in current field conditions, the second phase of the Human Resources Information System X Company project, it is recommended to use the Scrum framework with several considerations, adaptation parameters are parameters required in this project with good results, and Scrum has better adaptation process than the waterfall framework. The second parameter is transparency. Transparency in Scrum is much better than the waterfall framework model because Scrum aims to provide transparency space and opportunities to review and adapt to changes that would occur[27]. The last parameter is courage, which is needed in this human resources information system development project, with good results. Courage is essential in solving complex problems and growing high-performing teams[28].

5 | CONCLUSION

Obtained 25 literature from 587 from 3 sources, ScienceDirect, Emerald, and IEEE-Xplore, where waterfall literature has three literatures with systematic reviews of non-randomized controlled studies, and four literatures produce systematic review assessments with pre-test or not by a pre-test. Then there are three systematic reviews of Scrum literature with randomized studies, ten pieces of literature with systematic reviews of non-randomized controlled studies, and two pieces of literature that produce

systematic review assessments with pre-test or not with a pre-test. And finally, the time to develop literature. One piece of literature has a systematic review of non-randomized controlled studies, and two literatures produce systematic review assessments with a pre-test or not with a pre-test.

From analysis and data collection results, there are five aspects that Influential the time to development, organizational aspects, process aspects, project aspects, people aspects, and technical aspects. From these five aspects, 22 parameters were obtained. Five parameters influenced the time to develop the Human Resources Information System development project: Project size, Communication, Bugs or incidents, Organizational Alignment, and Organizational Stability. The project team stated that scope management, alignment of the vision and mission of the project, communication between employees, and Organizational stability were very influential with a total of 4.3 points; 4.3; 4.2; and 4.1. And 13 parameters that Influential the time to develop, such as; Organizational Politics, Executive support, Requirements refinement, Third Party Integrations, Task dependencies, Project Newness, Security & Publishing, Team stability and commitment, skill and knowledge, team familiarity, Technical dependencies, Poor code documentation, and Unreliable Infrastructure. Then four parameters are Influential Enough for the time to development: Geographical distribution, Understanding of The Business Logic, User involvement, and Insufficient testing.

Scrum framework is a relevant framework for current project conditions in X Company. Field data collection results show that the Scrum framework earns 3.6 points, 0.5 points greater than the waterfall framework with an acquisition of 3.1 point. The main cause of the waterfall framework needing to be more relevant in this project is the Risk factor with 2.7 points or Enough results as the background because it is less relevant in risk identification, scope changes, and mitigation that is not in accordance with procedures. Then Time factor with 2.7 points or with Enough results is based on the background of 5 parameters that influenced the time to develop the Human Resources Information System development project, namely Project size, communication, Bugs or incidents, Organizational Alignment, and Organizational Stability. The project team stated that scope management, alignment of the vision and mission of the project, communication between employees, and organizational stability were very influential. Finally, the Cost factor, with a result of 2.8 points or enough, was caused by less relevant risk identification, increased users during process development, and changes in management policies, such as changing requirements, which ended in late funding.

CREDIT

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