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NAVIGATING AGILE IMPLEMENTATION IN YEMENI SOFTWARE FIRMS: CHALLENGES, BENEFITS, AND STRATEGIC INSIGHTS

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ABSTRACT

Agile methodologies, emphasizing people, collaboration, and shared values, have gained significant traction globally. A thorough understanding of the challenges and benefits of implementing Agile practices within software development companies is vital for the progression of the field and will be the foundation for its advancement in practice and research. Yet there is a scarcity of empirical studies and a limited understanding of the key challenges and benefits that could be gain from Agile implementation, particularly within Yemeni companies. Therefore, this study aimed to investigate the challenges and benefits of implementing Agile practices within Yemeni software development companies. A mixed approach of analysis was used in this study which, started by a rigorous and systematic analysis process of literature followed by a qualitative and quantitative field study. Overall, the key challenges, identified from this process were organizational culture resistance, insufficient executive support, inadequate employee skill sets, poorly defined project scopes, and technological limitations. Conversely, the primary benefits observed were increased flexibility, accelerated time-to-market, reduced costs, and enhanced team communication. This research provides valuable insights to guide Yemeni software development companies in making informed decisions and developing effective strategies for successful Agile implementation.



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I. INTRODUCTION

Agile methodology, since its introduction about 20 years ago, has been widely implemented for software development. Agile approaches help organizations act with speed and flexibility to quickly adapt and react to changing situations [1]. The adoption of Agile practices in software development projects has gained significant attention in recent years due to its potential to enhance project management and delivery processes. According to the 10th Annual State of Agile Report, the top benefits of agile include managing changing priorities (87%), team productivity (85%), and project visibility (84%) [2]. While extensive research exists on Agile practices globally, studies specifically examining Agile adoption and its challenges within the Yemeni context are limited. This study aims to investigate the challenges and benefits of implementing Agile methodologies in Yemeni software development companies[3]. This study employed a mixed-methods approach to investigate the challenges and benefits of Agile software development, specifically within the Yemeni context. A systematic literature review of 39 peer-reviewed studies published within the last five years identified key themes and factors influencing Agile adoption. This informed a sequential field study comprising qualitative and quantitative components. First, eight in-depth, semi-structured interviews were conducted to explore nuanced perspectives. Subsequently, a survey, validated by two experienced Ph.D. experts, was distributed to professionals with diverse Agile experience (entry-level to over 20 years). The survey included sections on demographics, implementation challenges, general benefits, and open-ended questions for further qualitative insights. Overall, this study aims to explore the adoption of Agile practices within the Yemeni context, gathering valuable insights into the challenges and benefits encountered during implementation.

The findings will serve as a valuable resource for making informed decisions and developing effective strategies, ultimately contributing to the growth and development of software development companies within Yemen.

II. LITERATURE REVIEW

After conducting an extensive and thorough review of our primary studies, we aimed to uncover and analyze the various challenges and benefits associated with the implementation of agile methodology within software development companies. This in-depth exploration involved a meticulous examination of numerous case studies, research papers, and industry reports to ensure a comprehensive understanding of the topic. As a result of this rigorous analysis, we identified a total of 23 distinct challenges that organizations frequently encounter when adopting agile practices. These challenges span a wide range of issues, including but not limited to, difficulties in managing team dynamics, resistance to change from traditional development methods, and the complexities of scaling agile practices across large organizations. Additionally, our review revealed 13 significant benefits that companies can achieve through the successful implementation of agile methodologies. The findings are presented in detailed tables below, which categorize and summarize the challenges and benefits based on different contextual

Table 1: The Challenge and Benefits Factors.

No	The Challenge Factor	Freq	Related Studies
Technical			
1	Lack of requirements for traceability	16	[1] [4][5] [6] [7] [8] [9] [10] [11]
2	Inadequacy of existing technologies and tools	8	[12] [4] [13] [11] [14]
3	Minimal documentation	5	[1] [6] [7] [8] [10]
4	Inappropriate architecture	4	[1] [6] [7] [9]
Organizational			
1	Lack of management commitment	7	[12] [4] [13] [5] [7] [11] [14]
2	Organizational size	5	[2] [15] [11] [14]
3	Budget and schedule estimation	4	[7] [6] [10] [9]
4	Organizational culture	3	[12] [13] [11] [16]
5	Lack of Roles and Responsibilities	3	[5] [10] [11]
6	Contractual issues	3	[13] [8]
Environment			
1	Distributed Teamcz	5	[2], [17] [18] [19]
2	Organizational environment	4	[20] [11] [21]
3	National culture	3	[22] [23] [24]
4	Physical environment	3	[22][11] [21]
People			
1	Team capability	10	[1] [12] [4] [13] [17] [5] [7] [11]
2	Lack of Customer Involvement	10	[25] [1] [12] [26] [5] [6] [8] [9] [11] [14]
3	Limited face-to-face communication	8	[25] [12] [13] [17] [5] [17] [7]
4	Lack of Training and learning	7	[12] [13] [5] [7]
5	Resistance to change	7	[13] [27] [18] [28] [15] [11] [14]
6	Lack of Agile Awareness	5	[1] [5] [7] [10]
7			
Process			
1	Lack of Planning	6	[28] [7] [15] [11] [14] [10]
2	Lack of agile progress tracking mechanism	4	[15] [14] [10] [29]
3			
4	Process QA/standard processes	3	[27] [10]
No	The Benefits Factor	Freq	Related Studies
1	Agile is a Flexible model	8	[30] [31] [32] [33] [34] [35] [30]
2	Delivery speed to customer	7	[36] [37] [11] [14]
3	Reduction in the overall schedule	7	[37] [34] [11]
4	Easy to identify the risks	6	[36] [33] [34]
5	The project pursues simple design	4	[37] [11] [14]
6	Rigorous refactoring activities	4	[18] [37] [14]
7	Agile is cost reduction	6	[31] [37] [17] [34] [35] [11]
8	Coherent and self-organizing teamwork	13	[38] [39] [17] [37] [37] [11][14]
9	Improved team communication	5	[31] [37] [11] [14]
10	Good customer relationship	3	[37] [11] [14]
11	Right amount of documentation	3	[37] [11] [14]
12	Project scope is well-defined	3	[37]
13	Correct integration testing	2	[11][14]

Source: Authors, (2026).

Subsequently, building upon our findings, we classified these challenges into five broad dimensions: technological, organizational, environment, people, and process. The table above shows this classification. In addition, the conceptual model of the study is presented in Figure 1 below.

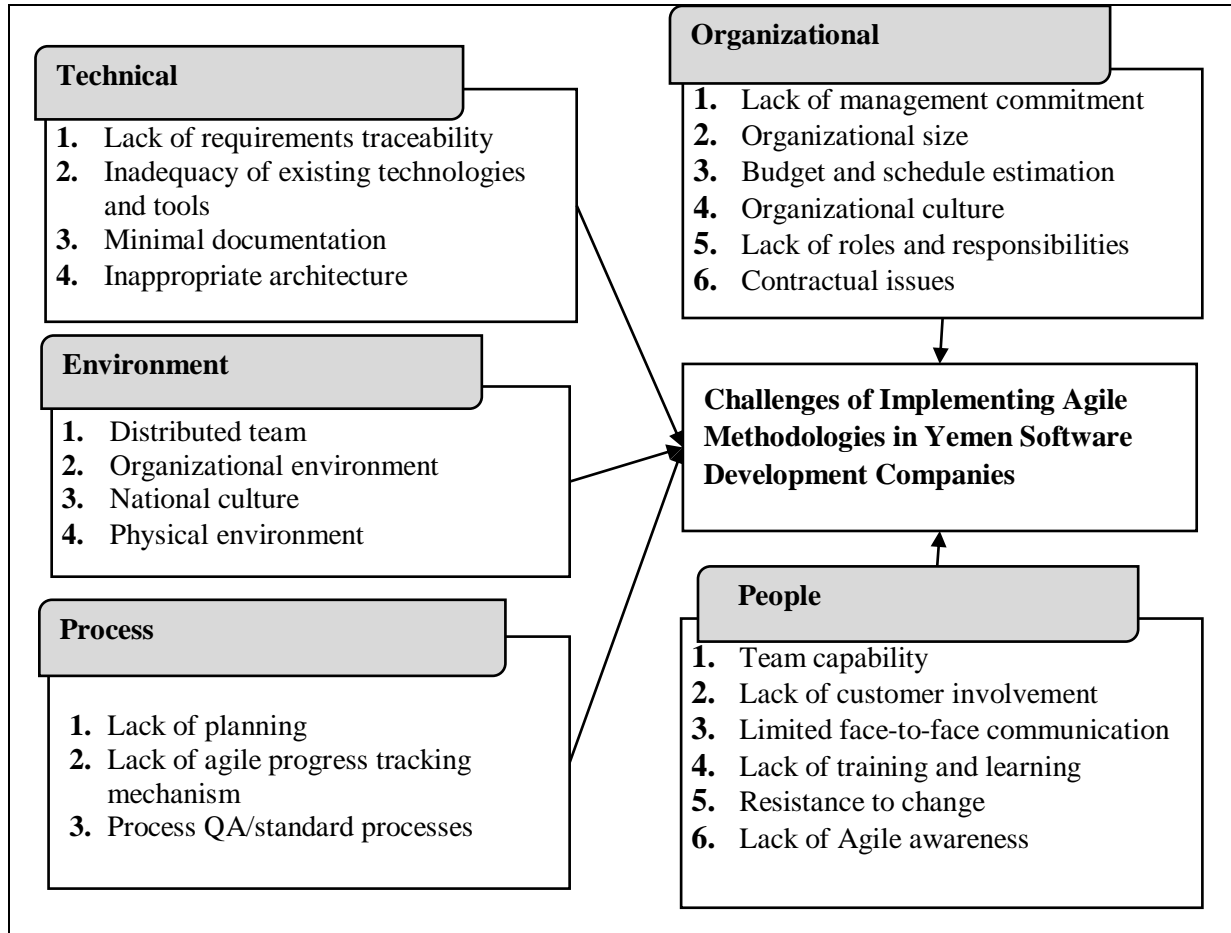


Figure 1: The Challenges of Agile Implementation.

Source: Authors, (2026).

III. METHODOLOGY

This study employs a sequential mixed-methods design to examine the benefits and challenges of Agile methodology adoption in software development organizations. The research comprises three distinct phases:

Phase-I: In this phase, a holistic literature review was conducted, to extracted the key benefits and challenges of Agile implementation from existing research papers more information about this phase can be found in [3].

Phase-II: In this phase, preliminary data was collected based on the results obtained from the literature review. In the preliminary data collection activity, the qualitative research approach was applied where 8 in-depth semi-structured interviews were conducted with actual users of Agile in the software industry sector in Yemen. The main objective of conducting the qualitative study was to gain better understanding of Agile benefits and challenges as perceived by the actual users.

Phase-III: After collecting the data from the literature review and expert interviews, the key benefits and challenges of Agile implementation were identified. Thereby, the researcher sought to examine those benefits and challenges, in a holistic view through a survey study, with the aim of ranking the most important benefits and challenges as observed by the individuals in the software development organizations.

The survey consisted of five parts, including an introduction, demographics, challenges affecting agile implementation, general benefits of agile methodology, and open-ended questions. Participants were asked to rate challenges and benefits on a scale of 1 to 5, and they also had the opportunity to provide additional insights. The survey was distributed through many platforms such as WhatsApp, Gmail, and Facebook, a total of 67 valid responses were received. Data analysis was conducted using SPSS software, enabling a thorough examination of the responses and facilitating the identification of significant trends and correlations within the data the result as shown in the following subsections.

IV. FINDINGS

The findings from the survey reveal critical insights into the challenges and benefits of implementing Agile methodologies in Yemeni software development companies. By gathering responses from industry professionals through a structured questionnaire, we identified several key themes that reflect the experiences and perspectives of those directly involved in Agile adoption.

This analysis provides a comprehensive overview of the current state of Agile practices in the region, highlighting both the obstacles encountered and the advantages realized by organizations seeking to enhance their software development processes.

Section A: Demographics

1. Gender

Table 2: Gender Distribution.

Gender		
	Freq.	Percent
Female	23	33.8 %
Male	45	66.2 %
Total	68	100.0

Source: Authors, (2026).

Out of the total 68 respondents, 45 identified as male (66.2%), while 23 identified as female (33.8%). These findings indicate a higher representation of male participants in the survey.

2. Age

Table 1: Age.

Age		
	Freq.	Percent
Older than 46	6	8.8 %
41 - 45 Years	9	13.2 %
36 - 40 Years	13	19.1 %
31 - 35 Years	12	17.6 %
26 - 30 Years	11	16.2 %
21 - 25 Years	16	23.5 %
Younger than 20	1	1.5 %
Total	68	100.0

Source: Authors, (2026).

The survey data reveals a diverse age distribution among participants. . with older individuals above 46 years accounting for 8.8% of participants. The age groups of 41-45 years, 36-40 years, and 31-35 years had participation rates of 13.2%, 19.1%, and 17.6% respectively. The age groups of 26-30 years and 21-25 years had participation rates of 16.2% and 23.5% respectively. Additionally, there was one participant (1.5%) younger than 20 years old. This inclusive age distribution highlights the engagement of professionals across different age ranges in Agile implementation in Yemeni software development companies as shown in Table 3.

3. Educational Qualification

Table 2: Educational Qualification.

Educational Qualification		
	Freq.	Percent
Doctorate	6	8.8 %
Master	13	19.1 %
Bachelor	43	63.2 %
Diploma or less	3	4.4 %
High School	2	2.9 %
Other	1	1.5 %
Total	68	100.0

Source: Authors, (2026).

The survey data revealed a diverse range of educational qualifications among the participants. The majority held a bachelor's degree (63.2%), followed by participants with a master's degree (19.1%). A smaller percentage had a doctorate (8.8%), while a few had diplomas or less (4.4%). There were also participants with high school education (2.9%) and one with a unique educational qualification (1.5%), as shown in Table 4.

4. Job Title

Table 3: Job Title.

Job Title		
	Freq.	Percent
CIO	6	8.8 %
Project Manager	6	8.8 %
Software Analyst	4	5.9 %
Programmer	28	41.2 %
Other	24	35.3 %
Total	68	100.0

Source: Authors, (2026).

The survey data revealed a diverse range of job titles among the participants, indicating varied roles and responsibilities in Agile implementation. Chief Information Officers (CIOs) and project managers each accounted for 8.8% of participants, highlighting their involvement in Agile. Software analysts made up 5.9%, emphasizing the importance of requirements analysis. The most prevalent job title was "programmer" (41.2%), followed by 35.3% falling into the "other" category, representing diverse roles within Agile teams. The data reflects the collaborative nature of Agile methodologies across different job titles.

5. Job Experience

Table 6: Job Experience.

Job Experience		
	Freq.	Percent
More than 20 Years	6	8.8 %
16 - 20 Years	9	13.2 %
11 - 15 Years	13	19.1 %
6 - 10 Years	8	11.8 %
1 - 5 Years	32	47.1 %
Total	68	100.0

Source: Authors, (2026).

The survey data revealed a diverse range of among the participants. A notable percentage (8.8%) had more than 20 years of experience, bringing valuable expertise to Agile teams. Additionally, 13.2% had 16-20 years of experience, 19.1% had 11-15 years, and 11.8% had 6-10 years. The majority (47.1%) had 1-5 years of experience, indicating a significant presence of professionals at the early stages of their careers. Understanding the distribution of job experience levels helps organizations leverage the diverse perspectives and knowledge of professionals when implementing Agile methodologies as shown in Table 6.

6. Duration familiarity with agile

Table 7: Duration familiarity with agile.

Duration of familiarity with agile		
	Freq	Percent
More than 20 Years	1	1.5 %
16 - 20 Years	1	1.5 %
11 - 15 Years	4	5.9 %
6 - 10 Years	8	11.8 %
1 - 5 Years	54	79.4 %

Source: Authors, (2026).

The survey data revealed that familiarity with Agile practices in Yemeni software development companies is relatively recent, with the majority (79.4%) having 1-5 years of familiarity. Only a small percentage (1.5%) reported more than 20 years or 16-20 years of experience with Agile, indicating a scarcity of professionals with long-term exposure to Agile methodologies as shown in Table 10. This lack of extensive experience poses a challenge in effectively implementing Agile practices. To address this, companies may need to focus on providing training programs and knowledge-sharing initiatives to enhance understanding and application of Agile methodologies as shown in Table 7.

7. The size of projects you are currently working on

Table 8: The size of projects you are currently working on.

	Freq .	Percent
Small Projects	26	38.2 %
Medium Projects	15	22.1 %
Big Projects	2	2.9 %
Small Projects, Medium Projects	10	14.7 %
Medium Projects, Big Projects	6	8.8 %
Small Projects, Medium Projects, Big Projects	9	13.2 %
Total	68	100.0

Source: Authors, (2026).

Table 7 shows the survey data reveals the distribution of project sizes among participants in Yemeni software development companies implementing Agile methodologies. Among the participants, 38.2% are currently working on small projects, while 22.1% are involved in medium-sized projects. Only 2.9% of participants are working on big projects. Additionally, some participants are engaged in multiple project sizes, with 14.7% working on both small and medium-sized projects, 8.8% involved in both medium and big projects, and 13.2% reporting simultaneous involvement in small, medium, and big projects. This diverse range of project sizes being managed using Agile methodologies highlights the flexibility and adaptability of Agile practices. It underscores the importance of tailoring Agile approaches to address the specific challenges and benefits associated with each project size.

8. The size of the organization.

Table 9: The size of the organization.

The size of the organization		
	Freq.	Percent
Small-sized organization	26	38.2 %
Medium-sized organization	32	47.1 %
Big-sized organization	10	14.7 %
Total	68	100.0

Source: Authors, (2026).

The survey data reveals that in Yemeni software development companies, 38.2% of participants work in small-sized organizations, 47.1% in medium-sized organizations, and 14.7% in big-sized organizations as presented in Table 8. This distribution underscores the presence of Agile methodologies across diverse organization sizes, emphasizing the importance of agility in smaller contexts and addressing coordination challenges in larger organizations. Tailored Agile strategies can be implemented based on the organization's size to cater to its specific needs and characteristics.

Section B: Challenges that affect the implementation of the Agile methodology

The literature review and the primary study identified numerous challenges and benefits associated with applying Agile software development methodology. Over 36 challenges and benefits were extracted. After analyzing the most frequently mentioned challenges and benefits, a total of 20 challenges and 10 benefits were selected. These challenges and benefits were categorized into five dimensions: technology, organization, environment, people, and processes. They were then incorporated into a questionnaire that utilized a Likert scale. The results of the questionnaire are as follows:

Table 10: Summary of the challenges of implementing Agile methodology in Yemen software companies.

The Dimensions	The Challenges	S/A	A	N	D	S/D	Mean	Std. Deviation	Rank	Likert Scale	
Technological Challenges	lack of work documentation	N	17	28	7	13	3	3.632	1.183	1	High
		%	25.0%	41.2%	10.3%	19.1%	4.4%				
	Inappropriate architecture	N	11	35	7	12	3	3.574	1.097	2	High
		%	16.2%	51.5%	10.3%	17.6%	4.4%				
	Lack of requirements for traceability	N	10	26	20	11	1	3.495	0.985	3	High
		%	14.7%	38.2%	29.4%	16.2%	1.5%				
Inadequacy of existing technologies and tools	N	10	27	9	18	4	3.309	1.188	4	Medium	
	%	14.7%	39.7%	13.2%	26.5%	5.9%					
Weighted Mean							3.489				
Std. Deviation							0.785				
Organizational Challenges	Budget and schedule estimation	N	13	39	10	6		3.868	0.827	1	High
		%	19.1%	57.4%	14.7%	8.8%					
	Lack of roles and responsibilities	N	21	25	7	12	3	3.721	1.208	2	High
		%	30.9%	36.8%	10.3%	17.6%	4.4%				
	Lack of management commitment	N	12	35	8	11	2	3.647	1.048	3	High
		%	17.6%	51.5%	11.8%	16.2%	2.9%				
Organizational size	N	10	22	17	16	3	3.294	1.120	4	Medium	
	%	14.7%	32.4%	25.0%	23.5%	4.4%					
Weighted Mean							3.588				
Std. Deviation							0.815				
Environmental Challenges	National culture	N	10	43	9	6		3.838	0.784	1	High
		%	14.7%	63.2%	13.2%	8.8%					
	Organizational environment	N	13	37	9	9		3.794	0.907	2	High
		%	19.1%	54.4%	13.2%	13.2%					
	Distributed team	N	7	30	13	16	2	3.353	1.048	3	Medium
		%	10.3%	44.1%	19.1%	23.5%	2.9%				
Weighted Mean							3.661				
Std. Deviation							0.743				
People Challenges	Lack of training in the Agile methodology	N	27	29	5	4	3	4.074	1.06	1	High
		%	39.7%	42.6%	7.4%	5.9%	4.4%				

The Dimensions	The Challenges	S/A	A	N	D	S/D	Mean	Std. Deviation	Rank	Likert Scale	
	Lack of Agile awareness	N	21	36	4	7	4.044	0.89	2	High	
		%	30.9%	52.9%	5.9%	10.3%					
	Resistance to change	N	18	36	3	10	1	3.882	1.02	3	High
		%	26.5%	52.9%	4.4%	14.7%	1.5%				
	Team capability	N	15	34	9	7	3	3.750	1.06	4	High
		%	22.1%	50.0%	13.2%	10.3%	4.4%				
	Lack of customer involvement	N	12	27	13	15	1	3.500	1.07	5	High
		%	17.6%	39.7%	19.1%	22.1%	1.5%				
Limited face-to-face customer communication	N	8	36	11	8	5	3.500	1.09	6	High	
	%	11.8%	52.9%	16.2%	11.8%	7.4%					
Weighted Mean							3.791				
Std. Deviation							0.672				
Process Challenges	Lack of planning for each stage of Agile	N	17	35	8	6	2	3.868	0.991	1	High
		%	25%	51.5%	11.8%	8.8%	2.9%				
	Lack of agile progress tracking mechanism	N	12	36	12	6	2	3.735	0.956	2	High
		%	17.6%	52.9%	17.6%	8.8%	2.9%				
	Lack of Agile processes standardization	N	10	39	9	8	2	3.691	0.966	3	High
		%	14.7%	57.4%	13.2%	11.8%	2.9%				
Weighted Mean							3.720				
Std. Deviation							0.893				

Source: Authors, (2026).

❖ Section C: General benefits of Agile methodology

Table 4: General benefits of Agile methodology.

The Benefits	S/A	A	N	D	S/D	Mean	Std. Deviation	Rank	Likert Scale	
Agile is a Flexible model	N	26	33	7	2	4.220	0.750	1	High	
	%	38.2%	48.5%	10.3%	2.9%					
Improved team communication	N	19	41	8		4.162	0.614	2	High	
	%	27.9%	60.3%	11.8%						
Provides coherent and self-organizing teamwork	N	16	45	5	1	1	4.088	0.707	3	High
	%	23.5%	66.2%	7.4%	1.5%	1.5%				
Delivery speed to customer	N	20	35	11	2	4.074	0.759	4	High	
	%	29.4%	51.5%	16.2%	2.9%					
Good customer relationship	N	18	38	9	3	4.044	0.762	5	High	
	%	26.5%	55.9%	13.2%	4.4%					
Reduction in the overall schedule	N	14	39	11	4	3.926	0.779	6	High	
	%	20.6%	57.4%	16.2%	5.9%					
Easy to identify the risks	N	12	41	10	5	3.882	0.783	7	High	
	%	17.6%	60.3%	14.7%	7.4%					
Rigorous project restructuring activities	N	9	42	12	5	3.809	0.758	8	High	
	%	13.2%	61.8%	17.6%	7.4%					
The simplicity of project design	N	10	38	15	4	1	3.765	0.831	9	High
	%	14.7%	55.9%	22.1%	5.9%	1.5%				
Agile is cost reduction	N	10	38	14	6	3.765	0.813	10	High	
	%	14.7%	55.9%	20.6%	8.8%					
Weighted Mean							3.929			
Std. Deviation							0.612			

Source: Authors, (2026).

V. DISCUSSION AND CONCLUSION

Interpreting empirical findings within a structured and multidimensional framework is essential for identifying key challenges and research gaps, as emphasized in prior systematic literature reviews [40]. The questionnaire results provide valuable insights into the challenges encountered in implementing Agile software development methodology across different dimensions. The analysis reveals the percentage, mean, and standard deviation for each challenge within their respective dimensions. The most prominent challenge in the Technological Challenges dimension is the lack of work documentation, with 25% of respondents highlighting its importance. This challenge has a mean rating of 3.63, indicating a significant difficulty in effectively documenting work in an Agile context. Other technological challenges, such as inappropriate architecture (mean: 3.57), lack of requirements for traceability (mean: 3.49), and inadequacy of existing technologies and tools (mean: 3.31), also present notable obstacles to Agile implementation. Moving to the Organizational Challenges dimension, budget and schedule estimation emerge as the most significant challenge, emphasized by 19.1% of respondents. This challenge has a mean rating of 3.87, indicating notable difficulties in accurately estimating project budgets and schedules in an Agile setting. The lack of roles and responsibilities (mean: 3.72) and the lack of management commitment (mean: 3.65) are also significant challenges that organizations face in implementing Agile, the Organizational size (mean: 3.29). In the Environmental challenges dimension, national culture is identified as the most significant challenge, with 14.7% of respondents emphasizing its importance.

This challenge has a mean rating of 3.84, highlighting the impact of cultural factors on Agile implementation. The organizational environment (mean: 3.79) and distributed teams (mean: 3.35) are additional challenges that organizations need to address to facilitate successful Agile adoption. Regarding People Challenges, lack of training in the Agile methodology is the most prevalent challenge, emphasized by 39.7% of respondents. This challenge has the highest mean rating of 4.07, indicating a significant gap in Agile knowledge and skills within organizations. Other challenges include lack of Agile awareness (mean: 4.04), resistance to change (mean: 3.88), team capability (mean: 3.75), lack of customer involvement (mean: 3.50), and limited face-to-face customer communication (mean: 3.50). In the Process Challenges dimension, lack of planning for each stage of Agile emerges as the most significant challenge, with 25% of respondents identifying its importance. This challenge has a mean rating of 3.87, highlighting the need for effective planning throughout the Agile development process. The lack of an agile progress tracking mechanism (mean: 3.74) and the lack of Agile processes standardization (mean: 3.69) are also significant challenges that organizations face in implementing Agile as shown in Table 9. As Table 10 shows the survey results highlight a strong overall perception of the benefits of Agile methodologies among participants in Yemeni software development companies, as reflected in the mean scores for various benefits. The highest-rated benefit, flexibility of the Agile model, achieved a mean score of 4.220, indicating a strong consensus, with 38.2% of respondents expressing strong agreement.

Improved team communication followed closely with a mean of 4.162, emphasizing its critical role in Agile practices. Coherent and self-organizing teamwork received a mean score of 4.088, reinforcing the positive view of Agile's impact on team dynamics. Delivery speed to customers and good customer relationships were also highly rated, with means of 4.074 and 4.044, respectively. However, the reduction in overall project schedules, while still viewed positively, had a mean score of 3.926, suggesting some variability in experiences among respondents. Risk identification was noted as a benefit with a mean of 3.882, while rigorous project restructuring activities ranked lower at 3.809, indicating potential challenges in implementation. Both the simplicity of project design and cost reduction received mean scores of 3.765, reflecting a more moderate perception of their impact. The overall weighted mean of 3.929 suggests a favorable view of Agile methodologies. Notably, the standard deviation for the benefits was 0.612, indicating a strong consensus among respondents regarding these advantages. This low standard deviation implies that participants largely agreed on the benefits of Agile, particularly in enhancing flexibility, communication, and efficiency in software development projects. These insights can guide Yemeni companies in refining their Agile practices to maximize project management and delivery effectiveness.

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