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Summary

Agile methods have been largely used for so many years for a flexible software development process. To get the best results and eliminate unnecessary efforts, it is important for the development team to select the most appropriate methods and techniques. The fundamental core of an agile method should be well understood before deciding on which parts of the method to adopt. The quickest way to do so is understanding the Agile Manifesto. We have observed however that, in practice, agile practitioners do not dedicate the necessary attention to the manifesto and directly aim at a specific agile method or practice. This has led us to question *the role of Agile Manifesto in tailored agile methods adoption*. We carried out a systematic literature review to answer four research questions related to tailored agile method adoption i.e., the perception of the Agile Manifesto in adopting tailored agile methods, and what are the influence, relevance of the manifesto in meeting the team's problems, expectations and benefits.

Keywords : Agile Methods, Agile Manifesto, Agile Adoption, Systematic Literature Review

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The Role of the Agile Manifesto in Tailored Agile Methods Adoption

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Abstract. Agile methods have been largely used for so many years for a flexible software development process. To get the best results and eliminate unnecessary efforts, it is important for the development team to select the most appropriate methods and techniques. The fundamental core of an agile method should be well understood before deciding on which parts of the method to adopt. The quickest way to do so is understanding the Agile Manifesto. We have observed however that, in practice, agile practitioners do not dedicate the necessary attention to the manifesto and directly aim at a specific agile method or practice. This has led us to question *the role of Agile Manifesto in tailored agile methods adoption*. We carried out a systematic literature review to answer four research questions related to tailored agile method adoption i.e., the perception of the Agile Manifesto in adopting tailored agile methods, and what are the influence, relevance of the manifesto in meeting the team's problems, expectations and benefits.

1 Introduction

Representatives from eXtreme Programming (XP), Scrum, DSDM, Adaptive Software Development, Crystal, Feature-Driven Development and Pragmatic Programming met in 2001 to discuss and established common ground for an alternative to structured and traditional heavy software life cycles. They eventually emerged with a *manifesto* for Agile Software Development, commonly known as the *Agile Manifesto* defining values and principles to be respected to be defined as *agile*.

No method can, of course, be a one-size-fits-all solution. Likewise, simply choosing an agile method and following every rule is also inconsistent and inefficient. Ideally, a software development team should adopt just the parts that suit to its criteria e.g., situations, goals, problems, constraints, ... In other words, an agile method needs to be tailored, i.e., the development team will only adopt those concepts and building blocks that are most suitable to its specifications. The manifesto can help them to understand and identify the core features of each agile method and thus support the choice to be made.

However, based on our observation, the Agile Manifesto has rarely been referred to as the reason why a software development team adopts a particular agile method. Teams either adopts a specific agile method or a tailored one, based on many criteria but very few of them focus on the Agile Manifesto. This coincides with the article, *“Agile is dead”* [17] by Dave Thomas, one of the Agile Manifesto creators. He claims that *“Since the Snowbird meeting, I haven’t participated in any Agile events. Why? because I didn’t think that any of these things were in the spirit of the manifesto we produced”*.

These reasons lead us to the question *“Is Agile Manifesto crucial or not for tailored agile methods adoption?”*

The main objective of this research is then to find out how the Agile Manifesto has been discussed in the research related to tailored agile methods adoption, and whether or not the Agile Manifesto deserves more value and attention than it has got so far. To this end, we conducted a systematic literature review (SLR) based on previous publications focusing on tailored agile methods adoption.

The remainder of this paper is structured as follows. First, literature reviews related to agile methods adoption are briefly discussed in Section 2. The research methodology including details on research questions, search strategy and data extraction is proposed in Section 3. Then, the results of our literature review are presented in Section 4. Finally, findings are summarized and discussed in the conclusion.

2 Related Work

This paper is in continuation of the literature reviews provided in [2,5,6] followed by [9,4,16].

Our research method is inspired from [9,4] regarding the collection of data and its disclosure in the form of systematic maps. We are thus exposed to the same bias. In addition, we followed the guidelines for systematic literature review from [10].

[4] discusses the question of tailored agile methods adoption but does not mention the influence of the Agile Manifesto. It analyzes methodological and practical aspects of research on tailored agile methods and the criteria used for agile methods tailoring. Their results show that the selection of practices is based on internal environment such as project type, communication, culture and management support and objectives. [14] recognizes that tailored agile is impacted by organizational culture and technical aspects.

[1,3,7,12,13] do not provide formalized answer on how to select agile practices for tailored agile methods adoption while [1] admits that no final academic solution was found on practice selection in tailored agile methods adoption. Adoption depends mainly on the business goals, the culture and the resources of the organization.

[13] emphasizes the impact of agile values integration by practitioners on the adoption of different practices. Despite this, the defined values are not literally those from the manifesto even though they are inspired from papers and books written by its authors. Following [13], the key agile values are defined as *flexibility, customer-centric, working software, collaboration, simplicity, communication, natural, learning, pragmatism and adaptability*. It is the link between those values and the organizations culture that will define the scope of practices adopted.

The Sidki Agile Measurement Index (SAMI) [3], a 5-step value-based road map to guide adoption, uses agile values and principles to define a path to agility.

Following [8], 28 systematic literature reviews about agile software development have been issued over the last 10 years. Most of them are related to agile practices and usage. Only one is dedicated to agile adoption: [15].

[15] reviews literature analysis and industrial inventories in the scope of agile in the broad sense. It compares agile adoption strategy types and makes the distinction between the evaluation stage of adoption, where the organization assesses its ability to adopt agile methods, and the introduction stage of adoption. Furthermore, it emphasizes the dependencies and synergies between practices and their impacts on adoption. This review is about adoption in general, not tailored adoption nor tailored agile.

The model in [11] emphasizes the relation between values, principles, agile features and practices in tailored adoption.

3 Methodology

This paper adopts a SLR approach [10] to analyze how the role of Agile Manifesto in tailored agile methods adoption is perceived. A SLR allows us to do a formal and systematic approach to identify, select and synthesize recent literature relevant to our research question [10]. Specifically, SLR has been used here for assessing what role of Agile Manifesto has played in tailored agile methods adoption. It consists in defining (1) research questions, (2) search strategy, (3) study selection, (4) data extraction and finally (5) analyzing data. Each step will be explained hereafter. Figure 1 exposes the process we have adopted.

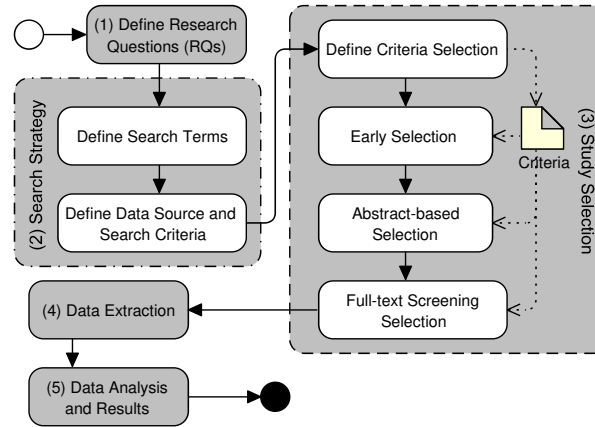


Fig. 1: Research protocol.

3.1 Research Questions

This research aims at identifying the role of the Agile Manifesto and more specifically *whether or not the Agile Manifesto (i.e., the 4 values and 12 principles) is still the core concept that teams should understand before choosing to adopt an agile practice or method*. To answer this, we have formulated four Research Questions (RQs) in this research:

- *RQ1: How have the Agile Manifesto and its influence been discussed in tailored agile methods adoption?*
- *RQ2: Is the Agile Manifesto relevant to the team's problems that lead to tailored agile methods adoption?*
- *RQ3: Is the Agile Manifesto relevant to the team's expectations from tailored agile methods adoption?*
- *RQ4: Is the Agile Manifesto relevant to the team's benefits of tailored agile methods adoption?*

The first question is to verify whether or not Agile Manifesto has lost its attention. The other three questions try to investigate if the results from tailored agile methods adoption are relevant to the Agile Manifesto. If it is the case, it means that the Agile Manifesto should receive more value and attention from the development team. In other words, software development team should spend more efforts to understand the fundamentals of the manifesto before tailoring any agile method for adoption.

3.2 Search Strategy

Search terms Based on the research questions, we defined search terms as the combination of various words referring to tailored agile methods including *partial, tailor, customize, practice selection* and the name of the most popular agile methods (according to the 11th VersionOne survey [18]). Since we want to find out the expectations/goals of adopting agile methods, we thus also added the word “goal” into the search terms. We summarize the search terms as follows: “(Agile OR Scrum OR XP OR Kanban OR ScrumBan OR Lean OR DSDM OR AgileUP OR FDD OR Iterative Development) AND ((practice AND select) OR tailor OR customize OR partial OR adopt OR expectation OR goal) ”.

Search Engines and Search Criteria We only considered formal data sources, i.e., papers that were published in peer-reviewed conferences and journals from the four well-known digital libraries in software engineering field: IEEE Xplorer (<http://ieeexplore.ieee.org>), ScienceDirect (<http://sciencedirect.com>), SpringerLink <http://link.springer.com>) and ACM Digital Library (<https://dl.acm.org>). We did not consider GoogleScholar since it provides also unpublished and non peer-reviewed papers.

For each search engine, we used advanced search options to ensure our dataset quality. In general, we set the publication years between 2000 and 2017, the field of Software Engineering, and the search terms matching the paper's title, keywords or abstract. Basically, we found 1722 papers in IEEE Xplorer, 526 papers in ScienceDirect, 9053 papers in SpringerLink, and 1824 papers in ACM Digital (see Figure 2).

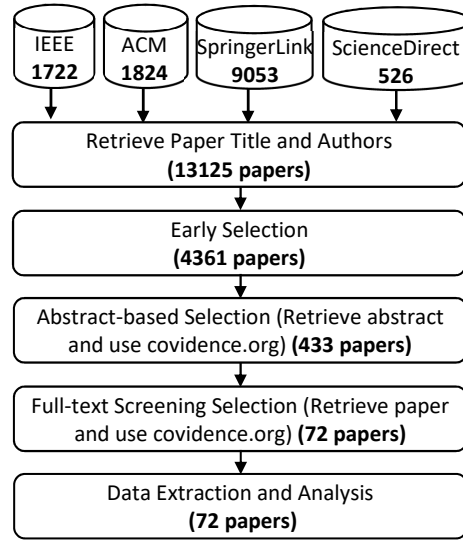


Fig. 2: Papers selection.

3.3 Study Selection

We defined a 3-step paper selection process due to the number of papers found: *Early Selection*, *Abstract-based Selection* and *Full-text Screening Selection*. Each step, described in the following subsections, has a well-defined criteria selection. Figure 2 provides the results of selected papers of each step.

Early Selection The goal was to have a consistent list of papers. All the search results were merged into a single file listing 13125 papers in total. We then eliminated redundant papers or papers not published in the 2000-2017 period. This step allowed us to discard about two-thirds of the papers to finally retain 4361 papers.

Abstract-based Selection The goal was to determine whether or not the article relates to our research questions based on its abstract which was carefully read by three reviewers. Before that, we defined the criteria for inclusion and exclusion to be used specifically for this step:

- **Inclusion criteria:**

- Tailored/partial/customized agile methods or agile practices selection;
- Empirical/research study on adopting agile methods for software development;
- Literature review/survey on agile framework;
- Challenge/issue in agile methods adoption;
- Approach, model, framework, introduction or guide to agile methods adoption;
- Integration of agile methods to other methods;
- Transformation from other to agile methods;

- Agile practices usage.
- **Exclusion criteria:**
 - Agile usage in theory;
 - Agile usage/implementation/adoption not for software development;
 - Simulation model;
 - Article from workshops;
 - Use of a specific practice/technique (daily meeting, pair programming, etc.);
 - Agile method which has not been introduced in one of the most popular agile methods.

We used an online tool named Covidence (www.covidence.org). It is a collaborative tool for facilitating the SLR process.

To get start, we needed to upload the title and abstract of the 4361 papers into Covidence. However, SpringerLink and ACM Digital libraries do not allow to download multiple abstracts at once, we therefore developed a third-party program for help. We then started the review process.

Each reviewer read the title and abstract of each paper and voted individually (Yes/No/-Maybe) based on the above criteria. Papers with three 'Yes' votes were included for the next step, those with three 'No' votes were eliminated and papers with three 'Maybe' or conflicted votes were solved by a face-to-face discussion. 433 papers were selected for next step.

Full-text Screening Selection The goal was to do a full-text screening of each paper and determined if it still relates to our research questions. We followed the same process as in the previous step and used the same tool.

First, we downloaded the full-text in PDF format and uploaded it to Covidence. 399 papers were successfully uploaded, and 4 papers were rejected for technical and format reasons. In addition to the abstract-based selection, we extended our inclusion criteria:

- **Inclusion criteria:**
 - Described the influence of agile values and principle over agile methods or practices selection;
 - Described how they adopt some set of practices or methods based on their problems or expectation;
 - Described the benefits they gained from adopting some set of agile practices or agile methods.

362 papers were eliminated and only 72 papers were selected to be studied in detail.

3.4 Data Extraction

Each paper was read carefully and data was extracted by only one reviewer. We divided the 72 papers into three sets and each reviewer took care of one set. For each paper, we extracted the following information:

- **Conference or Journal name:** It allows us to determine if the dataset is representative for our study.

- **Type of agile:** It allows us to know in which environment the tailored agile methods are adopted.
- **Type of institution:** It allows us to know in which sector agile methods are tailored and adopted.
- **Mention about Agile Manifesto:** It allows us to partially answer RQ1. More than a simple ‘Yes/No’ answer, we noted as well what values and principles were mentioned.
- **Agile Manifesto influence on partial agile adoption:** Basically, we tried to find a clear statement that the authors stated about the influence. We denoted the finding as ‘Yes/No’ or the values and principles if any of them were clearly described as influent. It allows us to partially answer RQ1.
- **Problem:** We read very carefully to understand the cause behind the agile methods tailoring. For any mentioned problem that leads to agile practices or methods adoption, we extracted the specific statement without any modification and stored them in a list. Mapping this list to the 4 values and 12 principles of the Agile Manifesto allows us to determine whether or not the Agile Manifesto is relevant to the team’s problems and to answers RQ2.
- **Expectation:** We followed the same process for extracting problems. Instead of looking for the team’s problems, we tried to understand their expectations from specific practices or agile methods before the adoption. This allows us to answer RQ3.
- **Benefit:** Again the same process was followed. Instead of looking for the team’s problems, we tried to understand the team’s benefits after the adoption. This allows us to answer RQ4.

4 Results

As seen in Figure 3, we found that more than 50% of the selected papers were published in the field of agile methods and in highly ranked conferences including XP, AGILE, PROFESS, ICGSE, ICSE, and HICSS. In addition, most of the papers studied empirical evidence and included case study, experimental study, exploratory study, literature review and observational study. We also noticed that more than 50% of the studies in the dataset were conducted in IT companies while the rest are in the IT sector of the non-IT company. Furthermore, it is noticeable that agile methods are tailored and used mainly in normal agile environment (46%), distributed environment (22%), and Scaled Agile (7%). As a result, we can conclude that our dataset is representative for our study.

4.1 RQ1: How have the Agile Manifesto and its influence been discussed in tailored agile methods adoption?

Figure 4 illustrates the result of our analysis from the 72 selected papers. Figures 4.a, 4.b and 4.c describe respectively the statistics of the papers (a) mentioning the Agile Manifesto only, (b) describing to some extent the Agile Manifesto including its values and principles, and (c) clearly stating the influence of the Agile Manifesto in adoption.

Overall, 58% of the papers mention explicitly the Agile Manifesto when evoking the tailored agile methods adoption (see Figure 4.a). Furthermore, we found that papers do

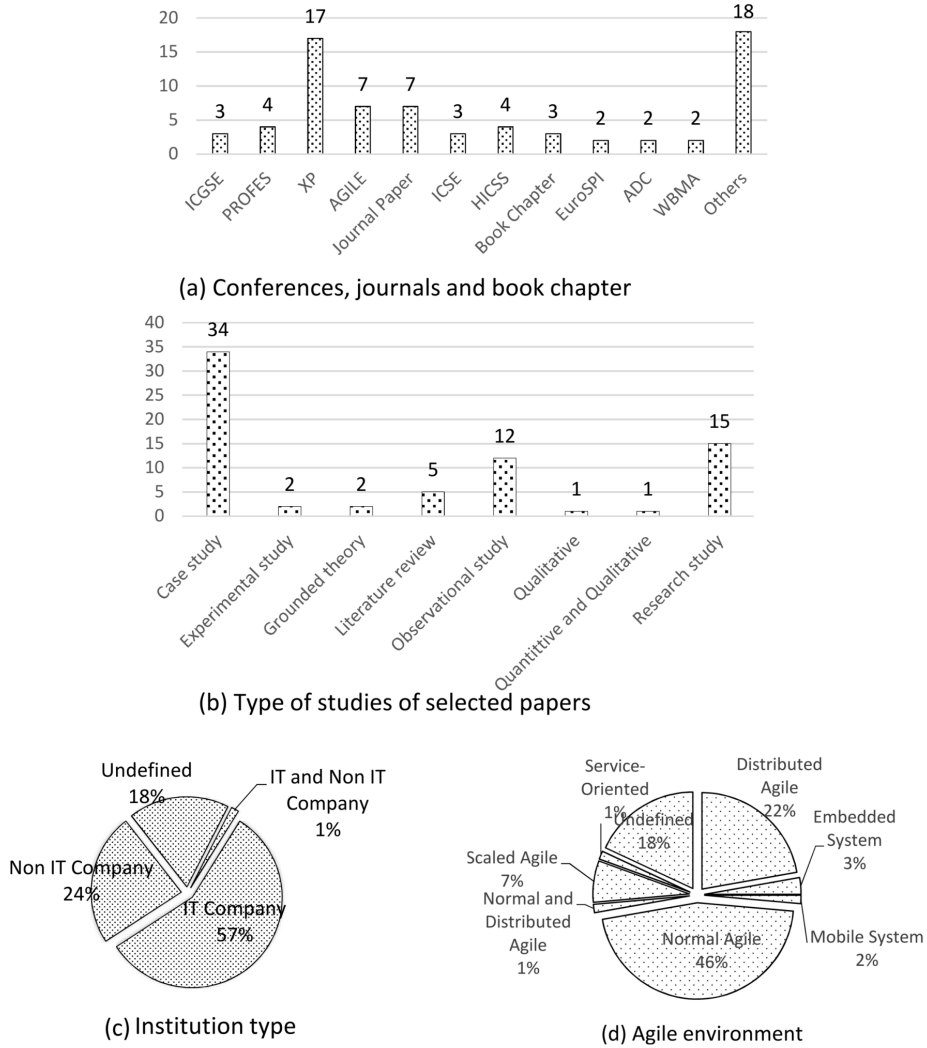


Fig. 3: Dataset information.

not discuss about the Agile Manifesto in the same way. 35% of them simply mentioned the word “Agile Manifesto” without even referring to neither a value nor a principle. The other 65% refer to at least one value or principle of the Agile Manifesto, from which 25% describe the 4 values, 22% the 12 principles, and the other 18% both values and principles (see Figure 4.b).

With respect to the influence of Agile Manifesto on tailored agile method adoption, only 15 papers clearly acknowledge them from which 11 acknowledge with explanation and the other 4 only acknowledge without further details.

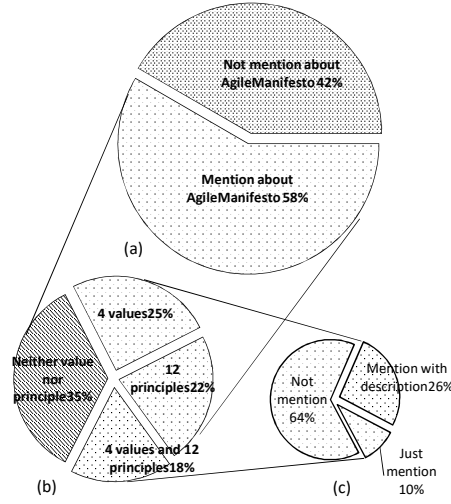


Fig. 4: The influence of Agile Manifesto in tailored agile methods adoption.

4.2 Data Analysis Process for RQ2, RQ3 and RQ4

In order to answer RQ2, RQ3 and RQ4, our intuition was to compare the problems, expectations and benefits extracted from the selected papers with the Agile Manifesto, i.e., the 4 values and 12 principles. Since [11] had already provided the mapping among the 4 values and 12 principles, we only compared them (problems, expectations, and benefits) with the 12 principles.

From the data extraction process, we gathered 3 lists of statements, one for the problems³, one for the expectations⁴, and one for the benefits⁵. As a result, we have 51 statements describing problems, 226 statements describing expected results and 247 statements describing benefits.

The mapping process was done manually by one author and double-checked by another. For each list, we did a Cartesian product and checked if the statement in the list could be related to a principle. The result of the mapping is exposed in Figure 5.a⁶. Figure 5.b provides the mapping of problems, expectations and benefits to the 4 values. The number of problems, expectations and benefits, which were mapped to the values, is the result of the union between difference principles contributing each value (see [11]).

³ Problems were extracted from 14 papers that described the problems they encountered which led them to tailored agile adoption.

⁴ Expectations were extracted from 35 papers that discussed the team's expectations.

⁵ Benefits were extracted from 45 papers that discussed the benefits of tailored agile methods adoption.

⁶ The value's and principle's numbers are respectively denoted in the chronological order that appears in the agilemanifesto.org

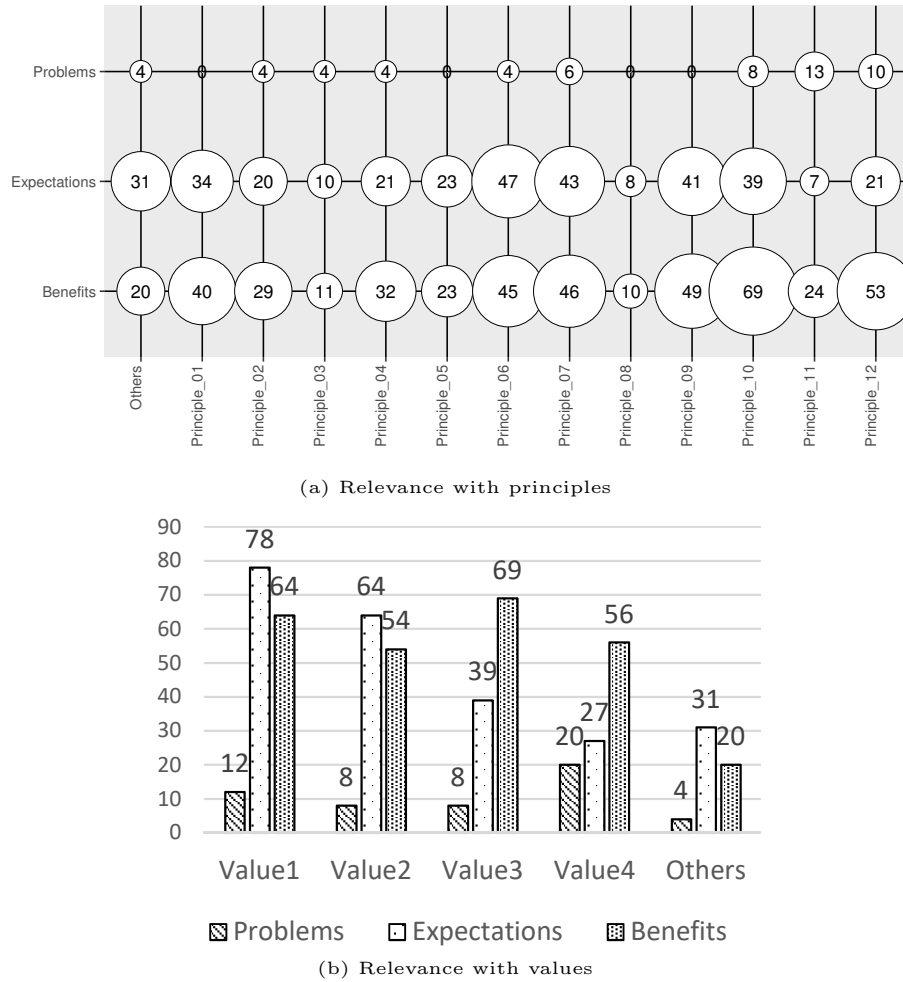


Fig. 5: The mapping of problems, expectations and benefits with Agile Manifesto.

The final lists of problems, expectations, benefits and the result of mapping with Agile Manifesto is available online at <https://goo.gl/YXsvco>.

4.3 RQ2: Is the Agile Manifesto relevant to the team's problems that lead to tailored agile methods adoption?

As seen in Figure 5.a, most of the problems (94%) can be mapped to the 12 principles. The top line in Figure 5.a shows the distribution of problems in line with related principles. The three most relevant ones are Principle_10, Principle_11, and Principle_12. The reason is that most problems faced by development team are customers-based and the change-oriented ones that motivate tailored agile methods adoption. Four principles are

not mapped with any problem. However, at the value level, we can see in the Figure 5.b that all of the values are relevant.

We can summarize that the Agile Manifesto and team's problems are closely relevant to one another. However, the number of problems related to principles is not significant; it leads us to conclude that problems faced by the development team are not the main reason for tailoring agile methods for adoption.

4.4 RQ3: Is the Agile Manifesto relevant to the team's expectations from tailored agile methods adoption?

We extracted 227 expectations in total from the selected papers. Figure 5.a (second row) and Figure 5.b present the detailed statistics of agile principles and values respectively. The majority of the expectations (86.2%) can be mapped to at least one principle. The three most relevant principles are Principle_6, Principle_7 and Principle_9 which contribute to Value2 "working software over comprehensive documentation" i.e., having a working software is always what people expected the most. More precisely, Principle_6 and Principle_7 describe a very similar idea on software delivery and thus they both have slightly different number of "expectations". At the value level, Value1 "Individual and interaction over process and tool" is the most relevant. In contrast to the "problems" section, Principle_11 and Value4 are the least relevant. While the difference between the two most relevant values (Value1 and Value2) are not significant, a big gap exists between the most and the least relevant values (Value1 has 78 related expectations and Value4 just 27).

Briefly speaking, we can conclude that the Agile Manifesto is relevant to the team's expectations when tailoring agile methods for adoption. However, agile principles are not all equally important. This corresponds exactly to the motivation of tailored agile methods adoption, i.e., adopting only the most relevant principles or practices instead of full adoption.

4.5 RQ4: Is the Agile Manifesto relevant to the team's benefits of tailored agile methods adoption?

The mapping results between the benefits extracted from the papers and the elements of Agile Manifesto are presented in Figure 5.a for the principle level and Figure 5.b for the value level. We found that the majority of the benefits (91.8%) could be mapped to at least one principle. At the value level, Value3 and Value1 are the most relevant among all. This proves that agile methods allow development teams to improve their communication both between team members and customers. Globally, the number of "benefits" mapped to each value does not change much from one value to another. Also, it is noticeable that there is a strong correlation between expectations and benefits.

The result confirms that benefits from tailored agile methods adoption correspond to the Agile Manifesto.

5 Discussion and Conclusion

The primary aim of this paper was to find out the role of the Agile Manifesto in tailored agile methods adoption by using a SLR approach. We first tried to verify whether or not the Agile Manifesto has lost attention from development teams. Then, we tried to see if the Agile Manifesto is still the description of agile methods' core features by comparing it with team's problems, expectations and benefits.

The result of the RQ1 shows that our observation is true, the Agile Manifesto has really lost attention from the development team. Among the 72 selected papers, only about half of them (58%) mentioned the Agile Manifesto. Agile practitioners tend to follow only the rules of a specific methodology such as Scrum, XP, etc., and completely ignore the manifesto.

Contrary, the results of RQ2, RQ3 and RQ4 show that the 4 values and 12 principles of the Agile Manifesto are highly relevant to team's problems, expectations and benefits. 94% of problems, 86.2% of expectations and 91.8% of benefits can be mapped to principles and values of the Agile Manifesto. It means that Agile Manifesto still covers fundamental aspects of any agile method. Therefore, development teams should spend some time to understand the Agile Manifesto before adopting any agile method including a tailored one.

In addition, as can be seen in Figure 5, there is a strong correlation between expectations and benefits (except for the principles Principle_10 and Principle_12). This high correlation can explain that, by tailoring agile methods to meet their expectations, the team can of course obtain the benefits accordingly.

As a conclusion, software development teams tend to neglect the Agile Manifesto when tailoring agile methods for adoption. We found however that Agile Manifesto should deserve more value and attention from the development team; it deserves to be a guideline for the development team to tailor any agile method and select the right features for adoption. Having a deep knowledge of the Agile Manifesto gives advantages for better tailoring agile methods to maximize the team's expectation and eventually the benefits.

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