

# Agile Manifesto and Practices Selection for Tailoring Software Development: a Systematic Literature Review

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**Abstract.** Agile methods have been largely used for many years to provide developers with a flexible software development process leading to software quality improvement. To get the best results and eliminate unnecessary efforts, the development team should select the most appropriate methods and techniques. The fundamental core of an agile method has to be well-understood before deciding which parts of the method need to be adopted. We believe that the quickest way to do so is to understand the prescripts of the Agile Manifesto. Many researches have proposed different tailoring approaches based on the relation and straight-forward interpretation between each agile practice and agile values or principles. We however have observed that agile practitioners do not dedicate the necessary attention to the Agile Manifesto before adopting agile methods or practices and directly use them. It is because the importance of Agile Manifesto in tailoring context is not obvious enough to the community. This study aims at doing a systematic literature review on the existing case studies, to verify the relation between the Agile Manifesto and agile practice selection.

**Keywords:** Agile Manifesto · Agile Methods · Agile Methods Adoption · Partial Agile Adoption · Systematic Literature Review.

## 1 Introduction

Representatives from eXtreme Programming (XP), Scrum, Dynamic Systems Development Method (DSDM), Adaptive Software Development (ASD), Crystal, Feature-Driven Development (FDD) and Pragmatic Programming met in 2001 to discuss and establish common ground for an alternative to structured and traditional heavy software development life cycles. They eventually emerged with a *manifesto* for Agile Software Development, commonly known as the *Agile Manifesto* (<http://agilemanifesto.org/>), 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 a particular agile method and following every rule is also inconsistent and inefficient. Instead, software development teams apply agile methods differently, i.e., depending on their problems, resources, and goals or expectation [1]. For instance, the development team will choose to adopt concepts and building blocks that are the most suitable to them based on their specific situation, goals, problems, constraints, etc. This selection makes the method more adherent to the development context; it is known as software methods tailoring [16].

Choosing agile concepts, or more concretely agile practices, to adopt requires a sufficient knowledge of the concepts and the impacts these could have to the team. Understanding all the details of agile concepts could be a time consuming and complicated task so that many approaches have been proposed in order to simplify agile methods tailoring.

One of the interesting topics in agile methods tailoring is the relation and straight-forward interpretation between each agile practice and agile values or principles [3, 8, 18, 22, 25, 27, 32]. On this basis, different ideas for agile methods tailoring have been suggested. For instance, Ahmed and Sidky [3] proposed the road-map to adopt agile practices based on five values, considered as the most essential to agility. According to Madi et al. [27], knowing the most important values is the key to follow the best set of practices as agile values are fundamental. They analyzed papers and books to explore the key agile values and the relationships between them. Our previous works [22, 23] illustrated the strong relationship between the Agile Manifesto (values and principles) and agile practices, together with an approach for practices selection using an intentional modeling framework.

Even though the ideas seem so rational and reliable, to the best of our knowledge no formal verification on the relation between agile practices and values or principles has been performed yet. Their relations were assumed based on the assumptions or beliefs of authors. Moreover, although their relations have been supported by many researchers, we have observed that agile practitioners do not seem to agree that Agile Manifesto is useful for the adoption. This has led to the claim that “*Agile is Dead*” raised by Dave Thomas, one of the Agile Manifesto authors [35]. In many cases [5, 7, 9, 12, 34], development teams do not dedicate any effort to understanding any agile value or principle before adopting any agile method; they simply adopt the specific agile methods or practices which have been known as popular. These reasons motivated us to study and verify, from a statistical point of view, the relation between the agile values, principles and practices in tailored agile methods adoption, by mean of a systematic literature review. Indeed, value and principle are subjective concepts that vary greatly from one method to another. Gathering all the values and principles in literature and categorizing them would require enormous time and efforts. We leave thus this question for future research. Also, our aim is to ease the selection process, having a limited number of concepts would definitely be helpful and efficient. Consequently, we decided to focus on the fundamental 4 values and 12 principles defined in the Agile Manifesto.

In this research, we conducted a systematic literature review to extract key information from the case studies such as: (1) *How has the Agile Manifesto and its importance been discussed in tailored agile methods adoption?* And (2) *Can the Agile Manifesto and agile practices selection be related?* We believe that this study will help to enhance the value of the fundamental ideas of the Agile Manifesto and make its importance more obvious to the community.

The rest of this paper is structured as follows. First, literature reviews related to agile methods adoption are briefly discussed in Section 2. Our research methodology, including details on research questions, search strategy, and data extraction is discussed in Section 3. Then, the results of our literature review are presented in Section 4 followed by the threads to validity in Section 5. Finally, our conclusion and findings are summarized and discussed.

## 2 Related Work

Over the last decade, many agile methods have been proposed based on the Agile Manifesto to meet specific requirements and situations. For instance, Scrum is proposed with the objective to put more focus on project management organization while XP is designed to be more responsive to customer requirement changes [28]. Although agile methods are flexible, they may not be easy to adopt. To ease the process, various meta-models have been proposed [14, 26, 28, 31, 33, 37, 38], serving as a road-map for agile adoption. We note, for instance, the situational method framework [31], development process [28], goal-oriented meta-model [14, 26], Agile Unified Process [4], Goal-Net theory [33], etc.

Another research direction focusing on selecting agile practices during adoption is agile methods tailoring [1, 3, 10, 15, 24, 27]. Campanelli and Perreiras [10] analyzed methodological and practical aspects of research on tailored agile methods and the criteria used for agile methods tailoring. Their results show that practice selection is based on internal environment such as project type, communication, culture and management support and objectives. Qumer and Henderson-Sellers [29] also acknowledged the impact of organizational culture and technical aspects. Abbas et al. [1], Esfahani et al. [15], Kurapati et al. [24] and Madi et al. [27] provided a formalized answer on how to select agile practices for tailored agile methods adoption but admitted that no final academic solution was found on practice selection in tailored agile methods adoption.

Alongside the aforementioned approaches that depend mainly on the business goals, the culture and the resources of the organization, there exists a new group of methods based on agile values and principles [3, 22, 27]. Madi et al. [27] identified 10 key agile values and show how frequently they were mentioned in the literature. Their identified agile values are: *flexibility, customer-centric, working software, collaboration, simplicity, communication, natural, learning, pragmatism and adaptability*. According to them, these 10 values constitute the most important influence on practitioners in practice selection. The Sidky Agile Measurement Index (SAMI) [3] showed the adoption of agile practices based on an agile maturity model. SAMI is a 5-step road map to guide adopting teams based on

five values considered essential to agility: (level 1) *enhancing communication and collaboration*; (level 2) *delivering software early and continuously*; (level 3) *developing high quality, working software in an efficient and integrated manner*; (level 4) *respond to change through multiple levels of feedback*; and (level 5) *establishing an environment to sustain agility*. SAMI is not based on any specific agile method such as XP, Scrum or Crystal, but instead, uses agile values and principles to define the path to agility. However, the framework was built just based on assumptions of the author as mentioned in [3]. Lee and Yong [25] also claimed that each agile practice should help accomplish agile principles in a method and can be grouped into management practices, software process practices and software development practices. Similarly, we defined in [22, 23] the relation between agile value, principle and practice in the goal perspective where principle contributes to value and practice is used to achieve the principle. We also proposed a framework which can be used to help selecting practices. In all these references, agile value and principle are seen, directly and indirectly, as the set of goals that the development team needs to achieve in order to be agile and practice is used to help them accomplish these goals.

Motivated by these methods, we strongly believe that there is a relation between agile value, principle, and practice in a goal perspective. In other words, when it comes to selecting agile practice, by understanding the Agile Manifesto, practitioners should be able to effectively and quickly distinguish the outcome of different practices more easily. Although such idea has been confirmed by many researchers [3, 22, 25, 27], its usefulness in supporting a practitioner to select an agile practice remains unclear.

Many systematic literature reviews have been performed with respect to many different aspects in agile methods, from the general concept such as [2, 11, 13] to the specific topics like [10, 17, 30]. Among all, the more closely related to our work is [10], a systematic literature review of 56 research papers on agile methods tailoring. It provides a detailed literature on agile methods tailoring and a deep understanding on how the researches on agile methods tailoring were conducted. The authors identified also the research community view on agile method tailoring, and the research gaps on the theme. The result, however, does not prove anything about the relation between agile value, principle and practice.

### 3 Research Methodology

This paper adopts a Systematic Literature Review (SLR) approach [19] to study and verify the relationships between the Agile Manifesto and agile practices, in the context of tailored agile methods adoption. An SLR allows us to adopt a formal and systematic approach to identify, select and synthesize recent literature relevant to our research questions [19]. It consists in defining (1) research questions, (2) search strategy, (3) study selection, (4) data extraction, and finally (5) data analysis. Each step will be explained hereafter. Figure 1 illustrates the process we have followed.

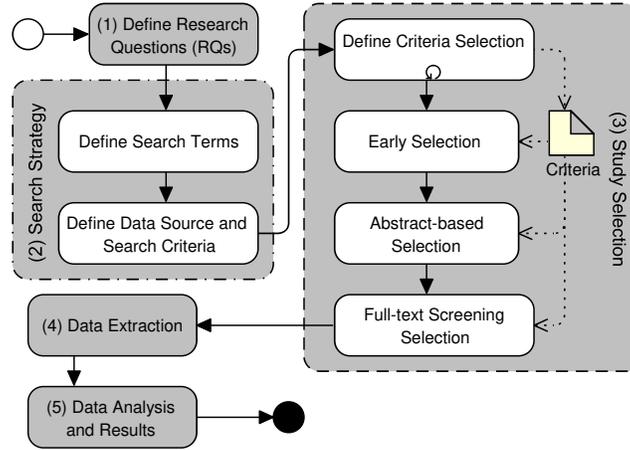


Fig. 1. Research protocol.

### 3.1 Research Questions

The main aim of this research is to confirm the relationship between the Agile Manifesto and agile practices, 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 an agile practice or method to adopt*. To answer this, we have formulated two fundamental Research Questions (RQs) in this research:

**RQ1: How has the Agile Manifesto and its importance been discussed in tailored agile methods adoption?** This first question is to verify whether or not the Agile Manifesto has lost its attention and importance. Answering this question allows us to know about the state of the art of the Agile Manifesto from a practitioner’s point of view; it includes:

- *RQ1.1: How often has the Agile Manifesto been discussed by agile practitioners during their adoption?*
- *RQ1.2: In which manner has the Agile Manifesto been discussed, as a whole or only part of it, just as a reminder or in detail?*
- *RQ1.3: Has the Agile Manifesto been recognized as important by practitioners for their adoption or not? If it has, how often and how has it been described?*

**RQ2: Is the Agile Manifesto related to agile practices selection?** This question verifies whether or not there exist relations between the Agile Manifesto and practices, as mentioned by many researchers. As pointed out in the related work (see Section 2), agile values and principles have been regarded as a set of goals to achieve for a method to be agile. This set of goals is said to be accomplished by adopting agile practices.

We seek to answer this question by comparing the development team’s goals of adopting agile methods with what is described in the Agile Manifesto. The results would allow us to confirm whether or not the Agile Manifesto could be related to agile practice selection, from the practitioner’s point of view.

Based on our observation, development team’s goals in adopting tailored agile methods can be described in three situations: (1) sometimes, development teams decide to change their development process based on *problems* they encountered. Their goal is to solve these problems by using a set of agile practices or methods; (2) some other cases, *problems* are not the root cause of the adoption. Knowing that agile methods are the most popular nowadays, some development teams decide to follow them with the hope of improving their current processes. They have their predefined goals or *expectation* to achieve by adopting specific agile practices or methods; (3) regardless of the *problem* to solve or the *expectation* to fulfill, in many cases, result from adopting agile methods are described as *benefits*. These benefits can be seen as the accomplished goals.

Hence, in order to know whether or not the Agile Manifesto could be related to agile practice selection, we defined three other sub research questions:

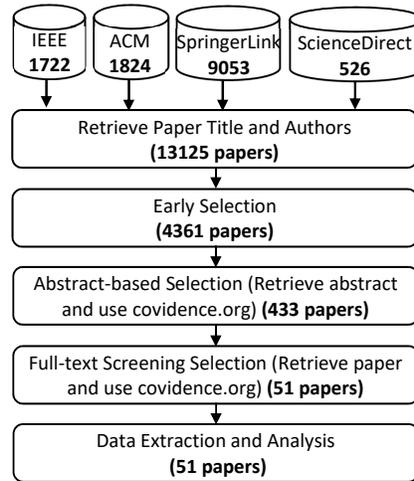
- RQ2.1: *Is the Agile Manifesto relevant to the team’s problems that led to tailored agile methods adoption?*
- RQ2.2: *Is the Agile Manifesto relevant to the team’s expectations from tailored agile methods adoption?*
- RQ2.3: *Is the Agile Manifesto relevant to the team’s benefits of tailored agile methods adoption?*

If the development team’s goals of agile methods adoption in most situations are relevant to the Agile Manifesto, then the description in the manifesto can still cover the core goals of this methods creation. Understanding the Agile Manifesto would allow the development team better defining their goals in adopting agile methods and consequently better selecting the set of agile practices.

### 3.2 Search Strategy

**Search terms.** Our objective is to understand the importance of the Agile Manifesto in tailored agile methods adoption. Software method tailoring is the process that makes the method more adherent to the development context [16]. Various terms are used in the literature as a synonym for *tailor*, i.e., *partial*, *customize*, and *practice selection* [1, 6, 14, 22, 24]. 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 [36]). 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 consider formal data sources, i.e., papers that were published in peer-reviewed conferences and journals from the four well-known digital libraries in the field of software engineering: IEEEXplorer (<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.



**Fig. 2.** Papers selection.

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 title of the paper, keywords or abstract. Basically, we found 13125 papers in total: 1722 papers in IEEEXplorer, 526 papers in ScienceDirect, 9053 papers in SpringerLink, and 1824 papers in ACM Digital Library (see Figure 2).

### 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 selection criteria. 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 we started the real selection process, we defined and refined several times the criteria for inclusion and exclusion to gather the maximum possible relevant articles and effectively reject irrelevant papers. The final criteria are summarized in Table 1:

**Table 1.** Inclusion and exclusion criteria for Abstract-based selection.

Inclusion criteria	Exclusion criteria
-Tailored/partial/customized agile methods or agile practices selection;	-Agile usage/implementation/adoption not for software development;
-Empirical/research on adopting agile methods for software development;	-Agile usage in theory;
-Literature review/survey on agile framework;	-Simulation model;
-Challenge/issue in agile methods adoption;	-Article from workshops;
-Approach, model, framework, introduction or guide to agile methods adoption;	-Use of a specific practice/technique (daily meeting, pair programming, etc.);
-Integration of agile methods to other methods;	-Agile method which has not been introduced in one of the most popular agile methods.
-Transformation from other to agile methods;	
-Agile practices usage.	

We used Covidence ([www.covidence.org](http://www.covidence.org)), a collaborative tool for facilitating the SLR process.

To get started, we needed to upload the title and abstract of the 4361 papers into Covidence. However, since SpringerLink and ACM Digital library do not allow downloading 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 determine 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 manually 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 to the real case study which:

- describes the influence of agile value or principle over agile methods or practice selection;
- describes how they adopt some set of practices or methods based on their problems or expectations;
- describes the benefits they gained from adopting some set of agile practices or agile methods.

As long as one of the criteria is found, the article is included. At the end, 383 papers were eliminated and only 51 papers were selected in this study.

### 3.4 Data Extraction

Each paper was read carefully and data was extracted by only one reviewer. We divided the 51 papers into three sets and each reviewer took care of one set. For each paper, we extracted the following information:

- **Conference or Journal name and year of publication:** 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 answer RQ1.1 and RQ1.2. We denoted the findings as ‘Yes’ when the paper explicitly mentioned the word Agile Manifesto and we extracted values or principles and denoted them otherwise;
- **Agile Manifesto influence on partial agile adoption:** Basically, we tried to find a clear statement of influence by the authors. We denoted ‘Yes’ if author simply refers ‘Agile Manifesto’ as influential, or we extracted the values and principles if any of them were described as influence. It allows us to answer RQ1.3;
- **Problem:** We read very carefully to understand the cause behind the agile methods tailoring. For any mentioned problem that led to agile practices or methods adoption, we extracted the specific statements without any modification and stored them in a list. Mapping this list to the 4 values and 12 principles of the Agile Manifesto allowed us to determine whether or not the Agile Manifesto is relevant to the team’s problems and to answer RQ2.1;
- **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 RQ2.2;
- **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 RQ2.3.

## 4 Results

As seen in Figure 3, we found that more than 60% of the selected papers were published in the field of agile methods and in highly ranked conferences (A- or B-based on Core Portal Conference — <http://portal.core.edu.au/conf-ranks/>) including ICSE, HICSS, XP, AGILE and PROFES. In addition, most of these papers were published less than 10 years ago. We also noticed that more than 70% of the studies in the dataset were conducted in IT companies while the rest were in the IT sector of a non-IT company. Furthermore, it is noticeable that agile methods are tailored and used mainly in normal agile environment (51%), distributed environment (23%), and Scaled Agile (8%). As a result, we can conclude that our dataset is representative for our study.

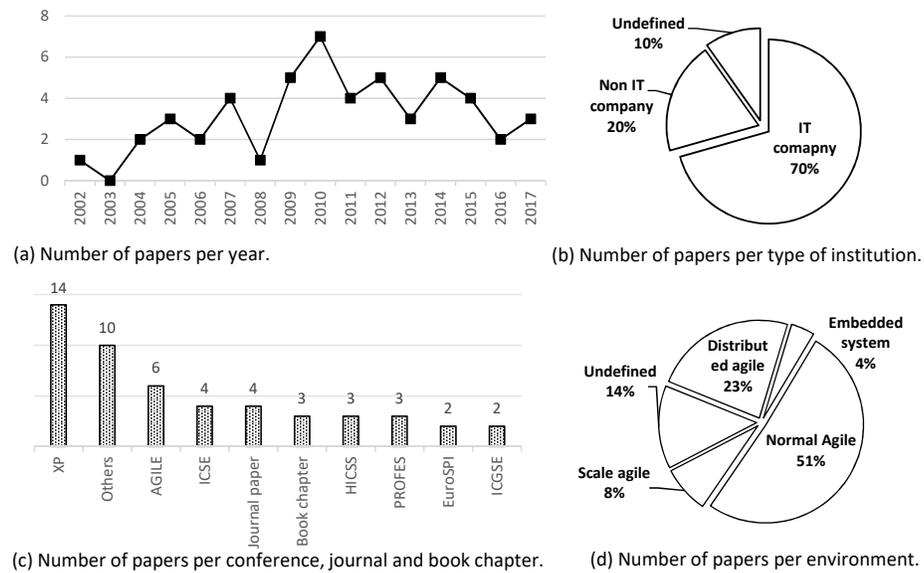


Fig. 3. Dataset information.

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

Figure 4 summarizes the result of our analysis from the 51 papers.

Overall, 51% (26 papers) of the papers mention the Agile Manifesto when evoking the tailored agile methods adoption (see Figure 4.a). Furthermore, all the papers do not discuss the Agile Manifesto in the same way. 38% of them (10 papers out of 26) simply mention the word “Agile Manifesto” without even referring to neither a value nor a principle. The other 38% refer to only the

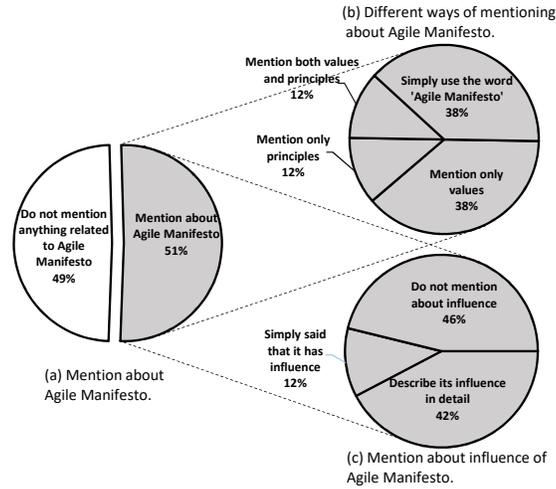


Fig. 4. The influence of the Agile Manifesto in tailored agile methods adoption.

values, 12% (3 papers) refer to only the principles and the rest 12% refer to both values and principles (see Figure 4.b).

With respect to the influence of the Agile Manifesto on tailored agile methods adoption (see Figure 4.c), it is only discussed in 14 papers among which 11 papers (42%) acknowledge it with a clear explanation while the other 3 (12%) only acknowledge without further details.

The result of RQ1 shows that the interest of the development team in understanding the Agile Manifesto is not significant. Overall, out of 51 case studies, 51% talk about it while only 21% (11 papers) acknowledge its influence.

#### 4.2 RQ2: Is the Agile Manifesto related to agile practices selection?

In order to answer RQ2, our intuition was to compare the problems, expectations and benefits extracted from the 51 selected papers with the Agile Manifesto, i.e., the 4 values and 12 principles. Since we had already provided the mapping among the 4 values and 12 principles in [23] (see Table 2), 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 problems<sup>4</sup>, one for the expectations<sup>5</sup>, and one for the benefits<sup>6</sup>. As a result, we have 42 statements describing problems, 155 statements describing expected results and 205 statements describing benefits.

<sup>4</sup> Problems were extracted from 12 papers that described the problems they encountered which led them to tailored agile adoption.

<sup>5</sup> Expectations were extracted from 27 papers that discussed the team’s expectations.

<sup>6</sup> Benefits were extracted from 37 papers that discussed the benefits of tailored agile methods adoption.

**Table 2.** Mapping agile values and principles.

<b>Value</b>	<b>Principle</b>
<b>Value1:</b> Individuals and interactions over processes and tools	<b>Principle_5:</b> Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
	<b>Principle_6:</b> The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
	<b>Principle_8:</b> Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
	<b>Principle_11:</b> The best architectures, requirements, and designs emerge from self-organizing teams.
<b>Value2:</b> Working software over comprehensive documentation	<b>Principle_12:</b> At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.
	<b>Principle_1:</b> Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
	<b>Principle_3:</b> Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
	<b>Principle_7:</b> Working software is the primary measure of progress.
<b>Value3:</b> Customer collaboration over contract negotiation	<b>Principle_10:</b> Simplicity--the art of maximizing the amount of work not done--is essential.
	<b>Principle_4:</b> Business people and developers must work together daily throughout the project.
<b>Value4:</b> Responding to change over following a plan	<b>Principle_2:</b> Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
	<b>Principle_9:</b> Continuous attention to technical excellence and good design enhances agility.

The mapping process was carried out manually by one author and double-checked by another, in the form of a Cartesian product. This means that for each list, we compared every statement to the 12 principles of the Agile Manifesto. They are mapped when they have a close relation to one another. For instance, the problem “delivery pains” is closely related to both Principle\_6 “Our highest priority is to satisfy the customer through early and continuous delivery of valuable software” and Principle\_7 “Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale”. This problem is thus mapped to both the Principle\_6 and the Principle\_7. The result of the mapping is exposed in Figure 5.a. 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 the different principles contributing to each value.

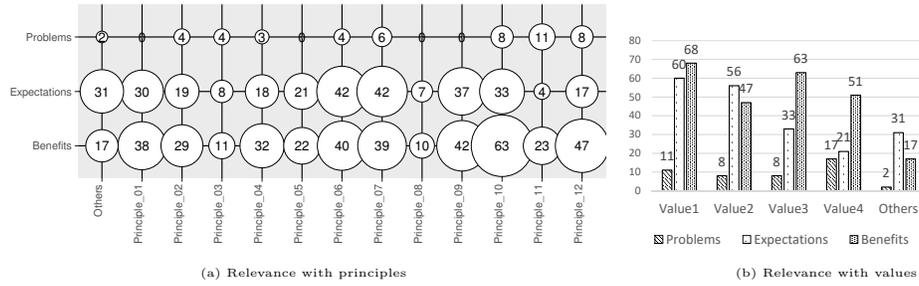


Fig. 5. Mapping of problems, expectations and benefits with Agile Manifesto.

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

The correlation ratio between the Agile Manifesto and agile methods adoption goal (problems, expectations, and benefits) is defined by the number of problems, expectations and benefits that can be mapped to at least one agile principle over the total number we found. For instance, 40 out of 42 problems can be mapped to at least one of the principles. The correlation ratio between problems and the Agile Manifesto is thus 95%.

**RQ2.1: Is the Agile Manifesto relevant to the team’s problems that led to tailored agile methods adoption?**

As seen in Figure 5.a, most of the problems (95%) 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 the development team are customer-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 Figure 5.b that all the values are relevant.

We can summarize that the Agile Manifesto and team’s problems are closely related to one another. However, the number of problems 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.

**RQ2.2: Is the Agile Manifesto relevant to the team’s expectations from tailored agile methods adoption?**

We extracted 155 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 (80%) 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 expect the most. More precisely, Principle.6 and Principle.7 describe a very similar idea on software delivery and thus they both have slightly different numbers 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 differences 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 60 related expectations and Value4 just 21).

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.

### **RQ2.3: 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 (92%) 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 to 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 overall results show that 95% of problems, 80% of expectations and 92% of benefits can be mapped to principles and values of the Agile Manifesto. It means that the Agile Manifesto is highly related to the real development of team’s goals in every situation: problems, expectations and benefits.

## **5 Threats to Validity**

Kitchenham [20] states that the systematic process involved in SLR is designed to avoid bias. Thus, in every step of our SLR process, we manage the limitations and the bias as much as we can.

Starting from data source, Kitchenham et al. [21] claims that researchers should collect from at least 4 different sources. Inspired from this idea, we collected our data from four different sources: IEEEExplore, ACM Digital Library, SpringerLink and ScienceDirect.

For the keywords used in search engines, we used multiples terminologies (synonyms) used by both researchers and practitioners. We only consider papers published between 2000 and 2017, since the Agile Manifesto could not be mentioned before 2000. Therefore, we unavoidably missed some papers. However, we believe that we have retrieved a large and representative sample for this review.

Regarding the inclusion and exclusion criteria, we defined and refined them several times before starting the real selection to collect the maximum relevant papers and effectively reject irrelevant ones. According to Kitchenham [20], this can greatly minimize the possibility of bias.

To address the problem of quality, in accordance with Campanelli and Parreiras [10], we only considered peer-reviewed papers from conferences and journals. There is no explicit definition of “quality” criteria, instead, we assume that all conference papers/journals reach an acceptable level of quality. However, this could be a limitation of this study.

Next, in the data extraction and classification stages, we applied standard classifications defined in the current literature based on shared and common definitions. We had multiple face-to-face discussions when there were misunderstandings in some concepts. Nevertheless, the data extraction about the influence could be considered as a limitation of the study. In fact, the influence was not always explicitly mentioned and some data may consequently have been missed or misunderstood.

Another final type of bias is the publication one. Based on Kitchenham and Charters [19], they refer to the problem that positive results are more likely to be published than negative results. In fact, very few case studies have reported failed case of adoption, instead, they have been focusing more on the benefits of the adoption.

To summarize, despite some limitations, we consider the internal validity of this research to be acceptable. Most of the bias encountered are inherent and we aimed to manage them as much as we could.

## 6 Discussion and Conclusion

The primary aim of this paper was to verify the relation between the Agile Manifesto and agile practices selection through an SLR approach. We first tried to find out *how the Agile Manifesto has been discussed in tailored agile methods adoption*. Then, we tried to see *whether or not agile practices selection can be related to agile values or principles defined in the Agile Manifesto* by comparing them with team’s problems, expectations and benefits.

The result of RQ1 shows that our observation is true, the Agile Manifesto has really lost attention from the development team. Among the 51 selected papers, only about half of them (51%) mentioned the Agile Manifesto (detail and not detail). Agile practitioners tend to follow only the rules of a specific methodology such as Scrum, XP, etc., and completely ignore the manifesto.

On the contrary, the results of RQ2.1, RQ2.2 and RQ2.3 show that the 4 values and 12 principles of the Agile Manifesto are highly relevant to team’s problems, expectations and benefits. 95% of problems, 80% of expectations and 92% of benefits can be mapped to principles and values of the Agile Manifesto. It means that the 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, even though a lot of research supports the idea that the Agile Manifesto (values and principles) allows defining the set of practices, yet software development teams tend to neglect the Agile Manifesto when tailoring agile methods for adoption. We found however that the Agile Manifesto should be more valued and draw more 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.

Finally, this study provides a more insightful validation on the relation between the Agile Manifesto and agile practices which was always made based on the assumptions or beliefs of the researchers. This validation can be used as the evidence to create a more complete framework for tailored agile methods adoption in an alternative perspective. For the next step, we aim at building a repository through a systematic review of the empirical studies to gather the relationships between the Agile Manifesto and each practice. Using this repository, the practitioner can then identify easily the related practices to fulfill fully or partially principles and values of the Agile Manifesto.

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