

Investigating Agile Values and Principles in Real Practices

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Abstract—Software engineering is the field of development of information systems. However, the development process can often be complicated. Therefore, many researchers have introduced their approaches to manage the complication. This led to the introduction of new subfields such as change management, and organisational change. Agile can be regarded as a collection of best practices with the same values and principles. Since the introduction of Agile manifesto, many researchers, manufacturers, and organisations have introduced their thoughts, tools, and models to enhance the understanding and adoption of Agile. Sharing a similar understanding of Agile among people involved is essential in order to adopt it. This paper investigates the understanding of Agile among IT professionals. In addition, the factors that impact the understanding and adoption of Agile are highlighted and studied. A survey methodology was employed in this research among IT professionals from different organisations. The results of this study show that productivity and ability to accept change are conflicting the understanding among participants. Furthermore, the experience of participants has an impact on the ways in which Agile are adopted.

Keywords—Agile; software engineering; information systems; change management; organisational change

I. INTRODUCTION

Since 2001, Agile [1]–[3] has been known to be the most adaptive way in the field of software engineering. It refers to a software development model that should accept changes during software development. Hesselberg [4] articulated that “The agile mindset is now finding its way into the C-suite, and it is starting to radically change the way organizations are led and managed. Business agility is on everybody’s lips, for very good reasons”.

Some researchers define Agile as a collection of best practices with same values and principles [5]. However, other researchers define Agile as a subset of iterative methods of the traditional methodologies of software development [6]. In general, Agile can be defined as development way that relies on the philosophy of change embracing.

Agile has several benefits that overcome traditional ways. These benefits can be summarized in the following: change embracing, customer heard, quick achievement, good interactions, and continuous improvements. However, several drawbacks come along with Agile. These drawbacks can be summarized in the following: time consuming, unsatisfactory documentation, change dilemma, and unclear customer [7]–[9].

Many have introduced their Agile methods and frameworks [10]–[13] such as Scrum [14]–[16], eXtreme Programming (XP) [17]–[19], and DevOps [20]–[22]. Each method and framework has its own pros and cons. However, there is no unified framework or method that can be considered to be the best practice in every circumstance [23].

Since Agile introduction, many software development teams are claiming that they adopt Agile model. However, a question of “do they adopt agile?” can be raised. This research aims to investigate the understanding of Agile among software development teams. It is crucial that development teams share the same understanding of Agile when it is employed. Therefore, this research questions the understanding by investigation each value and principle of Agile against the participants views of these values and principles. This is carried out by asking the participants to priorities and criticizes the values and principles. In addition, it highlights any modified version of adopting and understanding that can exist.

The remainder of this paper is structured as follows: Section II describes the related work of this field of research. This is followed by the Section III which describes the research questions of this research. The methodology employed is described in Section IV. Section V is divided into three subsections which show and discuss the findings of this research. Finally, the conclusion and limitations will be drawn in Section VI.

II. RELATED WORK

Ozkan et al. [24] have introduced a study that combines Agile principles from different resources and divided them into groups in order to develop a better understanding of Agile. This grouping was done by one expert. The evaluation process involved two experts. However, authors still see the understanding of Agile as a challenging process [25].

Nurdiani et al. [26] introduced their methodology to understand and compare Agile Maturity Models (AMM) and its strategies. The methodology was based on collecting data from previous studies’ results on the topic and a survey done on 46 participants. However, the attempt arrived to transfer Agile methods onto organizational level and practical implications [27].

Koi-Akrofi et al. [28] investigated Agile in management of IT projects. The study was to compare the use of Agile and traditional ways to manage IT projects. The study focused on the challenges of using Agile. The authors found that despite the benefits of using Agile, many challenges accompany the

employment of Agile. These challenges, such as empowerment and organization culture, make it difficult to apply. Therefore, many go to the traditional ways instead of Agile or merge both models in real life.

Hess et al. [29] investigate the ways to improve the understanding of Agile in the perspective of Information needs and communication and collaboration. The study is based on a previous study of the authors that investigate traditional ways. The authors are comparing the results from both studies. The findings highlighted the gap in product inconsistency when employing Agile. However, authors found also that teams do not share the same understanding of the values of Agile as they use them differently [30].

Barroca et al. [31] introduced a paper that summarizes an international workshop discussion on Agile transformation. Many definitions were discussed and presented. In addition, challenges of Agile transformation were identified. One of the challenges is the understanding of Agile within the teams. However, the authors attempted combine solutions to overcome these challenges [32]–[34].

Jia et al. [35] have conducted a case study to investigate the understanding of developers of Agile requirements. The study was conducted on around 130 students divided into 17 teams to develop a web-based email management system. The main findings of the study identified difficulties in understanding the Agile requirements. Inconsistent understanding of Agile was noticed [36].

Baham et al. [37] have introduced a theoretical core that they found to be a gap in the studies of Agile. The authors offered a framework that unified the theoretical understanding of Agile. However, the study is considered to be an inspiration for future discussion and implications on the topic.

Eilers et al. [38] have investigated the gap between being Agile and going Agile among development teams. The study included around 129 participants and shows that the empowerment of the development teams enhances the Agile work and overcomes challenges. In addition, happiness and commitment are the factors of connection of being or doing Agile [39]. However, it has been argued that empowerment has limited impact on project outcomes [40].

III. RESEARCH QUESTION

This research outlines two research questions which focus on the investigation of Agile understanding and adoption among software development teams.

RQ1. Is there a difference in understanding and adoption between experienced IT professionals and less experienced professionals? In order to answer this question, participants will be asked to categorize themselves into one of five categories. Based on the answer to this question, the collected data will be analyzed accordingly.

RQ2. Based on the experience of IT professionals, is there an evolutionary understanding of Agile values and principles? The answer to this question will rely on participants' views on priority and criticism of Agile values and principles.

IV. METHODOLOGY

This research employed the methodology of questionnaire. This methodology will allow collected data based on experience of participants and classify the responses for further investigation. The questionnaire was sent to potential participants in the IT field via emails and social communication. Fig. 1 shows the stages of the investigation.

The questionnaire was sent to 80 potential participants, the responses received were 38 responses. The participants are IT professionals with different job titles namely: Software Analyst, Software Designer, Software Developer/Implementer/ Programmer, Software Engineer, Software Project Coordinator, Software Project Manager, and Software Tester. It is clear from the aforementioned job titles that the focus on this study is Agile adoption and understanding among software development teams.

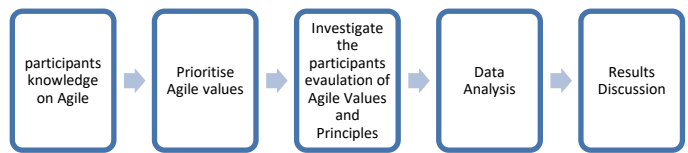


Fig. 1. Research methodology.

The questionnaire was divided into four sections. The first section includes direct questions about gender, job title, qualification, and years of experience. In addition, in this section, participants are asked to rate their knowledge on Agile and whether they have been taught or trained on Agile. Furthermore, participants are asked if they view their organization employing Agile. The second section is related to Agile values shown in Table I. The participants are asked to prioritize the values from their experience.

TABLE I. AGILE VALUES [3]

Values	abbreviation
Individuals and interactions over processes and tools	Val1
Working software over comprehensive documentation	Val2
Customer collaboration over contract negotiation	Val3
Responding to change over following a plan	Val4

In the third section of the questionnaire, the participants are asked to criticize the Agile values shown in Table I with one of the options shown Table II. The fourth section of the questionnaire is also regarding participants' criticism on the Agile principles shown in Table III. The criticism is based on participants' selection of options from Table II to the principles shown in Table III.

TABLE II. CRITICISM CRITERIA

Criterion	Meaning
Keep as it is	No change suggested
Need To be Removed	Removal suggested
Need To Be Modified	Some changes might be suggested

Following the ethical manner of scientific research, participants were informed that the collected data is confidential and is used for research purposes. Thereafter, they were asked to provide their consent to participate, and they were able to withdraw at any stage of the process. The participants were assured that their privacy is protected and respected.

TABLE III. AGILE PRINCIPLES [3]

Principles	abbreviation
Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.	PPI1
Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.	PPI2
Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.	PPI3
Business people and developers must work together daily throughout the project.	PPI4
Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.	PPI5
The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	PPI6
Working software is the primary measure of progress.	PPI7
Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.	PPI8
Continuous attention to technical excellence and good design enhances agility.	PPI9
Simplicity--the art of maximizing the amount of work not done--is essential.	PPI10
The best architectures, requirements, and designs emerge from self-organizing teams.	PPI11
At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.	PPI12

From Fig. 2, 74% of participants are males where the remaining are females. In addition, participants are from a different range of experiences. However, most of them have less than 10 years of experience with a percentage around 61%. Participants with more than 10 years of experience constitute around 39% of all participants.

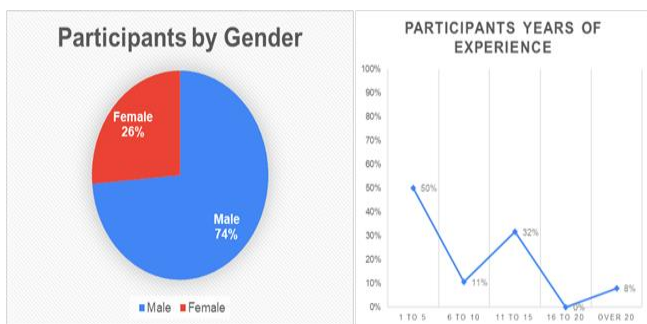


Fig. 2. Participants genders and experience range.

V. RESULTS AND DISCUSSION

In this section, the results of the research will be shown and discussed. First, the general findings of the research will be presented and discussed. These are related to the participants understanding of Agile and the source of knowledge learnt

Agile from. In addition, how the participants view the adoption of Agile in their organisations. Next, the remaining subsections are presenting the findings related to the research questions of the experiences of the participants and their understanding of Agile and new models of understanding.

A. General findings

In order to identify the source of the participant's knowledge of Agile, participants were asked direct questions specifying if they have learned Agile in school or at training in a workplace. Fig. 3 shows that around 74% of participants have been trained in the workplace on Agile. On the other hand, just above half of participants have been taught Agile at school.

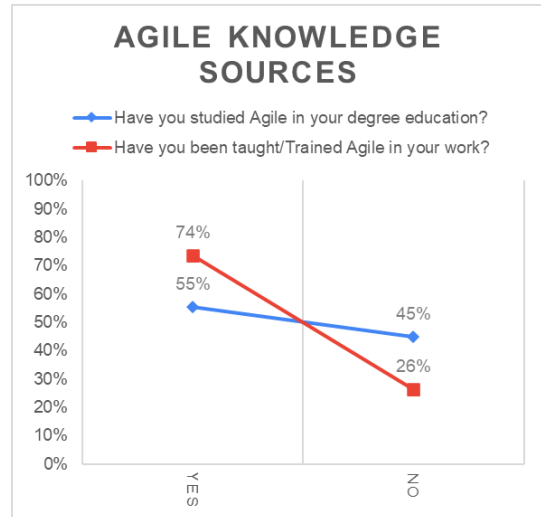


Fig. 3. Participants knowledge source of agile.

From Fig. 3, it is obvious that workplaces are more interested in Agile, and they tend to train professionals on Agile even if they have studied it. From this, organisations of participants urge the adoption of Agile. However, contrastingly, Fig. 4 illustrates the view of the participants on the adoption of Agile, and it is obvious that around 58% of participants believe that their organisations adopt Agile.

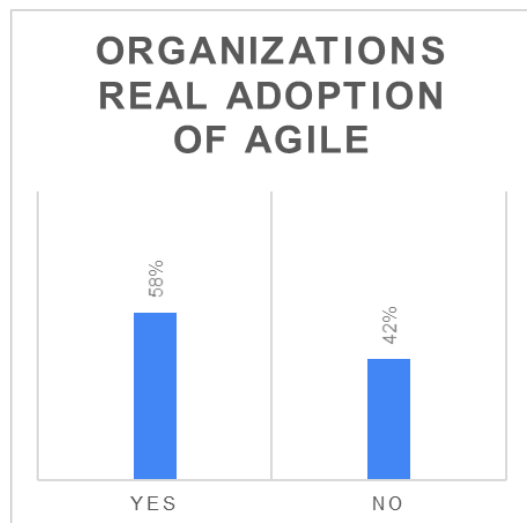


Fig. 4. Participants views on adoption of Agile in their organisation.

Fig. 5 illustrates a key point about the understanding of Agile among IT professionals. It shows the participants' self-rating on Agile knowledge. Although, as shown in Fig. 3, 74% of participants received training on Agile and 55% of them studied it in school, Fig. 5 shows that around 61% of participants rated their knowledge in Agile as medium as or less than medium.

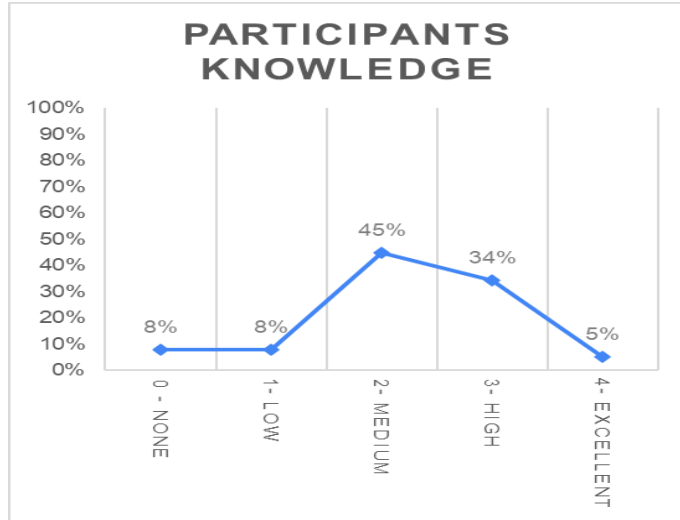


Fig. 5. Self-rating of participants on Agile knowledge.

It can be concluded from the general findings that there is a gap in sharing the understanding of Agile among IT professionals. In addition, despite the urge of the organisations to adopt Agile, a struggle can be noticed to do such. This might be attributed to the gap of Agile understanding among the IT professionals.

B. Prioritising Agile Values

In order to investigate the new understanding of Agile, participants were asked to prioritize the values of Agile shown in Table I. It is obvious from Fig. 6 that Val2 has been prioritized the most by participants as it occupies the first and second priority. Val2 is regarding the value of working software over documentation. This is an interesting point as this value needs interactions with clients and might lead to a change of requirements. Therefore, Val1 and Val4 are following in the priority order as shown in Fig. 6.

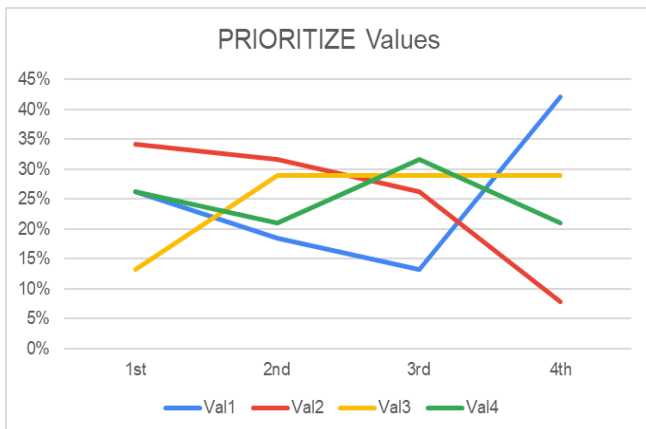


Fig. 6. Participants prioritising Agile values.

It can be concluded that the understanding of the participants of Agile values has been impacted by the tendencies of productivity and customer satisfaction. In addition, software documentation might be affected by adopting Agile as this understanding imposes more productivity over quality and more changes over quality.

C. Criticism of Agile Values and principles

Participants were asked to provide an abstract view on the criticism of the values and principles of Agile. Fig. 7 shows the participants responses to a criticism question on each value of Agile. The question aims to collect a general answer of participants as if they believe that a value should be eliminated, modified, or kept as is.

From Fig. 7, it is obvious that Val2 is a controversial value among participants. In addition, a high number of opinions regarding modification and elimination to the value were focused on Val2 with around 71%. It is worth noting that Val2 is about productivity over quality. Furthermore, Val4 received an equal number of responses to modification and elimination, however, it received the highest number of responses to be kept as is among other Agile values.

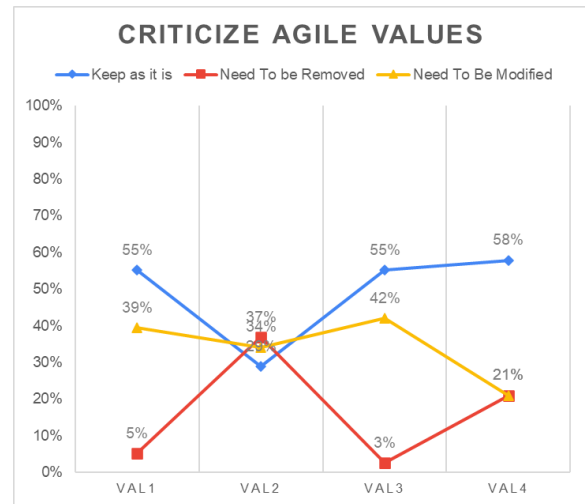


Fig. 7. Participants criticising Agile values.

With regards to the criticism of Agile principles, Fig. 8 illustrates the responses of the participants. Overall results show that participants tend to have no criticism of Agile principles, as the dominant response is to keep as is. However, PPL2, PPL6, PPL7, and PPL10 seem to receive responses regarding modification of these principles. It is worth noting that PPL2 is about changes in software, PPL6 is about communication with clients, PPL7 is about productivity, and PPL10 is about simplicity of software.

It can be concluded from results shown in Fig. 7 and Fig. 8 that Val2, which is regarding productivity over quality, is again obvious in the criticism of the participants. Interestingly, the principles of PPL2, PPL7, and PPL10 are related to the Val2. From this it can be noticed that productivity over software quality is a controversial understanding among the participants. In addition, this is related directly to the adoption of Agile as it might introduce new ways of Agile adoption or affect the traditional way of Agile adoption.

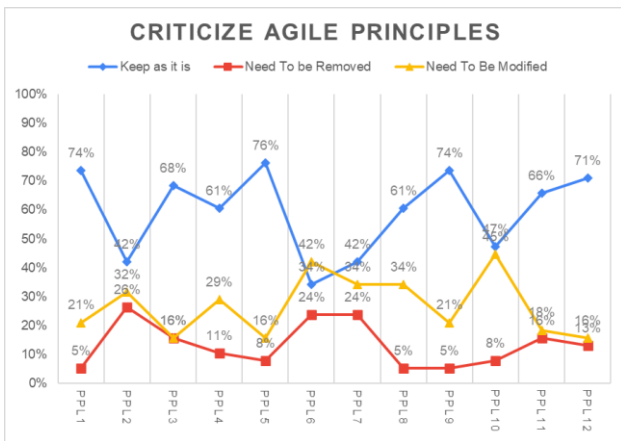


Fig. 8. Participants criticising Agile principles.

D. Criticism of Agile Values and principles Based on experience.

In this section, the previous criticism of Agile values and principles is investigated further. The focus is on the comparison of participants' responses to the criticisms based on years of experience. The responses were divided into two groups: less than 10 years of experience and more than 10 years of experience.

Fig. 9 illustrates the criticism responses of participants regarding Agile values based on experience of participants. It is obvious from the Figure, that participants with less than 10 years of experience have no tendency to criticize except for Val2 where around 70% of the participants think Val2 needs to be eliminated or modified.

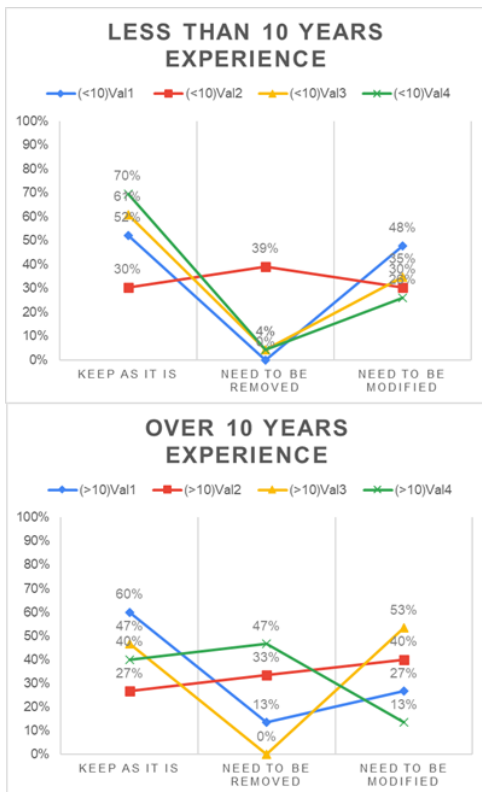


Fig. 9. Based on experience participants criticising Agile values.

On the other hand, participants with more than 10 years of experience agree with participants with less than 10 years of experience on that Val2 needs to be eliminated or modified. Furthermore, the majority of participants with more than 10 years of experience think that Val3 and Val4 should be modified and eliminated respectively.

With regards to Agile principles, Fig. 10 shows the criticism responses of participants based on experience of participants. The majority of participants with over 10 years of experience think that PPL7 should be eliminated. In addition, they think that PPL6 should be eliminated or modified. In addition, PPL10 received great attention to be modified by the majority of participants with over 10 years of experience.

On the other hand, the majority of participants with less than 10 years of experience believe that PPL2 should be eliminated or modified. In addition, they think PPL6 should be modified. Furthermore, participants with less than 10 years of experience give the same attention as participants with over 10 years of experience on that PPL10 should be modified.

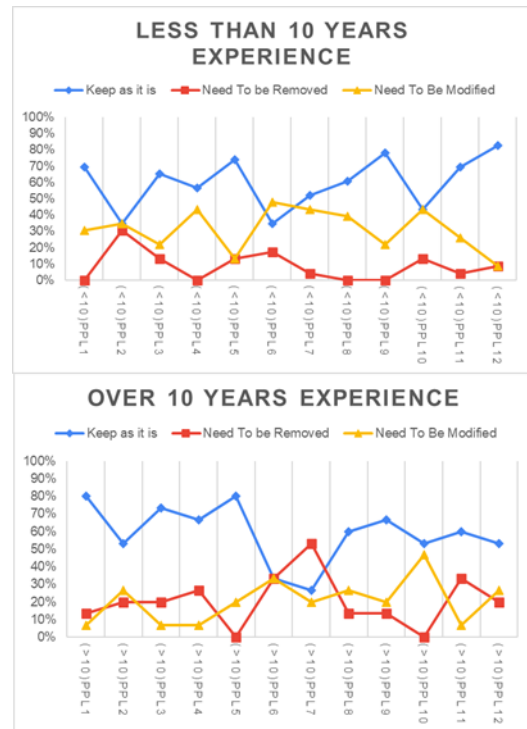


Fig. 10. Based on experience participants criticising Agile principles.

It can be concluded from the results that experience impacts the understanding and perspective of participants on Agile values and principles. This is clear from the difference of the views of Val3 and Val4 as participants with over 10 years of experience are more likely to criticize these two values of Agile unlike participants with less than 10 years of experience. However, all participants agree on the criticism of Val2. In summary these different views might affect the adoption of Agile within teams in organisations.

VI. CONCLUSION AND LIMITATIONS

In this paper, Agile values and principles were focused on in the perspective of the understanding and the adoption from

the point of view of the IT professional involved. The methodology of survey was employed in order to investigate the understanding and adoption of Agile among IT professionals.

Findings of this research can be summarized as follows:

1) *In general*, there is a clear difference in understanding and adoption of Agile.

2) *Workplaces* are taking Agile seriously and as they pay great attention to Agile training with 74% of participants been trained in their workplace. It seems that workplaces do not rely on the members knowledge of Agile from members' study in schools.

3) *Despite* the workplace attention to Agile adoption, a great deal of participants does not believe that their workplace is adopting Agile.

4) *Despite* the training they received and the school teaching of Agile, participants are not confident about their knowledge and understanding of Agile as 61% of them seem to rate their knowledge and understanding as medium of less.

5) *The participants* understand Agile as productivity more than change embracement. This is due to the priority they give to Val2 as first and second priority.

6) *However*, Val2 is a controversial value of Agile as 71% of responses in the criticism of Agile values goes to need modification or elimination of Val2.

7) *Agile principles* PPL 2, 6, 7, and 10 are criticized by participants to be modified or eliminated, however, participants in general do not criticize other Agile principles.

8) *Participants* with less than 10 years of experience tend to avoid criticizing Agile values except Val2 which they believe should be eliminated or modified.

9) *Participants* with over 10 years of experience tend to criticize Agile values in particular Val 2, 3, and 4.

10) *A difference in focus* can be seen in Agile principles criticism between participants with over 10 years of experience and participants with less than 10 years of experience. PPL2 is the principle that participants with less than 10 years of experience believe should be eliminated or modified, whereas participants with over 10 years of experience believe that PPL7 should be eliminated or modified.

As limitations of this study, the number of participants responses is one of the limitations. Reaching a higher number might help in generalizing the results and might give other perspectives to the issues of Agile understanding. Another limitation related to the number of participants is that as the number is not large, responses cannot be divided based on teams with the same job titles.

As future work based on this research, the investigation of refinement of the values and principles of agile should be conducted, since this research findings motivate the refinement of them. Another future direction is the introduction of a new model for training people in organizations which tend to adopt Agile. Finally, further investigation needs to be conducted in

the field of quality of software which is developed with the employment Agile.

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